Sociocultural Diversity in the Prehispanic Southwest: Learning, Weaving, and Identity in the Chaco Regional System, A.D. 850-1140

Edward A. Jolie

University of New Mexico - Main Campus

Follow this and additional works at: https://digitalrepository.unm.edu/anth_etds

Part of the Anthropology Commons

Recommended Citation


This Dissertation is brought to you for free and open access by the Electronic Theses and Dissertations at UNM Digital Repository. It has been accepted for inclusion in Anthropology ETDs by an authorized administrator of UNM Digital Repository. For more information, please contact disc@unm.edu.
Edward A. Jolie

Candidate

Anthropology

Department

This dissertation is approved, and it is acceptable in quality and form for publication:

Approved by the Dissertation Committee:

Dr. Patricia L. Crown, Co-Chairperson

Dr. W. H. Wills, Co-Chairperson

Dr. Timothy K. Lowrey

Dr. Laurie D. Webster
SOCIOCULTURAL DIVERSITY IN THE PREHISPANIC SOUTHWEST:
LEARNING, WEAVING, AND IDENTITY IN THE CHACO REGIONAL SYSTEM, A.D. 850-1140

BY

EDWARD ALEXANDER JOLIE

B.A., Anthropology, Mercyhurst College, 2001
M.A., Anthropology, University of Nevada, Reno, 2004
M.S., Anthropology, University of New Mexico, 2006

DISSERTATION

Submitted in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy
Anthropology

The University of New Mexico
Albuquerque, New Mexico

December, 2018
DEDICATION

For Elizabeth DeJarnette Howe Chief (5/23/1912-3/6/2010), and the Weavers of Chaco Canyon and their Descendants.
ACKNOWLEDGEMENTS

Completion of this project has been a long time coming. I am indebted to my parents, Elizabeth and Jacques Jolie, for their unwavering support and, in particular, my mother’s willingness to give archaeology (and archaeologists) a second chance. Aaron, Denise, and Tyler Jolie provided constant nourishment and support, as did Kathy and Dr. Tony Burgett. They prove the old Lakota adage that a man with lots of family is rich indeed. My most profound thanks are due, of course, to my wife Ruth, and daughter Eleanor, for absolutely everything. This dissertation is for my late grandmother, Elizabeth Chief, one of the most amazing and inspiring women I have ever known.

My committee members, Dr. W. H. Wills (co-chair), Dr. Patricia L. Crown (co-chair), Dr. Timothy K. Lowrey, and Dr. Laurie D. Webster, provided exceptional instruction, guidance, and support over the years that I will always be grateful for. The opportunities provided by Drs. Wills and Crown to work in Chaco Canyon quite literally yielded life-changing experiences. I have benefitted tremendously as a scholar and scientist from their expansive knowledge and sharp, critical minds. Dr. Webster has become a frequent collaborator and great friend over the years and I am lucky to have had the chance to work so closely with her. She has almost singlehandedly filled the void in Southwestern perishables research left by the passing of Kate Peck Kent and Carolyn Osborne, all while stimulating greater interest in perishables among the next generation of archaeologists. Dr. Lowrey's Flora of New Mexico course remains a favorite among those I took at UNM, and I have greatly appreciated his enthusiasm for, and insights about, my project.

Special thanks are also due to Dr. Julia A. King, Ed Chaney, and staff at Jefferson Patterson Park and Museum, St. Leonard, Maryland, for providing me with my first experiences in archaeology, as well as their continued encouragement. I am grateful to Dr. James Adovasio, who originally stimulated by interest in perishable technologies, and to Drs. Catherine and Don Fowler, who sustained it.

This project required many weeks and months spent at a number of museums and curation facilities across the country. It would never have been possible without the time, energy, and good humor of a great many individuals at the following institutions: American Museum of Natural History (Dr. David Hurst Thomas, Dr. Peter Whiteley, Anibal Rodriguez, Lori Pendelton), Arizona State Museum (Mike Jacobs), Arizona State University Center for Archaeology and Society (Dr. Matt Peeples), Edge of Cedars Museum (Deborah Westfall), History Colorado Center (Bridget Ambler, Sheila Goff), Maxwell Museum of Anthropology at the University of New Mexico (Dr. David A. Phillips), Mesa Verde National Park Collections (Dr. Scott Travis), Museum of Indian Arts and Culture (Dr. Melissa Powell), National Park Service Chaco Museum at the University of New Mexico (Dr. Wendy Bustard), National Park Service Western Archaeological Conservation Center (Kim Beckwith), Natural History Museum of Utah (Dr. Glenna Nielsen-Grimm, Michelle Knoll), Peabody Museum of Archaeology and Ethnology at Harvard University (Dr. Steven LeBlanc, Susan Haskell, Diana Zlatanovski), Robert S. Peabody Museum of Archaeology at the Phillips Academy (Bonnie Sousa, Marla Taylor), Salmon Ruins Museum (Nancy Sweet Espinosa), Smithsonian National Museum of the
American Indian (Dr. Patricia Nietfeld), Smithsonian National Museum of the Natural History (James Krakker, David Rosenthal, E. Keats Webb), University of Colorado Museum of Natural History (Dr. Stephen Lekson, Christina Cain), University of Pennsylvania Museum of Archaeology and Anthropology (William Wierzbowski), Yale Peabody Museum of Natural History (Dr. Roger Colton). Anibal Rodriguez and Dave Rosenthal deserve extra special note and thanks for making my long periods of research at their institutions both productive and a great deal of fun. Additionally, Dr. Greg Hodgins, Becky Watson, and Marcus Lee, of the NSF-supported AMS Laboratory at the University of Arizona, have been generous with their time and support for my radiocarbon dating efforts over the years.

Innumerable others have helped me at different times and in various important ways throughout this process. I offer my heartfelt thanks to: Woody Aguilar, Ben Bellorado, Dr. Larry V. Benson, Dr. Todd Bostwick, Drs. Bruce and Cynthia Bradley, Gary M. Brown, the late David Brugge, Dr. Oskar Burger, Luis Cabo-Perez, the late Dr. Linda Cordell, Robin Cordero, Patricia and Brian Craine, Matt Dawson and Stacey Chambliss, Daniel Dumile, Roger and Linda Echo-Hawk, Dr. Suzanne Eckert, Chris and Laney Farrugia, Dr. Jeffrey Ferguson, Judith and Andrew Finger, Dr. Christina Getrich, Dr. Michael Wayne Graves, Erina Gruner, Dr. Wm. Randall Haas, Jr., Dr. Eugene Hattori and Laurie Sheehan, Dr. Kelley Hays-Gilpin, Drs. Carrie Heitman and Phil Geib, Dr. Bruce and Lisa Huckell, Winston Hurst, Jeffrey and Gina Illingworth, Otis Jackson, Jr., John Kania and Joe Ferrin, Dr. Kathyrn Klein, Dr. Louise Lamphere, Dr. Kerriann Marden, Dr. Frances Joan Mathien, Dr. Hannah Mattson, Drs. Maxine McBrinn and Ken Howard, Susan McCabe, Chris Millington, Vangee Nez, Dr. Nancy Odegaard, Dr. Steve Ousley and Gudrun Richter, Dr. Mary Ann Owoc, Dr. Stephen Plog, Dr. Judith Polanich, Bryn B. Potter, Joyce Raab, Lori Reed, Paul F. Reed, the late Dr. Charles Rozaire, Dr. Gwendolyn Saul, Curt and Polly Schaafsm, Dr. Keri Schleher, Ralph and Lisa Shanks, Dr. Beverly Singer, Kimberly Spurr, Dr. Elisabeth Stone, Sarah Striker, Dr. Ian Thompson, Dr. Kerry Thompson, Meaghan Trowbridge, Matt Tuttle, Dr. R. Gwinn Vivian, Dr. John Ware, Dr. Joe Watkins and Carol Ellick, Gina Watkinson, Dr. Adam and Stephanie Watson, Janine Webster, the late Margie Webster, Dr. W. Rex Weeks, Garry Weinmeister, and Thomas C. Windes. As well, some of the preliminary results of this study have been presented elsewhere (Jolie and Webster 2015, 2017; Webster et al. 2014). The process of contributing to these works, and interacting with the editors and reviewers, has improved the final product. If I have forgotten anyone, I offer my sincerest apology.

Finally, and critically, I have been most fortunate to have received generous financial support for both my coursework and this research from a number of institutions and organizations over the years: National Science Foundation dissertation improvement grant BCS-0853134, NSF Grant BCS-0520579 to Paul Reed, Laurie Webster, and Jeffery Clark for work on Aztec Ruins basketry, a Mellon Doctoral Fellowship at UNM, Hibben Fellowships at UNM, UNM’s Graduate Research and Development Grant, UNM’s Student Research Allocation Committee, the American Indian Graduate Center, the Clark Scholarship and Joe Ben Wheat Research Award from the University of Colorado, Boulder, Sigma Xi, and UNM’s Institute for American Indian Research.
Between about A.D. 850 and 1140, the archaeology of Chaco Canyon in northwestern New Mexico reveals the rapid construction of large communal structures where smaller settlements had existed previously and shows that the locality became the core of an extensive regional system in the Four Corners region of the northern Southwest integrated by formal trails, the circulation of nonlocal goods, and the sharing of ritual items. Researchers vigorously debate the role of increased sociopolitical complexity in this development, but less attention has been given to questions of sociocultural diversity and its impacts.

Guided by previous research suggesting the existence of sociocultural or biological diversity, this dissertation examines a set of related models that propose sociocultural diversity at site, community, and regional spatial scales by seeking to distinguish patterned stylistic variability in woven artifact manufacture with implications for understanding sociocultural diversity across the Chaco system. The concept of
technological style, united with current research on social learning theory, provides the conceptual framework that connects ancient woven artifacts with learning networks, social interaction, identities, and diversity. Drawing on this body of theory, I conducted detailed technological analyses of over 1,100 coiled baskets, plaited mats, and plaited sandals from Chaco Canyon and multiple other sites.

This study’s findings provide evidence for site-scale diversity at Pueblo Bonito in Chaco Canyon, and Aztec West Ruin to the north. Community-scale diversity is suggested within Chaco Canyon between great houses and small sites. Pan-regional consistency in many technological stylistic features of basketry artifacts demonstrates a deep shared history of teaching and learning these technologies, but woven artifacts from Mesa Verde sites are most distinctive, and evidence also exists for differences between outlying communities.

The distribution of ritual basketry at Chaco Canyon and beyond suggests linkages between the social entities that maintained them, first at Pueblo Bonito and, later, at outlying communities. Diversity in ritual practice emerges as factor that likely both facilitated a shared Chacoan identity and integrated newcomers. Taken as a whole, the available evidence suggests the importance of tolerance of sociocultural diversity as integral to the successful maintenance of a heterogeneous Chacoan society.
# TABLE OF CONTENTS

LIST OF FIGURES ......................................................................................................... xix

LIST OF TABLES ........................................................................................................... xxx

Chapter 1. Introduction ............................................................................................. 1

Diversity and Archaeology in the Prehispanic Southwest ......................... 8

Diversity, Scale, and Identities ........................................................................ 10

What do We Mean by “Diversity”? .............................................................. 11

Anthropology and Diversity ........................................................................ 14

Cultural vs. Social Diversity .......................................................................... 16

Identity, Ethnicity, and Diversity ................................................................. 18

Summary ............................................................................................................ 23

Volume Outline ............................................................................................... 24

On Human Remains, Mortuary Accompaniments, and Offerings ............. 28

Chapter 2. Sociocultural Diversity in the Southwest ......................................... 30

The Historic Southwest ..................................................................................... 32

Cultural and Social Diversity during the Historic Period ......................... 37

Cultural and Social Diversity in the Prehispanic Southwest .................. 44

Social Identities, Population Movement, and Coresidence .................... 48

Roots of Prehispanic Cultural and Social Diversity ................................... 50

Prehispanic Population Movement and Coresidence ............................ 55

Emerging Studies of Prehispanic Southwestern Diversity .................... 66

Summary ............................................................................................................ 69
Chapter 5. Basketry and Prehispanic Southwestern Sociocultural Diversity

Southwestern Basketry in Time and Space

Basketry Production Systems in the Prehispanic Southwest

Sandals

Mats

Coiled Baskets

Perishable Artifact Production in Chaco Canyon and Beyond

Production Implements

Stored Raw Materials and Unfinished Artifacts

The Organization of Chacoan Woven Artifact Production

Investigating Cultural and Social Diversity through Basketry

Model 1: Site-Scale Diversity

Model 2: Community-Scale Diversity

Model 3: Regional-Scale Diversity

Research Methods

Artifact Sampling and Analysis

Neutron Activation Analysis

Residue Analyses

Radiocarbon Determinations
Chapter 6. Formal and Functional Variation in Chacoan Baskets, Mats, and Sandals .......................................................................................................................255

Artifact and Site Chronologies ........................................................................255

Radiocarbon Determinations ........................................................................258

Pueblo Bonito .................................................................................................259

Aztec West Ruin ............................................................................................266

White House ....................................................................................................269

Summary ............................................................................................................269

Formal and Functional Variation .....................................................................270

Coiled Basket Form ........................................................................................274

Pueblo Bonito ....................................................................................................274

Bifurcated Burden Baskets ............................................................................276

Clay Coated and Painted Baskets ....................................................................287

Cylinder Baskets ..............................................................................................292

Oval, Hourglass- or Figure-eight-shaped Trays ..............................................302

Coiled Baskets in Mortuary Contexts ................................................................305

Additional Chaco Canyon Vessels ...................................................................306

Aztec West Ruin ...............................................................................................306

Coiled Baskets in Mortuary Contexts ............................................................315
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmon Ruins</td>
<td>319</td>
</tr>
<tr>
<td>Antelope House</td>
<td>320</td>
</tr>
<tr>
<td>Additional Canyon de Chelly National Monument Vessels</td>
<td>324</td>
</tr>
<tr>
<td>Mesa Verde Region</td>
<td>325</td>
</tr>
<tr>
<td>Twill Plaited Mat Form</td>
<td>331</td>
</tr>
<tr>
<td>Twill Plaited Sandal Form</td>
<td>332</td>
</tr>
<tr>
<td>Tie Systems</td>
<td>335</td>
</tr>
<tr>
<td>Chaco Canyon</td>
<td>335</td>
</tr>
<tr>
<td>Canyon de Chelly National Monument</td>
<td>336</td>
</tr>
<tr>
<td>Middle San Juan</td>
<td>337</td>
</tr>
<tr>
<td>Mesa Verde</td>
<td>338</td>
</tr>
<tr>
<td>Toe Jogs</td>
<td>338</td>
</tr>
<tr>
<td>Chaco Canyon</td>
<td>338</td>
</tr>
<tr>
<td>Canyon de Chelly National Monument</td>
<td>340</td>
</tr>
<tr>
<td>Middle San Juan</td>
<td>344</td>
</tr>
<tr>
<td>Mesa Verde</td>
<td>344</td>
</tr>
<tr>
<td>Mends</td>
<td>345</td>
</tr>
<tr>
<td>Trends in Formal and Functional Variability</td>
<td>347</td>
</tr>
<tr>
<td>Coiled Vessel Form and Function</td>
<td>347</td>
</tr>
<tr>
<td>Twill Plaited Matting</td>
<td>356</td>
</tr>
<tr>
<td>Twill Plaited Sandals</td>
<td>357</td>
</tr>
<tr>
<td>Residue Analyses</td>
<td>361</td>
</tr>
</tbody>
</table>
Neutron Activation Analysis ........................................................................... 367
Strontium Isotopic Sourcing .......................................................................... 372
Summary ........................................................................................................ 374
Note ............................................................................................................... 376

Chapter 7. Technological Stylistic Variation in Chacoan Baskets, Mats, and Sandals ....................................................................................................................... 380

Variation in Technological Style ..................................................................... 381
Site-Scale Stylistic Patterning ......................................................................... 384
Coiled Basketry .................................................................................. 384
Pueblo Bonito ............................................................................................ 384
Raw Material .................................................................................. 385
Structural Type............................................................................. 385
Work Surface and Direction ........................................................................ 391
Starting and Finishing Methods ................................................................. 394
Stitch Splices ................................................................................ 395
Decoration .................................................................................. 398
Metric Variation ............................................................................. 406
Aztec West Ruin .................................................................................. 416
Raw Material .................................................................................. 416
Structural Type............................................................................. 417
Work Surface and Direction ........................................................................ 420
Starting and Finishing Methods ................................................................. 423
Sampling and Interpretive Constraints .......................................................... 642

Model 1: Site-Scale Diversity ......................................................................... 646

Model 2: Community-Scale Diversity ............................................................ 655

Model 3: Regional-Scale Diversity ................................................................. 659

Sociocultural Diversity and Chacoan Identities ............................................. 693

Sociocultural Diversity and Chacoan Society ............................................. 694

Organizational and Ritual Diversity ............................................................ 697

Linguistic Diversity? ..................................................................................... 706

Conclusions .................................................................................................... 713

References Cited ............................................................................................. 721
LIST OF FIGURES

Figure 2.1. Approximate locations and territorial boundaries of Native American tribes in the U.S. Southwest during the eighteenth and nineteenth centuries A.D..........................................................33
Figure 2.2. Major archaeologically defined cultural traditions in the U.S. Southwest ......................................................................................................45
Figure 2.3. Examples of documented population movements in the U.S. Southwest during the thirteenth and fourteenth centuries A.D..............60
Figure 3.1. The Four Corners region of the northern U.S. Southwest showing the location of Chaco Canyon relative to major sites and site clusters relevant to this study ........................................................................76
Figure 3.2. Chaco Canyon and the location of major sites ........................................ 84
Figure 3.3. Great houses in the greater San Juan Basin and across the Chaco regional system .......................................................................95
Figure 4.1. Coiled basket bowl made by a young Hopi girl in the 1920s............... 172
Figure 4.2. A small Hopi coiled basketry plaque woven prior to 1923.............. 174
Figure 4.3. Profile view of a small coiled bowl from Mummy Cave, Arizona, woven by a novice ..........................................................175
Figure 4.4. The author’s first 1/1 simple plaited cattail mat woven in November 2007 ..................................................................................176
Figure 4.5. Unfinished plaited ring basket start woven by a novice from Room 139 at Aztec Ruin West, New Mexico...........................................177
Figure 4.6. Complete coiled plaque from Mesa Verde, Colorado, woven by a novice ..................................................................................177
Figure 5.1. Schematic illustration of weft twined basketry technology ............... 195
Figure 5.2. Schematic illustration of close coiled two rod and bundle bunched foundation basket ..............................................................195
Figure 5.3. Schematic illustration of simple plaited basketry technology with a 1/1 interval of interlacement .........................................................196
Figure 5.4. Schematic illustration of 2/2 interval twill plaited basketry technology ................................................................. 196
Figure 6.1. Planview map of Pueblo Bonito, Chaco Canyon, New Mexico......... 264
Figure 6.2. Planview map of Aztec West Ruin, New Mexico............................ 268
Figure 6.3. Counts of vessel forms identified at Pueblo Bonito ....................... 275
Figure 6.4. Front and back views of the complete bifurcated burden basket from Room 320 at Pueblo Bonito .....................................................282
Figure 6.5. Oblique view of the hourglass-shaped opening of the complete bifurcated burden basket from Room 320 at Pueblo Bonito ..........283
Figure 6.6. Profile view of the complete bifurcated burden basket from Room 320 at Pueblo Bonito ..............................................................284
Figure 6.7. Overview of the smallest bifurcated burden basket from Burial 8 in Room 326 at Pueblo Bonito .........................................................284
Figure 6.8. Examples of bifurcated burden basket effigies from Pueblo Bonito
showing variation in form and decoration ....................................................286

Figure 6.9. Overview of Pepper’s “altar painting” from Room 13 in Pueblo Bonito
that is actually the remains of a clay coated and painted coiled burden (?) basket..........................................................289

Figure 6.10. Obverse and reverse views of a selection of spalls from a clay coated
and painted steep-sided basket bowl from Room 83 in Pueblo Bonito.......291

Figure 6.11. Reconstruction of turquoise mosaic-covered cylinder basket from
Burial 14 in Room 33 at Pueblo Bonito..........................................................294

Figure 6.12. Two profile views of a cylinder basket from Room 320 in Pueblo
Bonito.............................................................................................................297

Figure 6.13. Two profile views of a cylinder basket from Room 320 in Pueblo
Bonito.............................................................................................................298

Figure 6.14. Three profile views of the polychrome painted cylinder basket from
Burial 24 in Room 330 of Pueblo Bonito........................................................299

Figure 6.15. Overview of the interior of the best preserved oval or hourglass-
shaped tray from Burial 6 in Room 326 of Pueblo Bonito .............................304

Figure 6.16. Counts of vessel forms identified at Aztec Ruin West...........................309

Figure 6.17. Incomplete, heavily worn steep-sided bowl from Room 189 at Aztec
West...............................................................................................................309

Figure 6.18. Concave view of small coiled plaque from the third story of Room
136-2 at Aztec West.......................................................................................310

Figure 6.19. Late Bonito phase clay coated and painted coiled basketry ladle or
dipper with rattle handle from Room 189 at Aztec West ............................313

Figure 6.20. Counts of vessel forms identified at Mesa Verde sites .........................327

Figure 6.21. Two polychrome steep-sided bowls from Mesa Verde.........................327

Figure 6.22. Top, a wide mouthed bowl and, bottom, a tray from Mesa Verde .....328

Figure 6.23. Convex view of coiled basket shield from Room 6 at Cliff Palace,
Mesa Verde....................................................................................................329

Figure 6.24. Profile and interior views of an unusual basket from a “southern
Colorado cliff dwelling” that is likely a copy of a bifurcated burden
basket...........................................................................................................330

Figure 6.25. Top view of a fine 2/2 twill plaited broad leaf yucca sandal with toe
jog and toe-heel tie system from Room 72 at Aztec West ............................334

Figure 6.26. Top view of a fine 2/2 twill plaited yucca sandal with side loop tie
system but lacking a toe jog from Room 111 at Pueblo Bonito ..................334

Figure 6.27. Counts of toe-heel and side loop sandal tie systems from Antelope
House in study sample by temporal period ................................................337

Figure 6.28. Counts of toe-heel and side loop sandal tie systems from Aztec Ruin
West by temporal period..............................................................................338

Figure 6.29. Counts of sandals with and without toe jogs from Pueblo Bonito by
grouped temporal periods...........................................................................339

Figure 6.30. Upper view of jogless fine 2/2 twill plaited sandal of rush culms
from Room 32 at Pueblo Bonito ..................................................................341

Figure 6.31. Top view of a jog-toed fine 2/2 twill plaited sandal of rush culms
Figure 6.32. Counts of sandals with and without toe jogs from Antelope House by temporal period .................................................................343
Figure 6.33. Counts of sandals with and without toe jogs from Aztec Ruin West by temporal period .............................................................................345
Figure 6.34. Concave view of a complete small plaque from Mesa Verde ........48
Figure 6.35. At left, partially burned clay coated and painted basket from Room 300 at Pueblo Bonito and, at right, clay coated basket with faint design in black paint from exterior northwest corner of Aztec West ........................................355
Figure 6.36. Top view of a mostly complete fine 2/2 twill plaited yucca sandal with side loop ties and mended toe from the Bc 288 in Chaco Canyon .....358
Figure 6.37. Remains of a well-mended coiled basket tray with organic residue from Room 54 at Aztec West .................................................366
Figure 6.38. Plaque found near Grave 39 in Room 136-2 at Aztec West ........366
Figure 6.39. Hierarchical cluster analysis of NAA elemental data from clay spalls from clay coated baskets .........................................................370
Figure 6.40. Scatterplot of calcium (Ca) and iron (Fe) concentrations illustrating differences in elemental composition between ceramic sherd samples submitted to the MURR by Glowacki (2009) from the Mesa Verde region and L. Reed (2007, Reed at al. 2011) from the Middle San Juan region, compared with clay coated basket spall samples ........................................370
Figure 7.1. Concave view of a one rod foundation coiled basket sewn with noninterlocking Yucca sp. leaf stitches from Room 107 at Pueblo Bonito ...389
Figure 7.2. Profile view of a three rod bunched foundation coiled bowl sewn with noninterlocking stitches from Room 320A at Pueblo Bonito ........389
Figure 7.3. Concave view of fragments from a three rod bunched foundation oval or hourglass-shaped tray sewn with noninterlocking stitches from Room 54 at Pueblo Bonito .................................................392
Figure 7.4. Pueblo Bonito coiled basketry structural type by vessel form ........392
Figure 7.5. Pueblo Bonito coiled basket work surface by vessel form ..........393
Figure 7.6. Close-up concave surface view of a 2/2 interval false braid rim termination preserved on a cylinder basket from Room 320A at Pueblo Bonito ..................................................................................................396
Figure 7.7. Close-up convex surface view of 1/1 rim plaiting (beading) on a cylinder basket with self rim treatment from Room 326 at Pueblo Bonito ..................................................................................................396
Figure 7.8. Convex surface view of bifurcated burden basket fragment exhibiting turquoise paint from Room 326 at Pueblo Bonito .........................402
Figure 7.9. Convex (top) and concave (bottom) surface views of steep-sided bowl (possible cylinder basket) fragments decorated with a dyed stitch design overpainted with black and yellow on exterior ........................................403
Figure 7.10. Scatterplot of Pueblo Bonito coiled basketry stitches and coils per cm by arbitrary spatial quadrant ..............................................408
Figure 7.11. Scatterplot of Pueblo Bonito two rod and bundle bunched
foundation, noninterlocking stitch coiled basketry stitches and coils per cm by arbitrary spatial quadrant .................................................................408

Figure 7.12. Scatterplot of mortuary and non-mortuary Pueblo Bonito coiled basketry by stitches and coils per cm ............................................................409

Figure 7.13. Scatterplot of Pueblo Bonito two rod and bundle bunched foundation, noninterlocking stitch coiled basketry stitches and coils per cm by mortuary room number .................................................................410

Figure 7.14. Scatterplot of Pueblo Bonito western burial cluster coiled basketry stitches and coils per cm by burial .................................................................411

Figure 7.15. Scatterplot of Pueblo Bonito coiled basketry stitches and coils per cm by temporal period ..............................................................................411

Figure 7.16. Scatterplot of Pueblo Bonito two rod and bundle bunched foundation, noninterlocking stitch coiled basketry stitches and coils per cm by temporal period ..............................................................................412

Figure 7.17. Aztec Ruin West coiled basketry structural type by vessel form ........421

Figure 7.18. Aztec Ruin West coiled basket work surface by vessel form ............421

Figure 7.19. Concave surface view of a one rod foundation, intricate interlocking stitch and wrap basket center from Room 139 at Aztec West ..................422

Figure 7.20. Concave surface view of a bowl from Grave 20 in Room 95 at Aztec West ........................................................................................................424

Figure 7.21. Oblique angled profile and close-up views of a bowl from Grave 40 in Room 136-2 at Aztec West .................................................................424

Figure 7.22. Concave surface view of a bowl fragment exhibiting a dyed stitch design of pendant zig-zags, probably from Room 202 at Aztec West ............431

Figure 7.23. Convex surface view of the base of a bowl exhibiting a dyed stitch design that includes turkey feather quill stitches (dark brown) and a painted black bird or other zoomorphic figure from Room 189 at Aztec West .................................................................431

Figure 7.24. Convex surface view of a basket base exhibiting black painted design, possibly zoomorphic, from Room 147 at Aztec West ......................432

Figure 7.25. Concave surface view of a clay coated and painted basket base exhibiting a black painted design, possibly zoomorphic, from the exterior northwest corner of Aztec West .................................................................432

Figure 7.26. Concave surface view, with close-up, of clay coated and painted basket fragments exhibiting a painted design from Kiva L at Aztec West ....433

Figure 7.27. Clay spalls from a clay coated and painted basket from Room 122-2 at Aztec West ..........................................................................................433

Figure 7.28. Convex and close-up views of fragments of a basket exhibiting adhering matted fibrous material impregnated with red pigment, probably from Room 199 at Aztec West ..................................................434

Figure 7.29. Aztec Ruin West coiled basketry stitch and coil dimensions by structural type ..............................................................................................436

Figure 7.30. Aztec Ruin West coiled basketry stitch and coil density by structural type ..............................................................................................436
Figure 7.31. Aztec West Ruin coiled basketry stitch and coil density by the three sectors yielding the largest samples .............................................................437
Figure 7.32. Aztec West Ruin coiled basketry stitch and coil dimensions by temporal period ............................................................................................438
Figure 7.33. Aztec West Ruin coiled basketry stitch and coil density by temporal period .............................................................................................................438
Figure 7.34. Aztec West Ruin coiled basketry stitch and coil density by temporal period and two most abundant structural types ...........................................439
Figure 7.35. Aztec West Ruin coiled basketry stitch and coil density by mortuary and non-mortuary contexts ..........................................................440
Figure 7.36. Aztec West Ruin coiled basketry stitch and coil density plotted by room number .................................................................................................440
Figure 7.37. Map of Salmon Ruins, New Mexico, showing room locations and architectural divisions as they existed by Late San Juan period (A.D. 1190-1300) times and the site’s terminal occupation ............................................444
Figure 7.38. Concave view of a two rod and bundle stacked foundation basket sewn with noninterlocking stitches from Burial 33B001 in Room 33B at Salmon Ruins............................................................................................................445
Figure 7.39. Concave view of two rod and bundle bunched foundation, noninterlocking stitch basket from Room 62W at Salmon Ruins ..................445
Figure 7.40. Scatterplot of Salmon Ruins coiled basketry stitch and coil density by site spatial subdivision ..............................................................................448
Figure 7.41. Concave view of a finely woven one rod foundation, interlocking stitch basket from Room 101W at Salmon Ruins ..........................................448
Figure 7.42. Map of Antelope House, Canyon del Muerto, Arizona, showing architecturally distinct room blocks .............................................................................450
Figure 7.43. Convex surface view of two rod and bundle bunched foundation, noninterlocking stitch basket fragments from Room 21 at Antelope House .............................................................................................................452
Figure 7.44. Concave surface view of a complete one rod foundation, interlocking stitch coiled basket plaque from Room 21 at Antelope House ...........452
Figure 7.45. Concave surface view of two rod and bundle bunched foundation, noninterlocking stitch basket fragments from Kiva B (Central Plaza Annex) at Antelope House .........................................................................................456
Figure 7.46. Scatterplot of a sample of Antelope House coiled basketry by stitch and coil density and site spatial subdivision .....................................................................................................................460
Figure 7.47. Fragment of 2/2 twill plaited matting from refuse in Room 25 at Pueblo Bonito .............................................................................................................463
Figure 7.48. Large 3/3 twill plaited mat fragment in multiple pieces found beneath disarticulated human remains in Room 330 at Pueblo Bonito ......463
Figure 7.49. Frequency of plaited matting structural types at Pueblo Bonito through time .................................................................................................464
Figure 7.50. Overview of a 3/3 twill plaited mat fragment from Room 85 at Pueblo Bonito .............................................................................................................466
Figure 7.51. Intricate selvage twill (interval unknown) mat (Variant 1) from Room 24 at Pueblo Bonito .................................................................468
Figure 7.52. Overview and close-up of intricate selvage 2/2 twill mat fragment (Variant 14) from Room 3a at Pueblo Bonito ........................................468
Figure 7.53. Intricate selvage 2/2 twill mat fragment (Variant 9) from Room 62 at Pueblo Bonito ..................................................................................472
Figure 7.54. Close-up views of a large 3/3 twill plaited mat fragment from mortuary contexts in Room 330 at Pueblo Bonito .................................473
Figure 7.55. Scatterplot of Pueblo Bonito twill plaited matting strip width and density by structural type ........................................................................475
Figure 7.56. Scatterplot of Pueblo Bonito twill plaited matting strip width and density by spatial subdivision ..................................................475
Figure 7.57. Scatterplot of Pueblo Bonito twill plaited matting strip width and density by aggregated temporal periods ........................................476
Figure 7.58. Scatterplot of Pueblo Bonito twill plaited matting from mortuary and non-mortuary rooms by strip width and density ......................476
Figure 7.59. Scatterplot of Pueblo Bonito twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision .........................477
Figure 7.60. Three-dimensional scatterplot of Pueblo Bonito twill plaited matting intricate selvage width and structural complexity proxies by spatial subdivision ..........................................................478
Figure 7.61. Frequency of plaited matting structural types at Aztec Ruin West through time ..................................................................................482
Figure 7.62. Twill plaited 3/3 interval mat fragment with intricate selvage (Variant 6) from Late Bonito contexts in Room 122-2 at Aztec West ........484
Figure 7.63. Twill plaited 3/3 interval mat fragment with intricate selvage (Variant 22) from Late Bonito contexts in Room 48 at Aztec West ........484
Figure 7.64. Twill plaited 2/2 interval mat fragment with intricate selvage (Variant 25) of Post-Chaco age from mixed Grave 29 in Room 141 at Aztec West ........................................................................................................485
Figure 7.65. Aztec Ruin West twill plaited matting intricate selvage variants by temporal period ........................................................................................................487
Figure 7.66. Aztec Ruin West twill plaited matting intricate selvage variants by site area ........................................................................................................487
Figure 7.67. Plan and close-up views of virtually complete 2/2 twill plaited mat with intricate selvages (Variant 10) found associated with Grave 20 in Room 95 at Aztec West ..........................................................491
Figure 7.68. Two fragments of a 2/2 twill plaited mat with intricate selvages (Variant 10) probably from Room 193 at Aztec West .........................492
Figure 7.69. One of two fragments of a 2/2 twill plaited mat with intricate selvage (Variant 27, not shown) from Room 62-2 at Aztec West exhibiting painted decoration in black, red, and white .........................................................493
Figure 7.70. Scatterplot of Aztec Ruin West twill plaited matting strip width and density by structural type and temporal period .................................495
Figure 7.71. Scatterplot of Aztec Ruin West twill plaited matting strip width and density by spatial subdivision .................................................................495
Figure 7.72. Scatterplot of Aztec Ruin West Late Bonito phase (A.D. 1100-1130) twill plaited matting strip width and density by spatial subdivision ..............496
Figure 7.73. Scatterplot of Aztec Ruin West post-Chaco (A.D. 1130-1290) twill plaited matting strip width and density by spatial subdivision ......................496
Figure 7.74. Scatterplot of Aztec Ruin West twill plaited matting from mortuary and non-mortuary contexts by strip width and density ........................497
Figure 7.75. Scatterplot of Aztec Ruin West twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision ......................498
Figure 7.76. Scatterplot of Late Bonito phase (A.D. 1100-1130) Aztec Ruin West twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision .................................................................499
Figure 7.77. Scatterplot of post-Chaco (A.D. 1130-1290) Aztec Ruin West twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision .................................................................499
Figure 7.78. Scatterplot of Late Bonito phase (A.D. 1100-1130) Aztec Ruin West twill plaited matting intricate selvage width and structural complexity proxy by spatial subdivision .................................................................500
Figure 7.79. Scatterplot of post-Chaco (A.D. 1130-1290) Aztec Ruin West twill plaited matting intricate selvage width and structural complexity proxy by spatial subdivision .................................................................500
Figure 7.80. Fragment of a 2/2 twill plaited mat with intricate selvage (Variant 27) from adult female burial 43W057 in Room 43W at Salmon Ruins ...........................................................................................................505
Figure 7.81. Scatterplot of Salmon Ruins twill plaited matting strip width and density by spatial subdivision .................................................................506
Figure 7.82. Scatterplot of Salmon Ruins twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision ........................506
Figure 7.83. Scatterplot of Salmon Ruins twill plaited matting intricate selvage width and structural complexity proxy by spatial subdivision ..........507
Figure 7.84. Heel-end sole of an incomplete 2/2 twill sandal made from two ply, s-spun, final z-twist yucca cordage strips from Early Bonito (A.D. 850-1040) contexts in Room 111 at Pueblo Bonito ..............................................516
Figure 7.85. Use of broadleaf and narrowleaf yucca strips for fine twill plaited sandals through time and across space at Pueblo Bonito .........................517
Figure 7.86. Top, sole view of 2/2 twill plaited sandal with 90 degree self side selvage from Room 24/229 at Pueblo Bonito. Middle show close-up view of an overhand knotted toe selvage and, bottom, heel selvage with strips looped around adjacent strips .............................................................................519
Figure 7.87. Overview and close-up of the sole of fine twill plaited sandal with pseudo-embroidered zig-zag design from Room 246A in Pueblo Bonito .....524
Figure 7.88. Scatterplot of temporal variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density .................................................................525
Figure 7.89. Scatterplot of spatial variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density

Figure 7.90. Scatterplot of Pueblo Bonito fine 2/2 twill plaited sandal strip width and density by mortuary and non-mortuary contexts

Figure 7.91. Scatterplot of variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density by presence/absence of toe jog

Figure 7.92. Scatterplot of variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density by presence/absence of decorative embellishment

Figure 7.93. Fine twill plaited sandals from Aztec Ruin West by space, time, and raw material

Figure 7.94. Sole view of fine 2/2 twill plaited narrow leaf yucca sandal from Room 46 at Aztec West

Figure 7.95. Upper surface of fine twill plaited sandal with 3/3 interval 90 degree self selvage from Room 153-2 at Aztec West

Figure 7.96. Close-up sole view of fine twill plaited sandal from Room 153-2 at Aztec West showing strip splice stubs that have been overhand knotted

Figure 7.97. Upper (left) and lower (right) views of fine twill plaited sandal from Room 115 at Aztec West with decorative border ridges

Figure 7.98. Close-up views of upper and lower surfaces of the toe of a fine twill plaited sandal from Room 115 at Aztec West with decorative border ridges and raised zig-zag design on sole

Figure 7.99. Upper (left) and lower (right) surfaces of fine twill plaited sandal with sewn strip decoration from Room 139 at Aztec West

Figure 7.100. Scatterplot of temporal variation in Aztec Ruin West fine 2/2 twill plaited sandal strip width and density

Figure 7.101. Scatterplot of spatial variation in Aztec Ruin West fine 2/2 twill plaited sandal strip width and density

Figure 7.102. Scatterplot of variation in Aztec Ruin West fine 2/2 twill plaited sandal strip width and density by presence/absence of toe jog

Figure 7.103. Scatterplot of variation in Aztec Ruin West fine 2/2 twill plaited sandal strip width and density by presence/absence of decorative embellishment

Figure 7.104. Upper (left) and lower (right) surface views of best-preserved fine twill plaited sandal from Room 62W at Salmon Ruins

Figure 7.105. Scatterplot of Salmon Ruins fine twill plaited sandal strip widths and densities by site room location

Figure 7.106. Scatterplot of Salmon Ruins fine twill plaited sandal strip widths and densities by chronological assignment

Figure 7.107. Upper (left) and lower (right) surfaces of an unprovenienced fine 2/2 twill plaited sandal with yucca cordage pseudo-embroidered design on sole from Antelope House

Figure 7.108. Upper surface of a fine 2/2 twill plaited sandal (top) from Room 29 at Antelope House with toe selvage in which terminal strips are
looped around adjacent strips (middle) and a double 90 degree heel self selvage (bottom) ..........................................................................................548

Figure 7.109. Fine 2/2 twill plaited sandal from Room 30 at Antelope House. Upper surface (left) shows border decoration effected by systematic lateral splicing and sole (right) shows pseudo-embroidered zig-zag ........551

Figure 7.110. Upper (left) and lower (right) surfaces of fine 2/2 twill plaited sandal with border decoration created by with strip tensioning from Room 35 at Antelope House ..................................................................................552

Figure 7.111. Upper (left) and lower (right) surface views of a fine 2/2 twill plaited sandal from Room 19 at Antelope House with dyed strip design effecting a lattice or diamonds ..........................................................553

Figure 7.112. Scatterplot of Antelope House fine twill plaited sandal sample strip widths and densities by site spatial subdivision ........................................................................................................553

Figure 7.113. Scatterplot of Antelope House fine twill plaited sandal sample strip widths and densities by chronology ........................................................................................................556

Figure 7.114. Scatterplot of fine twill plaited sandals from the South Room Block/Area of Antelope House through time ........................................................................................................556

Figure 7.115. Scatterplot of strip widths and densities for only Late Pueblo III (A.D. 1200-1270) period fine twill plaited sandals from Antelope House by site spatial subdivision .............................................................557

Figure 7.116. Unprovenienced fragment of a steep-sided, two rod and bundle bunched foundation vessel from Chetro Ketl ..........................................................578

Figure 7.117. Fragmentary remains of a probable bifurcated burden basket with polychrome design from unknown contexts at Kin Kletso..........................578

Figure 7.118. Ceramic bifurcated burden basket effigies from an unknown context at Kin Kletso and Pueblo del Arroyo Room 27 ...........................................579

Figure 7.119. McElmo phase three rod bunched foundation coiled basket fragment from Room 3-4 at Bc 288 ...........................................................................581

Figure 7.120. Scatterplot of stitch and coil dimension data for coiled baskets from sampled sites in Chaco Canyon ...........................................................................581

Figure 7.121. Scatterplot of stitch and coil density data for coiled baskets from sampled sites in Chaco Canyon ...........................................................................582

Figure 7.122. Scatterplot of stitch and coil dimension data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl .......................................................582

Figure 7.123. Scatterplot of stitch and coil density data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl .......................................................583

Figure 7.124. Scatterplot of stitch and coil dimension data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl by temporal period ..............................................584

Figure 7.125. Scatterplot of stitch and coil density data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl by temporal period ..............................................584
Figure 7.126. Fragment of a 2/2 twill plaited mat with an intricate selvage (Variant 3) and strip shift-induced design from an unknown context at Chetro Ketl .................................................................586
Figure 7.127. Fragment of a 1/1 simple plaited mat with an intricate selvage (Variant 45) from Room 39 or 40 at Tsin Kletsin .........................................................587
Figure 7.128. Fragment of a 3/3 twill plaited mat with an intricate selvage (Variant 44) from the trash area outside of the east wall of Room 5 at Bc 288.........................................................................................589
Figure 7.129. Scatterplot of Chaco Canyon plaited matting strip width and density by site ........................................................................................................592
Figure 7.130. Scatterplot of Chaco Canyon twill plaited matting intricate selvage width and structural complexity proxy by site ........................................592
Figure 7.131. Upper surface view of fine 3/3 twill plaited narrowleaf yucca sandal from Bc 288 ........................................................................................................594
Figure 7.132. Upper surface view of fine 2/2 twill plaited broadleaf yucca sandal from Chetro Ketl with subtle decorative edge ridges........................................595
Figure 7.133. Scatterplot of Chaco Canyon fine twill plaited sandal strip width and density by site ................................................................................................596
Figure 7.134. Nearly complete half rod and bundle stacked foundation, noninterlocking stitch coiled bowl from Burial 32, a young adult (female?), in Room 138 at Aztec West Ruin .................................................................605
Figure 7.135. Undated one rod foundation, interlocking stitch-and-wrap coiled bowl fragments with yucca leaf stitches from Kin Bineola........................................606
Figure 7.136. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil dimension data by regional basketry sample ...............................................................................................609
Figure 7.137. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil density data by regional basketry sample ...............................................................................................609
Figure 7.138. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil dimension data by regional basketry sample with Basketmaker period samples .................................611
Figure 7.139. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil density data by regional basketry sample with Basketmaker period samples .................................611
Figure 7.140. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil dimension data for Pueblo Bonito, Aztec Ruin West, and Mesa Verde sites ..............................................................................613
Figure 7.141. Scatterplot of two rod and bundle bunched foundation,
noninterlocking stitch coiling, and three rod bunched foundation,
noninterlocking stitch coiling stitch and coil density data for Pueblo
Bonito, Aztec Ruin West, and Mesa Verde sites ........................................613

Figure 7.142. Left, nearly complete 2/2 twill plaited mat with intricate selvage
(Variant 27) from a burial at an unknown Mesa Verde site. Right, detail of
faded two-tone pattern and bicolor shift manipulation to produce a band
containing zig-zags ..........................................................................................619

Figure 7.143. Scatterplot of twill plaited matting strip width and density data by
aggregated regional sample ........................................................................619

Figure 7.144. Scatterplot of twill plaited matting strip width and density data for
Pueblo Bonito, Aztec Ruin West, and Mesa Verde ........................................620

Figure 7.145. Scatterplot of twill plaited matting strip width and density data for
Pueblo Bonito, Aztec Ruin West, and Mesa Verde by temporal period .........620

Figure 7.146. Scatterplot of twill plaited matting intricate selvage initial fold and
apex fold angles by aggregated regional sample .........................................621

Figure 7.147. Scatterplot of twill plaited matting intricate selvage width and
structural complexity proxy data by aggregated regional sample ...............621

Figure 7.148. Upper (left) and lower (right) surfaces of fine twill plaited sandal
from an unidentified Mesa Verde site ...........................................................623

Figure 7.149. Upper (left) and lower (right) surfaces of a fine twill plaited sandal
from an unidentified Mesa Verde site ...........................................................626

Figure 7.150. Scatterplot of fine twill plaited sandal strip width and density data
by aggregated regional sample ......................................................................627

Figure 8.1. Illustration reconstructing the turquoise, rodent tooth, argillite, and
jet mosaic-covered cylinder basket recovered in fragments from the
“Magician’s Burial” at Ridge Ruin, Arizona ....................................................662

Figure 8.2. Front (left) and back (right) views of the bifurcated burden basket
from Grave 1, Burial 2, in Cave 1, Tsegi Canyon, Arizona ..............................668

Figure 8.3. Front (left) and back (right) views of the bifurcated burden basket
from Cradle House, Arizona ...........................................................................673

Figure 8.4. Back (left) and profile (right) views of the bifurcated burden basket
from Segihatsosi Canyon, Arizona .................................................................674

Figure 8.5. Bifurcated burden basket from Moqui Canyon, Utah, cliff dwelling
with polychrome dyed stitch design and possible blue-green overpainting
on reddish brown stitches .............................................................................675

Figure 8.6. Interior view of a well preserved clay coated and painted partial
bowl fragment from an unknown site in the Four Corners region ...............676

Figure 8.7. Profile (top) and plan (bottom) views of the hourglass-shaped tray
that served as part of a medicine bundle from Antelope House, Arizona .....686

Figure 8.8. Convex view of painted shield from White House, Canyon de Chelly
National Monument, Arizona, and close-up of wall showing tip of a
wooden projectile piercing the fabric ............................................................687
LIST OF TABLES

Table 3.1. Chaco Canyon Cultural Chronology by Thomas C. Windes Correlated with the Pecos Classification................................................................................................................83
Table 4.1. Summary of Trends in Form and Technical Choice Variation According to Weave Structure and Approximate Social Scale ..........................................................182
Table 5.1. Prehispanic Southwestern Woven Artifact Assemblages Examined for this Study by Archaeological Site Name and Sample Size .....................................................236
Table 5.2. Primary Metric and Stylistic Data Recorded for this Study by Artifact Type and Data Type ..........................................................................................................................242
Table 5.3. Accelerator Mass Spectrometry Radiocarbon Dates on Perishables from Non-Chacoan Archaeological Sites Acquired for Technological and Chronological Comparisons ......................................................................................248
Table 6.1. Accelerator Mass Spectrometry Radiocarbon Dates on Coiled Baskets, Twill Plaited Mats, and Twill Plaited Sandals from Pueblo Bonito, Aztec Ruin West, and White House ....................................................................................................261
Table 6.2. Unique Vessel Forms from Pueblo Bonito .........................................................................................................................................................................................278
Table 6.3. Unique Vessel Forms from Aztec West .................................................................................................................................308
Table 6.4. Coiled Baskets from Numbered Graves at Aztec West .................................................................................................................................316
Table 6.5. Unique Vessel Forms from Antelope House .........................................................................................................................323
Table 6.6. Percentages of Fine Twill Plaited and Twined Sandals with and without Toe Jogs from Antelope House by Temporal Period ........................................................................343
Table 6.7. Spalls from Clay Coated Coiled Baskets Tested for Cacao Biomarkers and Yielding Negative Results ........................................................................................................363
Table 6.8. Summary Results of Paleobotanical Analyses of Basket Residue Samples from Aztec West ..........................................................................................................................364
Table 6.9. Spalls from Clay Coated Baskets Analyzed by Neutron Activation Analysis ........................................................................................................................................369
Table 6.10. Data on $^{87}$Sr/$^{86}$Sr Ratios for Two Woven Artifacts .................................................................................................................................373
Table 7.1. Coiled Basketry Primary Structural Type Variation by Site Sample ........................................................................................................................................387
Table 7.2. Pueblo Bonito Close Coiled Basketry Structural Type Presence by Room .................................................................................................................................390
Table 7.3. Pueblo Bonito Close Coiled Basketry Structural Type Abundance by Temporal Period ........................................................................................................................................390
Table 7.4. Distribution of Coiled Basketry Stitch Splice Types at Pueblo Bonito by Room ........................................................................................................................................398
Table 7.5. Decorated Coiled Baskets from Pueblo Bonito .........................................................................................................................................................................................399
Table 7.6. Descriptive Statistics for Metric Variables of Pueblo Bonito Two Rod and Bundle Bunched Foundation, Noninterlocking Stitch Coiled Basket Cell Baskets ........................................................................................................413
Table 7.7. Descriptive Statistics for Metric Variables of Pueblo Bonito Coiled Baskets with Unique Forms ........................................................................................................................................415
Table 7.8. Aztec West Coiled Basketry Structural Type Presence by Room ........................................................................................................................................418
Table 7.9. Aztec West Coiled Basketry Structural Type Abundance by Temporal Period ........................................................................................................................................419
Plaited Sandals .......................................................................................................................... 544

Table 7.36. Fine 2/2 Twill Plaited Sandal Study Sample from Antelope House by Spatial Subdivision and Room .................................................................................................................. 547

Table 7.37. Antelope House Fine Twill Plaited Sandal Starting and Finishing Method Sample ............................................................................................................................... 549

Table 7.38. Antelope House Fine Twill Plaited Sandal Side Selvage Treatment Sample .......................................................................................................................... 550

Table 7.39. Descriptive Statistics for Measurements on the Antelope House Fine Twill Plaited Sandal Sample ........................................................................................................... 555

Table 7.40. Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants from Bc 288, Chetro Ketl, Peñasco Blanco, and Tsin Kletsin ................................................................. 590

Table 7.41. Coiled Basketry Primary Structural Types Aggregated by Study Region .............................................................................................................................................. 603

Table 7.42. Plaited Matting Primary Structural Types Aggregated by Study Region .............................................................................................................................................. 614

Table 7.43. Mesa Verde Region Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants ............................................................................................................................. 616

Table 7.44. Counts of Shared Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants by Assemblage .............................................................................................. 616

Table 7.45. Comparison of Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants Represented by ≥5 Specimens by Assemblage .................................................. 617

Table 7.46. Fine Twill Plaited Sandal Starting and Finishing Methods and Side Selvage Treatments from Mesa Verde Sites .................................................................................. 624

Table 8.1. Bifurcated Burden Baskets from the Prehispanic Southwest .......................................................................................................................................................... 663

Table 8.2. Pueblo Era Burden Basket Models or Effigies from the Prehispanic Southwest .............................................................................................................................................. 669

Table 8.3. Coated and Painted Basketry Objects from the Prehispanic Southwest .............................................................................................................................................. 677

Table 8.4. Oval, Figure-eight-, or Hourglass-Shaped Trays from the Prehispanic Southwest .............................................................................................................................................. 684

Table 8.5. Basketry Shields from the Prehispanic Southwest .......................................................................................................................................................... 688
Chapter 1

Introduction

Human social and cultural diversity are overlapping concepts that refer broadly to the heterogeneity in behavior that results when multiple groups of people of different ethnolinguistic, culture-historical or enculturative backgrounds come together. Such diversity has become a focal point in academic research for understanding the roles of social and cultural difference in the generation and maintenance of social identities. Because social and cultural diversity, together with human biological diversity, inform and reflect individual and group identities, they play an important role structuring human cooperation and conflict (Brubaker 2004; Eriksen 2010; Esteban et al. 2012; Jenkins 2008a, 2008b; Kanbur et al. 2011; Lim et al. 2007; Maybury-Lewis 2002; Niezen 2003; Ross 2007; Sen 2006). Scientific study of human diversity therefore fills an important role in helping us understand the sources and nature of diversity and how diversity impacts human social relations and identities.

Anthropology is uniquely suited to this task, being able to draw upon the full breadth of the human experience to address such questions through ethnography, linguistics, biology, and archaeology. This is important given the extensive nature of human biological and cultural diversity. “Diversity” has, in fact, been advocated as the source of unity for anthropology. It simultaneously encompasses shared anthropological concerns with documenting and explaining human variability, cultural comparison, and
cultural critique, while also providing a viable disciplinary “brand,” or identity, to accommodate diverse publics’ need for knowledge (Hannerz 2010).

Between about A.D. 850 and 1140, the archaeology of Chaco Canyon in northwestern New Mexico reveals the rapid construction of large communal structures where smaller settlements had existed previously and shows that the locality became the core of an extensive regional system in the Four Corners region of the northern Southwest integrated by formal trails, the circulation of nonlocal goods, and the sharing of ritual items (Crown and Judge 1991; Doyel 1992; Heitman and Plog 2015; Kantner 2003a; Kantner and Kintigh 2006; Lekson 2006a; Neitzel 2003; Nelson 2006; Toll 2006; Vivian et al. 2006). Although researchers vigorously debate the role of increased sociopolitical complexity in this development (e.g., Judge and Cordell 2006; Lekson 2006a, 2009, 2015; Plog and Heitman 2010; Renfrew 2001; Sebastian 1992; Vivian 1990; Wills 2000), less attention has been given to questions of human diversity and its impacts. This is remarkable because research over the last century has suggested the possibility of multiple socio-culturally or biologically distinct groups both within the canyon and throughout the regional system (e.g., Akins 1986; Kluckhohn 1939; Meyer 1999; Schillaci 2003; Vivian 1990; Vivian and Mathews 1965; Van Dyke 1999a; Wills 2009).

Yet, because social diversity is not an easily quantified variable it must be examined archaeologically at multiple scales from the perspective of indirect evidence. One way to infer and characterize social diversity is to look for evidence of behaviors and institutions that contribute to it, such as migration, social interaction and small-
scale socio-political formations such as the descent groups (households, clans, moieties) and sodalities that prevail among historic Southwestern societies (e.g., Eggan 1983; Howell 2001; Howell and Kintigh 1996; Ortiz 1969; Ware 2014; Whiteley 1998; Whittlesey and Reid 2001). This approach, consistent with recent trends in distinguishing past social formations and identities, emphasizes a “bottom-up” perspective wherein the actions of multiple independent smaller social groups are suggested to account for wider patterns of social interaction and change (Bernardini 2005a, 2005b; Clark 2001; Duff 2002; Lyons 2003; Stone 2003; see also Pelto and Pelto 1975).

Isolating such institutions and phenomena archaeologically, however, is neither an easy nor straightforward task. Archaeologists today observe that such dynamic phenomena as multiscalar social boundaries, interaction, and identities are best tracked through the study of material culture attributes that reflect aspects of unconscious learning and enculturation. Since enculturation entails the learning and teaching of behavioral patterns dictated by an individual's (or collective's) ethnolinguistic or culture-historical background (Efferson et al. 2007; Whiting and Edwards 1988), spatially discrete variability, and overlap, in traditions of teaching and learning a craft (learning networks) should reflect social interaction that may also correlate with social boundaries and identities. Data suggesting distinctive or overlapping learning networks may then be compared against other independent lines of evidence to evaluate plausible explanations for the observed patterns.
Given the strong evidence for social and cultural diversity as a characteristic of ancient Southwestern societies, such diversity almost certainly played an important role in structuring human interaction at multiple spatial and temporal scales. By extension, it is also reasonable to infer that it likely played an underappreciated role in cultural developments within the far-reaching Chaco system. Taking the archaeology of the Chaco regional system as a case study, then, this dissertation examines a set of related models that propose social diversity at site-, community- and regional-scales by first seeking to distinguish patterned stylistic variability in woven artifact manufacture with implications for understanding social diversity across the Chaco system and, second, identifying the possible cultural or geographic affinities of Chaco Canyon’s occupants.

Toward this end, I conducted detailed technological analyses of over 1,100 coiled baskets, plaited mats, and plaited sandals from Chaco Canyon and multiple other sites in the Southwest. In contrast to earlier studies of Chacoan society that relied largely on variability in ceramics, lithics, architecture, and human skeletal remains, this study examines perishable artifacts that typically suffer the bias of preservation but which, when recovered, have demonstrated power for investigating questions of social interaction, boundaries, and identities (e.g., Adovasio 1986a, 1986b, 2002, 2005; Adovasio and Gunn 1986; Adovasio and Pedler 1994; Adovasio et al. 2002; Elsasser 1978; Fowler 2004; Fowler and Dawson 1986; Horton 2010; Jolie 2004, 2006a; Jolie and Webster 2017; McBrinn 2005, 2008; Polanich 1994; Pryor and Carr 1995; Webster 1997, 2007a; Webster and Loma’omvaya 2004). The new data and insights generated by this study contribute to a fuller and, arguably more realistic, reconstruction of Chacoan
society while also adding to the evidence suggesting sociocultural diversity within Chaco Canyon, throughout the system, and beyond.

Given the high degree to which ethnic and other cultural conflicts characterize current global discord, recognition and increased awareness of the dominant roles that social and cultural difference play in structuring human interaction means that we can and should turn to anthropological investigations of diversity for clues to resolutions. Doing so can provide us with a means of understanding how our differences matter and shed light on the varied social and historical contexts that lead to people living together, peacefully or not. Since popular beliefs and legislation today often privilege biology over lived experience when it comes to human diversity (Bell and Hartmann 2007; Berrey 2011; Moses and Chang 2006; Susser 2001), emphasizing the causes, character, and consequences of social and cultural diversity holds great potential for expanding the knowledge base that scholars and the public can draw upon to fruitfully engage contingent social issues.

The sheer extent of human diversity is daunting, and so a key challenge in the future will be comprehending and integrating empirical and theoretical advances that tackle human diversity among anthropology’s different subfields. Excepting relatively recent developments in historical archaeology, often in the context of postcolonial studies, that tackle the roots and varied expressions of race, ethnicity, class, gender, religion, and sexuality (e.g., Chenoweth 2009; Hu 2013; Larkin and McGuire 2009; Lightfoot 2015; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Voss 2008; Weik 2014), archaeology has been generally slow to tackle these issues, arguably because the
academy as a whole has struggled with diversity and social justice (Brondo and Bennett 2012; Lamphere 2004; Mendoza 2001; Meskell 2002). Legal developments, such as the passage of the Native American Graves Protection and Repatriation Act (NAGPRA, 25 U.S.C. 3001 et seq.) of 1990, have led to a sea change in archaeology, however. Among the many positive impacts of the NAGPRA have been greater collaboration between archaeologists and Native Americans, as well as new forms of archaeology and restorative justice (e.g., Colwell-Chanthaphonh 2007; Ferguson and Colwell-Chanthaphonh 2006; Killion 2007; Nash and Colwell-Chanthaphonh 2010; Watkins 2000). But I submit that there remains more for archaeology to consider, both theoretically and methodologically.

For these and other reasons explored below I see archaeology as a still underutilized tool in anthropology’s repertoire for informing larger social discussions of diversity and effecting socio-political change in the here and now. Burgeoning scholarship on human diversity across the social sciences demonstrates a range of benefits to understanding the social construction of race, ethnicity, class, and gender, the topics which tend to dominate current discussions of social and cultural diversity. Archaeology is no less important in these discussions and should be more prominent. Investigating and appreciating ancient diversity adds perspective to our current way of life, helping us question current social categories while also humanizing the past. It further helps strengthen people’s connections to their past and the pasts of others. This is vital because if we are to all live and work together we need to be able to talk about each other’s cultures and pasts. Archaeology’s long term perspective is, then, all the
more important because it can inform on the social processes that stimulate or mitigate diversity and its consequences across a range of social and historical settings. Given how politicized the study of the past and the creation of knowledge about the past are today, we need such perspective more than ever.

We can engage these and other issues of contemporary social relevance by more frequently drawing upon the archaeological record to identify the circumstances under which, and mechanisms by which, identities and ideologies promote or constrain cultural and social diversity, as well as how they intersect with human cooperation and conflict. Archaeology in isolation will not be able to provide the solution to today’s social issues, but it can contribute by raising awareness of past diversity and fleshing out a deeper historical perspective generally lacking in social science and humanistic approaches to the subject today. Following the lead of recent socio-natural studies in archaeology that highlight the value of archaeological research for understanding and resolving current environmental problems (e.g., Fisher et al. 2009; van der Leeuw and Redman 2002), I see our best way of engaging such an agenda as compiling a series of case studies from throughout time and across space at multiple scales that demonstrate the insights a deeper historical perspective can yield. In so doing archaeological research can both complement and challenge findings from other disciplines that seek to characterize issues surrounding diversity, cooperation, and conflict today. There also exists the potential for exploration of connections among environmental change, socio-cultural change, and diversity (e.g., Hegmon et al. 2016; Leslie and McCabe 2013; Nelson et al. 2011).
Diversity and Archaeology in the Prehispanic Southwest

Viewed against this backdrop, the history, anthropology, and archaeology of the North American Southwest afford a rich database from which we can draw to explore such questions (e.g., Cordell and Fowler 2005; Fowler 2000; Spicer and Thompson 1972). Culturally and biologically diverse Native American peoples have occupied the Southwest cultural province for no less than 13,000 calendar years, during which time they developed successful, sophisticated technological advancements in agricultural practices, ceramics, and architecture among other domains. Despite more than a century of sustained archaeological investigation, uneven preservation and gaps in our research have meant that we still have many unanswered questions about ancient Southwestern peoples, their cultural and biological origins, and affinities (e.g., Cordell and McBrinn 2012; Gregory and Wilcox 2007; Mills and Fowles 2017; Neitzel 2017).

What is clear from current knowledge, however, is that social and cultural diversity operating at multiple scales were significant factors structuring interaction among and between past human societies in the prehispanic Southwest. In the northern Southwest, archaeological identification of “Basketmaker” farming societies (so named for the beautiful baskets they wove) beginning around 3,000 calendar years ago coincides with spatial variability in human skeletal and archaeological remains taken to reflect well-established social and cultural diversity by that time (e.g., Coleman 2011;
Matson 1991, 2006; Washburn and Webster 2006). Understanding the timing and significance of such developments is tricky, but most archaeologists agree that the early agricultural period across the Southwest provided the context for the initial development and distribution of diversified cultural groups whose later descendants became the Southwestern societies known to the world these past few centuries (e.g., Cordell and McBrinn 2012; Kohler 2013; Wilshusen and Ortman 1999).

Our understanding of Southwestern social and cultural diversity at and just prior to contact with Europeans in A.D. 1539 is enhanced appreciably by historical documents, and ethnographic and archaeological research conducted over the last 130 years. Because languages in small-scale and middle range societies like those of the Southwest are taught and learned within the context of households and communities, linguistic variability is often (but not always) a good proxy for “big picture” cultural variability, population origins, and historical affinities. Southwestern linguistic diversity is striking, then, with no fewer than five distinct well-established families of languages (Southern Athabaskan, Keresan, Kiowa-Tanoan, Uto-Aztecan, Yuman, Zuni) evidenced in the northern portion of this culture area alone, and at least seven distributed across the “Greater Southwest” which extends into adjacent northern Mexico (Foster 1996; Hale and Harris 1979; Hill 2007, 2017a, 2017b). Relative to the land area occupied, this is a degree of ethnolinguistic diversity only exceeded in North America by the Pacific Northwest Coast and parts of California.

Identifying contemporary Southwestern peoples as the end point, or destination, of a long-term developmental trajectory gives us cause to seek the origins of that
diversity. While roughly 3,000 years is a vast temporal gulf separating ancient societies from their descendant communities, by all accounts the time between about A.D. 700 and 1300 represents a period of rapid pan-regional cultural expansion, diversification, and transformation (e.g., Cordell and McBrinn 2012; Lekson 2009; Plog 2008). During this time indigenous Southwestern peoples experienced marked demographic growth, developed more elaborate and regionally distinctive material culture repertoires, established larger settled villages, managed sophisticated agricultural systems, engaged in interregional migration, and achieved new levels of socio-political integration. Yet, against this broad evolutionary backdrop one particularly spectacular regional development stands out because it suggests sociopolitical and cultural change of a magnitude previously unseen, with cultural and demographic consequences that rippled throughout subsequent centuries.

Diversity, Scale, and Identities

Although the study of social and cultural diversity in archaeology is fraught with difficulties, this does not make the task insurmountable nor the topic less worthy of study. Rather, it requires that terms, concepts and methods be deployed critically and explicitly. In the sections that follow I introduce and analyze “diversity” and “identity,” two concepts central to my research. The dominant questions examined throughout
include: What do we mean by “diversity”? How can we investigate social and cultural diversity archaeologically? What implications does ancient diversity have for archaeological interpretation and contemporary identity politics? Foregrounding these questions helps lay the foundation for the analyses, syntheses, and discussions that unfold throughout this volume as I investigate social diversity in the prehispanic American Southwest.

What do We Mean by “Diversity”? 

The obvious place to begin is “diversity” as a word. A survey of dictionary definitions of “diversity” shows that it refers to the quality of variability or heterogeneity, specifically as it stands in opposition to uniformity or homogeneity. In reference to humans, modification with “cultural,” then, describes the quality of cultural heterogeneity within a human population. By extension, use of other descriptors, such as “social” and “biological,” underscores that there are many types or classes of human diversity.

Working from this position it would be easy to take it for granted that diversity of some sort existed in the past and so, in a general sense, that all societies exhibit diversity. Indeed, depending on the type of diversity one is examining, many societies could be said to exhibit considerable diversity. The point here is that to facilitate comparability one should compare similar types or categories of diversity. A second and related issue is that however appropriate it may be to assume the existence of diverse social and cultural forms in ancient times, such an assumption does nothing to help us
understand the character of that diversity or its implications for human behavior and cultural change. Worse yet, an uncritical assumption of diversity runs the risk of erroneously ascribing the quality of heterogeneity when in fact there may be evidence of homogeneity.

As a concept, “cultural diversity” is relatively recent, only achieving purchase in popular and academic English language publications since World War II and dramatically accelerating in use since the early 1970s alongside other terms that describe human variability (Stoczkowski 2009; Susser and Patterson 2001). The trajectory of this and related concepts’ rise in popularity during this timeframe is undoubtedly linked to social and historical developments, including the emergence of the human rights movement with the passage of the United Nations Universal Declaration of Human Rights in 1948 and, later, the civil rights movement. But by many accounts diversity today exists as an ill-defined, trendy and overused term that encompasses a wide range of meanings.

In its broadest sense cultural diversity refers to a variety of cultures or ethnicities in a regional or global context. It is often seen as analogous to biodiversity, implicitly or explicitly, although there are good reasons such an analogy should not be made (Heyd 2010; Manne 2003). Some, recognizing differences within cultural or ethnic groups, may narrow their use of the concept to acknowledge Native American cultures or Spanish cultures (e.g., Asturian, Castillian, Catalan) in the plural, for example. Others invoke cultural diversity to refer to the demographic makeup of a specific region characterized by communities containing multiple cultures, or ethnicities, but the current terms “multicultural,” “multiethnic,” “plural,” and “polyethnic” are more appropriate concepts.
for characterizing these similar demographic conditions, even if each has limitations
owing to its link to a particular interpretive model (Banks 1996; Barth 1969; Cohen 1978;
Jenkins 2008b; Lightfoot 2015; Meer and Modood 2012; Spicer and Thompson 1972;
Stanfield 1996; Susser and Patterson 2001; Vermeulen and Govers 1994).

Conflation of the concepts of cultural diversity and multicultural draws attention
to an important yet subtle distinction between the qualities and contexts of diversity,
namely diversity’s status as both a social condition and a demographic condition (Faist
2009, Smith 1998). Viewed as a social condition, diversity is meant to reflect interaction
and relations within a social system, and is often taken to imply meanings involving
moral commitment, positive social contact, and solidarity that lend to a view of diversity
as inherently good. Such a conceptualization helps explain contemporary promotion of
diversity as driven by the idea that it cultivates a more equitable distribution of
opportunities and resources, and that it creates a more tolerant and stable global
community (Jindra 2014; Susser and Patterson 2001). If true this has serious
implications for policy-making, engendering cooperation, and resolving conflict, but
empirical data bearing on the question of whether diversity is uniformly good are
unclear (Crisp and Meleady 2012; Fainstein 2005; Hegmon et al. 2016; Hong and Page
2004; Leslie and McCabe 2013; Putnam 2007; Rudmin 2003; Ruttan 2006; Wood 2003),
and this is in no small part because diversity is an axiological principle and therefore
always relative to some normative expectation (Heyd 2010). As we might expect,
interaction with "different" people(s) can engender greater understanding, but if
lifeways are very different or incompatible then diversity can heighten prejudice and conflict.

Moral imperatives aside, the social relations associated with viewing diversity as a social condition subsume a host of related processes such as assimilation, acculturation, and hybridity which, collectively, speak to changes stemming from contact between two or more groups. As a demographic condition, however, diversity says nothing about the nature of interaction, integration, or quality of social life. It simply identifies a state of mixture or heterogeneity. The significance of this is that necessary to understanding diversity as a social condition we must first investigate and characterize it as a demographic condition.

*Anthropology and Diversity*

Anthropological investigations of cultural diversity exhibit their own share of inconsistent uses and definitions of the concept, but the majority emphasize the modern salience of race, ethnicity, class, gender, sexuality, and transnationalism (di Leonardo 2004; Hannerz 2010; Susser and Patterson 2001; Vertovec 2007; Vertovec and Wessendorf 2005). Disciplinary focus is thus principally on socio-cultural categories and identity groups meaningful to contemporary peoples, rather than smaller scale social forms that emphasize social roles and relations, such as in politics, kinship, and marriage patterns. Examination of equity, or a lack thereof, within and between these social
categories is an additional concern that has led to the reconceptualization of cultural diversity’s relationship with biological diversity.

Human biological diversity refers to physical differences based in genetics, but popular understanding of it is commonly signified by the concept of “race,” a pseudoscientific social classification that categorizes people based on biological difference and is used to justify social inequality. In contemporary anthropological perspective, race is now studied as sociopolitical reality with biological consequences (Goodman 2001; Gravlee 2009). If we take cues from contemporary usage of concepts such as “race” and “ethnicity,” what we learn is that rarely are such common social classifications consistent across space or through time. This fact reminds us that the relationship between biology and culture is opaque; it is situational, changing depending upon social and historical contingencies.

A further line of inquiry in anthropology takes “biocultural diversity” as its object (Maffi 2005). Research on biocultural diversity is concerned with explicating the relationships between, and overlapping distributions of, linguistic, cultural, and biological diversity. Recognizing that such forms of diversity share in common threats to their existence, scholars are turning their attention to ways of understanding, measuring, and protecting biocultural diversity so as to influence policy and public opinion.

Paralleling this dominance of biological perspectives on cultural diversity within the field, some anthropologists come to the topic of human cultural and behavioral diversity, even more broadly construed, through evolutionary models of human
behavior and cultural evolution. These increasingly popular studies, allied with behavioral ecology and evolutionary psychology, seek to understand human cultural and behavioral diversity through the study of human universals, ecological factors, social learning, and gene-culture coevolution (e.g., Brown et al. 2011; Mace et al. 2005; Steele et al. 2010). This conceptual framework can incorporate research investigating cultural categories such as ethnicity, gender, and class, but its practitioners primarily examine the formation of cultural norms and boundaries, model long-term cultural evolution, and examine the generation and maintenance of material culture variability as it relates to the former two goals.

Cultural vs. Social Diversity

Distinguishing between cultural diversity and social diversity is difficult in light of how both concepts are deployed today. In general, the two concepts overlap considerably, though social diversity often tends to imply a narrower set of social categories and identity groups, such as descent groups, age or disability, but in some contexts refers to variability in “lifestyles” (e.g., Jindra 2014; Twiss 2012). This conceptual overlap contributes to confusion over what is actually being described or referred to, and certainly a complete decoupling of both is impossible because they are in reality constitutive of each other.

In its popular usage cultural diversity, as noted above, focuses principally on artificial sociocultural classes such as gender, race, ethnicity and class. In the case of
race, many scholars argue that its development and establishment are linked to colonialism, imperialism, and the growth of capitalism over the past two or three centuries (e.g., Susser and Patterson 2001). What the emergence of race as a social category tells us is that, like other contemporary social categories, it inheres with more general qualities of social identity such as shared background and historical experience that are, of course, operationalized and take on greater meaning on smaller, more individualized scales, too.

Recognizing the conceptual overlap between cultural and social diversity makes the latter concept redundant unless we can constrain its meaning. The most economical way of doing this is to rely on more restricted but accepted meanings of the word “social” as referring to roles and relations among and between people. Doing so allows us to define social diversity as I do here as heterogeneity in social structures that results when multiple groups of people of different ethnolinguistic, culture-historical or enculturative backgrounds come together. This formulation is also, arguably, more appropriate for describing social formations and identities that are the products of human activities at much smaller social scales for which we lack a more detailed or emic understanding of their practice by virtue of this fact. So many aspects of social identities are individuated to such a degree that they lose important local meanings when generalized to broader identities or identity markers that large groups of people recognize, as Echo-Hawk’s (2010) ruminations on race illustrate so well. Thus, an inability to archaeologically define coherent cultural or ethnic groups in the sense that
we mean when we invoke those terms today speaks to the difficulty of separating multiscalar relations tied to identities, except in much coarser terms than we would like.

For archaeologists, the concepts of cultural area and cultural tradition have been the mainstay of research owing to the legacy of the culture historical paradigm that equated constellations of cultural attributes with static cultural groups. The late Eric Wolf (1982:6) cautioned anthropologists against doing this very thing, noting that “By endowing nations, societies, or cultures with the qualities of internally homogeneous and externally distinctive and bounded objects, we create a model of the world as a global pool hall in which the entities spin off each other like so many hard and round billiard balls.” Such a metaphor illustrates well how the labels and concepts that we choose falsely model reality.

*Identity, Ethnicity, and Diversity*

Social diversity, like identity, then, is a moving target, in a constant state of flux and recombination. It begs the redefinition of identities and the renegotiation of interpersonal relationships at various scales. The fundamental act of classifying and labeling others, which all humans do, is a primary source of human conflict because it inevitably happens that such social, cultural or ethnic classifications map onto differences in access to resources (e.g., Berreby 2008; Esteban et al. 2012; Jindra 2014; Levine 1999). In turn, conflict then often provides a feedback mechanism by which group identity labels become institutionalized. This fluidity of self- and group-
identification processes is underscored by current anthropological formulations of “identity” that emphasize this dynamic nature (Chenoweth 2009; Díaz-Andreu et al. 2005; Hu 2013; Jenkins 2008a; Jones 1997; Meskell 2001; Meskell and Preucel 2004).

Yet, this sense of recursiveness contradicts identity’s basic or commonly accepted definition as designating a sense (real or perceived) of sameness, and this conceptual conflict ultimately undermines its utility as an analytical construct.

Students of identity scholarship have gotten much mileage out of Brubaker and Cooper's (2000; see also Brubaker 2004) well-made point that identity “either does too much or not enough.” They argue that identity, and in particular social identity groups such as ethnic groups, do not exist except for the sense that they connote individuals and groups of people who self-identify. Thus, identity does not make people do anything, rather, it describes peoples' thinking or point of view (cf. Chenoweth 2009).

This observation highlights inadequacies with identity as an analytical concept that are equally applicable to cultural and social "diversity." So, if identity does not actually exist, then what are we studying? Brubaker and Cooper recognize that this contradiction could be potentially paralyzing and so proceed to parse different senses of the term so as to provide some conceptual order while making explicit the fact that what most scholars investigate under the umbrella of identity consists of processes of identification.

Jenkins (2008b) has recently taken up Brubaker and Cooper’s challenge and, while agreeing with them on many points, argues that there is no need to impose conceptual order on a human social process that is itself characterized by ambiguity and
dynamism. He counters that we need concern ourselves more with conceptual clarity "grounded in the observable realities of the human stuff with which we deal" (Jenkins 2008b:26). To this end he offers a simple definition of a social identity group as a human collectivity the members of which recognize its existence and their membership in it (Jenkins 2008a). The advantage of this perspective is that it avoids imposing narrowly defined concepts on our "messy reality," about which we would run the risk of creating false models.

For the present purposes, I take this as a reminder that we need continually evaluate the terms and labels that we use to describe phenomena meant to reference social relations and aspects of identity. In archaeology this is all the more important given the extent to which concepts such as cultural diversity, when used, are rarely if ever explicitly defined. An important paper by Wilshusen and Ortman (1999) examines cultural diversity during the A.D. 700s and 800s in the northern Southwest, but never defines what is meant by cultural diversity. To be sure, their meaning is implicit in their writing and can be understood to refer to differences in cultural materials such as ceramics, architecture, and settlement history that are attested archaeologically, and for which similarities in these traits presumably reflect shared history as identity. The implication that Wilshusen and Ortman (1999) draw from their analysis is that the material culture variability they document suggests at least two distinctive cultural ("ethnic" in their words) groups in the region.

More often than not archaeologists use the term "ethnic" (adjective) and concept "ethnicity" (noun) with little consideration of what they mean and what is
implied when used as a label for a social group or groups in the past or present. An ethnic group is generally understood at a broad scale to be a group with shared identity and common heritage, often taken to imply shared language, culture and religion. Ethnicity can coincide with racial groupings but does not necessarily, and ethnogenesis describes the process of ethnic group emergence. Implicit is the understanding that ethnic identity entails a consciousness of belonging to a much larger group.

A cursory glance at various dictionary and encyclopedia entries for “ethnic,” “ethnicity” and “ethnic group” shows an additional salient quality of the concept, that is, the explicit observation that such identity groups are identified and defined by their relationships with nation states. The prevalent, though not universal, inclusion of this aspect in definitions of the term and concept highlights its importance and underscores how this form of group identity can be used strategically. Indeed, this quality is what much research in sociocultural anthropology on ethnicity has focused on since the term entered more common usage in the 1950s, and it remains critical to contemporary investigations (Banks 1996; Eriksen 2010; Jenkins 2008b; Susser and Patterson 2001).

Is ethnicity, then, what we are seeing and studying in the archaeology of the prehispanic Southwest? Unlikely, and in the absence of evidence for Southwestern state societies that may have included multiple ethnic groups, I would answer “No.” This does not mean that ethnic groups as a form of social identity are new, however. We can engage in an archaeology of ethnicity and look to ancient ethnically diverse states such as in Egypt, Mesoamerica, Mesopotamia, and the Peruvian Andes for excellent examples (e.g., Emberling 1997; Jones 1997). Rather, it means that we by strict definition cannot
have ethnic groups in the prehispanic Southwest without the necessary states or
temples to inscribe them (Hegmon 1998:273; Whiteley 2003; but see Ortman 2012). The
difference between notions of ethnicity and social or cultural identity, then, are but a
matter of degree, with ethnicity marking group identities circumscribed by nation states
and often characterized by unequal access to resources.

Imprecise use of this term in archaeology is at its best a misleading
oversimplification that suggests the existence of marked and bounded groups in pre-
state societies. At its worst it divorces the past from an acknowledgment of the
complexities of contemporary political significance of ethnic labels and their associated
interpretive and philosophical problems, particularly as they may relate to issues of
cultural affiliation and the archaeological record. The public, including the legal system,
then takes away from our work an oversimplified or watered-down perspective of past
societies' relationships to each other and present day groups. There are thus
implications for not only how we engage diverse publics but for how we present
archaeological evidence in the context of legal systems (Thuen 2004). For these reasons
I do not use the concept of ethnic groups in the context of the prehispanic archaeology
of the American Southwest.

When investigating smaller social and spatial scales my preference instead is for
"social diversity" over "cultural diversity" and reflects an intentional choice to (1)
distance my research focus from concerns with contemporary social constructs such as
race, ethnicity, and so forth, and the possibility of their imposition on ancient peoples,
(2) avoid confusion resulting from use of the value-laden culture concept, and (3) avoid
the misplaced assumption that archaeologically-defined cultures reflect uniform and bounded entities analogous to the tribes and ethnic groups studied by contemporary anthropologists and other scholars.

Use of the word “social” also acknowledges broader developments in archaeology over the last few decades that emphasize the social context of material life and how it shapes human experience in the past and present. In keeping with current conceptualizations of the “social” in archaeology, this research moves away from universalist and essentializing assumptions about culture to take the particular and the variable as objects of study, recognizing that an emphasis on the social opens up archaeology to contribute to debates well beyond the discipline (Hodder 2004).

Summary

In brief, “diversity” comes in many forms but biology and culture loom large as sources for criteria to classify human diversity. Human perception of other humans is simultaneously a product of culture and biology and therefore the two cannot be completely disentangled. Today, anthropological approaches to cultural diversity hone in on gender, age, sexuality, class, race and ethnicity as social and cultural constructs because of their contemporary salience. The problem that social diversity poses for archaeologists thus lies in its construction within the social realm and its intersection
with dynamic multiscalar social identities. That is to say that the kinds of diversity of interest to this project are socially constructed, and so present methodological and theoretical concerns related to the generation of questions about diversity that can be asked given the constraints of archaeological data. Lacking objects with qualities that indicate exclusive production and use by members of specific social groups it is very difficult to identify or, in some cases, verify, the existence of such groups in the archaeological record, despite knowing that they must have existed. We must therefore ask series of nested questions about the nature and scale of ancient social formations that may have existed in the past and examine multiple independent data sets. Shifting our emphasis from diverse “cultural” and “ethnic” groups to the narrower concept of “social” groups foregrounds social interaction in the creation of variability we see archaeologically while also helping us avoid the pitfalls of assuming the existence of larger cultural or ethnic groups.

**Volume Outline**

In the pages that follow, I initiate an examination of the interrelatedness of history, social learning and identity among the ancient peoples who constituted the archaeological phenomenon known as the Chaco regional system. In Chapter 2, I begin by reviewing what we presently know about social and cultural diversity in the historic
and ancient Southwest. Moving back in time from the historic period I examine archaeological evidence for social diversity and some of the documented and suggested social processes offered to account for these patterns. This discussion not only provides necessary regional archaeological background, but also helps generate expectations for the types of diversity and corresponding social formations that I consider in subsequent chapters. The research surveyed in Chapter 3 identifies substantive evidence suggesting that the archaeology of prehispanic cultural developments within Chaco Canyon and across the wider Chaco regional system between ca. A.D 850 and 1140 affords a case study and opportunity to evaluate the evidence for, and implications of, cultural and social variability at multiple scales.

The concept of technological style, united with current research on social learning theory in Chapter 4, provides the conceptual framework that connects ancient woven artifacts with learning networks, social interaction and diversity. Building on this body of theory, Chapter 5 examines the database of Southwestern baskets, mats and sandals created for this study to consider questions of pan-regional stylistic patterns and variability in organization of production to illuminate both the strengths and weaknesses of these data. It concludes by combining what we know about stylistic variability in woven artifacts with observations about the types of social formations likely to have existed in the ancient northern Southwest to generate three models of social diversity at three spatial scales (site-, community- and regional-scale) which yield expectations about variability in woven artifact style.
The results of stylistic analyses within and between study sites are presented in Chapter 6 in terms of how they do or do not match the stylistic expectations provided by the three models of social diversity operating at different spatial scales. The best case for site-scale sociocultural diversity in this study comes from Pueblo Bonito, where metric variation in coiled basketry suggests the existence of two, or perhaps three, overlapping learning networks centered on different areas of the pueblo. I interpret this evidence for spatially patterned learning network variability as indicating that coiled wares and matting from southeastern rooms were produced by weavers deriving from a technological stylistic tradition demonstrably distinct from that (or those) reflected in the northern rooms that can be linked to newcomers using these later architectural additions.

At Aztec West Ruin, the basketry artifact data indicate the existence of at least two distinct but overlapping learning networks at Aztec West operating in rooms centered in the opposing northeastern (Northeast and East North Wing Sectors) and northwestern (Northwest Sector) rooms of the pueblo. Following the end of the Chacoan occupation ca. A.D. 1130, the persistence of some spatially patterned stylistic differences along with increasing homogeneity in others suggests to me that a blending of learning networks that began earlier continued throughout subsequent decades of close interaction. In this case, the evidence is consistent with the co-residence of two populations that, while retaining some technological stylistic distinctiveness into the A.D. 1200s, became increasingly amalgamated with time.
Chaco Canyon’s Bonito phase basketry artifacts exhibit a relatively high degree of homogeneity in terms of preferences for raw material and primary technological stylistic features such as twill plairting interval, coiled basket foundation type and arrangement, work direction, and starting and finishing methods. Coiled baskets from Pueblo Bonito’s northern rooms potentially exhibit an affinity with the poorly provenienced sample from Chetro Ketl, and so might indicate a degree of learning network overlap consistent with strong social ties between the two nearby sites. Variability in preferred twill plairting interval at small sites, as well as between small sites and great houses, is suggestive of learning network differences, lending tentative credence to hypotheses based on architectural and ceramic variation that the small site and great house site size dichotomy reflects sociocultural heterogeneity.

Chapter 7 complements the insights gleaned from the preceding stylistic analyses by considering several unique technologies and forms in broader regional context. Pan-regional consistency in many technological stylistic features of basketry artifacts demonstrates a deep shared history of teaching and learning many of these technologies. Coiled basketry from Chaco Canyon stands out for its finer weave texture relative to all other regions. Mesa Verde wares tend to be the coarsest, and specimens from the Middle San Juan and de Chelly regions tend to fall between Chaco and Mesa Verde. The small sample of Late Bonito subphase coiling from Aztec West is finer compared to later baskets and overlaps well with Early to Classic Bonito subphase specimens from Chaco. Of the regions sampled, thirteenth century A.D. Mesa Verde coiled basketry is the most distinctive based on its relative coarseness of weave texture,
preference for three rod bunched foundations, distinctive decorative style, use of plaque forms, and the absence of burden baskets as well as distinctive ritual basketry forms. Mesa Verde fine twill plaited sandals reveal a decided preference for broadleaf yucca strips and diagnostic overhand knotted strip splices. These stylistic contrasts complement a large corpus of research indicating that a cultural boundary, though permeable, existed between Mesa Verde peoples and those of neighboring regions. The final chapter, Chapter 8, brings together the various strands running throughout the previous pages and weaves a narrative of Chacoan social diversity with new implications for reconstructing Chacoan society, its relations with neighbors near and far, and a consideration of the project’s relevance to current issues surrounding diversity and the politics of identity. New questions are also raised and I suggest avenues for future research that can enhance our interpretations and extend archaeology’s relevance to descendant communities and other publics.

**On Human Remains, Mortuary Accompaniments, and Offerings**

Out of respect for the deceased and those who may find their photographic depiction offensive for personal or cultural reasons, I have not included any photographs of human remains and I have made a concerted effort to minimize the illustration of items with clear human burial associations. That said, given the
complicated natural and cultural processes that many of the artifacts were subjected to after being deposited, in more than a few cases we cannot be certain of some objects’ associations. At Pueblo Bonito, for example, some items were clearly not buried with individuals but may have nonetheless been left as later offerings. I appreciate the need to display or illustrate sensitive items for scientific and educational purposes, and it is from this position that a select few items from actual and possible mortuary contexts are included for illustration. Where some of these potentially sensitive items are shown I have indicated their status in the text of their individual image captions.
Chapter 2

Sociocultural Diversity in the Southwest

As it is usually defined, the Southwest cultural province encompasses all of present-day Arizona and New Mexico, the contiguous southern portions of Colorado, Nevada and Utah, and the northern Mexican states of Chihuahua and Sonora. A physiographically and biologically varied landscape, the Southwest is dominated by the high elevation tablelands of the Colorado Plateau and the north-south trending chains of mountains and valleys that define the Basin and Range province. Occasional volcanic fields punctuate this landscape, while the Colorado Plateau and lower elevation Sonoran and Chihuahuan deserts of southern Arizona and New Mexico are dissected by major rivers such as the Colorado, Rio Grande, Salt, and Gila, and their tributaries. Throughout this area the climate is generally quite arid with the amount of annual precipitation varying by season and, even then, within the same region.

In simplifying terms, the Southwest as an archaeological culture area unites this desert ecology with an agricultural adaptation that stands in contrast to the hunter-gatherer and bison-hunting populations who predominated in adjacent cultural regions. Of course, there were probably always some foraging groups and pockets of bison hunting populations in the Southwest in different places at different times. As noted previously, linguistic diversity is a hallmark of the Southwest and serves as a good starting point for thinking about broader patterns of cultural diversity. At least six
language families were represented by the indigenous societies dispersed throughout the U. S. Southwest in historic times (Figure 2.1). These families and their constituent languages -- some as different as English and Mandarin, and many exhibiting considerable internal diversity -- include Southern Athabaskan (Apachean), Keresan (an isolate), Kiowa-Tanoan, Uto-Aztecan, Yuman, and Zuni (an isolate). But in the Southwest such linguistic variability also belies some of the broader cultural similarities seen among all of the “Pueblo” groups who are most recognizable for their villages of multistory stone masonry buildings occupied by a few hundred to a few thousand individuals. If we narrow our geographic focus to the northern Southwest we are confronted with the fact that here alone five language families (Athabaskan, Keresan, Kiowa-Tanoan, Uto-Aztecan, Zuni) are represented, all of which except Athabaskan are considered Puebloan. This marked linguistic diversity reflects the multiple distinct origins for Pueblo groups occupying this portion of the Southwest (Foster 1996; Hale and Harris 1979; Hill 2007, 2017a, 2017b) and invites the question of how Puebloan farming societies came to exhibit a relatively high degree of genetic homogeneity (Kemp et al. 2010) and share material culture, and social and ritual organization in spite of their different linguistic histories. A wholly satisfying answer to this enduring question remains elusive, but recent research implicates a high degree of population movement and adaptation to similar environments (Kohler 2013).

During the nineteenth century early explorers noted hundreds of earthen mounds and architectural ruins that inspired no small amount of mystery about the
peoples that created them. Some sites, such as Pecos Pueblo east of Santa Fe, can be tied to specific groups through traditional stories and early historic documents (Kidder 1924, 1932). Others have histories that remain largely unknown to Euroamerican settlers and their descendants. All sites, however, reflect the culmination of complex demographic and settlement processes spanning centuries or millennia.

Below, I briefly review our understanding of cultural and social diversity in the historic U.S. Southwest to set the stage for the discussion of prehispanic human diversity that immediately follows. Given the sheer size of the Southwest as a cultural province, I largely focus my discussion on the record pertaining to the Colorado Plateau, the region that is the focus of this dissertation. This restriction neglects northern Mexican cultural patterns and downplays relations with neighboring plateau peoples, for example, Fremont forager-farmers of Utah and the Patayan archaeological tradition considered ancestral to contemporary Yuman language-speaking populations of the lower Colorado River, so I address these and other societies, and noteworthy cultural developments, where warranted.

### The Historic Southwest

Puebloan linguistic diversity was one of the first cultural features seized upon by early Southwestern anthropologists to account for similarities and differences between
Pueblo peoples (Hale and Harris 1979; Kidder 1924; Kohler 2013; Upham et al. 1994). A division between the eastern and western Pueblos was made early, acknowledging geographical patterning in language distribution and an association of non-exogamous patrimoieties with the eastern Pueblos and matrilineal clans with the western Pueblos (Eggan 1950, 1983; Fox 1967; Ortiz 1969; Ware 2014; Whiteley 1998).

Figure 2.1. Approximate locations and territorial boundaries of Native American tribes in the U.S. Southwest during the eighteenth and nineteenth centuries A.D. (from Plog 2008:16; reprinted with permission).

The western Pueblos consist of the Hopi (Uto-Aztecan) in Arizona, and the Zuni (Zuni), Acoma and Laguna (both Keresan) in New Mexico. Peppering the Rio Grande river valley to the east are five Keresan Pueblos (Cochiti, San Felipe, Santa Ana, Santo Domingo, Zia), and eleven Pueblos speaking Kiowa-Tanoan languages (Isleta, Jemez,
Nambe, Picuris, Pojoaque, Sandia, San Ildefonso, San Juan, Santa Clara, Taos, Tesuque). Among these eleven Pueblos there is further linguistic difference reflected among the various dialects of the three Kiowa-Tanoan languages spoken: Tewa, Tiwa, and Towa. Prior to conflict with the Spanish there were other Kiowa-Tanoan languages spoken in additional villages, but these were ultimately vacated and their inhabitants incorporated into neighboring communities (Hale and Harris 1979; Ortiz 1979).

In terms of social organization, Pueblo peoples are primarily organized by descent groups, social groups whose members recognize shared ancestry and that outline rights to resources and access to marriageable individuals. In the west, the matrilocal household comprises the most basic social unit, at the level above which are named exogamous matrilineal clans (Eggan 1950). Leadership is theocratic and leaders are the male heads of lineages who are responsible for managing clan religious duties. The katsina ritual society, one aspect of Puebloan ceremonial life familiar to many non-Indians, focuses on supernatural entities related to the ancestors, the bringing of rain, and the general well-being of the community (Griffith 1983). It draws its membership from all of the clans regardless of kin and marriage ties. Other pan-tribal societies, or sodalities, also exist and tend to emphasize weather control.

Among Kiowa-Tanoan Pueblos, bilateral extended families comprise the smallest social unit (Dozier 1970; Ortiz 1969). The next level of social integration consists of ritually based non-exogamous moieties (dual divisions) with alternating leadership responsibilities. Excepting Taos, katsina rituals are present among all of the eastern Pueblos but less important as compared to western Pueblos. As with the western
Pueblos, however, other sodalities exist with membership cross-cutting moiety lines, but in the east they tend to focus on curing, hunting, and warfare. Keresan language-speaking Pueblos and Jemez (Kiowa-Tanoan) are generally considered organizationally intermediate in reference to the above patterns because they exhibit elements common to both the east and west, such as clans characteristic of the western Pueblos and moiety divisions associated with the eastern Pueblos (Eggan 1950, 1983; Fox 1967).

Notably, the importance of matrilineal clans among the western Pueblos and the eastern Keresans has been taken to suggest matrilineality's considerable antiquity in the Southwest (Eggan 1950, 1983; Ware 2014; Whiteley 2015; see also Kennett et al. 2017).

Historically occupying lands between and surrounding the Pueblos, nomadic Apachean language-speaking Navajo and Apache peoples lived in much more dispersed settlements (Thompson and Towner 2017; Welch et al. 2017). Subsistence was based on hunting, gathering and some agriculture; herding was introduced only after contact with Europeans. The traditional residence pattern was matrilocal and there was no broader social or political organizing structure beyond lineages and matrilineal clans. The imprint of long-term contact with Pueblo peoples is found in various aspects of Navajo and Apache social, economic, and religious life, but was certainly not unidirectional (Ortiz 1983; Thompson and Towner 2017; Warburton and Begay 2005).

Generally considered to be relative latecomers, Navajo and Apache peoples are conventionally understood to have migrated from the Mackenzie River Basin of northwest Canada, arriving in the northern Southwest by at least A.D. 1450 (Towner 1996; Warburton and Begay 2005; see also Anschuetz and Wilshusen 2011:328; Matson
and Magne 2007). Yet, given the ephemeral archaeological traces left by their nomadic lifestyle it is unlikely that determining the definitive timing of their earliest (and perhaps protracted) forays into the Southwest is possible (Thompson and Towner 2017). Further necessitating revision of the timeline for Apachean arrival in the Southwest are new data generated by Ives and colleagues (Billinger and Ives 2015; Ives 2014; Ives et al. 2014) from Steward’s (1937) collections from the Promontory Caves that were used to define the Promontory archaeological culture of central Utah. Recent study implicates a proto-Apachean origin for artifacts, including distinctive hide moccasins that are now dated as early as the late A.D. 1100s. A Promontory-style moccasin from Franktown Cave in central Colorado, dated to between cal AD 980 and 1110, adds to this mounting evidence (Gilmore 2005; Ives et al. 2014:627). For these reasons, rejecting out of hand an earlier Apachean presence in the northern Southwest is at best premature and, at worst, an oversimplification of the undoubtedly complex interactions between diverse mobile and sedentary groups occupying the northern Southwest. At the same time, it is also reasonable to suggest that any pre-A.D. 1450 Apachean presence may have resulted in minimal cultural impact on Pueblo peoples as well as being very challenging to detect archaeologically. These points may be particularly apt if, as suggested by some preliminary genetic research (Carlyle 2003; Carlyle et al. 2000; Malhi et al. 2003, 2008), gene-flow was largely unidirectional with Pueblo women mainly absorbed by Navajo communities and less so the other way around.

Similar questions about identification and timing plague archaeological understanding of the ancestors of nomadic Ute peoples who historically occupied
eastern Utah and western Colorado. Speakers of a Uto-Aztecan language distantly related to Hopi, Ute peoples were traditionally hunter-gatherers living in small, dispersed bands that occupied seasonal camps. Historic Ute peoples typically practiced a matrilocal residence pattern and lacked sociopolitical organization above the level of the band (Callaway et al. 1986). Acquisition of horses in the seventeenth century strengthened this lifestyle and facilitated raiding that brought them into conflict with neighboring groups, including Pueblo peoples to the south. Despite considerable debate among archaeologists over the timing and nature of the spread of Numic language speaking peoples across the desert west (e.g., Madsen and Rhode 1994), our knowledge of Ute archaeology remains sketchy. The best available evidence, coming from changes in projectile point styles and the appearance of distinctive brownware ceramics associated with Ute peoples, suggests Ute arrival in eastern Utah and western Colorado around A.D. 1100 (Madsen 1994; Reed 1994).

Cultural and Social Diversity during the Historic Period

Complementing the clues to cultural and social diversity provided by comparative linguistics, ethnographies and historical accounts point to multiple cases where groups of people from diverse backgrounds came together at one village or community. Arguably, the most famous case is that of Tewa people (commonly referred
to as Hopi-Tewa or Arizona Tewa) living in Tewa Village (Hano) on the First Mesa at Hopi and in the village of Polacca at the mesa’s foot (Dongoske et al. 1997; Dozier 1951, 1954, 1966; Kroskirty 1993; Stanislawski 1979). By all accounts, the Hopi-Tewa came to First Mesa at the turn of the eighteenth century to assist the Hopi in their defense against the Spanish and raids by Utes, Navajos and Apaches. This migration also likely served the Hopi-Tewa's interest in removing themselves from conflict with the Spanish following the Pueblo Revolt of 1680. Arriving at First Mesa the Hopi-Tewa were promised land, food, and spouses in return for the protection they provided.

While the Hopi-Tewa have actively, and with much pride, preserved their language and ceremonialism to a high degree, 300 years of intermarriage have led to their adopting Hopi matrilineality and matrilocality. From a biological perspective, Dozier (1954) noted no obvious physical differences between Hopi and Hopi-Tewa individuals. This situation of coresidence cultivated multilingualism, with most Hopi-Tewa adults speaking three to five languages well into the 1950s. Drawing on these skills, Hopi-Tewa individuals have traditionally served as “first speakers” or interpreters for Hopi, fostering communication with other groups. Though Tewa relationships with local Hopi have largely been amicable, there have been Hopi-imposed restrictions on crafting, and tensions surrounding ceremonialism, land ownership, and use have flared up on occasion.

Transcribed Hopi oral tradition further provides a rich record with relevance to archaeology and history that indicates serial migration and the incorporation of newcomers over the last seven or more centuries. Narratives discuss the disparate
geographic origins of many Hopi clans, some even suggesting that Keresan speakers formerly lived north of the Hopi mesas (Whiteley 2002a:413). Other accounts implicate migration based on a Keresan origin for ceremonies on First Mesa (Stephen 1936) and a Rio Grande source for critical ritual sodalities at Second and Third Mesa villages (Whiteley 2002b). These observations are amplified by archaeological research on ceramic production and exchange in the Hopi area by Bernardini (2005a, 2005b, 2007, 2008, 2011) and Duff (2002) that is guided by oral tradition. This body of research on the late prehispanic period suggests substantial diversity in village backgrounds within the Hopi area.

Additional accounts record the circumstances under which different Pueblo and other groups came together, as well as the consequences. For example, Tiwa language-speaking migrants from Isleta and Sandia settled in the Second Mesa village of Payupki at Hopi subsequent to the Pueblo Revolt of 1680 (Brandt 1979:345; Ellis 1979a:354; Hodge 1910:II:218). People of Sandia descent lived there for about 70 years before returning to the east and resettling Sandia, around which time some Hopi may have joined them. Residents of Hopi, Zuni, Keresan pueblos, and Jemez are reported to have joined Navajo groups occupying canyons del Muerto and de Chelly and elsewhere at various times of strife during the eighteenth and nineteenth centuries, with some specifically identified in the clan histories they were a party to (Brugge 1983; Steen 1966; Warburton and Begay 2005). Following decimation from Comanche raids and small pox in the late A.D. 1700s, Tanoan speakers from the Galisteo Basin moved to Santo Domingo (Keresan) where they retained their language and a separate tribal
government (White 1935). At Cochiti, a dozen or fewer Spanish-American families have variously resided there since at least about A.D. 1820. The Spanish assisted in defense against Apache and Navajo raids and often lived cooperatively as community members, although this arrangement was not without periodic strife over questions of land ownership (Lange 1959:14-20). Over the last few centuries the pueblo of Laguna reportedly received Navajo peoples and migrants from Hopi, Zuni, Acoma, and several Rio Grande pueblos, with the latter’s movement stimulated by drought (Ellis 1959; Parsons 1920, 1923). More specifically, Parsons (1920:88, 1923) recounts Zuni immigrants who joined Laguna at about 1860 or 1870, resulting in the incorporation of considerable elements of Zuni katsina practices into Laguna ceremonialism.

Historical documents further record the 1838 migration of people from the (now uninhabited) pueblo of Pecos (Tanoan) east of Santa Fe, New Mexico, in the wake of Comanche marauders and epidemics. Most migrants settled at Jemez, but smaller numbers also joined other communities (Parsons 1925). Although surviving documents detail little of the resultant intercultural interaction, interviews with surviving immigrants and their descendants attest to frustrations over ceremonial organization. More informative is that clan affiliations had been largely forgotten or made obsolete by the time the third generation was interviewed by Parsons (1925). Where Pecos immigrant culture persisted at Jemez it was not discernible materially but, instead, principally in ceremonial life where it made a strong contribution to Jemez ritual practice.
Throughout New Mexico in the eighteenth and nineteenth centuries multiple enclaves of socially stigmatized “Genízaros” existed at several Pueblos, such as Santa Clara (Chavez 1979; Horvarth 1979). A catchall social identity category for diverse native peoples enslaved by the Spanish, Genízaros were known for their military prowess and tended to occupy frontier communities. We know little of their interactions while living among Pueblos peoples, but do know that they often occupied community peripheries. As a distinct social group they wielded the most social and political clout when in high numbers, such as in the Belén community south of Albuquerque (Horvarth 1979). Significantly, an archaeological study of three Genízaro communities by Cordell and Yannie (1991) found that identifying a Genízaro presence materially is quite difficult, and perhaps best recognized by residential segregation marked by differences in pottery, stone tools, and possibly also cuisine.

During the late 1870s, a factional dispute arose at Laguna over Protestant American influence that led to 30 to 40 conservative community members immigrating to Isleta. They settled after being promised land in exchange for the good luck brought by the arrival of new ceremonies and several Laguna Corn Mothers (Ellis 1959, 1979b; Harvey 1963; Parsons 1928, 1932:348). One noteworthy consequence of this movement, documented by Parsons (1932:351) 50 years later, was an increase in the quality of ceramic vessels. Laguna women were known for their quality wares but Isleta women were not, at least not until they began to learn to make Laguna-style pots from the immigrants. Just as interesting, however, is the adjustment to social and ceremonial life made by the Laguna immigrants who differed in language and social organization
from their hosts. As Parsons (1932:352) writes, "The immigrants were taken into the Isletan kiva-moiety system, to which they had nothing to contribute, but which was familiar enough to make them feel at home, and to accept as a consequence, at least, of intermarriage with Isletans." Clan membership was resolved by finding the Isletan equivalents of the eight clans represented among the Laguna immigrants. Immigrant Laguna contributions to Isleta were most pronounced in medicine or curing, to which they added new dances, including the reintroduction of masked katsina ceremonialism, and a second medicine society. Ceremonial contribution is a constant feature of different Pueblo peoples coming together at one community and emerges as a hallmark strategy for historic Pueblo community integration as well as source of conflict (see also Levy 1992; Titiev 1944; Whiteley 2008; see also Whitehouse and Lanman 2014).

The Laguna case complements the better known Hopi-Tewa example. In both cases the immigrant groups retained their language and actively worked to prevent its communication to others. Social organization was largely adopted from the hosts while ceremonial organization was retained, but often modified or grafted onto that of the hosts, though not without conflict. Migrant groups often brought with them valued ceremonies and sacred objects that facilitated their integration into the host community. Ethnographic accounts of such situations often identify a persistent tension between immigrant and host groups where land ownership, and political and ceremonial matters are concerned, with migrants often settling on the outskirts of the village (Bernardini and Fowles 2011; Ellis 1959, 1979b; Herr and Clark 1997; Kohler and Root 2004; Snow 2012).
Harvey's (1963) analysis of the organization of katsina practices brought by Laguna migrants to Isleta underscores some of the impacts of this immigrant-host tension. Community members at Isleta were not uniformly accepting of the incorporation of Laguna katsina ceremonialism, with many having definite objections to its reintroduction and deriding both the katsina masks and the Laguna people who bore them. For these reasons, as well as their minority status, Laguna community members display pride in their ownership of katsinas but have resorted to secrecy to preserve the ceremonies and keep esoteric knowledge away from prying Isletan eyes. Many ritual practices are undertaken privately, if infrequently, in ceremonial houses, but annual public katsina dances that are accepted by the majority of the community must follow Isletan conventions. Importantly, similar conservativism in ritual practice has been documented in other situations of immigrant-host coresidence (e.g., Dozier 1954; Fewkes 1899; Parsons 1932).

Although constituting but a small sample of historic cases of social diversity at the community scale, these examples are important for providing a snapshot of the effects of Southwestern groups of different backgrounds and traditions living beside each other for decades or centuries. Taken as a whole, these studies illustrate how cultural and social variability can be masked by similarities in material culture. More generally, the linguistic, historic and ethnographic evidence is consistent with developing genetics research implying that language differences played a minor role in structuring gene flow among populations in the Southwest (e.g., Kemp et al. 2010; Malhi et al. 2008; Snow et al. 2010; see also Schillaci and Stojanowski 2005). Notably, in
colonial contexts where new multiethnic social identities arise strikingly similar patterns have also been documented, not only with the aforementioned Genízaros, but elsewhere in colonial North America (e.g., Chute 1997; Lightfoot 1995, 2005, 2015; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Sharrock 1974).

Cultural and Social Diversity in the Prehispanic Southwest

While pronounced areal differences appear as early as about 500 B.C. across the Southwest, archaeologists generally recognize three major ancient cultural traditions, or culture areas, throughout the region by about A.D. 700 based on spatial and temporal patterning in artifacts and other cultural features (e.g., Cordell and McBrinn 2012; Lekson 2009; Mills and Fowles 2017; Ortiz 1979, 1983; Plog 2008). Each of the three traditions -- Ancient/Ancestral Pueblo, Hohokam, and Mogollon -- is associated with a sizeable territory exhibiting greater internal archaeological (and presumed cultural) similarity than not, but the perceived boundaries between these cultural traditions are of variable rigidity through time and across space, reflecting fluctuations in long-term social interaction and exchange (Figure 2.2). Data from some areas and time periods suggest internal variation or do not otherwise fit well within these traditions, and so subregional variants, sometimes also referred to as culture areas, or provinces, have been defined. Notable examples include the less well known Patayan tradition of the
lower Colorado River thought to be ancestral to Yuman language-speakers, and Sinagua and Salado peoples of northeastern and southwestern Arizona, respectively (e.g., Crown 1994; Dean 2000; Kamp and Whittaker 1999; Pilles 1996; Schroeder 1979). The latter two are characterized by an apparent hybridization of adjacent cultural traditions resulting in ethnogenesis, the formation of a new shared identity.

Figure 2.2. Major archaeologically defined cultural traditions in the U.S. Southwest (from Fowles and Mills 2017:Figure 1.1, reprinted with permission).
Ancient Pueblo farmers, ancestral to the culturally and socially diverse Pueblo groups of present-day New Mexico and Arizona, were more widely spread out across the plateau lands and adjacent landscapes of the northern Southwest than are their descendants today (Cordell and McBrinn 2012; Mills and Fowles 2017; Schachner 2015). These peoples were the first to settle in villages and later developed extensive settlements with multistory masonry structures associated with plaza spaces and architecturally distinct ceremonial rooms called kivas, a reference to analogous structures among historic pueblos. They manufactured a wide range of unpainted and black-on-white painted ceramic styles and beautiful cotton textiles. Prehispanic Puebloan society is today recognized internationally from archaeological investigation of eleventh century A.D. remains in Chaco Canyon in northwestern New Mexico, as well as spectacular communities that arose later in Canyon de Chelly in northeastern Arizona, and in the Mesa Verde region of southwestern Colorado, among other places.

To the south and west of the Ancient Pueblos lived Hohokam peoples, desert farmers inhabiting Arizona south of the Mogollon Rim and into northern Mexico (Bayman 2001; Cordell and McBrinn 2012; Fish and Fish 2008; Mills and Fowles 2017). Practicing a tradition that contrasted the most markedly with the Pueblos, Hohokam peoples produced distinctive ceramic styles and constructed complex canal networks, platform mounds, and ballcourts. Their society peaked in geographic influence and cultural elaboration during the early to mid-eleventh century A.D. Similarities in architecture, material culture, and ritual practices suggest Hohokam contact with societies throughout northern and central Mexico. The Hohokam are considered to be
the ancestors of many contemporary O’odham peoples who speak languages belonging to the Uto-Aztecan family, but recent research implies that other groups, such as Yuman and Zunian language speakers, likely inhabited portions of the Hohokam region and participated in the Hohokam cultural tradition, as well (Abbott et al. 2012; Crown and Judge 1991; Hill 2007, 2017a, 2017b; Hill et al. 2004; Shaul 2014; Shaul and Hill 1998).

Farming peoples responsible for the archaeological record of the Mogollon Rim and the Plateau of east-central Arizona and west-central New Mexico are generally referred to as the “Mogollon,” but long-standing recognition of regional variation denoted by various Mogollon “branches” suggests cultural and social heterogeneity (Gregory and Wilcox 2007; Reid 1989). As originally characterized, Mogollon region peoples are typified by their pithouse villages and brown plain and red-slipped pottery. After A.D. 1000, probably owing to increased interaction with and migration between the Colorado Plateau, Mogollon peoples begin to take on more characteristics of Ancient Pueblo peoples to the north, such that later sites in the Mogollon region look decidedly Puebloan in terms of architecture and ceramics among other cultural features. One notable feature of the Mimbres branch Mogollon are their distinctive black-on-white ceramics that exhibit a rich iconography with representations of people, animals, insects, plants, and daily and ritual life (Brody 2004). The modern descendants of heterogeneous Mogollon area peoples include speakers of Zuni, as well as probable Keresan, Uto-Aztecan (Hopi and O’odham peoples), and possibly Kiowa-Tanoan language-speaking peoples (Gregory and Wilcox 2007).
As noted earlier, in regional perspective these cultural traditions are often referred to as archaeological “culture areas.” My preference, however, is for archaeological “areas” or “regions” because the addition of “culture” may mislead us into thinking that the patterns that archaeologists identify reflect some cultural reality and unity, which seems very unlikely at this scale given what we know about historic Southwestern peoples (Upham et al. 1994). This obtains, as well, to smaller culture area or province labels in the Southwest such as Chaco, Cibola, Kayenta, and Mesa Verde, for example (e.g., Cameron 2005; Chuipka and Fetterman 2013; Dongoske et al. 1997). Such broad areal similarity in cultural form most parsimoniously reflects extended cultural contact and exchange among multiple groups of diverse backgrounds as a byproduct of geographic proximity. The task before us is, then, to isolate those instances where finer scale cultural or social diversity existed and to understand its character, causes, and consequences so as to provide context for episodes of cultural stability and change in the past.

Social Identities, Population Movement, and Coresidence

Among the challenges to the archaeological identification of cultural and social diversity at the level below regions or culture areas—that is, communities and individual sites— is social interaction, specifically, distinguishing between the movement of artifacts and ideas independent of the movement of people who may be conveying them (e.g., Hegmon et al. 2000; Reid and Montgomery 1998). Setting aside site
formation processes, many behaviors, such as trade and intermarriage that are embedded in and constitutive of social and political networks that introduce variability into the archaeological record, can confuse evidence of population movement resulting in the coming together of groups of people of diverse backgrounds. When it comes to social interaction, archaeological focus tends to be on the identification of networks of exchange and the delineation of social boundaries. The movement of goods and ideas, as one proxy for social interaction, is generally tracked archaeologically by comparative studies of architectural and material culture variability, decorative embellishment and iconography, and constituent analyses that source the raw materials used to make artifacts. Social boundaries reflected in patterns in artifact styles are typically clearest at their edges where the contrast between two cultural or social groups is greatest and it is important to signal identities (Emberling 1997; Stark 1998; Stark et al. 2008; Stone 2015). Yet, the fact that social identities lack clear spatial boundaries is compounded by our dearth of knowledge of the scale at which a material culture boundary will map onto one or more social boundaries and identities (e.g., Mills 2007). Furthermore, the variability in material culture attributes observed at different geographic and temporal scales can also reflect varied levels or scales of boundaries and identities (Hegmon et al. 2016; Ortman and Cameron 2011).

Since social boundaries and identities are, in practice, layered or “nested,” an individual can be situated among a suite of identities at any given time (Jenkins 2008a). It is significant, then, that although the way in which certain material culture styles reflect identity may be arbitrarily distributed throughout cultures, they are
nonrandomly distributed within societies (Jones 1997). In the prehispanic Southwest, social identities were certainly similarly layered and scaled, probably according to salient historically documented social identity markers such as age, gender, descent group (e.g., household, lineage, clan, moiety), ritual and medicine sodality membership, community, regional site cluster and, ultimately, language group. At the broadest possible scale, Clark and colleagues (Clark and Reed 2011; Clark et al. 2013) suggest that “meta-identities” existed that reflected a higher level abstraction of group identity that surmounted and crosscut these other identities to unite groups with diverse backgrounds, as seen in contemporary American “meta-culture” and Christian and Islamic religious meta-identities. These authors suggest, for example, that the Chaco Regional System and the Salado Phenomenon may have embodied meta-identities that transcended existing identities rather than negating them.

**Roots of Prehispanic Cultural and Social Diversity**

The archaeological record of the prehispanic Southwest is rich but a basic lack of data, particularly the fine scale data required for nuanced understanding of ancient identities, largely argues against interpreting the significance of patterned material cultural variability in detailed sociocultural terms for the period prior to about 2,500 B.P. That cultural and social diversity existed among Archaic period foragers and the earliest farmers is a certainty, but what forms did they take and at what scales? Renewed interest in older data sets as well as new discoveries have yielded tantalizing clues to
social networks and interaction (e.g., Geib 2000; McBrinn 2005, 2008, 2010; Vierra 2018), but currently only permit coarse reconstructions of broad scale social boundaries and identities during these early periods. In part this is because small scale foraging and horticultural groups, as compared to sedentary farming societies, are more mobile, demographically smaller, exhibit less complicated socio-political structures, and generally produce less visible archaeological records.

Presently, the clearest archaeological evidence for prehispanic subregional cultural diversity in the northern Southwest, and presumably attendant social diversity, derives from the extensive material culture left behind by so-called Basketmaker peoples on the Colorado Plateau who are considered ancestral to contemporary Pueblo communities based on similarities in material culture. Flaked stone tools, textiles and basketry, rock art, architecture, and mortuary practices variously attest to regional Basketmaker cultural diversity in the northern Southwest visible along an west-east spatiotemporal gradient. Strong material differences between western and eastern Basketmaker populations are evident by ca. 400 B.C. and more subtle local variants are coming into focus as new discoveries and research on existing datasets accumulate (Charles 2006; Coleman 2011; Geib 1996, 2011; Matson 1991, 2006; McNeil and Shaul 2018; Teague and Washburn 2013; Washburn and Webster 2006; Webster 2011a; Webster and Hays-Gilpin 1994). That there exists evidence to suggest a Basketmaker cultural manifestation as early as 1000 B.C. (Gilpin 1994) implies that Puebloan cultural and social diversity has deep and complex roots (see also Kohler 2013).
Basketmaker peoples were fully invested in agriculture and organized in small groups of seasonally mobile families forming settlements consisting of several pithouse domestic structures. Basketmaker society appears to have been weakly integrated until between about A.D. 200 to 400 when pottery technology becomes widespread in the northern Southwest and economically autonomous households become archaeologically visible (Wills 2001a, 2012a). Thereafter, pithouse sizes increase substantially and clear evidence for internal functional variability appears, suggesting larger domestic groups and greater emphasis on property rights (Wills 2012a; Young and Gilpin 2012). Following the emergence of household organization, archaeologists see development of very large pit structures (about 10-25 m in diameter) as early as the A.D. 500s that are often referred to, appropriately or not, as “great kivas.” These early structures are thought to at least partly involve ritual activity and anticipate the even larger integrative community structures defined as great kivas in subsequent centuries (Adler and Wilshusen 1990; Van Dyke 2007a; Vivian 2000). It is equally possible that, rather than functioning as purely integrative structures for day-to-day life, they afforded a stable social center for dispersed, seasonally mobile households (Wills et al. 2012; Wilshusen et al. 2012). Regardless of their function, it is sufficient to note that the nature and extent of variability represented in Basketmaker assemblages, as well as the presence of public architecture, indicates a shift towards new social formations.

Developing out of the earlier pattern of dispersed households were the first large village communities. The earliest villages occur along the San Juan River in southwest Colorado and southeast Utah between about A.D. 600 and 900. During this
time archaeological data suggest the widespread development of innovative social and political formations such as sodalities not previously attested (Bellorado 2013; Feinman et al. 2000; Schachner 2010; Ware 2002a, 2014; Ware and Blinman 2000; Wilshusen et al. 2012; Young and Herr 2012). Among the most profound changes is an architectural shift, after about A.D. 750, from pithouses to above-ground domestic structures associated with semi-subterranean structures thought to be the earliest kivas (proto-kivas) which served domestic or ritual purposes, or both (Lekson 1988). Research in the Northern San Juan River (Mesa Verde) region of southwestern Colorado continues to provide a high resolution picture of diachronic cultural and social diversity during the Pueblo I (A.D. 750-900) period (Wilshusen and Potter 2010; Wilshusen et al. 2012). Demographic growth in this general area beginning in the early A.D. 700s, and culminating in the first decades of the A.D. 800s, is of such a scale that immigration is inferred in addition to in situ expansion (Wilshusen and Ortman 1999). Migrants to the Mesa Verde region, some traveling as much as 100 km, brought with them ceramic and architectural styles, as well as site layouts, that are more typical of sites in the Southern San Juan Basin (Chaco) region. The results of these processes are some of the earliest and largest village communities in the northern Southwest, many apparently home to groups of people from varied geographic and cultural backgrounds.

Two neighboring sets of Pueblo I era villages in the Dolores area that have been the focus of considerable research as part of the Dolores Archaeological Project exhibit striking artifactual, architectural, and site layout differences. Regional settlement history and patterning point to an east-west separation between the eight villages in the
Dolores River Valley. Four villages are recorded on either side of the river, with one from each cluster receiving detailed study. Grass Mesa Village and its neighbors east of the river bear similarity to contemporaneous sites in the Southern San Juan region, while McPhee village and its neighbors on the west side consist of nearly twice as many households and demonstrate local continuity in material culture. These observations lead Wilshusen and Ortman (1999) to suggest the residence, in close proximity, of two distinct cultural groups during the late A.D. 800s.

Subsequent research as part of the Animas-La Plata Project has extended some of these inferences to communities in other portions of the Northern San Juan. Chuipka and Potter (Chuipka 2008, 2009; Potter and Chuipka 2007; Potter et al. 2012) note that many early Pueblo I communities in this region show organizational variability suggestive of variable social identities both between and within sites. Focusing on Pueblo I community data from the Ridges Basin area south of Durango, Colorado, they argue that pit structure shape and configuration distinguish intracommunity households while settlement clusters thought to represent communities can be differentiated through settlement patterning and the presence or absence of community integrative structures. Human osteological analyses and mortuary features amplify these findings, suggesting genetic differences between some settlement clusters (Potter and Perry 2011).

Yet, comparison of contemporaneous settlement data from the north with data from the Southern San Juan drainage (Chaco) reveals a lack of correspondingly unambiguous evidence for cultural diversity (Wilshusen and Ortman 1999; Wilshusen
and Van Dyke 2006). Indeed, during the Pueblo I period populations remain steady or in decline. It was not until the late A.D. 800s and early 900s, however, when populations began to grow and Great House communities were increasing in Chaco Canyon and elsewhere throughout the southern region that archaeologists see evidence for depopulation of the Northern San Juan, possibly in response to persistent droughts that minimally affected points south. Many scholars thus interpret early Northern San Juan manifestations of cultural diversity and population movement as providing the social context for subsequent demographic contributions to the Ancient Pueblo community occupying Chaco Canyon in the A.D. 800s (Dean et al. 1994; Duff and Wilshusen 2000; Lipe 2006; Schachner 2010; Schlanger and Wilshusen 1993; Varien et al. 2007; Vivian 1990; Wills 2000; Wilshusen and Ortman 1999; Van Dyke 2007b; Wilshusen and Van Dyke 2006; Windes and Van Dyke 2012; but see Miller 2018). Critically, these developments established important social and economic ties between Chaco and the Northern San Juan Region that persisted throughout subsequent centuries (Cameron and Duff 2008; Cordell et al. 2007; Crabtree et al. 2017; Duff and Wilshusen 2000; Lipe 2006). However, more recent research is beginning to improve archaeological understanding of Chaco's connections to points south (Mills et al. 2018; Price et al. 2017).

Prehispanic Population Movement and Coresidence
Study of Southwestern aboriginal population movement, often reduced to the concept of migration, has a venerable history in the Southwest, but its prominence within academic discourse has fluctuated over the years. Definitions of migration vary, but most agree that it reflects residential relocation of individuals or small groups of people across social or political boundaries to another community while often retaining social ties to their former home (e.g., Cameron and Ortman 2017; Clark and Reed 2011; Duff 1998; Haury 1958; Lekson 1995; Ortman and Cameron 2011; Stone 2015).

Questions of migration, stimulated by indigenous oral histories, were instrumental to Southwest archaeology’s development in the late nineteenth century (Dongoske et al. 1997; Fowler 2000), while subsequent research invoked migration to help explain the origins of language group distributions as well as evidence for the coresidence of two or more cultural groups within the same community or site (Preucel 2005).

Although migration remains a useful concept for studying cultural process and change in the prehispanic Southwest, it is but one form of population movement, and one that carries with it no small amount of baggage owing to popular uses of the term (Ortman and Cameron 2011:235; Rouse 1995). Except cases where previous researchers argue for a migration event specifically (e.g., Bernardini 2005a, 2005b; Clark 2001; Haury 1958; Reed 2011; Stone 2015), I here avoid it as a universal descriptor in favor of the more general concept of population movement. Doing so allows me to leave open the question of the precise nature and scale of the movement identified so that a range of possible interpretations of the evidence can be evaluated later. This view is also consistent with current research demonstrating the dynamic, multi-directional nature of
mobility in the Southwest, and the recognition that prehispanic Southwestern groups were constantly or regularly in movement and had few boundary constraints (Bernardini 2005a, 2005b; Dean 1970; Lekson 1995; Ortman and Cameron 2011; Ramenofsky et al. 2009; Reid 1998; Reid and Whittlesey 2007).

A lengthy list of motivations exists for people to engage in movement, either voluntary or forced, that are distinct from settlement-subsistence mobility, and each has its own consequences for the moving group’s size and makeup, as well as the distance, pace, and duration of the move (Anthony 1990; Brettell 2003; Burmeister 2000; Cameron 2013; Duff 1998; Herr and Clark 1997; Kohler and Turner 2006; Mills 2011; Smith 2014). The same methods of stylistic and compositional analysis that can be used to study social interaction, boundaries, and identities can be brought to bear on questions of population movement, and to this toolkit researchers may add new evidence and approaches developed over the last 50 years. Current approaches in Southwest archaeology invoke a wide variety of data on artifactual, genetic, stable isotopes, osteological and mortuary variability; changes in cuisine, architecture and spatial organization; social network analyses and demographic reconstructions to detect population increases in excess of in situ growth; evidence of gaps or perturbations in the chronology of occupation; and evidence drawn from historical linguistics (e.g., Borck et al. 2015; Cameron and Ortman 2017; Clark 2001, 2007; Clark and Reed 2011; O’Donnell and Ragsdale 2017; Hegmon et al. 2016; Schillaci and Lakatos 2016; Lekson 1995; Mills et al. 2013, 2015; Ortman 2012; Ortman and Cameron 2011; Stone 2015). The most convincing archaeological cases for population movement and its resultant changes in
the demographic makeup of a community or site generally invoke the results of several
of these analyses at multiple scales.

Regardless of the analytical tools used or data collected, appreciation of
geographic proximity remains fundamental to reconstructing ancient cultural and social
diversity. This is so because spatial proximity dictates the scale and frequency of
interaction and has implications for the likelihood of detecting meaningful material
contrasts archaeologically that may reflect the signaling of social identities or
boundaries. In more general terms we can refer to the effect of distance, in which the
interaction between two locations, groups, or cultures declines as the distance between
them increases. Although an intuitive principle, this helps remind us why certain cultural
features help delineate broad scale regional boundaries but are too widespread to be of
use for discriminating cultural or social differences at the scale of individual sites or
communities.

Considering communities and individual sites, coresidence is key to delineating
cultural and social diversity at finer spatial scales of investigation. In archaeological
contexts, coresidence underscores the circumscription of domestic and other social
groups and focuses analyses on the contexts and activities that lead to apportionment
of space. While residences and activity areas can be discerned archaeologically with
relative ease, it is important to keep in mind that cohabitating groups are not
necessarily synonymous with discrete socio-political groups or identities, particularly
when it comes to groups functioning as economic or ceremonial units that may be
spread out over a settlement or community. Insufficient appreciation of this caveat
created problems for early attempts to reconstruct prehispanic Pueblo peoples’ social organization from spatial patterning in ceramic decorative styles (Graves 1998; Longacre 2000).

Early Southwest archaeologists had variously suggested the possibility of sites and communities evidencing coresident populations from different cultural traditions based on analogy to historic cases, such as Kluckhohn’s (1939) interpretation of Chaco Canyon settlement patterns as reflecting a large multicultural community, and Haury’s (1940; see also Reid 1989) work at Bear Village in the Forestdale Valley of east-central Arizona suggesting a mixture of Ancient pueblo and Mogollon traditions. By the 1950s, however, the concept of a “site-unit intrusion” informed initial systematic attempts to identify ancient migration events (Willey et al. 1956). Defined as a site, or occupational level at a site, that while clearly representative of one cultural group differs from the dominant cultural group of the area, site-unit intrusions are now well-known in the prehispanic Southwest and the concept remains influential today. Haury’s (1958; see also Stone 2015) work in the Point of Pines region in east-central Arizona is the most famous example (Figure 2.3). At Point of Pines Pueblo (AZ W:10:50), Haury interpreted the sudden appearance between A.D. 1260 and 1300 of a new architectural style and Kayenta ceramics as reflecting the migration of some 50-60 families from 200 km to the north. Burning preserved room assemblages remarkably well, and some of the early Kayenta ceramics were found with similarly styled wares made from local clays. Squash remains, uncommon for the region but more frequent in the north, were also found, as well as corn most similar to varieties known from the Kayenta region. The nonrandom
distribution of burned rooms and a storeroom full of corn implied intentional burning and hostilities that led to the eventual expulsion of the immigrant group, as rooms built after the burned rooms were abandoned bear no signs of the immigrants. If not all immigrants were expelled, those that remained lost most material traces of their nonlocal origin within a few decades.

Figure 2.3. Examples of documented population movements in the U.S. Southwest during the thirteenth and fourteenth centuries A.D. (from Cameron and Ortman 2017:Figure 37.1; reprinted with permission).
Subsequent research in mountainous east-central Arizona has demonstrated a lengthy tradition of joint use and coresidence by Mogollon, Ancient Pueblo, and Hohokam region peoples going back as far as the ninth century A.D. (Morris 1970; Redman 1993; Whittlesey et al. 2000). Long-term archaeological research in the Grasshopper region has thus far yielded some of the most robust evidence for cultural and social diversity (Reid 1989; Reid and Whittlesey 1999, 2007; Van Keuren 1999; Whittlesey and Reid 2001). At Chodistaas Pueblo, the northern and southern room blocks were apparently built and occupied by different groups between ca. A.D. 1260 and 1300. One group, evidently of a Mogollon region background but with extensive contact with Ancient Pueblo peoples to the north, introduced a Colorado Plateau-derived ceramic technology made with local materials (Zedeño 1994). The inhabitants of Chodistaas are ultimately thought to have joined Grasshopper Pueblo, founded in the A.D. 1270s and located about 1.5 km to the south. Between A.D. 1300 and 1330 Grasshopper grew rapidly with the addition of multiple-room construction units. Three large room blocks, each associated with its own plaza, formed the core of the pueblo and are taken to reflect distinct kin and residence groups. Within-pueblo social separation is implied by the presence of two room blocks on one side of a tributary of the Salt River and the third room block on the opposite side. Architectural differences considered in light of the layout and growth patterns at the pueblo attest to the presence of two or three socially distinct coresident cultural groups (Riggs 2001, 2007). Taken together with evidence for higher dietary stress and greater proportions of wild foods enjoyed by the occupants of the latest room block, Riggs (2001) suggests that the
Grasshopper data support a Hopi model of land ownership according to priority of first arrival. Human osteological and mortuary studies complement this reconstruction, showing differences in status between architectural units on opposing sides of the desiccated river channel. Strontium isotope analyses of skeletal remains demonstrate that the Grasshopper mortuary population was composed of local individuals as well as some who moved between 30 to 65 km from three other areas to the north (Ezzo and Price 2002). Mortuary accompaniments also suggest the presence of multiple sodalities or ceremonial societies dominated by men that likely served to integrate these diverse groups (Reid and Whittlesey 1999; Whittlesey and Reid 2001).

To the east in New Mexico, three Pueblo IV period sites are cited as evidencing small numbers of immigrants living alongside the local population. Based on painted mural content, and to an extent kiva architecture, Dutton (1963:200-206) speculates that during the mid- to late-A.D. 1300s a group of people from the Mogollon region settled along the Rio Grande at Kuaua where they merged with the resident population. In Dutton's view, Mogollon migrants contributed esoteric ritual knowledge and practices that were linked to the katsina religion and which helped strengthen positive communal relations between the migrants and their hosts. The presence of western Pueblo migrants at Pottery Mound and Hummingbird Pueblo, both located on the Rio Puerco, has also been proposed as an explanation for patterns in ceramic and architectural variability (Ballagh and Phillips 2014; Eckert 2008; Schaafsma 2007). At Pottery Mound the ceremonial contributions of the immigrants are thought to be reflected in kiva differences and, to accommodate consequential growth and elaboration in community
ceremonies, necessitated supplemental ceremonial spaces be set aside. Though Pueblo IV diversity and coresidence have received less focused attention, these cases raise the possibility of extending the importance of ritual activity in shaping migrant-host interactions back into the prehispanic era.

With this increasing recognition of the import of population movement in the indigenous Southwest and its role in contributing to sociocultural diversity, archaeologists continue to seek new conceptual frameworks to enhance their reconstructions. Some recent research has considered the consequences of conflict, raiding, and captive-taking (Cameron 2011, 2013; Kohler and Turner 2006), as well as economically stimulated ethnic enclaves (Eiselt 2012). Multiscalar applications of social network theory are also informing understanding of the roles that regional interaction and connectivity play in human response to environmental and cultural shifts (Borck et al. 2015; Cordell et al. 2007; Mills et al. 2013, 2015; Rautman 1993). A complementary avenue of inquiry explores material cultural diversity and finds that in socially diverse contexts where lower stylistic variability serves to promote conformity there appears to be a strong correlation with settlement persistence, arguably attributable to social situations conducive to the tolerance of diversity (Hegmon et al. 2016; Torvinen et al. 2016).

Coalescence and diaspora are additional concepts currently being used to model the scale and impacts of population movement coincident with the depopulation of the northern Southwest beginning in the thirteenth century A.D. (e.g., Clark and Reed 2011; Hill et al. 2004; Lyons et al. 2011; Mills 2011; Stone 2015). Diaspora connotes emigration
by multiple independent social units in response to deteriorating social and economic circumstances that remain in contact because of shared ideology or identity. By comparison, coalescent communities form rapidly as a byproduct of migration and upheaval, and are characterized by high degrees of cultural and social diversity bought about by residential proximity and frequent interaction (Hill et al. 2004; Reed and Clark 2011; see also Kowalewski 2006, 2007). Coalescent societies in particular are associated with a suite of behavioral responses such as population aggregation, the formation of multicultural communities, intensification of regional interaction, and elaboration of supra-village identities found in Southwestern communities after about A.D. 1200. These new perspectives contribute to our understanding of population movement by foregrounding the impacts of cultural admixture, which historically have been underdeveloped in Southwest migration studies (Clark and Reed 2011; Ortman and Cameron 2011; Stone 2015).

*Emerging Studies of Prehispanic Southwestern Diversity*

Residential proximity clearly creates situations ideally suited for archaeological identification of cultural and social difference, but it reflects only one dimension of population movement. Discerning the distances traveled by, and geographic affinities of, a non-local or intrusive group can be especially difficult if there already exists a relatively high degree of regional archaeological similarity in cultural form. This observation, and the lack of an isomorphic relationship between material objects and
social groups, partly accounts for the difficulty in tracking the movement of the thousands of people, in small groups, from Mesa Verde in the Northern San Juan region to the Rio Grande valley and elsewhere during the A.D. 1200s (Crown et al. 1996; Duff 1998; Fowles 2004; Kohler et al. 2010; Lekson et al. 2002; Ortman 2012; Schleher and Ruth 2005; see Figure 2.3).

Archaeologists have found that the scale and frequency of Southwest population movement increased markedly following the onset of widespread depopulation of the northern Southwest during the A.D. 1200s. A consequence is that many Ancient Pueblo communities and their neighbors beyond the Colorado Plateau witnessed dramatic demographic reorganization throughout the fourteenth century A.D. Development of densely populated villages in the Rio Grande Valley following waves of emigration from the Northern San Juan region is one well discussed example (Ford et al. 1972; Kemp et al. 2017; Kohler et a. 2010; Lekson 1995; Ortman 2012; Ortman and Cameron 2011; Roney 1995; Schillaci and Lakatos 2016; Spielmann 1998). Diaspora of peoples from the Kayenta region to southeastern Arizona provides a contrasting case. Whereas Mesa Verdean migrations appear to have produced new communities and blended identities in the Rio Grande Valley that eliminated many traces of the migrants’ homelands, cultural heterogeneity is a hallmark of communities resulting from the Kayenta diaspora, a noteworthy point because evidence suggests that the receiving communities were relatively heterogeneous to begin with (Stone and Lipe 2011; Clark and Laumbach 2011). Another apparent difference is in how Kayenta and Mesa Verde migrants maintained social networks. Mesa Verde migrants appear to have maintained closer
social networks with their homeland as compared with Kayenta migrants who lacked such close long-distance ties and instead cultivated extensive local social networks between migrants that extended beyond local community boundaries (Clark and Laumbach 2011; Cordell et al. 2007; see also Borck et al. 2015; Mills et al. 2013, 2015). These differences suggest Kayenta migrants’ need to articulate their distinctiveness amidst a complicated landscape shared by peoples from the Hohokam and Mogollon regions (Stone 2015; Stone and Lipe 2011). In fact, given the high degree of cultural mixing in east-central and southeastern Arizona, many scholars argue that Kayenta migrations are largely responsible for the archaeological pattern referred to as Salado (Clark 2001; Crown 1994; Dean 2000; Lyons 2003; Lyons and Lindsay 2006; Neuzil 2005, 2008; Woodson 1999).

The Salado phenomenon, variously described in the literature as an archaeological culture, ideological system, and most recently meta-identity (Clark and Reed 2011; Clark et al. 2013; Crown 1994), is well documented in the Tonto Basin and Lower San Pedro Valley areas of southeastern Arizona. Salado sites are often characterized by a mixture of Kayenta Pueblo masonry architecture and kivas, domestic features, ceramic styles, and mortuary patterns existing side-by-side with Hohokam-style ceramics, cremations, adobe dwellings, and platform mounds. However, the presence of cultural elements from the Mogollon region show that Salado peoples were not simply a mix of Kayenta and Hohokam populations, an observation garnering further support from genetic distance studies of human remains (Whittlesey et al. 2000). Yet, the most distinctive (and only consistent) feature of the Salado phenomenon is Salado
polychrome ceramics. Consisting of three sequential ceramic types made between the late A.D. 1200s and mid-A.D. 1400s, Salado polychrome bowls and jars were widely produced by Kayenta immigrants and decorated with a number of different design styles. What unites Salado polychromes, however, is the consistent use of red slips and black and white painted designs to effect a consistent set of symbols amounting to an iconic system. Crown’s (1994) definitive study of Salado ceramics links their popularity to the success of a Southwest regional cult. The symbolic content of the painted ceramics indicates that this religious movement was associated with rain, fertility, and community well-being. Common design motifs and icons that expressed this ideology include representations of serpents, clouds, lightning, flowers, feathers, and birds. Scholars agree that this ideological component of the Salado phenomenon provided a mechanism for integrating the diverse peoples who came together in the Salado area as a consequence of joint land use, immigration and coresidence. The resultant coalescent societies were fewer in number than preceding periods but occupied larger settlements. They transformed the social landscape of the southern Southwest dramatically by causing broad social disruption and stimulating both economic competition and intensification of interregional exchange (Hill et al. 2004). For reasons that are unclear, but which may have included environmental degradation and social conflict, the Salado pattern ceases to be a recognizable phenomenon by ca. A.D. 1450 when large portions of southern Arizona were depopulated.

Reconstruction of Salado origins and affinities can be juxtaposed against the less well understood Sinagua archaeological pattern centered on the Flagstaff area (Kamp
and Whittaker 1999; Pilles 1996; Plog 1989). Here, a distinctive local tradition is discernible by about A.D. 600 in terms of settlement pattern, ceramic and architectural styles, and less reliance on farming as compared to their Kayenta Ancient Pueblo, Mogollon, and Hohokam neighbors. Culturally, the Sinagua area is often viewed as a “melting pot” in which local peoples were joined by small numbers from the Kayenta, Mogollon and Hohokam regions. Early interaction among these regional cultural traditions appears by at least the ninth century A.D., but it is not until the mid-A.D. 1000s that cultural diversity fluoresces. Debate continues about the stimulus behind and timing of Sinagua cultural mixing, but current models favor a combination of environmental and social factors, including contemporaneous demographic expansion in neighboring regions that may have made population movement into the Sinagua region attractive. Kayenta Pueblo and Mogollon influences are best attested in ceramics and architecture, which may speak less to migration rather than increased interaction, while a stronger Hohokam presence is implicated by a single pithouse at Winona Village, similarity in textile structures (see Kent 1983a; Raney 2005; Teague 1998), and more than a dozen ballcourts that suggest adoption of Mesoamerican-derived ceremonial elements. Although population movement has been deemphasized in some current reconstructions, it is clear that it did play a role and that the most significant influx was from the Hohokam region. Ultimately, the Sinagua area was depopulated by A.D. 1400, and scholars generally agree that most joined groups who would later become Hopi and Zuni peoples. The complicated Sinagua example is particularly intriguing because, rather than simply illustrating the introduction of new cultural features, archaeologists detect a
blending of features from Ancient Pueblo, Mogollon, and Hohokam regional traditions that result in a new cultural pattern in the apparent absence of an obvious over-arching ideological system.

Summary

Apprehending motivation for, and detection of, population movement (particularly migration events) that creates situations amenable to the coming together of groups from diverse backgrounds has dominated Southwest investigations, but as several recent scholars have noted this effort has been at the expense of considering impacts for individuals and communities (Clark and Reed 2011; O’Donnell and Ragsdale 2017; Ortman and Cameron 2011; Stone 2015). But this focus is not without good reason, as consideration of impacts requires identification and detailed examination of the character of the movement. The most important observations are that no single artifact or feature identifies any one cultural or social group and the features which may signal the presence of peoples of diverse backgrounds are context-dependent, varying by time, place and group.

In a review of research on population movement in the prehispanic Southwest, Ortman and Cameron (2011) identify several variables that influence the material visibility of population movement. They include the distinctiveness of the group(s) prior
to movement, the nature of integration in the host group or community, the social status of the migrants in relation to their hosts, the availability of raw materials, and the choices the moving group makes with respect to how strongly they wish to signal their cultural beliefs and practices. Among these factors group size and social status figure prominently because they have the most materially visible consequences for integration of the migrants into a new community or assertion of their distinctive origins and identities. The high communicative or signaling quality of communal architecture and ceramic decoration, as well access to as exotic and high status goods, makes patterning in these materials particularly well suited to interpreting wealth and status differences, and the negotiation of identities. Group size, often tied to the distance traveled, can and often does accentuate these patterns, but the nature of migrant-host interaction is also conditioned by the duration of coresidence and can fluctuate between periods of cooperation and conflict. In general, the longer and more extensive the interaction, the more likely that new blended or hybridized identities and social formations will arise.

Lindsay (1987) compared the Point of Pines migration event with three San Pedro Valley Salado sites and saw similarities in duration of migrant-host coresidence (10-20 years) as well as evidence of migrant assimilation. Taking a more systematic approach, Stone (2003) examined three cases of Kayenta migration to east-central Arizona and concluded that while migrants occupying the enclave at Point of Pines expressed their shared identity (ethnicity in her terms) consistently in overt ways, at Grasshopper and Silver Creek they did not. With respect to the Point of Pines case, Stone suggests that the relatively large migrant group size facilitated the maintenance
of traditional social and ritual practices, illustrating that while coresidence provides ample opportunities for identity signaling, the precise nature of that signaling is relational and context-dependent. Her more recent reexaminations of the Point of Pines data complement this assessment, but she speculates further that while shared ritual practice was critical to successful host-migrant integration, it was ultimately a source of conflict for coresident Kayenta and Mogollon peoples as community growth culminated in an excessively full ritual calendar (Stone 2015:87).

Inferring the consequences of sociocultural heterogeneity archaeologically can be as, if not more, challenging than detecting population movement and untangling the nature of social interaction. And our reconstructions are, of course, post hoc and only as good as the data on which they are based. The preceding historical and archaeological reviews demonstrate the sheer variability of impacts resulting from distinctive site and community histories, as well as the role of historical connections and social networks among groups. All of this implies that a contextual, case-by-case approach is best suited to addressing questions about impact and cultural social diversity. Such a “bottom-up” approach appreciates the actions of multiple independent smaller social groups in creating and maintaining regional patterns of social interaction and absolutely requires attentiveness to spatial as well as temporal scale. Social identities, boundaries and interaction operate differently depending on scale, whether it be scale of movement, migrant group, or receiving community.

Historic cases show that language differences generally play a minor role in structuring gene flow but in some settings may foster intra-community conflict when
language is used strategically to assert or maintain a distinctive identity. Ceremonial and ideological contributions borne by new social groups also emerge as critically important to the successful reception and integration of new social groups (Parsons 1939:968-973), and archaeological cases such as the Salado further imply that this was a frequent, but not required, condition for the cooperation of different social groups in prehispanic times, too. The historic and archaeological records further demonstrate that a perennial source of conflict in heterogeneous communities derives from tensions arising from competing interests among different social groups, not the least of which result from issues surrounding land ownership and competition over economic resources.

An influential model of land ownership and community social seniority according to priority of arrival has been developed from ethnographic studies of Pueblo peoples, especially at Hopi (Eggan 1950; Dozier 1970; Kroeber 1917; Levy 1992; Titiev 1944; Whiteley 1998, 2008), and appears to have wider applicability throughout the historic and prehispanic Southwest. The model is difficult to validate archaeologically but finds support insofar as identified immigrant groups often occupy the spatial and social peripheries, at least initially, of their new homes (Ellis 1959; Herr and Clark 1997; Kohler and Root 2004; Snow 2012). Accordingly, first comers have the opportunity to control key lands and other resources, establish community traditions, and shape religious ritual. However, as Bernardini and Fowles (2011) point out, this first-versus-late binary opposition can be too simplistic, as first comers at Hopi and Taos are known to have been usurped by latecomers through a combination of ceremonial clout and physical force. The upshot is that settlement layout and development are important factors to
consider when evaluating impacts of cultural and social diversity for sites and communities, but there remains no single set of predictable social outcomes when diverse peoples come together.

By design I have largely omitted discussion of the archaeology of Chaco Canyon and the regional system from the preceding discussions, but current research provides a wealth of relevant data with implications for the understanding the issues raised by evidence for cultural and social diversity elsewhere in the prehispanic Southwest. It is with the foregoing in mind that I now turn to an overview of Chaco Canyon and the Chaco Regional System before summarizing the most pertinent evidence available for cultural and social diversity.

**Note**

1. I omit consideration of Kidder’s (1920; see also Keur 1944) well-known hypothesis of Navajo-Pueblo coresidence at “pueblito” sites in the Gobernador district during the A.D. 1700s in light of accumulating data strongly implying that they were constructed and used solely by Navajo peoples (e.g., Sinkey 2004; Towner 2003; see also Van Hoose 2008).
Chaco Canyon has been the focus of intensive archaeological study and debate for over a century and has played an important role in the development of both Southwest archaeology, specifically, and American archaeology, generally. Today, about 16 km² of the canyon comprises the Chaco Culture National Historic Park, which was established in 1907, and much of the land surrounding the park is held by the Navajo Nation. The canyon is a sacred landscape for many Native American groups, source of pride for New Mexico’s residents, recognized UNESCO World Heritage Site, and important tourist destination.

The canyon’s rich human past, extending back at least 10,000 calendar years, is most remarkable for the transformation of small farming villages into a canyon-spanning community typified by multistory core-veneer masonry buildings called “great houses,” beginning in the ninth century A.D. During this time Chaco Canyon and its most well-known great house, Pueblo Bonito, became the center of a regional system extending beyond the bounds of the San Juan Basin into the twelfth century. The dramatic developments of this era have long seemed at odds with the desiccated and seemingly inhospitable environment of the canyon as it appears today.

In this chapter I survey the archaeology of Chaco Canyon and the regional system to trace what archaeologists currently understand of its origins, florescence, and
decline. This provides a foundation for understanding the temporally and spatially
dynamic social landscape of the prehispanic Southwest that influenced, and was
influenced by, Chaco Canyon’s cultural developments. A final section considers in
greater detail evidence cited for cultural and social diversity within Chaco Canyon and
across the regional system that informs this study. This exercise points to a number of
patterns relevant to this study while highlighting some of the potential organizational
impacts of diversity yet to be fully examined.

**Chaco Canyon and the Regional System**

*Environment and Subsistence*

Chaco Canyon is situated in northwestern New Mexico in the western San Juan
basin, a geologic structural basin covering around 12,000 km² and encompassing much
of northwestern New Mexico, southwest Colorado, and adjacent parts of Arizona and
Utah (Vivian 1990; Figure 3.1). This roughly east-west trending canyon system is some
30 km long and ranges from a half a kilometer to one kilometer in width. It varies in
depth from about 80 to 180 m, and local elevations can range from about 1,500 to 2,500
m. The canyon floor is bisected by an ephemeral river, the Chaco River (Wash), which
ultimately joins the San Juan River northeast of the Chuska Mountains.
As with the San Juan Basin more broadly, the canyon’s climate is semi-arid with high annual temperature variation (-31 to 41° C) and frequent short- and long-term precipitation fluctuations that have contributed to the Chaco Wash’s dynamic history of
aggradation and entrenchment over the last few millennia (Force 2004; Force et al. 2002; Love et al. 2011; Vivian et al. 2006). Although the canyon has experienced no major climatic shifts over the last 10,000 years, paleoenvironmental reconstructions show that regional climate has always fluctuated (Dean 1992; Hall 1988). Current climatic reconstructions for the canyon are informed by regional and local packrat middens, pollen records, and floodplain stratigraphy, but rely heavily on tree-ring records that facilitate high resolution reconstruction of precipitation over time. Roughly the last 1,400 years are of most interest here because broader trends in precipitation largely correlate with cultural developments (Dean 1992; Sebastian 1992; Vivian et al. 2006; Windes 1987, 1993).

In broad brush strokes, extant data show that the lengthy period between about A.D. 600 and the early 1000s was generally marked by above average precipitation that would have made the canyon one of the most well-watered localities in the region. This is all the more notable because a decline in total moisture culminating in a major drought between circa A.D. 850 and 900 in the Northern San Juan appears to have only minimally impacted the canyon’s water tables. In subsequent decades this trend towards increased precipitation persisted with sporadic dry spells until A.D. 1030-1050, when the second worst drought period is documented for the Chaco era. Moisture conditions improved for several decades until A.D. 1080 to 1100 when records show a brief but severe drop in precipitation. This was followed by three very wet decades terminating in the onset of the most severe drought of the Chaco era, which lasted until A.D. 1180. After the late twelfth century environmental crisis, regional climate
ameliorated but was struck again by dramatically falling precipitation during the "Great Drought" of A.D. 1276 to 1299, which was in turn followed by prolonged climatic irregularity throughout the 1400s (Dean et al. 1994; Vivian 1990).

Faunal resources in the canyon and throughout the San Juan Basin vary substantially through time and across space, depending on climate, elevation, time of year, and human utilization (Akins 1985; Cully 1985; Mathien 2005:43-45). The remains of small mammals such as cottontail rabbit (**Sylvilagus** sp.), jack rabbit (**Lepus** sp.), and prairie dog (**Cynomys gunnisoni**) dominate faunal assemblages, while large game including pronghorn antelope (**Antilocapra americana**), mule deer (**Odocoileus hemionus**), elk (**Cervus elaphus**) and mountain sheep (**Ovis canadensis**) provided important contributions. Other small mammals, such as several species of squirrels and rodents, are frequently documented as well. Various bird and carnivore species appear to have been used largely for feathers, ornaments, and hides for ceremonial purposes. Birds, in particular, are well represented, and this attests to the presumed importance of their feathers and bones for material culture rather than food, much as they are among historic Pueblo peoples (Ainsworth et al. 2018; Akins 1985; Parsons 1939; Watson 2012). Recovery of macaw bones from species indigenous to southern Arizona and Mexico from five great houses and one small house site indicates the strong desire for these nonlocal species’ feathers, probably for ritual activities (Akins 1985; Crown 2016a; Watson et al. 2015).

Faunal assemblage composition, generally comparable for small and large sites, indicates the perennial importance of small mammal hunting between A.D. 600 and
1200, while multiple records indicate the onset of intensified large game hunting by the early A.D. 1000s (Akins 1985; Badenhorst 2008; Grimstead et al. 2016a; Hamilton et al. 2018; Watson 2012). Beginning around A.D. 1100, large game abundance in faunal records declines, coincident with a rise in cottontail rabbits and turkeys (*Meleagris gallopavo*), both within Chaco Canyon and across the San Juan Basin (Badenhorst and Driver 2009). Turkey, long valued for its feathers, apparently became more important as a food source by the mid-A.D. 1100s, and was possibly introduced from other areas to offset decreased availability of small mammals (Badenhorst and Driver 2009; Grimstead et al. 2016b; Vivian et al. 2006). Yet, despite these broad patterns, site-specific studies indicate spatial and temporal variability. For example, Watson’s (2012, 2014) detailed analysis of faunal remains from two small sites located on the south side of the wash across from Pueblo Bonito shows increasing dependence on large game between A.D. 850 and 1150 that suggests redistributive and/or feasting behavior tied to communal ritual.

Present-day studies of canyon flora identify overlapping but distinctive vegetative communities that characterize the different elevation zones within the canyon (Cully and Cully 1985; Mathien 2005:37-43). Pinyon-juniper woodland, in which one-seeded juniper (*Juniperus monosperma*) prevails, covers the higher elevations of Chacra Mesa along the southwest margin of the canyon, while shrub grassland is found across the uplands north of the canyon. Notably, evidence from packrat middens shows that conifers suitable for construction timbers were never common in Chaco Canyon, even prior to substantive human occupation (Hall 1988). Beneath the canyon’s
sandstone cliffs and above the floodplain are rocky benches exhibiting thin soils that are attractive to a mix of grasses as well as shrubs, with fourwing saltbush (*Atriplex canescens*) as the most abundant. Floodplain vegetation consists primarily of saltbush, black greasewood (*Sarcobatus vermiculatus*) and grasses. At the canyon’s lowest elevations within the erosional channel of the Chaco Wash there is riparian, woody vegetation dominated by rabbitbrush (*Ericameria nauseosa*) and black greasewood, with some cottonwood (*Populus fremontii*), sandbar willow (*Salix exigua*) and the invasive tamarisk (*Tamarix chinensis*).

Farming provided the primary means of subsistence for the occupants of Chaco Canyon for at least the last 2,200 years, though corn (*Zea mays*) agriculture may have been practiced as early as 4,000 years B.P. (Coltrain et al. 2007; Hall 2010; Toll et al. 1985; Windes 2015). Corn was the most important cultivated plant, assumed by most scholars to have underwritten the significant labor necessary for eleventh century A.D. building spikes, but beans (*Phaseolous vulgaris*), squash and gourds (*Cucurbita* spp.) were also grown. Preserved plant remains, pollen, and human fecal contents from archaeological contexts show that while corn constituted the dietary staple, wild plant foods, especially grasses and weeds, routinely supplemented cultivated crops.

Chaco Canyon has historically been viewed as a marginal environment for agriculture and any success ancient inhabitants had was viewed as owing to concentration in agriculturally productive portions of the canyon and implementation of intensified farming practices that capitalized on local geomorphological features to enhance agricultural potential (Benson 2011; Schelberg 1984; Vivian 1990; Wills 2017;
Wills et al. 2016). Although additional work is needed to substantiate initial findings (see Benson 2012; Cordell et al. 2008; Drake et al. 2014), isotopic sourcing of corn cobs from Chaco Canyon suggests that a portion of the canyon occupants’ corn may have been imported from points west, north, and south during the Bonito Phase (Benson 2010, 2012, 2017; Benson et al. 2003, 2008, 2009; Grimstead et al. 2015). Recent field studies and geospatial modeling, however, provide good evidence to challenge prior assumptions of Chaco Canyon’s agricultural marginality, suggesting that certain areas of the canyon are far more productive than has been appreciated (Dorshow 2012; McCool et al. 2018; Tankersley 2017; Tankersley et al. 2016; Wills and Dorshow 2012; Wills 2017; Wills et al. 2014). Coupled with paleoenvironmental data suggesting periods of elevated precipitation and water tables during the height of the Chaco era, a strong case can be made that locally high carrying capacities were part of what made the canyon attractive to ancient farmers (Wills 2000; Wills and Windes 1989; Wills et al. 2016).

Archaeological Overview

Understanding the sociopolitical and economic transformations that characterize the Chaco phenomenon during the Bonito phase dated between A.D. 850 and 1140 requires consideration of what came before and may have contributed to them, as well as what followed the regional system’s disintegration so that we can track lasting repercussions. Cultural chronology is vital to this task, and while ceramic styles and an extensive tree-ring database for the canyon afford decadal- and even annual-scale reconstructions,
there are gaps and periods with coarser resolution that make it difficult to precisely date specific features and deposits. Multiple temporal phase schemes have been employed over the years to characterize Chacoan cultural change (see Mathien 2005), but for ease of discussion I employ the most current chronology used by Chaco scholars, and when discussing lengthier periods of time I also refer to the more general Pecos Classification (Table 3.1; Figure 3.2).

*La Plata Phase/Basketmaker III, A.D. 500-700.* Basketmaker III (BM III) occupation of Chaco Canyon and the San Juan Basin is well documented if neglected by researchers as compared with later periods (Windes 2015). While the two largest sites (Shabik’eschee and 29SJ423) are located atop mesas overlooking the floodplain, most are found in the canyon bottom near tributary drainages. Recent geological field studies support earlier suggestions that a more extensive distribution of Basketmaker sites throughout the canyon has been obscured by deep alluviation in the floodplain (Hayes et al. 1981:24; Wills et al. 2012).

Sites of this period generally consist of on average three circular pithouse structures with several slab-lined storage cists, making the sizes of Shabik’eschee and 29SJ423 all the more striking, not just for the canyon but the greater San Juan Basin (Reed 2000). Site 29SJ423, located at the west end of the canyon where it joins the Escavada Wash, consists of at least 24 slab-lined houses or bins and was occupied beginning in the A.D. 500s. Shabik’eschee, located 11 km southeast of Pueblo Bonito and dating between the mid-A.D. 500s and early 700s, is one of the largest BM III sites on the Colorado Plateau and has received the most focused investigation (F. Roberts
Table 3.1. Chaco Canyon Cultural Chronology by Thomas C. Windes Correlated with the Pecos Classification (adapted from Lekson 2006a: Figure 1.3).

<table>
<thead>
<tr>
<th>Pecos Classification&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Chaco Canyon Phase</th>
<th>Period (A.D.)</th>
<th>Major Architectural and Demographic Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Pueblo III</td>
<td>Mesa Verde</td>
<td>1200–1300</td>
<td>Reoccupation of Chaco Canyon great houses.</td>
</tr>
<tr>
<td>Pueblo III</td>
<td>McElmo</td>
<td>1140–1200</td>
<td>Little or no building in Chaco. Major population decrease.</td>
</tr>
<tr>
<td>Early Pueblo III</td>
<td>Late Bonito</td>
<td>1100–1140</td>
<td>&quot;McElmo&quot; sites in Chaco. Major great house construction north of San Juan River. Population increase, then decrease.</td>
</tr>
<tr>
<td>Early Pueblo II</td>
<td>Early Bonito</td>
<td>900–1040</td>
<td>Small-house aggregation and increase in number. A number of great houses built in San Juan Basin. Major population increase.</td>
</tr>
<tr>
<td>Late Pueblo I/Early Pueblo II</td>
<td>Early Bonito</td>
<td>850–925</td>
<td>Above-ground slab house sites; small to moderate size.</td>
</tr>
<tr>
<td>Pueblo I</td>
<td>White Mound</td>
<td>800–850</td>
<td>Above-ground slab row house sites; small to moderate size. First great houses appear. Major increase in storage facilities.</td>
</tr>
<tr>
<td>Early Pueblo I</td>
<td>White Mound</td>
<td>700–800</td>
<td>Deep pit houses, dispersed. Limited storage facilities?</td>
</tr>
<tr>
<td>Late Basketmaker III</td>
<td>La Plata</td>
<td>600–700</td>
<td>Shallow pit houses, dispersed. Storage facilities (cists).</td>
</tr>
<tr>
<td>Basketmaker III</td>
<td>La Plata</td>
<td>500–600</td>
<td>Shallow pit houses. Storage facilities (cists). Two large, aggregated communities with great kivas appear.</td>
</tr>
<tr>
<td>Late Basketmaker II</td>
<td>Brownware</td>
<td>400–500</td>
<td>Unknown.</td>
</tr>
<tr>
<td>Archaic</td>
<td>—</td>
<td>pre–1</td>
<td>Unknown.</td>
</tr>
</tbody>
</table>

<sup>a</sup> Conventional dating of relevant Pecos Classification stages includes: Basketmaker II (1200 B.C.–A.D. 500), Basketmaker III (A.D. 500–750), Pueblo I (A.D. 750–950), Pueblo II (A.D. 900–1150), and Pueblo III (A.D. 1150–1350). Shaded rows and columns identify the Bonito Phase.
Figure 3.2. Chaco Canyon and the location of major sites (from Lekson 2006:Figure 1.2b, reprinted with permission).

1929; Wills and Windes 1989; Wills et al. 2012; Windes 2015). Current reconstructions envision episodic site use resulting from cycles of seasonal population aggregation that produced an estimated 61 domestic structures reflecting at least two temporally discrete occupations.

Both sites are associated with very large pit structures viewed by many as early Great Kivas, and are near several other BM III sites. Their elevated siting on mesa tops south of the wash and proximity to good agricultural lands and abundant wild resources may partly account for their size. Reevaluation of BM III settlement in Chaco Canyon has led Wills and colleagues (2012) to argue that rather than being independent sites, Shabik’eshee and 29SJ423 represent the eastern and western extremes of a single dispersed Basketmaker community defined by regular interaction and the partitioning
of some decision-making. One implication of this interpretation is that it provides insightful social and historical context for later settlement organization in the canyon. Wills et al.’s recognition of a single BM III community stretching throughout the canyon builds on Windes et al.’s (2000; see also Windes 2015) observation that the earliest great houses built in the A.D. 800s and early 900s were focal points for large dispersed communities, and suggests greater time depth to, and perhaps continuity in, emergent social formations that may have facilitated the development of the Chaco regional system.

*White Mound Phase/Pueblo I, A.D. 700-850.* Throughout the eighth century and up until the late ninth century, while large relatively permanent villages were first emerging in the Northern San Juan region, Chaco Canyon experienced a gradual progression of the settlement pattern that developed during the preceding two centuries, perhaps even lagging behind the rest of the San Juan basin (Lekson et al. 2006:93). At Chaco, settlements consisted of short-lived hamlets of a few families that remained dispersed. After about A.D. 750, pithouses became larger and deeper with above-ground stone structures joined in contiguous units. Surveys within the park document an increase in the number of sites by the end of this period, although chronological misidentification and alluviation in the canyon bottom may require considerable revision of site numbers (Hayes et al. 1981; Wills et al. 2012; Windes 2015; Windes and Van Dyke 2012).

No early A.D. 800s settlements are known from Chaco Canyon that clearly anticipate later great houses, but two large short-lived settlement clusters about 15 km
south of Fajada Gap in the middle of the Canyon provide valuable clues (Wilshusen and Van Dyke 2006; Windes 2007, 2015; Windes and Van Dyke 2012). These settlements, situated along the South Fork of the Fajada Wash and just to the west of Kin Klizhin Wash, are noteworthy for their size, the presence of great kivas, and intervisibility with prominent landmarks. Notably, the central site of the South Fork settlement, 29MC184, is the only site in the area exhibiting the rare Type 1 Chaco-style core-veneer masonry that was used to construct two adjacent structures visible to the rest of the community. Neither settlement is as tightly clustered as contemporaneous ones in the Mesa Verde region, but both are certainly more so than other settlements in the southern San Juan basin. Ceramic and lithic studies suggest that these communities were founded by people with geographic ties to the south and west in the Grants and Zuni areas, while an ancient road segment connecting the great kiva and 29MC184 suggests greater community integration and corresponding social changes not previously seen (Windes 2015; Windes and Van Dyke 2012).

*Early Bonito Subphase/Late Pueblo I-Early Pueblo II, A.D. 850-1040.* Local and regional population movement and rapidly expanding settlements are hallmarks of the late ninth and early tenth centuries A.D. in the San Juan River drainage. During this period archaeologists also see greater regional boundedness in ceramic styles that suggests shared geographic identities and higher levels of regional interaction (e.g., Cordell and Plog 1979; Hantman and Plog 1982). Following the disintegration of drought-afflicted villages in the Mesa Verde region, migrants apparently moved south along the Chaco River, ultimately following it into the canyon, where more favorable
rainfall likely made it more attractive relative to other locales in the region (Dean et al. 1994; Sebastian 1992; Vivian 1990; Windes and Van Dyke 2012; but see Miller 2018). Settlement growth between ca. A.D. 875 to 950 along the Chaco River and its tributaries, particularly the eastern flank of the Chuskas, supports this view.

Changes within the canyon between about A.D. 850 and 950 include the construction of multiple new small sites (the “Bc sites”) and the first great houses at Peñasco Blanco, Pueblo Bonito, and Una Vida (Windes 2015). Available tree-ring dates indicate the earliest substantive construction at Pueblo Bonito around A.D. 860 (Judd 1964; Lekson 1986; Windes 2003; Windes and Ford 1996), but several isolated dates and undated underlying pit structures (Judd 1964:129-132) suggest earlier Pueblo I site use that is poorly understood. Notably, recent accelerator mass spectrometry (AMS) radiocarbon dates and genetic analyses underscore the scope and magnitude of the cultural developments initiated at this time. Assays on burials from Room 33 in the northwest part of Pueblo Bonito suggest it was used as a crypt by the A.D. 850s, if not the early 800s (Coltrain et al. 2007; Kennett et al. 2017; Plog and Heitman 2010), and ancient DNA results from these same burials demonstrate the existence of a matrilineal descent group that persisted for some 300 years (Kennett et al. 2017). Two of the crypt burials (Burials 13 and 14) are the richest from the canyon and, arguably, the rest of the prehispanic northern Southwest (Akins 2003). Their elaborateness and antiquity as compared to other Bonito Phase burials in trash mounds implies residential interment of higher status individuals 150 to 200 years earlier than had been previously assumed and their close ties to the foundational matriline. Multiple radiocarbon dates on
imported macaws at Pueblo Bonito further suggest that the birds acquired elevated importance for their roles in critical ritual and long distance contacts between A.D. 900 and 975 (Watson et al. 2015; see also Crown 2016a).

Great houses differ from contemporaneous small sites not just in scale but also form during this period (Lekson 1986, 2007a; Lekson et al. 2006; McKenna and Truell 1986; Wilshusen and Van Dyke 2006). Though mirroring small sites in basic layout, early great houses consist of two to three stories of uncoursed core-veneer stone masonry that apparently follow preconceived ground plans characterized by rear storage rooms backing single story living rooms and enclosed ramada work areas (Lekson 1986, 2007a; Vivian 1990). Associated with these structures by A.D. 1040 are great kivas that imply increased settlement integration via communal ritual practice. More numerous than great houses during the tenth and early eleventh centuries A.D., small sites exhibit marked architectural variability that some see as the product of diverse geographic origins of their builders (Lekson et al. 2006; McKenna and Truell 1986; Vivian 1990; Windes 2015; Windes et al. 2000; see also Bustard 1996). Tree-ring width-based comparisons show that some construction timbers were being imported as early as the A.D. 850s, with the Zuni Mountains being the primary source until about A.D. 1020 (Guiterman et al. 2016).

By about A.D. 1000 the scale of canyon great houses exceeds that seen elsewhere in the San Juan basin. Population growth and great house construction continue into the mid-A.D. 1000s, but a possible “hiatus” or at least decline in canyon construction is suggested for the period A.D. 960 to 1020 (Lekson 2007b:32).
Construction at the three earliest great houses continues between A.D. 1020 and 1040, which also sees the addition of the Chetro Ketl and Pueblo Alto great houses near Pueblo Bonito to establish “downtown Chaco” as the canyon’s densest occupation. The A.D. 1030 to 1050 drought undoubtedly stressed canyon residents and may have led to reduced activity in great houses as well as explain the abandonment of many small sites and the aggregation of others (Windes 1987, 1993). Yet, the nature of architectural and settlement shifts during this time implies overall increased population density, unprecedented coordination of construction labor, and the nascent prominence of great house sites as focal points for the canyon community. Evidence further suggests that the architectural landscape of the canyon’s core was structured by ritual and astronomically significant alignments (Fritz 1978; Sofaer 2007; Van Dyke 2007b; Wills 2012b).

While many scholars see the breakup of large villages in the northern San Juan as contributing demographically and socially to the development of Early Bonito subphase great house settlements, great houses in the San Juan basin at this time either predate or are coeval with the early great houses in Chaco Canyon, implying that Chaco Canyon did not become locally dominant until after A.D. 1040 (Duff and Wilshusen 2000; Vivian 1990; Wilshusen and Van Dyke 2006; Windes 2007). Comparative study of early great houses and other San Juan basin settlements indicates the possibility of two varieties of Early Bonito subphase community organization, one centered around great houses and large circular pitstructures in Chaco Canyon, the other emphasizing great kivas in the Red Mesa valley and other portions of the southern San Juan basin (Van Dyke 2007b:89-91; Windes 2007; see also Wilshusen and Wilson 1995). As researchers note, this
pattern may reflect the geographic affinities of the settlements’ occupants. Excepting the early two great kivas at Shabik’eschee and 29SJ423, early Chaco great houses seemingly follow a northern pattern like that seen at McPhee Village where integration was provided via oversized pitstructures. By comparison, great kivas are more common in the southern San Juan basin and reoccur in significant numbers around A.D. 1050 in the canyon (Van Dyke 2007a; see also Altschul 1978). Association of these two nondomestic architectural forms with different settlement layouts beyond the canyon -- compact communities with large pitstructures and dispersed communities with great kivas -- suggests social organizational differences (Windes 2007; cf. Wilshusen and Ortman 1999). Assuming that the greater Chaco region was occupied by both great house-centric groups and great kiva-centric groups reflecting two models of community organization during the Early Bonito subphase, the incorporation of great kivas during the mid-A.D. 1000s may be seen as signaling the merger of these organizational structures within the canyon-centric Classic Bonito world (Van Dyke 2007b:91).

Classic Bonito Subphase/Pueblo II, A.D. 1040-1090/1110. The period between A.D. 1040 and 1100 delineates the Classic Bonito subphase, when community structure and most other elements associated with the Chaco regional system emerge, signaling the achievement of a level of cultural florescence and influence unparalleled in Southwestern archaeology (Lekson et al. 1988; Mills 2002). During this time Chaco Canyon is considered to be the core of an extensive regional system spanning nearly 80,000 km² of the San Juan River basin and adjacent uplands integrated by formalized pathways (often called roads), the circulation of nonlocal goods and the sharing of ritual
A discernible rise in imported goods initiated during the preceding subphase increases dramatically, and the development of an inequitable distribution of goods is underscored by their concentration at great houses as compared to small sites (Cameron and Toll 2001; Toll 2006). Gallup-Dogoszhi-style decorated ceramics are most abundant by A.D. 1040, and significant numbers of painted and utility wares were being imported to the canyon from various sources. One of the most important sources for goods appears to have been the Chuska Valley some 80 km to the west, from which more than half of the corrugated utility wares derive, in addition to large quantities of Narbona Pass chert for flaked stone tools (Arakawa et al. 2016; Cameron 2001; Judd 1954; King 2003; Toll and McKenna 1997).

During this period Pueblo Bonito witnessed significant new construction and received quantities of luxury or exotic goods exceeding those at all other great houses (Judd 1954; Neitzel 2003; Pepper 1920). By the late A.D. 1000s, Pueblo Bonito largely resembled its current architectural footprint of nearly 350 rooms, 32 kivas, and 3 great kivas (Lekson 1986; Windes 2003). In addition to the profusion of shell and turquoise ornaments recovered from Pueblo Bonito dating to the Classic Bonito subphase (Hull et al. 2014; Mathien 2001; Mattson 2015, 2016a; Windes 1992), numerous other goods indicate long-distance exchange with the Hohokam and Mogollon regions and Mesoamerica (Cameron and Toll 2001; Nelson 2006; Toll 2006). Copper bells, pseudo
cloisonné, and the remains of macaws are well documented Mesoamerican imports, but perhaps the most remarkable discovery is the identification of cacao (chocolate) residue on pitchers and unique cylinder vessels (Crown and Hurst 2009; Crown et al. 2015, 2018; Washburn et al. 2011, 2014; see also Toll 1990; Washburn 1980). Stylistically diverse but made in a form resembling earlier Mayan vessels used in ritual contexts, fewer than 200 of these cylinder vessels are known, and 166 derive from Pueblo Bonito, 112 coming from Room 28 alone (Crown 2018). The restricted distribution of these vessels, and the elaborate preparation required to produce cacao-based beverages among the Maya, suggest the likely importation of not just the beverage’s ingredients and recipe, but attendant ritual practice as well (Crown 2018; Crown and Hurst 2009; Crown et al. 2015).

The major new construction and room additions, many for storage, documented within the canyon from about A.D. 1060 to 1110 imply population growth and tremendous cooperative effort (Lekson 1986, 2007a; Lekson et al. 2006; Windes 2010; Wills 2017). Rough estimates indicate some 200,000 wooden beams were used to build a dozen great houses. Strontium and oxygen isotopic sourcing studies suggest the possibility that some of these architectural timbers were imported from montane sources 75 to 100 km distant (Drake et al. 2014; English et al. 2001; Reynolds et al. 2005; Wills et al. 2014), and tree-ring width-based comparisons reveal a shift in preference by A.D. 1060 to timber from the Chuska Mountains (Guiterman et al. 2016). Given the distances that wood was transported, several scholars have noted that the planning and
harvesting implies silviculture (Wills 2000; Windes and Ford 1996; Windes and McKenna 2001).

With the initiation of multiple new great houses, differences with small sites become more exaggerated as the former diverge from their earlier tenth century A.D. layout. Spatially, great houses predominate on the north side of the canyon, while small site farming settlements are common to the south side. Based on modeled agricultural potential, Wills and Dorshow (2012) propose that individual social groups built and owned multiple great houses in and around the canyon, with their use structured by land use and demographic trends. Following the aforementioned historic model suggesting that earlier settlements would have accrued greater social seniority within the growing community, it appears that the earliest great houses were sited to take advantage of or control agriculturally important portions of the landscape, as suggested by the canyon’s archaeological record (Vivian 1990, 1992; Wills 2017).

Current population estimates during the “peak” of the Bonito phase vary widely, suggesting an upper limit as high as 2,000 to 3,000 for the entire canyon (Dean 1992; Lekson 2015) and a resident population at larger sites ranging from 70 to 100 persons based on numbers of domestic features (Benson et al. 2006a; Bernardini 1999; Windes 1984, 1987). With increasingly reduced estimates of residential populations at many great houses, it is suggested that social mechanisms including periodic rituals, pilgrimages, or trade fairs brought large numbers of people to the canyon (Earle 2001; Judge 1989; Judge and Cordell 2006; Kantner and Vaughn 2012; Renfrew 2001; Toll
2001). However, recent research suggests that the scale of these episodic gatherings has been overestimated (Crown 2016c; Plog and Watson 2012).

Beyond the canyon’s limits, great houses and associated small site clusters thought to be farming villages are referred to as “outlier communities” (Figure 3.3). Over 250 outliers have been identified based on their Chaco-style architecture, great kivas, and Gallup-Dogozhi-style ceramics (Kantner 2003a; Kantner and Kintigh 2006; Kantner and Mahoney 2000; Lekson 1991; Marshall et al. 1979; Powers and Van Dyke 2015; Powers et al. 1983). The nature of these outliers’ relationships to the Chaco Canyon community is debated, but they were clearly variable through time and across space, and many communities may have been affiliated with canyon great houses, providing social linkages for the movement of goods, people and ideas (Altschul 1978; Arakawa et al. 2016; Chuipka and Fetterman 2013; Doyel et al. 1984; Duff et al. 2012; Gilpin 2003; Glowacki et al. 2015; Judge and Cordell 2006; Kantner and Kintigh 2006; Marshall et al. 1979; Murrell and Unruh 2016; Safi and Duff 2016; Toll 2006, 2008; Vivian 2005; Wills 2017; Wills and Dorshow 2012).

The character of developments during this period, including the high volume of imported material, massive building efforts, construction of formalized pathways, water control systems, and aggregation in agriculturally productive areas, supports the view that the Chaco Canyon community underwent a shift in sociopolitical organization (Judge and Cordell 2006; Mills 2002; Vivian 1990). If not simply a continuation of earlier transformations (Kennett et al. 2017; Plog and Heitman 2010), these changes certainly indicate a shift from what came before. Although Chaco Canyon has been the subject of
archaeological inquiry for over a century, recent discussions (Heitman and Plog 2015; Lekson 2006a; Mills 2002; Mathien 2005; Plog 2010; Plog et al. 2017; Wills 2000, 2017; Wills et al. 2012, 2014, 2016) highlight the extent to which scholars still disagree over fundamental questions regarding demography, economic and ritual organization, the nature and extent of Chacoan influence on outlier communities, and sociopolitical organization. Contemporary explanatory models form a continuum ranging from a high

Figure 3.3. Great houses in the greater San Juan Basin and across the Chaco regional system (from Kantner and Kintigh 2006:Figure 5.1, reprinted with permission).
degree of centralized canyon community organization to egalitarian (e.g., Altschul 1978; Earle 2001; Grebinger 1973; Kantner 1996; Lekson 2006c, 2009, 2015; Plog and Heitman 2010; Powers et al. 1983; Saitta 1997; Sebastian 1992; Vivian 1989, 1990; Wilcox 1993, 1999). There is emerging consensus, however, that sociopolitical power was not highly centralized and that ritual played a critical role in the expansion of Chacoan architecture throughout the San Juan Basin (Mills 2002; Sebastian 2006). Roads, Chaco-style architecture, and Gallup-Dogoszhi ceramics with hachure-filled motifs are the principle hallmarks of connectivity within the Chaco system that many scholars now view as reflecting emulation and a shared belief system with attendant ceremonialism, rather than strong integration and overt control by canyon great houses (Brown et al. 2013; Heitman and Plog 2015; Kantner and Hobgood 2016; Kantner and Kintigh 2006; Kantner and Mahoney 2000; Lekson 1991; Meyer 1999; Neitzel 1995; Plog 1990, 2003; Van Dyke 2007b; Van Dyke et al. 2016).

Intrinsic to most of these explanatory models are elements of economy and ritual. While many models acknowledge the importance of both, most tend to emphasize one over the other, with some envisioning competition among aspiring leaders in the context of economic or ritual power that leads to sociopolitical change (Mills 2002; Wills 2000). Reducing the numerous models posited to explain Chaco to economics and ritual is not to ignore the considerable variation in their details, but highlights the two broad dimensions upon which the current models frequently hinge. Primarily economic models emphasize labor mobilization, agricultural and craft production, and the Chaco system’s role in facilitating the movement of goods between
outlying communities and the canyon (e.g., Earle 2001; Grebinger 1973; Peregrine 2001; Powers et al. 1983; Sebastian 1992; Wills 2000, 2001b, 2017). Some scholars see a small group of economically powerful people who managed the flow of goods from residences inside the canyon’s great houses. As yet, however, no goods have been identified outside the canyon that were produced within it. In contrast, models emphasizing an ideological perspective see system integration as largely symbolic and cosmological, with food, goods, and services being brought into the canyon by visitors (Judge 1989; Judge and Cordell 2006; McGuire and Saïtta 1996; Saïtta 1997; Van Dyke 2007b; Yoffee 2001). In this view, powerful religious practitioners held authority and ministered to people in the canyon, with outlying communities and visitors seeking to both participate and emulate.

The roles and importance of economy and ritual undoubtedly fluctuated over time in the canyon and throughout the system, but given the centrality of agriculture to historic Pueblo peoples’ daily and ceremonial life, questions about whether Chaco Canyon’s occupants were agriculturally self-sufficient loom large in all models. As noted above, research (Dorshow 2012; Wills 2017; Wills and Dorshow 2012) suggests that in spite of the high volume of imported goods (possibly including corn), and its present-day inhospitable appearance, the canyon was likely capable of supporting a substantial resident population. Although variable in time and across space, records of rainfall during the Bonito phase suggest extended periods of above-average precipitation that would have made agriculture more feasible and attractive to a wide range of peoples occupying settlements outside of the canyon during a period of demographic flux across
the northern Southwest (Dean 1992; Dean et al. 1994; Vivian 1990; Vivian et al. 2006). It seems likely, then, that models integrating both ritual organization and economic mobilization provide the most explanatory potential (Wills 2000, 2017).

_Late Bonito Subphase/Early Pueblo III, A.D. 1090/1110-1140._ Acknowledging the importance of agricultural productivity to Chaco’s success, most scholars agree that the “beginning of the end” of the Chaco system’s dominance can be traced to a severe drop in precipitation and water tables between A.D. 1080 and 1100 that created an agricultural crisis and likely diminished faith in community ritual practice (Dean et al. 1994; Judge 1989; Judge and Cordell 2006; Sebastian 1992, 2006; Vivian 1990; but see Wills 2009). By around A.D. 1080, great house construction within the canyon and across the San Juan basin had begun to decrease significantly, and there is an inferred population decline. Numbers of exotic goods drop markedly, and animal consumption shifts from large game to small mammals and turkey. At the same time, major great house construction takes place along and north of the San Juan River. Expansion at outlying sites such as Aztec Ruins, located some 80 km to the north on the Animas River, suggests that the system’s center shifted to a more permanent water source around A.D. 1100 (Brown et al. 2008; Judge 1989; McKenna and Toll 1992). Early architecture at Aztec and nearby Salmon Ruins imply construction by Chaco-derived masons with later additions and modifications made by local groups (Baker 2008; Brown and Paddock 2011; Brown et al. 2008; Reed 2006).

Stimulated by a return to higher levels of precipitation between A.D. 1100 and 1130, early 1100s recovery within the canyon is characterized by the construction of
smaller more compact great houses in a new architectural style known as “McElmo,”
and the presence of new ceramic design styles employing organic as opposed to mineral
paint. Earlier interpretations of this shift in material culture within the canyon saw it as a
site-unit intrusion and corresponding influx of a new cultural (ethnic) group with
northern origins (Dutton 1938:94-95; Judd 1959; Vivian and Mathews 1964; see also
Windes 1987). Subsequent studies denied the migration scenario, instead arguing for
local continuity in architectural traditions (Lekson 1986, 2006b, 2007b; Van Dyke 2004,
2007b). Some scholars also saw this architectural shift as signaling the emergence of
some form of dual social organization (Heitman and Plog 2005; Van Dyke 2004; Vivian
1990), but such a proposal need not be exclusive of either of the former. Most recently,
Wills (2009; see also Wills 2018) has marshaled empirical support from concurrent
changes in architecture, ceramics, culinary practices, and refuse disposal, as well as the
possible cessation of important ritual activities, to uphold the McElmo migration
scenario. His observations support a return to the view that there was an intrusion of
northerly peoples, perhaps following an occupational hiatus, during the late A.D. 1000s
and mid-1100s. Earlier use of McElmo masonry at Aztec West Ruin around A.D. 1110,
contemporaneous with Chaco masonry styles, suggests the possibility that Aztec was a
source of migrants to Chaco, possibly joined in later decades by small groups emigrating
from further north after this time (Brown and Paddock 2011; Brown et al. 2013; Duff
and Wilshusen 2000:181). Wills’s synthesis suggests serial reoccupation of the canyon
by distinctively different groups than those directly responsible for prior Bonito phase
developments.
McElmo and Mesa Verde Phases/Pueblo III, A.D. 1140-1300. The succeeding McElmo and Mesa Verde phases encompass the reorganization of communities in the San Juan basin and beyond following the dissolution of the Chaco system.

Unfortunately, inconsistent and changing academic use of the labels “McElmo” and “Mesa Verde” has resulted in various, sometimes overlapping, meanings, both within the canyon and at outliers to refer to Northern San Juan-influenced ceramic styles, actual migrants from Mesa Verde, or just the A.D. 1200s. As understood today, the McElmo phase (A.D. 1140 to 1200) simply denotes the abundance of architecturally defined McElmo sites and associated material culture throughout Chaco Canyon, whereas the terminal Mesa Verde phase (A.D. 1200 to 1300) references canyon reoccupation by small groups with strong connections to the Northern San Juan River region. Most scholars agree that by A.D. 1140 Chaco Canyon had ceased to exist as a unified community (Judge 1989; Judge and Cordell 2006; Lekson and Cameron 1995; Sebastian 1992, 2006; Vivian 1990). A severe long-term summer drought afflicted much of the Colorado Plateau between A.D. 1130 and 1180, and the canyon and San Juan basin were significantly depopulated (Dean 1992; Dean et al. 1994; Roney 1996; Sebastian 1992; Stein and Fowler 1996; Vivian 1990; Vivian et al. 2006). Against this backdrop of climatic change and demographic reorganization, the available evidence suggests that post-Chaco communities retained an appearance of some continuity but with changes in architecture and ceramics, and by extension social networks (Cameron 2009; Cameron and Duff 2008; Durand and Durand 2000; Glowacki et al. 2015; Lekson 2007a; Lekson et al. 2006; Mattson 2016a; Roney 1996; Stein and Fowler 1996). New
great houses in the Northern San Juan region continued to be built and older ones remodeled. By this time, the political and demographic center of the Chaco world had shifted north to the Aztec great house (see Figure 3.1), although scholars debate how central that pueblo was to regional integration after ca. A.D. 1140 (Brown et al. 2008, 2013; Cameron and Duff 2008; Lekson 2009, 2015; Lipe 2006; McKenna and Toll 1992; see also Irwin-Williams 2008). Substantive if punctuated human occupation persisted in the canyon until the mid- to late-A.D. 1200s, though its nature and extent remains poorly understood (Mathien 2005; Sebastian 2006; Vivian and Mathews 1965; Wills 2009; see also Windes 2003:31).

Beyond the bounds of Chaco Canyon, the thirteenth century A.D. witnessed the rise of the Mesa Verde region as a demographic center (Bellorado 2013; Duff and Wilshusen 2000; Lipe 2006; Lipe and Ortman 2000; Varien et al. 2007, 2008). The Cibola area to the south followed a different trajectory, with the establishment of large aggregated towns that drew upon but recast tenets of the Chacoan architectural and ideological tradition (Cameron and Duff 2008; Duff and Lekson 2006; Kintigh et al. 1996; Safi 2015; Safi and Duff 2016; Stein and Fowler 1996; Vivian 2005). Ultimately, intense and persistent drought between A.D. 1276 and 1299 produced agricultural stress and social conflict, resulting in widespread depopulation of the northern Southwest and leaving remnant groups to compete with the expanding territories of increasing numbers of hunter-gathers from the north and west (Reed 1994; Van West and Dean 2000; Varien et al. 2008).
Few would argue that Bonito Phase Chaco’s legacy ended with the dramatic reorganization of the Southwestern cultural landscape after A.D. 1300. Scholars recognize that developments of the Chaco era echoed across succeeding generations to influence Puebloan social and ritual thought and organization (e.g., Bernardini 2011; Brandt 1994; Judge and Cordell 2006; Lekson 2009, 2015; Plog 2011; Ware 2001; Ware and Blinman 2000; Whiteley 1998, 2004). Traces of Chaco are not only found materially and organizationally, but also persist in the oral traditions of many indigenous peoples today. No fewer than 25 contemporary Southwestern Indian nations recognize an affiliation with Chaco Canyon, and 20 of these tribes are deemed “culturally affiliated” under the NAGPRA (McManamon 1999; Schillaci and Bustard 2010). That the canyon was, and remains, a central place for numerous indigenous Southwestern peoples is well attested by its rich archaeological record, transcribed traditional narratives that record its role in tribal histories, and contemporary beliefs and practices connecting the canyon to living societies (e.g., Begay 2004; Goin and Lippard 2013:147-151; Kuwanwisiwma 2004; Swentzell 2004; Warburton and Begay 2005).

Intriguingly, a persistent thread throughout Pueblo and Navajo peoples’ traditions associates Chaco Canyon with a place that, for a time, was almost utopian, with abundant rain, food and peaceful coexistence among its inhabitants (Bernardini 2011; Fowles 2013; Lekson 2006c, 2009:198-200, 2015:145-150; Lekson and Cameron 2011; Lekson and Cameron 2015:145-150).
1995). In the end, however, certain individuals (or the Great Gambler in Navajo stories) became too powerful, and bad things happened as a result. In retrospect, many see the events of the Chaco era as epitomizing a form of society detrimental to people and thus deliberately rejected and remembered by its descendants. Chaco remains salient to indigenous communities today for multiple reasons and continues to be remembered for what happened there. These narratives point to social consequences not necessarily predicated on drought-induced agricultural crises or insufficient attention to religious practices, but which yield a lesson about living with each other for future generations (Hays-Gilpin and Lomatewama 2013).

**Chacoan Cultural and Social Diversity**

The preceding discussions illustrate the complicated nature of both the cultural developments in the northern Southwest between about A.D. 800 and 1300 and the archaeological record by which they are understood. Strong archaeological evidence for cultural continuity with historic Pueblo peoples is complemented by traditional oral narratives, all lending validity to the use of ethnographic analogy to aid archaeological interpretation. Although scholars recognize that the use of ethnographic analogy is not without its problems and that aspects of Chaco era developments likely have no historic Southwestern analog, none would outright reject all use of analogy (Heitman 2007,
2011, 2015, 2016, 2017; Heitman and Plog 2005; Lekson 2006b, 2006c, 2009; Sebastian 2006; Spielmann 2005; Ware 2014, 2017; Whiteley 2015). The question then becomes not whether we should use ethnographic analogy, but how it should be used. Arguably, the best way is to view ethnographies as descriptions of specific points in time that reflect the cumulative histories of the people described. Because analogy to the historic Pueblos has figured so prominently in Ancient Pueblo archaeology, it is unsurprising that arguments for cultural and social diversity within Chaco Canyon draw heavily upon historic and ethnographic data (particularly Dozier 1966, 1970; Eggan 1950; Fox 1967; Hale and Harris 1979; Ortiz 1969). What is surprising, however, is that few who propose cultural or social heterogeneity as a feature of Chacoan society have explored the possible organizational implications of such a condition, particularly since population movement and the coming together of groups from different backgrounds are themes that resonate with oral narratives and contemporary indigenous questions about the past (Bernardini 2005, 2011; Ellis 1967; Lekson and Cameron 1995; Naranjo 1995; Ortman and Cameron 2011:233).

In the sections that follow, I review previous arguments and evidence for cultural and social diversity both within Chaco Canyon and across the regional system between about A.D. 800 and 1300. To make this task more manageable, and to acknowledge the different scales at which social interaction takes place and identities are materialized, I break my review into a discussion of the evidence for cultural and social diversity at three spatial scales that correlate well with common scales of archaeological analysis: regional, community, and site. I do not claim this to be an exhaustive review given the
voluminous literature out there on Chaco, but I have tried to be thorough in identifying published arguments and various lines of evidence for diversity. I have already mentioned some of these cases and only briefly reiterate them here. In the concluding section I revisit the scales of cultural and social diversity in the prehispanic Southwest and suggest some of what can be gained by investigating this topic within the context of Chaco archaeology.

*Evidence for Regional Diversity*

To examine regional-scale diversity we can consider the Chaco region, or alternatively the “Chaco World” encompassed by the Chaco system, as represented by great house communities distributed across the northern Southwest (see Figure 3.3). The boundaries of this region vary depending on the time period, criteria used to define them, and the researcher drawing the boundaries, but roughly extend from the Little Colorado River in eastern Arizona on the west to Cuba, New Mexico, on the east, and from Monticello, Utah, in the north to just above the Mogollon Rim in west-central New Mexico on the south (Chaco Research Archive 2018; Kantner 2003a; Kantner and Kintigh 2006; Kintigh 2003; Lekson 1991). Though imperfect for the analytical and interpretive reasons just mentioned, this regional boundary is sufficient for present purposes because we are interested in regional-scale patterns for which rigid boundaries are not required. However, the notion that the Bonito phase produced a regional “system” merits additional discussion.
By definition, conceptualizing “things Chaco” as a regional system, implies connectivity and the working of its components in concert such that a degree of unity is imparted. Although the nature of such unity is debated, and varies depending on the line of evidence, “system” is a useful heuristic that implies more intensive interaction and exchange of goods and ideas within the region than between Chacoan peoples and their non-participating neighbors (Crown and Judge 1991; Vivian 1996; but see Kantner 2003b; Reed 2004:56). The danger of envisioning Chaco as a system, as Wolf (1987:22-23) reminds us, is that such a rigid conceptualization reifies Chaco as the dominant core and outlying communities as the subordinate periphery. It is more realistic to acknowledge individuals and communities beyond the canyon as, to varying degrees, active participants in and contributors to the full range of cultural developments that archaeologists have identified.

While I use the concept of regional system here and throughout to reference the degree of integration and connectivity that archaeologists discern, I do not imply a relationship of power or a singular function of the system at a macro-scale. Rather, I consider the varied backgrounds and interests of constituent social groups and factions within and across the system to explore social dynamics as a structuring variable. Focusing on interaction in a broad sense helps alleviate issues with economic dependency within the system by allowing dependency to subsume not only economy but information, interaction, and ideology among communities. Furthermore, as Vivian (1996:46) notes, it mitigates the risk of thinking about the Chaco system as a static
entity that existed to “do something,” rather than an internally dynamic system during the 200 or more years of its existence.

Evidence for regional cultural and social diversity throughout the Chaco system is both abundant and imprecise. Stated another way, although there is ample evidence for region-wide diversity, few studies have taken this question up as an empirical matter. For so large a geographic area, the absence of heterogeneity would be startling, but more than a century of archaeological research in the Southwest shows that this vast area, coincident with the Ancient Pueblo tradition on the Colorado Plateau, also overlaps with the permeable boundaries of adjacent traditions in the Hohokam and Mogollon regions.

As noted earlier, the late ninth and early tenth centuries A.D. in the San Juan basin were demographically dynamic from the twin perspectives of population movement and social organization, with evidence indicating the movement of peoples from formative villages in the Northern San Juan region south down the eastern flanks of the Chuska Mountains and along the Chaco River to Chaco Canyon (Varien et al. 2008; Windes and Van Dyke 2012). As noted earlier, several researchers have proposed that early great house settlements may have conformed to at least two different organizational models, one centered on large circular pitstructures and the other great kivas (Windes 2007; Van Dyke 2007b). There is growing interest in understanding variability among later outliers, but a great deal of new work is required, specifically including more excavation of outlier settlements. Formalized pathways, often called roads, communications systems such as signaling stations, as well as material exchange,
all suggest principally localized interaction among outliers, giving the impression “not of a unified whole, but rather a disconnected heterogeneity” (Kantner and Kintigh 2006:175).

Current evidence for cultural and social diversity among outliers largely rests on studies of architectural variability and ceramic styles, which may at first seem to be circular thinking given the observation that Chacoan architectural conventions and Gallup-Dogoszhi-style decorated ceramics are used to identify settlements as outliers. Yet, studies of ceramic exchange at outliers, while showing great variability, generally affirm that the majority of ceramics were locally produced and consumed (Kantner et al. 2000; Neitzel et al. 2002; see also Duff and Nauman 2010). With respect to outlier architecture, diversity through time and across space is emphasized over similarity in the fundamental aspects of great house construction (Cooper 1995; Durand 2003; Gilpin 2003; Kantner 1996; Kantner and Kintigh 2006; Lekson 1991; Meyer 1999; Murrell and Unruh 2016; Van Dyke 1999a, 1999b, 2003; Vivian 2005).

Drawing on approaches to technological style, Meyer (1999) and Van Dyke (1999a, 2003) conducted detailed analyses of architecture at samples of outlier communities. Meyer examined four canyon great houses and eleven outliers and delineated three major regional construction syntaxes for Chacoan walls. He further demonstrated that the four types of masonry facings associated with Chacoan construction do not appear in chronological order. His findings suggest that most if not all outlier great houses were locally built, laying to rest the idea that outlying great houses were all built by the same masons working in Chaco Canyon. Van Dyke’s study
focused not on masonry but settlement layout, and found strong contrasts between northern and southern outliers in a sample of 61 great houses from 55 outlier communities.

Related to these studies, a primary question driving recent research in the Middle San Juan River region between Mesa Verde and Chaco Canyon has been the extent to which migration, emulation, or a combination of both are responsible for Chacoan features in the late eleventh and early twelfth centuries A.D. (Reed 2006, 2008, 2011a). Results of the analyses of settlement patterning (Reed 2011b), architecture (Brown and Paddock 2011), ceramics (Washburn and Reed 2011), and ritual wooden artifacts (Webster 2011b) from the Salmon and Aztec Ruins great house settlements indicate initial small group migration from Chaco Canyon that joined and mixed with local peoples between about A.D. 1090 and 1130. Because there is more evidence for emulation and, as of yet, little evidence for Chacoan migration at other great houses (but see Baldwin 1987, Varien et al. 2007:289), the Late Bonito subphase migrants detected at Salmon and Aztec may be a function of the early A.D. 1100s shift of the system’s center to Aztec Ruins. Taken together, these data support the view that the incorporation of Chacoan elements in Middle San Juan great house settlements, as at other settlements within the region (Kantner and Kintigh 2006; Meyer 1999; Safi 2015; Safi and Duff 2016; Van Dyke 2003, 2007b), probably reflects a shared Chacoan ideology or meta-identity that united diverse peoples in a range of collaborative endeavors (Clark and Reed 2011; Clark et al. 2013).
Evidence for Community Diversity

Like “region” and “system,” “community” can be a cumbersome concept because consistent criteria for defining communities archaeologically are rarely applied, and it is often hard to disentangle the notion of physical place from the construction of identity through social relations (Canuto and Yaeger 2000; Chenoweth 2009; Harris 2014; Varien and Potter 2008; Wills and Leonard 1994). Communities of the past were often united through kinship and expressed through mortuary and ritual practices that materialize descent groups within a given geographic space. As identities formed at different scales, kin affiliations intersected community, regional and linguistic boundaries. Aspects of shared identity are expressed through material culture, but inevitably certain practices of affiliation are more visible or salient than others depending on the context. Adler (1994) argues that community development in the northern Southwest was, generally speaking, a two-stage process, the first involving increased co-residence of resource access groups larger than the household and the second involving agglomeration at the community level. Chaco Canyon during the Bonito phase is recognized by some as a dispersed multi-site community (Lekson et al. 1988) and by others as multiple communities with their bounds constrained by agricultural productivity (Wills and Dorshow 2012; Windes et al. 2000). Depending on one’s definition, a sense of community need not be limited to Chaco Canyon. The appearance of widely dispersed settlements (communities) across the San Juan basin showing Chacoan features after about A.D. 1000 suggests a larger Chaco community
corresponding to the Chaco World or regional system (Judge 1991; Kantner and Kintigh 2006; Lekson 1991; see Figure 3.3), though few employ this sense of community for anything beyond the existence of an “imagined community” (Van Dyke 2007a). Acknowledging the problems inherent to defining dynamic communities archaeologically, I rely on the authors’ published identifications of communities and consider a “community” to be a residential group identified by settlement clustering whose members frequently interact with one another in the context of fluid and shifting social relationships (Doyel et al. 1984; Wills 2009). That said, I do think it is reasonable to conceptualize Chaco Canyon during the Bonito phase as a single community, while recognizing that changes through time prevented the canyon-wide community from becoming a monolithic or static entity (see Figure 3.2).

At its peak Chaco Canyon was its best advertisement for itself, highlighting its organization, the secular and sacred resources at its disposal, and connections to distant peoples. The earliest proposals for community-scale diversity in Chaco Canyon have their origins in arguments from the 1930s based upon the identification of architectural and pottery differences that suggest an intrusion of peoples from southwest Colorado (Dutton 1937:186-187, 1938:94; Hawley 1937:118; Hewett 1936:135-138; Morris 1939:204; Roberts 1930:17-18, 1932:12-13). It was Hawley (1937), however, who first proposed a co-residence of peoples from the Little Colorado River area of Arizona alongside groups from the northern San Juan River, setting the stage for what has become the “co-traditions” model of Chacoan cultural and social diversity (Vivian 1997). Integral to this proposal was recognition of the contemporaneity of small sites and great
houses during the Bonito Phase, but architectural data from a handful of Basketmaker III and early Pueblo I period sites have raised the possibility that sociocultural heterogeneity existed even earlier (Adams 1951:291; Vivian and Mathews 1965:29).

Work by Kluckhohn (1939) at the small site Bc 51, across the wash from Pueblo Bonito, supported Hawley’s observations and led him to interpret the site-size dichotomy as a product of two co-resident populations from different cultural traditions, perhaps even speaking different languages as documented at some historic pueblos. Kluckhohn speculated that small site occupants were migrants attracted to the canyon by Chaco’s magnificence and the power of their ceremonialism. Vivian and Mathews (Vivian 1965; Vivian and Mathews 1965) later revived Kluckhohn’s proposal and added a third tradition (phase) that accounted for twelfth century A.D. McElmo architecture in the canyon as a product of migrants from the Northern San Juan. The “McElmo problem” (Wills 2009), discussed earlier in the context of Chaco Canyon culture history, constitutes another argument for community- and site-scale diversity within the canyon.

In considering the nature of social organization in Chaco Canyon, Vivian (1970) accepted earlier reconstructions of a tripartite community and focused his attention on the small site-great house dichotomy during the Early and Classic Bonito subphases. What set Vivian’s work apart from that of his predecessors is his examination of potential mechanisms that integrated these distinct groups and their implications for social organizational variability. In Vivian’s interpretation, the larger sites reflect a town-scale community structure, while the smaller, more amorphous sites are village-scale community analogs. The implication is that this site-size division resulted from two
distinctive social organizational structures related to two cultural groups or lineages that developed over time along unique culture-historical trajectories. Towns were organized along the lines of non-exogamous moieties with a bilocal residence pattern, whereas villages were composed of corporate lineages centered on differing kinship- or ceremony-based allegiances adhering to a matrilocal residence pattern. Intra-community social cohesion was maintained by sharing governmental and ceremonial responsibilities, while relationships between the town and village communities were maintained by a mutual concern for water control and labor for agricultural production. In the years that followed, Vivian (1989, 1990) modified his initial interpretation to include an account of the origins of the two distinct populations identified. He proposed that variability within the canyon resulted from the convergence of two distinct cultural traditions, the earlier from the La Plata area in southwestern Colorado and the other from the Cibola area of west-central New Mexico and east-central Arizona. Building on ethnographic accounts of eastern Pueblo dual organization (Dozier 1960, 1965, 1970; Eggan 1950; Ortiz 1969), Vivian argued that these groups were organized socially according to an egalitarian, rotating sequential hierarchy in which power is shared horizontally (heterarchically) by a limited number of decision makers (cf. Johnson 1982:403) that belong to cross-cutting moieties and sodalities that rotate on a seasonal basis. Importantly, his model accepts Lekson’s (1986, 2007b) argument for cultural continuity in McElmo architecture and does not consider the presence of a possible third tradition or migration.
Vivian’s take on the great house and small site dichotomy is the most detailed, but other scholars have also viewed this architectural variability as implying organizational differences within the canyon, even if the precise meaning of that variation remains poorly understood (Bustard 1996, 1999; Judge and Cordell 2006; Lekson et al. 2006; Sebastian 2006). Vivian (1990:298-299) and Van Dyke (2007b), for example, see evidence in settlement layout at multiple outliers for the existence of a dual division in social organization. That the demographic situation was complicated beyond the dense occupation of the central canyon is also indicated by Windes et al.’s (2000) research farther up the canyon at the Chaco East Community. Windes and colleagues found evidence in architecture, ceramics, and lithics for residential mobility at Chaco East, as well as at nearby Pueblo Pintado. Specifically, they observed that these settlements yielded ceramic and chipped stone assemblages with compositions dissimilar from other sites in the canyon as well as with one another. Windes et al. identified no clear origins for the populations at these communities but noted the possibility of local ties, perhaps with contributions from the large Pueblo I settlements south of Fajada Gap or migrants from north of the San Juan River.

Although none of the above works attempted to link canyon groups to historic peoples, Ford et al. (1972) suggest the presence of both Keresan and Tanoan (specifically Tewa) language-speakers in Chaco Canyon on the basis of ceramic type distributions. Analyses of mortuary data have shed additional light on community-scale diversity in Chaco, as well as the possible linguistic affiliations of some residents. Several studies have incorporated a sample of Chaco Canyon human skeletal remains as part of
larger site and area studies, noting internal heterogeneity as well as affinities between Pueblo Bonito and ancestral Hopi, Zuni, and Tewa sites (e.g., Corrunccini 1972; El-Najjar 1978; Hrdlička 1931, 1935; Ortman 2012; Seltzer 1944). However, the methods and small samples of these studies may skew their results (see Marden 2011). The best-known analyses of biometric variation in Chaco Canyon human remains have been conducted by Akins (1986, 2001, 2003) and Schillaci and colleagues (Schillaci 2003; Schillaci et al. 2001; Stojanowski and Schillaci 2006).

Of the over 450 burials reported from Chaco Canyon, Akins (1986) isolated 179 that were suitable for detailed osteological analyses. A total of 153 were from small sites and 26 were from great houses. Of the total Chaco Canyon sample, Akins found at least 131 individuals to derive from Pueblo Bonito, largely divided among the two burial clusters excavated in the late nineteenth century by Pepper (1909, 1920) in the northern part of the pueblo and Judd (1954) in the western. In addition to surveying trends in development, health and mortuary practices, Akins considered broader biological affinities on the basis of inherited craniometric traits. In her 1986 study she used stepwise discriminant statistical analyses to ascertain biodistance between samples of crania from the north (n=18) and west (n=21) Pueblo Bonito burial clusters, Pueblo del Arroyo (n=2), Fajada sites (n=6), and Bc 59 (n=5) (Akins 1986:Table 4.1). Beginning with nine cranial measurements that are presumably good proxies for genetic inheritance, she had to eliminate five because more than 10% of her sample had missing values. Her findings indicate that the two Pueblo Bonito clusters represented distinct populations more closely related to the other canyon sites in her sample than each
other, with the western burial cluster sharing greater affinity with Bc 59 than any other site, and the northern burial cluster most closely related to the Fajada site group (Akins 1986:75).

Additional evidence from Akins’s (2001, 2003; Akins and Schelberg 1984) research suggests that, within the context of all Chaco Canyon burials, mortuary data support the conclusion that the individuals buried in Pueblo Bonito had higher status than those buried in any of the small sites. She argues that individuals at Pueblo Bonito demonstrate evidence of ascribed status and were also taller and healthier because they had better access to more or higher quality resources (but see Marden 2011:357, 376). Her studies further indicate that great houses exhibit a more formalized mortuary system and there are marked differences between the contents of burials from great houses and small sites, which she takes to be indicative of status differences. The latter proposal received recent support from Plog and Heitman’s (2010:19625) examination of canyon-wide burial patterning. The difference in mortuary patterns between great houses and small sites is interesting, as Akins (1986, 2001) also observes a preference for extended burial at great houses.

Taking a similar statistical approach to variability in inherited craniofacial features, Schillaci and colleagues (2001) examined the potential biological affinities of canyon occupants through comparison with a range of skeletal series spanning the twelfth century through the historic period. Their study affirmed Akins’s (1986) observations that the burials from Pueblo Bonito represent two distinct populations and, although their samples are all quite small (range, n=4-23; mean, n=10.9), Schillaci
et al. identify biological affinities with later groups buried at sites outside the canyon. Specifically, they found Pepper’s (1920) northern burial cluster to align with the (younger) ancestral Zuni sites of the Village of the Great Kivas and Heshotauthla and the Hopi site of Awatovi, and Judd’s (1954) western burial cluster to align with the ancestral Tiwa site of Pot Creek and the (presumed) ancestral Tano/Tewa site of Pindi.

In the context of trying to understand the development of biologically-defined population diversity at Chaco Canyon, Schillaci (2003) tested four models accounting for such diversity against his data derived from quantitative genetic analyses of craniometric variation from Pueblo Bonito (n=27), two Fajada area sites (n=6), Bc 51/53 (n=5) and 15 sites outside of the canyon (range, n=5-56 ; mean, n=10.8), nearly all of the latter considerably post-Bonito phase in age. He found that “the best model for the development of population diversity at Chaco Canyon during the Pueblo II period is that which describes aggregation of regional populations (e.g., Cibola, La Plata, and Dolores area populations) with evidence of gene flow with Rio Grande groups” (Schillaci 2003:239; see also Corruccini 1972). Notably, the level of population diversity Schillaci describes for Chaco Canyon is greater than that observed for historic groups such as the Tewa, Tiwa, and Zuni, whose traditional histories document the coming together of multiple groups. This observation is buttressed by other studies employing similar data sets to assess biological distance (Akins 1986; Ortman 2012). The conclusion that Schillaci draws from these findings is that Chaco Canyon was home to multiple ethnolinguistic groups, possibly from both the Western and Eastern Pueblos who, despite being biologically distinctive, shared a similar material culture repertoire.
Finally, although a few scholars have suggested Mesoamerican origins for some individuals buried in Chaco Canyon (e.g., Frisbie 1978, 2018; Kelley and Kelley 1975; Reyman 1978; Turner and Turner 1999; see also Washburn 2011), I do not discuss these arguments further because most Chaco researchers see no empirical evidence for this (e.g., Bustard 2008; Mills 2002; Nelson 2006). Most importantly, such arguments find no support in extant osteological and genetic studies that conform to a generalized Southwestern pattern indicating regional trends of homogeneity with admixture from nearby areas (e.g., Akins 1986; Kemp et al. 2010; Marden 2011; Malhi et al. 2003; Schillaci 2003; Schillaci and Stojanowski 2003; Durand et al. 2010; Snow and LeBlanc 2015; Snow et al. 2010, 2017). The data available thus strongly argue against Mesoamerican migrants as contributing biological diversity within the canyon.

Evidence for Intrasite Diversity

Studies of architectural, ceramic, and mortuary data that suggest site-scale diversity complement evidence for community diversity and also indicate the likelihood of unappreciated diversity at some settlements within the regional system. The best-known case for site-scale diversity is Pueblo Bonito, based on evidence marshaled by several researchers for multiple groups living side-by-side throughout its occupation. Though not acknowledging Hawley’s (1937) and Kluckhohn’s (1939) proposals in his early publications, Judd (1925, 1927, 1954, 1964; see Vivian 1956) offered a reconstruction of Pueblo Bonito’s occupational history similar to theirs, based on his
excavations at Pueblo Bonito in the 1920s. Judd saw the site’s origin as a Pueblo I pithouse village whose inhabitants, the “Old Bonitians” were unrelated to later occupants. Citing similarities in the configuration of dwelling layouts, storerooms, kivas, and trash mounds, he posited that the nucleus of the site was first established by people from southwest Colorado. These northerners occupied Pueblo Bonito until new settlers, also from the north, arrived around the A.D. 1020s (Judd 1954, 1964). These “Late Bonitians” he considered both more aggressive and progressive as compared to existing occupants and responsible for Pueblo Bonito’s mid-eleventh century florescence. They most clearly differed from the “Old Bonitians” materially in terms of pottery and architecture (Judd 1927, 1954:18-38). The Late Bonitians were ultimately the first to leave Chaco, while the conservative Old Bonitians stayed behind. He writes of their interaction (Judd 1954:36):

The two people were co-occupants for a hundred years or more, and yet the houses they built and lived in, the tools they made and used, differ so much that physical, linguistic, and mental differences between the two may be presumed. The Late Bonitians were aggressive; they usurped leadership of the village immediately upon arrival. In contrast, the Old Bonitians were ultraconservative; they clung tenaciously to their old ways, their old habits and customs. The Late Bonitians created the Classic Chaco culture, most advanced in all the Southwest. The Old Bonitians, dwelling next door, lagged a century behind.

Such a characterization paints a vivid picture of the contrasts that Judd cites as separating the two groups of inhabitants. Though we can be of little certainty about the dispositions and interpersonal relationships that Judd surmises, he does offer a view as to why the two groups lived with each other. Specifically, he posits that they aggregated under the auspices of regional exchange, agreeing to share living space by way of some sort of compact or contractual agreement (Judd 1925, 1954:35). In a sense, Judd
envisioned a New World social contract that preceded the intellectual developments of the European Age of Enlightenment by six centuries. For Judd (1925:91), Pueblo Bonito was simply a “center at which representatives of many unrelated tribes met for barter and trade.”

The principal criteria that Judd used to differentiate the Old versus Late Bonitian occupations at Pueblo Bonito, ceramic design types and architecture (Judd 1927, 1954:19-21, 1964), overlap considerably (but not perfectly) with the differences posited to reflect a new population influx in the McElmo migration model formalized by Vivian and Mathews (1965), which itself identifies the possibility of site-scale co-residence, if not sequential occupation separated by a cultural hiatus (Wills 2009). From his work at the Pueblo del Arroyo great house several hundred yards west of Pueblo Bonito, Judd (1959) argued that del Arroyo was founded by Late Bonitians from Pueblo Bonito. Pueblo del Arroyo is an interesting case insofar as it began as a Classic-style great house to which McElmo style room blocks were added to the north and south in the early A.D. 1100s (Windes 2010). Meyer (1999) views the McElmo masonry style as demonstrably intrusive to Chaco Canyon, employing sandstone from a different local source and faced in a distinctive way. Ultimately, the primary difference between Judd’s reconstruction and the McElmo migration model rests on chronology, with Judd placing the arrival of Late Bonitians as early as about A.D. 1020, and current formulations of the McElmo model seeing immigration around A.D. 1100, or perhaps even as late as 1140 (Wills 2009).
Research by multiple scholars since Judd lends credence to a scenario of at least two spatially and biologically distinct groups occupying Pueblo Bonito, notwithstanding later McElmo re-occupations. Hudson’s (1972) study of measurement systems at Pueblo Bonito showed that while no standardized unit of measure was employed in the building’s construction, two different measurement systems were used between A.D. 1050 and 1115 that correspond to an east-west architectural division. Bustard’s (1996, 1999, 2003; see also Cooper 1995) space syntax analysis of Pueblo Bonito demonstrates a shift towards greater within-structure variability after A.D. 1050 that she suggests may correspond to different sociopolitical groups occupying the pueblo’s southwest and southeast room blocks. Without noting specific rooms, Windes and Ford (1996:302) also mention spatial and temporal clusters of reused wood at Pueblo Bonito that may indicate areas of the site controlled by different groups. It would be interesting to know if any of the rooms identified by Windes and Ford correspond with the rooms and kivas that Judd (Judd 1964:65-66, 183) proposed to have been the work of “foreign” masons.

The bioarchaeological study undertaken by Akins (1986) was the first to provide empirical data on a comparison of skeletons from Pepper’s (1920) northern and Judd’s (1954) western burial clusters, both of which are unique relative to other canyon burials for several reasons. The cluster defined during Pepper’s late nineteenth century excavations comprises four adjacent rooms (32, 33, 53, and 56) situated in the northern part of the pueblo. These rooms yielded the remains of minimally 25 individuals (Marden 2011), more than half of whom were dispersed across the rooms. Large quantities of turquoise and shell ornaments, ceramics, wooden ceremonial items, nine
wooden flutes, and other objects were recovered (Akins 2003; Pepper 1909, 1920). Two male burials (13 and 14), recently directly dated to the ninth century A.D. (Coltrain et al. 2007; Kennett et al. 2017; Plog and Heitman 2010), have stood out to Chaco scholars for their accompaniments of ceramic vessels, jewelry, as well as a turquoise and shell encrusted cylindrical basket analogous to the ceramic cylinder jars. These burials are widely recognized as two of the most elaborate in the prehispanic northern Southwest, and most view these data as indicating these individuals’ higher status and positions of authority (e.g., Akins 1986, 2001, 2003; Kennett et al. 2017; Lekson 2006a, 2006c; Plog and Heitman 2010; but see Marden 2011, 2015). Immediately adjacent Room 28 produced the stunning cache of 112 cylinder vessels thought to date to the eleventh century A.D., and artifact quantities from these and other nearby rooms strongly suggest use as repositories for ritual paraphernalia (Crown 2018).

To the south and west, Judd’s (1954) burial rooms (320, 326, 329, 330) contained at least 95 individuals (Akins 2003), with an estimated 70 percent found in a mixed or disturbed state. Though not as elaborate as the northern burials, the western burials still produced more mortuary offerings when compared to other canyon burials. Included in these room assemblages were a wide range of turquoise and shell ornaments, ceramic vessels, cylindrical pots and baskets, and bifurcated burden basket forms and their ceramic effigies, among other items (Akins 2003; Judd 1954).

Taken together, these two burial room clusters comprise more than 90 percent of the known burial population from Pueblo Bonito and about 25 percent of that from the entire canyon. Their associated mortuary offerings, spatial isolation, and location in
the oldest parts of the pueblo have fueled speculation over their meaning and significance. Recent radiocarbon dating of multiple burials from the northern and western clusters conclusively demonstrates that the rooms served as multigenerational crypts beginning in the early- to mid-A.D. 800s with the interment of Burials 13 and 14 (Coltrain et al. 2007; Kennett et al. 2017; Plog and Heitman 2010; Price et al. 2017). The western crypt developed later, shortly after those rooms were built in the late A.D. 800s, and remained a burial repository with the northern crypt into the late eleventh and early twelfth centuries A.D. (Price et al. 2017). Marden’s (2011, 2015) taphonomic reanalyses suggest that the disarray of the remains in both burial clusters is likely the result of unintentional disturbance of primary interments by human and animal agents over the course of several centuries, as well as some intentional manipulation of individuals’ bones, rather than looting or other processes suggested by some researchers (e.g., Frisbie 2014; Judd 1954; Pepper 1909, 1920).

Genetic relatedness among the individuals interred within each burial cluster has been previously suggested by Akins’s and Schillaci and colleagues’ work, as well as studies noting elevated frequencies of certain inherited skeletal pathologies, including polydactyly (Crown et al. 2016; Marden 2011:204, 333; Mulhern et al. 2006; see also Snow and LeBlanc 2015). The acceptance of Pueblo Bonito’s burial clusters as tombs or crypts associated with different social and/or biological groups has, unsurprisingly, stimulated vocal debate over the nature of Pueblo Bonito social organization, with some proposing that they may reflect an emergent dual division or moiety system that cross-cut great houses (Heitman and Plog 2005; Plog and Heitman 2010). Systematic
evaluation of this issue from a bioarchaeological perspective was first conducted by Schillaci and Stojanowski (2002a, 2003; see also Schillaci 2003; Schillaci et al. 2001; Stojanowski and Schillaci 2006) in response to arguments made by Peregrine (2001; Peregrine and Ember 2002) that the prehistoric inhabitants of Chaco Canyon conformed to a pattern of matrilocal postmarital residence. Peregrine argued that matrilocal residence patterns in a marginal environment stimulated the formation of a corporate network sociopolitical strategy and eventually a Chacoan polity. He based his argument on the fact that a number of the most likely modern descendants of the Chacoans (Hopi and Zuni in his view) are matrilocal and that household floor area had increased to levels indicative of female-based residence, grounded in models derived from cross-cultural data in the Human Relations Area Files (see Porčić 2010). Schillaci and Stojanowski (2002a, 2003; see also Schillaci and Stojanowski 2005) attempted to evaluate this by conducting a biodistance analysis using five craniofacial variables from 16 sites in and around Chaco Canyon and reexamining the architectural data. Their results indicated that the western burial population from Pueblo Bonito bears a relationship to the present-day bilocal/patrilocal Tewa of Santa Clara Pueblo and a more marginal relationship with Zuni. In their view, the architectural data provide no evidence to support the idea that Chacoan communities had living areas that exceeded 100 m², the threshold for matrilocality cited by Peregrine. Schillaci and Stojanowski (2003; Stojanowski and Schillaci 2006) then used sex-specific phenotypic variation to evaluate postmarital residence patterns at Pueblo Bonito. Although the sample sizes are small, their results suggest greater variation in the female samples from each cluster (contra
Akins 1986:75), which they argue is counter to a matrilocal residence pattern where you would expect greater male variation. Instead, they suggest that Chacoans practiced a bilocal residence pattern more similar to Rio Grande Pueblo peoples (but see Cameron 2013:225).

Importantly, insights afforded by recent genetic and isotopic studies, combined with the direct radiocarbon determinations on Pueblo Bonito’s burials, resolve some of the aforementioned questions. Kennett et al.’s (2017) analyses of ancient DNA show that nine burials from Room 33 in the northern burial cluster share identical mitochondrial genomes, with some demonstrating mother-daughter and grandmother-grandson relationships. These data provide strong evidence for a multigenerational matrilineal descent group linked to lineages of elevated social status from Pueblo Bonito’s establishment in the early- to mid-A.D. 800s through the early A.D. 1100s. Price et al.’s (2017) comparison of strontium and oxygen isotope data from skeletal remains from 61 individuals from Pueblo Bonito’s northern and western burial clusters with individuals from sites outside the Canyon to the north and west suggest population stability over 300 years, casting doubt on migration from the north as having played a significant role in cultural developments at the site. A Chaco Canyon origin seems likely for all but two of the Pueblo Bonito individuals, but nearby locales in the southern San Juan Basin cannot be excluded at this time for lack of comparative data. Price et al. (2017) furthermore interpret slight isotopic variation between the northern and western burial cluster populations as possibly indicating that the western cluster reflects a branch derived from the matriline comprising the northern burial cluster.
It is important to keep in mind, however, that these tombs are located in the oldest rooms of the pueblo, which had fallen into disuse by the mid- to late-A.D. 1000s (Windes 2003). Though the burial rooms continued to be used for this purpose, other rooms accumulated trash and building debris. For this reason we cannot assume that burial location corresponds with residence location. In fact, residential use appears to have been focused in the northern arc of rooms until the late 1000s, after which time occupation and use of the pueblo changed decidedly, coincident with the rise in abundance of Chaco-McElmo black-on-white ceramics and McElmo architecture throughout the canyon (Wills 2009; Windes 2003). That directly dated human remains from both burial clusters clearly show use into the early A.D. 1100s implies that at least some aspects of a Classic Bonito belief system persisted into the Late Bonito subphase. Collectively, chronometrics and mortuary assemblages and their patterning provide support for Early Bonito subphase social differentiation and “an effort to establish and legitimize sociopolitical hierarchies through reference to origins, ancestors, and cosmological powers” in a manner similar to what some scholars have termed “house societies” (Plog and Heitman 2010:19624; see also Gillespie 2000; Heitman 2007, 2010, 2015; Heitman and Plog 2005; Mills 2015).

Two spatially separate trash mounds located immediately south of Pueblo Bonito, one to the east, and the other to the west, were investigated for the purposes of recovering burials and ceramics sequences between the late 1900s and 1920s (Pepper 1920; Judd 1954, 1964). Re-excavation of Judd’s exploratory trenches through the mounds by W. H. Wills and the University of New Mexico (Wills et al. 2016) yielded a
substantial quantity of artifacts. Analyzed by Crown (2016c) and colleagues, this material permitted evaluation of a dual division within Pueblo Bonito that might logically be reflected in consumption and discard patterns attested to by the mounds’ contents. Results indicate that the East Mound began to accumulate somewhat later than the West Mound and continued to receive trash for a brief period after the West Mound was no longer in use, and that the contents of both middens are consistent with domestic consumption, episodes of construction, and smaller scale feasting and ritual events (Crown 2016c). Mattson (2015, 2016b) finds technological stylistic differences in Cibola Gray Ware between the East and West trash mounds that may reflect differences in intrasite production or exchange reflecting social group divisions within Pueblo Bonito, and Riggs (2016) notes differences in the discard of modified sherds between the two mounds. These chronological and material differences between the mounds suggest that different groups may have used separate mounds for their trash.

As noted earlier, research north of Chaco Canyon at Salmon and Aztec Ruins has produced mounting evidence to suggest that migrants from Chaco Canyon founded or were at least involved in the initial founding of both settlements between about A.D. 1090 and 1130. This same research program has affirmed evidence for continuous if less intensive McElmo phase occupation of Salmon after this time and proposed a similar scenario for Aztec West (Reed 2008, 2011a). This is contrary to Morris’ (1919, 1928) earlier view that there was a cultural hiatus at Aztec West, after which time Mesa Verdean migrants reoccupied the site. Although a cultural discontinuity cannot yet be fully rejected (Vivian 2008), current evidence suggests the possibility of less intensive
use until around A.D. 1200, after which time there is a more substantive occupation by locals (termed San Juan by Reed and colleagues to minimize confusion with the Mesa Verde label). If verified by future research, a continuous occupation would strengthen the possibility that founders or colonists from Chaco Canyon may have lived alongside local groups at Salmon and Aztec and mixed with them (Brown and Paddock 2011; Irwin-Williams 2006, 2008; L. Reed 2007; P. Reed 2006).

Site-scale research on other great houses outside the canyon is limited but provides supporting evidence for the co-residence of multiple cultural or social groups. Baldwin (1987) compares room size patterns at several sites in Chaco Canyon and the Northern and Middle San Juan regions to explore room size’s utility in differentiating cultural (ethnic, in his terms) groups. Comparison of room size patterns from Bonito phase sites in Chaco with Mesa Verde sites dated between A.D. 1050 and 1175 yielded markedly different patterns, much as one might expect given their differing cultural patterns. Interestingly, a number of sites that architecturally suggest Chacoan influence, including the Escalante, Ida Jean, and Lowry great houses, demonstrate room size patterns intermediate between Chaco and Mesa Verde. By comparison, the Aztec and Salmon great houses fit very comfortably within the room size pattern documented for Chaco Canyon. Assuming that room size patterns are partly determined by learned behaviors, including a culture’s proxemic system, Baldwin argues that these patterns must represent migration and mixed resident populations. Examination of ceramics dating to the Chacoan occupations of the Cox Ranch and Largo Gap great houses in the southern Cibola region of west-central New Mexico have led Duff and Nauman (2010),
and Safi and Duff (2016; Safi 2015) to suggest co-residence by potters linked to Mogollon and Pueblo traditions. At both sites two visibly distinct pottery traditions that were produced on-sites are discernable, implying that potters from both traditions co-resided within room blocks.

A contrasting case comes from excavations further afield at Antelope House in Canyon del Muerto, Arizona (Morris 1986). Considered by some to be a Chacoan outlier (Kantner 2003a) based on the presence of a probable great kiva and limited use of Chaco-style masonry, the site yielded no clear evidence for immigration during its peak occupation between A.D. 1100 and 1270. However, a dual division between the southern and northern room blocks is seen architecturally and materially in corn, utility ceramics, basketry, and matting. Other datasets, such as textiles and decorated ceramics, were more variable and thus inconclusive. One possible but unproven organizational explanation is that the patterned distribution of largely female-dominated activities, in comparison to the lack of clear patterning in loom-woven products (most likely a male-dominated task), suggests a matrilocal residence pattern (see Magers 1986a:246-247; Morris 1986:545).

Studies examining biological diversity at outliers are few because of small mortuary samples. In one study at Aztec West, Schillaci and Stojanowski (2002b; see also Schillaci et al. 2001) examined craniofacial variability in 20 post-Chaco burials (males n=9, females n=11) and found greater variability in females, which they interpret as consistent with a patrilocal postmarital residence pattern akin to that practiced by Tewa language-speaking groups along the Rio Grande. Durand et al. (2010) used
discrete dental traits under genetic control to explore migration in the northern Southwest and found strong affinities between Pueblo Bonito and Aztec Ruins. At Salmon Ruins, Durand et al. (2010) see the post-A.D. 1150 occupation as reflecting biological ties to Pueblo Bonito and Aztec populations blended with local peoples, providing possible support for emigration from Chaco during this time. Greene’s (2011) study of craniofacial traits using a sample from Middle San Juan River region sites reveals a trend of local homogeneity but with indications of blending with populations to the north and south. Although limited in scope, these studies allude to the potential of future biometric examination of outlier mortuary data.

Chacoan Sociocultural Diversity in Perspective

Unsurprisingly, archaeological narratives about the prehispanic Southwest, much like our understanding of the historic period, yield tantalizing evidence indicating that the varied physical landscape of arid mesas, river valleys, and mountain chains was matched by a relatively heterogeneous cultural, social, and biological landscape. Material cultural, architectural, burial, and settlement pattern variability suggest pan-Southwest cultural diversity that is today reflected by the reconstruction of large regional cultural traditions that include Ancient Pueblo, Mogollon, and Hohokam, as well as subregional traditions such as Kayenta, Mesa Verde, Cibola, and so on. These
areal traditions are discernible on the basis of their greater internal similarity and contrast with neighboring traditions. Below the level of the major regional traditions, material correlates indicative of linguistic difference do not leap out at us, but analogy to historic groups ensures that considerable linguistic variability in the past has been masked, both between and among archaeologically defined traditions. These observations are, of course, not new and have provided the baseline for archaeological research in the Southwest since the last quarter of the nineteenth century (Cordell and Fowler 2005; Dongoske et al. 1997; Fowler 2000).

Available evidence demonstrates that not only are cultural and social diversity hallmarks of ancient Southwestern societies, but that the archaeological record also attests to social processes documented during the historic period that promote diversity, including serial migration and aggregation as responses to differing environmental and demographic conditions. The challenge, however, is ascertaining what patterned archaeological variability means in terms of the ancient cultural and social groups who cannot identify themselves to us today. Difficulty in linking ancient cultural and social groups of various sizes to material culture is underscored by the attendant problem of site formation processes and distinguishing among behaviors related to gender roles, subsistence, mobility, or exchange, which cloud the archaeological record. In historical perspective, one obvious trend that is that as data have accumulated, and recovery and analytical techniques improved, it has become easier to ask questions about smaller-scale interaction and social units in the prehispanic Southwest. As culture-historical concerns with defining archaeological
cultures and building chronologies gave way to renewed scientific interest in migration as a social process that structures archaeological variability, more scholars have engaged in this and related issues systematically, leading to renewed interest in oral traditions detailing population movement, social interaction, and social identities (e.g., Bernardini 2005a; Teague 1993; Whiteley 2002a). This corpus of work is amplified by focused archaeological research on social interaction, identities and ethnicity over the last three decades (e.g., Diaz-Andreu et al. 2005; Jones 1997), culminating in the contemporary salience of these topics since the passage of the NAGPRA in 1990, which in certain situations requires us to establish a historically traceable shared identity between a contemporary Native American tribe and a past identifiable group.

The research reviewed above and in Chapter 2 largely reflects these broader disciplinary trends. What we learn from these studies is that behaviors centered on the domestic sphere, or “daily practices,” and their archaeological manifestations are especially useful for investigating identities and interaction at multiple scales. The most relevant data include artifact technological and decorative style, architecture, settlement pattern, trash disposal, mortuary practices, food preparation and cuisine, clothing and adornment, and ritual practice. No one behavior or set of behaviors signifies an identity or form of interaction, but those that embody unconscious learned behaviors are arguably the most culturally conservative and, thus, sensitive to nested identities and scaled social boundaries that inform on cultural origins and affinities.

I have argued previously that, as a concept, social diversity helps minimize the imposition of today’s socio-cultural constructs on ancient groups by focusing attention
on behaviors and organizational structures rather than historic or current sociopolitical
cultural and ethnic units such as tribes or pan-tribal constructs such as “Pueblo” or
“Basketmaker.” This perspective acknowledges that such forms of diversity may,
depending on context, overlap with or correspond to cultural units, but does not
assume it. Appreciating critiques that the Southwest ethnographic record may hold
undue sway over our interpretations of indigenous lifeways during the Bonito phase, the
strong evidence for a high degree of broad demographic and cultural continuity across
the northern Southwest suggests that ethnographically and cross-culturally documented
social formations such as descent groups (e.g., clans, moieties) and sodalities likely have
considerable antiquity (e.g., Ware 2001, 2002b, 2014) and thus provide useful heuristics
for modeling ancient social diversity.

Previous research on prehispanic social organization in the Southwest
demonstrates that corporate groups manifest themselves through a variety of artifact
types as well as architecture and mortuary data (e.g., K. Anderson 1971; Dean 1969,
Lowell 1996; Morris 1986; Nordby 2001; Riggs 2001, 2007; Rohn 1971; Whittlesey and
Reid 2001), underscoring the extent to which reconstruction of these organizational
structures is necessarily post hoc and entails a fair amount of conjecture. For Chaco
Canyon, Judge and Cordell (2006; see also Cordell and Judge 2001) have presented a
synthetic model of society and polity that acknowledges a degree of cultural and social
heterogeneity. It provides a point of comparison for the individual studies of diversity
discussed above and a springboard for considering sociopolitical consequences with implications for this study, so it is worth recapitulating here.

By about A.D. 600 in the northern Southwest, Judge and Cordell (2006) recognize the existence of community integrative ritual (see also Wilshusen et al. 2012) and with it the presence of a degree of cultural heterogeneity in Chaco Canyon following the arrival of peoples from the Northern San Juan area in the late A.D. 800s and early 900s. They reason that shared symbols and rituals early on served to integrate groups with diverse languages and backgrounds. Concurrent establishment of ritual authority at Pueblo Bonito by this time (Plog and Heitman 2010) undoubtedly also enhanced the canyon's appeal as a locus of ritual power. Rather than displacement of existing groups, Judge and Cordell see acceptance, cooperation, and agricultural intensification to support large populations. Following Vivian (1990) and Ware (2001), they argue that non-kin sodalities and emergent dual divisions such as moiety structures were integral to the canyon's sociopolitical organization. Sodalities are non-kin groups organized on the basis of gender or age that often span communities or tribes and exist to perform particular social, ritual or economic duties. Moieties are dual social divisions, such as the Winter (Turquoise) and Summer (Squash) moieties among Rio Grande Tewa peoples, that alternate governmental and ceremonial responsibilities over the course of the year (Fox 1967; Ortiz 1969). Both of these organizational structures are known from Southwestern and cross-cultural ethnographic data to be effective in uniting heterogeneous populations, and they typically do so by linking ritual to subsistence-related cycles (Vivian 1990; Ware 2014). However, the nature of the dual tribal sodalities, or moieties,
proposed for central Chaco Canyon is viewed as akin to those among historic eastern Pueblo peoples. That is, they are not true moieties in the strict sense but variants detached from kinship by virtue of their lack of marriage regulation and recruitment based on criteria not limited to descent (Ware 2001, 2014). Whereas Ware dates this organizational development to after A.D. 1040 and the Classic Bonito subphase, Vivian (1990) and Judge and Cordell (2006) envision it occurring earlier, sometime during the tenth century.

Judge and Cordell (2006) thus infer that ritual activities followed schedules linked to episodic use of the canyon. In the absence of evidence for violence, Judge and Cordell envision cooperation under a governing structure that eschewed kinship in favor of the promotion of broad participation in ceremonies (see also Wills 2000). Priests were leaders of sodalities whose authority resided in esoteric ritual knowledge that impacted economic and political decisions. By the eleventh century, this sociopolitical structure had concretized, and canyon society effloresced, ushering in widespread great house construction regionally and integrating outlying communities with roads and extensive exchange networks. The staggering number of nonlocal goods coming into the canyon during this time, with apparently nothing tangible going out, implies non-traditional trade relationships and lends support to the view that ritual participation pulled in goods and people to provide labor and other services that underwrote ritual elaboration. Judge and Cordell point out that a system of dual organization would have downplayed competitive aggrandizing and generated a pool of leaders to coordinate subsistence, construction, and ritual activities. Climatic downturn during the A.D. 1090s
likely shook the faith of canyon occupants and participants, undermining religious leaders' authority and contributing to the observed sociopolitical shift north to Aztec Ruins and, eventually, the regional system's decline.

As was their goal, Judge and Cordell offer a plausible interpretation of how society and polity functioned and were interwoven during the ascent of Chaco Canyon and the regional system. Emphasis is placed on the likelihood of the existence of sodalities and dual divisions and their roles in organizing canyon life. However, their scenario does not speak directly to the various lines of evidence articulated for cultural and social heterogeneity, nor does it consider the benefits and challenges that may have been posed by cultural and social heterogeneity, beyond seeing the necessity of integrative social mechanisms. These points merit further discussion.

As Judge and Cordell (2006) note, the absence of data suggesting endemic violence, coupled with the evidence for widespread exchange and cooperation in the form of massive building and waterworks projects, implies that the roles of coercive force and violence were negligible during the Bonito phase. The archaeological record further suggests a lack of evidence for population movement precipitated by dramatic social or environmental upheaval, as is required by the model of coalescent communities invoked to explain thirteenth and fourteenth century A.D. migrations in the Southwest that resulted in heterogeneous communities (cf. Clark and Reed 2011). The data instead support the view that Chaco Canyon, and by extension the regional system, was a predominately cooperative endeavor grounded in cyclic communal ritual participation and mobilization of labor in tandem (Judge and Cordell 2006; Wills 2000,
The high degree of inter-site variation seen in the Bonito phase archaeological record, well expressed by architectural diversity and the organization of craft production (Lekson et al. 2006; Toll 2006), as well as the lack of clear site-unit intrusions throughout the Classic Bonito subphase, suggest the reasonable inference that new arrivals to the canyon likely came in small groups no larger than a few households or families. The general similarity in their material culture further suggests that their geographic origins (primarily) lie within the boundaries of the regional system. However, during certain periods (e.g., Early Bonito subphase) and times of the year, the sum total of such small groups joining the canyon population must have been substantial, perhaps characterized by an ebb and flow that has made their movement even more challenging to detect. It is also murky to what extent the unprecedented labor investment involved in Classic Bonito subphase construction employed imported labor. Seasonal periodicity underpinning wood acquisition lends support to the possibility of seasonal demographic influxes from beyond the canyon (Wills 2000; Windes and McKenna 2001; see also Windes 2015; Windes et al. 2000). In light of the distant sources relied upon for some architectural timbers, as well as lithics and ceramics, the Chuska Valley is a prime demographic source area for future research (e.g., Murrell and Unruh 2016). Certainly, the evidence for co-resident populations at several of the outlier communities further suggests the possibility of as yet unrecognized diversity within the larger regional system.

A contrast, then, can be drawn with the Late Bonito subphase economic and demographic recovery in the canyon that has been linked to the appearance of McElmo
architecture and ceramics. Although Judge and Cordell (2006:206) see McElmo architecture as reflecting a return to a decidedly more residential focus within the canyon, I agree with Vivian and Mathews (1965) and Wills (2009) that the extent of the twelfth century A.D. cultural shift within the canyon suggests a demographic incursion, arguably by multiple small groups with greater internal similarity than not (implying a shared geographic origin) and operating at a larger spatial scale than any prior population influxes into the canyon. Although the precise nature and extent of the hypothesized McElmo migration remains obscure, the scope of changes observed within the canyon and beyond after A.D. 1100 imply population movement of sufficiently numerous social units to contribute to a transformative new identity, as well as other social formations (Wills 2009, 2018).

Understanding the nature and extent of cultural and social diversity in Chaco Canyon and throughout the system is vital to accurately describing its internal structure. Without better knowledge of such diversity, it is difficult to specify the details and processes of sociopolitical organization that managed economic and ritual organization (Judge and Cordell 2006; Toll 2006; Vivian 1990), or how diversity affected post-Chacoan reorganization and population movement (Cameron and Duff 2008; Cordell et al. 2007; Brown et al. 2008; Brown and Glowacki 2013; Glowacki et al. 2015; Reed 2008; Toll 2008). Compared to a culturally or socially homogenous community, a community composed of multiple cultural, social or ethno-linguistic groups would place different demands on the organization of production, labor and political systems (Dozier 1966; Meyer 1999; Roberts 1964; Rousseau 1990, 2006; Stanczak 2006; Stanfield 1996; Stone
Intra-societal variation is regarded as central to understanding differential processes of social change, and variability in value orientations, among even relatively homogenous social groups, often drives tension and hostility (Pelto and Pelto 1975). If ethnographic and historic accounts of cultural and social diversity in the Puebloan Southwest are any indication, social heterogeneity and multilingualism among Chaco Canyon peoples would have provided opportunities for greater partitioning or secluding of important ritual (and other) knowledge, particularly across different generations who experienced different levels and degrees (or forms) of multilingualism (Kroskrity 2009; Roberts 1961, 1964; Ware 2001:84). Attendant to this may have been between-group differences in the perception of secrecy surrounding membership in particular descent groups, such as clans that historically are less ceremonial and, hence, revealable, as among the Keresan language-speaking Laguna as compared to their Tanoan language-speaking Isletan hosts (Parsons 1932:353). Over the span of several generations it is easy to see how conflict or tension among Pueblo peoples of different backgrounds could militate against wider acceptance of some ceremonial beliefs and practices, even though a segment of the community might be receptive to them (cf. Harvey 1963). One implication of this is recognition that in a socioculturally diverse community, social, political, and ceremonial orders were likely extremely dynamic over the span of several centuries as they accommodated or reacted against intragroup disputes that might have arisen.
For all of these reasons, it is both necessary and timely to revisit existing evidence for and implications of cultural and social diversity during the Bonito phase. Consider that Judd’s (1925, 1954) ideas on two cultural groups occupying Pueblo Bonito appear to have (not surprisingly) changed with time, such that by the publication of his reports on Pueblo del Arroyo (1959) and Pueblo Bonito’s architecture (1964), he more forcefully argued for a connection between his Late Bonitian migration from southwest Colorado and McElmo stylistic similarities, which shortly thereafter were articulated as an explicit model for the McElmo phase by Vivian and Mathews (1965). It is conceivable that Judd, lacking fine-scale comparisons of Old and Late Bonitian architecture and material culture through time, conflated two temporally discrete cases of co-residence. Reading between the lines of Judd’s reports, I suggest that he may have perceived material differences suggesting two groups living side by side at Pueblo Bonito during the A.D. 1000s, but lacked the temporal control or detailed analyses to disentangle more precisely the spatiotemporal dimensions of these occupations. Judd’s later support of a Late Bonitian-McElmo connection may then be seen as his reflection upon others’ research in the canyon not fully considered in his 1954 monograph (cf. Vivian 1956). In effect, the Pueblo Bonito record may provide an example of serial cultural plurality obscured by inadequate spatiotemporal controls (Vivian 2008; Wills 2009:312).

Interpretive constraints and model-building aside, there are also data limitations to consider, particularly with respect to the relative weight that scholars give to some studies. For example, bioarchaeological studies in Chaco Canyon suggest a number of intriguing possibilities for diversity at the community- and site-scales but are plagued by
sometimes contradictory results, interobserver error, and very small sample sizes relative to the types of biodistance studies performed. Schillaci and colleagues’ studies (Schillaci 2003; Schillaci and Stojanowski 2002a, 2002b, 2003; Schillaci et al. 2001; Stojanowski and Schillaci 2006), building on Akins’s work (1986, 2003), have become increasingly influential in discussions of Chaco archaeology but are rarely considered critically and run the risk of becoming reiterated in the literature as fact. For example, samples used for outgroup comparison are almost always younger than Chaco remains and come from sites far removed from the region of primary focus. Recent radiocarbon dating demonstrates that the mortuary accumulations in the northern and western burial groups at Pueblo Bonito span nearly three centuries, providing further reason to be cautious when interpreting within-site biodistance findings. Some physical anthropologists familiar with the studies are uncomfortable with drawing inferences about genetic relationships from extremely small sample sizes, especially when based on an equally small number of craniofacial variables, some of which have not been demonstrated to be genetically significant by (or since) Howell’s (1973) pioneering study (Stephen D. Ousley personal communication, 2011; Marden 2011:154-155; Ortman 2012:92-94; G. Richard Scott personal communication, 2006; see also Greene 2011).

These comments are not intended to detract from the critical importance of Akins’s and Schillaci and colleagues’ research, which has been very influential in guiding my own work, but to urge caution in treating such findings as well-supported conclusions as some Chaco researchers have done, rather than as simply suggestive or tentative. Scientific studies of human biological diversity are generally given greater weight than
other lines of evidence in contemporary society (Susser 2001; Theun 2004), and this may partly explain the tendency to stress their findings over their contradictions and limitations. Because these bioarchaeological studies are inherently limited by the data at hand, this does not mean that we need reject them, but rather scrutinize them and conduct additional research. To this point, recent advancements in archaeogenomics and stable isotope analyses (Kennett et al. 2017; Price et al. 2017) provide much needed independent checks of traditional osteological studies while highlighting ethical issues attendant to research on human remains (Claw et al. 2017; Cordell and Kintigh 2010; Ousley 2010; Schillaci and Bustard 2010, 2011a, 2011b; Sullivan 2000).

The point of the foregoing critique is that being able to understand regional social dynamics, much less community or site dynamics, is next to impossible if we do not continue to ask these questions about demographic composition and investigate them critically at multiple spatial and temporal scales. The data are imperfect, and typically difficult to analyze and interpret, but they yield insights integral to understanding social processes that mitigate or promote changes in economics, politics, society and ideology. Much as popular assumptions about Chaco Canyon’s agricultural productivity have been insufficiently evaluated (Wills 2017; Wills and Dorshow 2012), so too has fuller investigation of the impacts of cultural and social heterogeneity.

Architecture and ceramics by themselves do not allow realistic reconstruction of social identities and interaction during the Bonito phase. What are needed are additional fine-scale studies of architectural and ceramic variability, as well as analyses of material classes that represent distinctive or converging production and use systems. A focus on
multiple lines of evidence and multiple spatio-temporal scales keeps us mindful of the
fact that perceptions of boundedness within Chaco and across the system can sidetrack
us from paying attention to variation in stylistic patterns and exchanged goods (Plog
2010). Only as we begin to bring together these independent lines of evidence from
multiple material and biological datasets can we appreciate demographic composition
as the important structuring variable that it was.

Previous approaches to archaeological data that analyze stylistic and decorative
variability have been shown to be productive for tracking cultural and social groups
operating at multiple scales through time. In the next chapter I develop an approach to
studying such stylistic variability by drawing on recent research invoking the concept of
technological style and allied literature on learning theory. These literatures help
illuminate the social contexts of artifact production and knowledge transmission and
provide guidance for identifying, tracking, and interpreting social interaction and
geographic affinities through time and across space with woven artifacts.
Chapter 4

Linking Artifact Styles, Learning, and Diversity

In archaeological analyses, it is routine for material culture to be reduced to tallies and frequencies of artifacts and their types. From a descriptive and comparative standpoint this is both necessary and useful, but stopping there we run the risk of neglecting the social dimension of material culture and technology as encompassing the relationship between objects, individuals, and groups. Archaeologists study the objects made, used, and discarded by ancient societies, as well as study ancient societies through their material culture. Artifacts have their own life histories and biographies that when elucidated often subvert dichotomies that many take for granted, such as that between the utilitarian and the ceremonial (Hoskins 1998; Lillios 1999; Walker 2001). Artifacts also operate as repositories for social memory (Mills 2004, 2008, 2015; Mills and Walker 2008; Van Dyke and Alcock 2003; Webster et al. 2014) and as cultural microcosms, conveying metaphors to community members for understanding sacred architecture, history, and cosmology (Ortman 2000; Sekaquaptewa and Washburn 2004).

Contemporary studies of materiality appreciate how artifacts are embedded within unique environmental and sociocultural systems that are situational and reflexive (Dobres 2000, 2009; Dobres and Hoffman 1999; Hicks and Beaudry 2010; Hurcombe 2007; Pfaffenberger 1992; Schiffer and Miller 1999). Within these ever-changing and
shifting contexts, artifacts contribute to the production and maintenance of equally
dynamic cultural norms, values, and identities. Thus, while no single class of artifacts
provides complete understanding of past societies, detailed study of specific artifact
types can yield insights that enrich our understanding of ancient peoples. The body of
scholarship on material culture effectively demonstrates that objects, far from being
passive, play active roles in human societies and are integral to social production and
reproduction.

Artifact Variability and Social Learning

Archaeologists have long grappled with reconstructing the links between
technology, artifacts, and past social behavior. While definitions of technology are
diverse and depend greatly on the researcher and his or her question (Miller 2007;
Pfaffenberger 1992; Schiffer 2001a), a simple definition of technology as the techniques
and raw materials used to manufacture a product helps us characterize technological
variability and change as alterations to manufacturing techniques and/or materials that
affect the end product. In spite of scholarly debate over which approaches to the study
of technology yield the most productive insights, most researchers agree that a holistic
understanding of ancient technologies requires multiple approaches applied at different
scales (Costin 2005; Dobres 2009; Eerkens and Lipo 2007; Hicks and Beaudry 2010;
The variety of archaeological approaches to technology highlights the complexities of studying technological change with archaeological data and the inappropriateness of assuming that technological variation and change are stimulated by a single social, cultural or environmental factor. Depending on the context, a single factor or combination of factors may be operating. Whether they derive from economic or ideological changes, new social behaviors often provide opportunities for technological variation (Schiffer 2001b).

One prominent source of technological and artifactual variation, innovation, can be defined in a narrow sense as the development and execution of a new idea or object, but it is best conceived of in a broader sense as an active process that includes the acceptance or adoption of that newly originated idea or behavior. A consequence of defining innovation more broadly is that it cannot easily be disentangled from the study of material culture variability and long-term technological change. “Innovation exists by virtue of an extant tradition to which it contributes something new” (van der Leeuw and Torrence 1989:5). The ongoing complex interaction between tradition and innovation is reflected in the degree to which technological change is governed by nested and reticulating sets of choices that individual social actors make and which are, themselves, based upon specific social and historical contexts (Dietler and Herbich 1998; Dobres 2000; Hurcombe 2007; Roux 2013, 2015). Multiple factors affect individuals’ decisions about new or modified technologies, including the costs and benefits of the learning process (Efferson et al. 2007; Shennan and Steele 1999), the risks of adoption as they
relate to social and economic survival (Fitzhugh 2001; van der Leeuw 1990), and evaluation of objects’ performance characteristics (Schiffer 2001b, 2005; Schiffer and Skibo 1997). In this regard, archaeological study of the innovation process can be seen as a history of decision-making (van der Leeuw 1990). Innovation represents the culmination of successive decision-making processes about technique, form, and function within the bounds of the social rules of an individual’s society. Individuals evaluating a new technology must make decisions as to whether they will accept or reject the innovation, resulting in differential patterns in the adoption or diffusion of innovations that are, in turn, reflected in spatial and temporal variability in material culture.

Social learning, referring to learning in a social context, intersects and operates in concert with individual learning (i.e., innovation) to produce the variability in material culture that archaeologists study. Social learning in humans entails observational learning (i.e., copying) and verbal instruction, and is biased by the numerous cultural, social, and historical variables that can influence individuals’ choices. Situated learning theory, an established framework for examining social learning, emphasizes that knowledge is learned unconsciously through participation in daily life (Chaiklin and Lave 1993; Lave 2011; Lave and Wenger 1991). Learning is recognized as an active process of changing participation influenced by shifting social and historical contingencies during engagement in activity. Shared knowledge of, and participation in, particular activities leads to “communities of practice” that can inform researchers on enculturation, social interaction and reproduction, and identities (Hughes et al. 2007; Wenger 1998). In
archaeological research, communities of practice are seen as consisting of practitioners who share a set of production techniques guided by local tradition as well as a sense of identity linked to the technological traditions held in common (Minar and Crown 2001; Stark 2006). Such an approach, often blended with practice theory, has been most productive in the examination of ancient social boundaries and interaction among potters (e.g., Dobres 2000; Habicht-Mauche et al. 2006; Stark et al. 2008; Wendrich 2012). This scholarship, which employs ethnoarchaeological findings, demonstrates that archaeological communities of practice are not necessarily coincident with villages, communities, or archaeologically-defined cultures and identities. Rather, they reflect aspects of shared identities within the broader social field, and because they represent one segment of a larger material culture repertoire, they require investigation across multiple material categories and at multiple scales.

Research in education and neurophysiology illuminates how repetitive performance of a task or activity leads to increased speed and efficiency (Caine and Caine 1994; Holding 1989; Krakauer and Mazzoni 2011; Magill 1983; Minar and Crown 2001; Singer 1982; Thulman 2014; Wolpert et al. 2011). As a participant or learner becomes more proficient through practice, the sequence of activities attendant to a particular task requires less and less focused thought and attention. Over time, the participant masters the motor habits required for the task, and the activity becomes automated and highly consistent. Owing to a lack of flexibility in such processes that are learned to a high degree of automaticity, there is, as a consequence, an elevated level of conservation in the execution of that task. Whether forming a ceramic vessel, making a
basket, spinning a yarn, writing one’s name, or tying a shoe, the requisite motor habits
performed at an automatic level are largely resistant to change and can be reflected in
select attributes of material culture (Arnold 1985; Carr and Maslowski 1995; Crown
2007a; Dobres 2000; Gosselain 1998; Minar 1999; 2000, 2001a; Minar and Crown 2001;
Newton 1974; Pryor and Carr 1995; Thulman 2014; Wendrich 2012). Conservation of
cultural practice in material culture is, of course, neither solely nor always conditioned
by automatization of certain motor habits, but the literature on skill learning points to
the powerful role of learning in structuring material cultural variability, especially for
artifact features that are a product of repetitive motor skills.

Mounting evidence from psychology, neurophysiology, and anthropology
suggests that the content and process of cultural and skill learning during childhood
have a strong cumulative impact on later teaching and adult epistemological
orientations that affect social interaction (Bang et al. 2007; Legare 2017; Raybeck and
Ngo 2011; Schönpflug 2009). Archaeological study of social learning thus has great
potential to generate inferences that move beyond explanations of material culture
variability as illustrative of sociocultural boundaries to understanding cultural and social
difference within the context of social relations such as gender hierarchies and politics
(Bowser 2000; Bowser and Patton 2004; DeBoer 1990; DeBoer and Moore 1982;
Gosselain 2000, 2011). Study of learning frameworks, which focus on the mechanisms
by which technological skills are learned, has emerged as a novel means of studying
learning and childhood in the archaeological record (Hayden and Cannon 1984a, 1984b;
Tehrani and Reide 2008; Wallaert-Pêtre 2001).
Crown’s (1999, 2001, 2002, 2007a, 2014) research on how prehispanic Southwestern children became competent potters provides an excellent example of the benefits of this approach. Through a series of studies, Crown has examined hundreds of whole ceramics vessels from the prehispanic Southwest with an eye towards evaluating the relative skill in producing and decorating pots. She identified more than 700 vessels that are the likely products of unskilled novices or learners, probably children. These vessels are characterized by skill and cognitive levels that indicate familiarity with the manufacturing process but are lacking in the motor skills and coordination necessary to produce symmetrically formed vessels and execute consistent designs. Errors in brush strokes and design layout are frequent, for example. Crown found examples of vessels formed by skilled potters and painted by novices, as well as occasional pots formed by novices and painted by a skilled adult. While these vessels demonstrate a degree of adult collaboration and guidance, children in general appear to have learned to form and paint ceramics through observation and imitation rather than direct hands-on instruction. More interestingly, Crown found spatial and temporal variability in learning frameworks. Comparison of Hohokam and Mimbres Mogollon ceramics indicated greater child-adult collaboration among the Mimbres that Crown (2001, 2010) concludes reflects a preference among Mimbres potters for mastery of motor skills required to execute characteristically fine-lined Mimbres vessels. Additionally, she found evidence suggesting that Mimbres children began their learning earlier than Hohokam children and were accorded more leeway in choosing designs. Hohokam learners were guided to do “only what they were capable of doing, but doing it
correctly,” and this included executing designs in the culturally “right” way (Crown 2001:464).

Examining Chihuahuan polyhromes from northern Mexico and White Mountain redwares from east-central Arizona and western New Mexico, Crown (2002) observed that child-adult collaboration during learning was relatively common. Within contemporaneous White Mountain polychromes and Cibola black-on-white ceramics she noted that hand-on collaboration increased markedly after A.D. 1100, likely a consequence of skilled adults providing more instruction to facilitate mastery of new technologies and complicated polychrome designs. Variability in learning frameworks suggests corresponding variability in how prehispanic children were socialized and helps explain the relative conservatism of Hohokam region ceramics as compared with the remarkable creativity of Mimbres Mogollon vessels, in addition to illuminating social responses to new technologies. A further implication of this research is its challenge of the assumption often made by archaeologists that craft products such as ceramics are always the work of a single individual. Crown (2007b, see also Crown 2016b; Crown and Wills 2003) has marshaled ethnographic and archaeological evidence that shows ample cases in which multiple individuals worked cooperatively to complete a single vessel. These collaborative endeavors are not limited to children working with adults, but also multiple adults performing segmented tasks to complete individual vessels. Archaeological identification of collaboration has implications for recognizing variability in learning frameworks and some types of specialized production, as well as understanding issues of artifact ownership, use, and deposition.
As important as it is to examine how individuals learn skills and cultural knowledge, it is also necessary to inquire about the ways in which information moves within and between societies to produce the boundaries we discern. Cultural transmission theory continues to contribute to our understanding of the role of social learning in the origins of material cultural variability by providing rigorous quantitative models of artifact variation (Cavalli-Sforza and Feldman 1981; Boyd and Richerson 1985; Eerkens and Lipo 2005, 2007; Ellen et al. 2013; McClure 2007; O’Brien 2008; Richerson and Boyd 2005; Schillinger et al. 2017; Shennan 2008; Stark et al. 2008; Steele et al. 2010). Comprising several complementary research programs drawing heavily on Darwinian evolutionary theory, cultural transmission studies principally examine social learning and cumulative cultural evolution. Dual inheritance theory, which is predicated on the idea that culture provides a second non-genetic mechanism of inheritance by which information is exchanged between individuals, also figures prominently (Boyd and Richerson 1985; Richerson and Boyd 2005). From the perspective of cultural transmission, artifactual variability is introduced by the intersection of individual learning with social learning and the transmission of knowledge in a modified state or through copying errors. Generally working at larger spatial and temporal scales, these studies tend to focus on the emergence of new cultural traditions (“cultural diversity” in their terms) resulting from changes within cultural boundaries (phylogenesis) and interaction that cross-cuts cultural boundaries (ethnogenesis). This body of theory is also responsible for introducing terms for dominant modes of cultural transmission that help describe and model transmission, as well as illuminate biases that can affect the
scale and direction of flow of information. The three primary routes of cultural
transmission include vertical, horizontal, and oblique transmission, and of these, vertical
and horizontal transmission are strongest in human societies (e.g., Cavalli-Sforza and
transmission describes cultural transmission from one generation to the next, usually
parent-to-children. Oblique transmission refers to cultural knowledge transmitted from
one generation to the next where the recipient is not a direct descendant, such as in
formal teaching settings. In horizontal transmission knowledge moves between
individuals of the same generation or age, regardless of any biological connection. A
number of specific transmission biases have been identified that describe how some
cultural variants come to be favored over others during the process of transmission, and
such biases fall into the categories of direct (content) or indirect (context) (Boyd and
Richerson 1985; Henrich and McElreath 2003; Roux 2015). In the former, some aspect of
the content of the transmitted information makes it more likely to be adopted, whereas
in the latter, individuals’ social cues guide what is transmitted. These biases are
commonly incorporated into analytical models to understand their long-term effects on
cultural evolution.

Informed by Darwinian evolutionary theory and the literature on cultural
transmission, Van Hoose (2008) articulated the concept of "learning lineages" as one
way to study how cultural transmission and learning structure the archaeological record.
Learning lineages recognize that artifacts are part of "sets of ideas or behaviors
transmitted through historically related chains of teacher-learner relationships, or
chains of learning events, whether or not they involve an active teaching component" (Van Hoose 2008:21). The term "lineage" in this sense is analogous to biological descent, and stipulates that continuity in artifact traditions reflects continuity in transmitted ideas. Van Hoose (2008) developed this concept to examine the multiscalar dynamics of interaction and information flow among Navajo and Pueblo peoples in northern New Mexico between the sixteenth and eighteenth centuries A.D. He found that easily transmitted information about ceramic production, such as surface treatment, was widely distributed, while the motor habits used to construct vessels, in addition to coil size and firing behavior, were restricted and required more intimate learning contexts. Van Hoose used these findings to argue for long-term interaction between Navajo and Pueblo peoples characterized by an absence of close interpersonal contact between potters from different communities.

The current diversity of approaches to social learning and its material consequences in archaeology highlights differing research emphases as well as some considerable theoretical divergence (Ellen et al. 2013; Stark et al. 2008; Tehrani and Reide 2008; Roux et al. 2017; see also Little and Lancy 2016). Paramount among the theoretical conflicts is a difference in how social theory and cultural transmission approaches informed by evolutionary theory view technical similarity and difference. Through the lens of cultural transmission theory, similarities and differences are unintentional, resulting from transmission mechanisms such as imitation and innovation. In contrast, scholars relying on social theoretical approaches view technological variation as meaningfully constituted, representing individuals’ intentional
choices to conform or distance themselves from other people within or outside their social group. Although integrating these divergent perspectives is difficult, in pragmatic terms this conflict exemplifies the fact that different approaches exist for the varied questions archaeologists have about past social learning and material culture variability. In part, this is because of the widely varying spatial and temporal scales at which archaeological research operates, as well as the imperfect or uneven datasets generated by archaeology and allied disciplines investigating the human condition. Resulting theoretical tensions ensure that scholars continue to ask questions and learn about the complex processes that generate human diversity.

Artifact Style, Learning Networks, and Diversity

Learning and its material consequences make sense as an avenue of archaeological inquiry because much of craft learning is unconscious and thus more stable than shifting social boundaries and identities that are defined by a sense (real or perceived) of sameness. Social boundaries and identities are also constituted at various scales by multiple processes of cultural transmission that often operate simultaneously. So how exactly can learning and artifact production be related to mutable social boundaries, identities and, ultimately, cultural and social diversity? This is a complicated question that requires several inferential linkages to answer. To begin with, a growing
body of archaeological literature supports the idea that social interaction and boundary processes that materialize identities are best approached archaeologically through the study of material culture attributes that reflect aspects of unconscious learning or enculturation (e.g., Arnold 2005; Clark 2001, 2004, 2007; Dietler and Herbich 1998; Gosselain 2000; Haas 2006; Lyons 2003; Lyons and Clark 2008; Minar 2001a, 2001b; Neuzil 2004, 2008; Ortman and Cameron 2011; Roux 2013, 2015; Roux et al. 2017; Stark et al. 2008). Because enculturation entails the learning and teaching of behavioral patterns dictated by an individual’s (or collective’s) ethnic, linguistic or culture-historical background (Efferson et al. 2007; Whiting and Edwards 1988), spatially bounded variability or overlap in enculturative traditions should reflect social interaction and boundaries. However, since cultural and social diversity are not quantifiable variables that can be measured by themselves, they must be examined archaeologically from the perspective of indirect evidence.

One important way in which archaeologists have attempted to delineate past social boundaries and interaction is through the examination of stylistic patterning in material culture (Carr and Neitzel 1995; Conkey and Hastorf 1990; Sampson 1988; Stark 1998; Stark et al. 2008). Since the 1960s, artifact “style” has been a unifying concept and unit of analysis for archaeology (Clark 2007; Conkey 2006; Graves 1998; Hegmon 1992; Plog 1983). Historically, style for most archaeologists was simply equated with variation, and demonstrable stylistic variability was viewed as a tool to help interpret cultural materials. Despite style’s various uses and definitions over the years, Hegmon’s (1992; see also Hegmon 1998) review of archaeological research on style demonstrates that
there are two basic tenets common to all uses of style as a concept. Style is perceived 1) as a way of doing something and 2) making a choice among several alternatives. While past debate over archaeological definitions of style reflects disagreement over what different material styles and their distributions really represent, style can productively be defined as “a way of doing things” (Hegmon 1992:518). This purposefully broad definition allows flexibility about what is considered stylistic, while also letting many different kinds of style be specified. For instance, stylistic choices may be enculturative, representing the product of shared learning traditions, resulting in what Sackett (1982, 1985, 1986) terms “isochrestic variation,” variants that are functionally equivalent. Alternatively, stylistic traits may be symbolic or emblemic, representing intentional attempts to communicate information about group membership (Wiessner 1983, 1984, 1985; Wobst 1977).

Carr (1995a, 1995b; Carr and Maslowski 1995; Pryor and Carr 1995) and Clark (2001, 2004; Lyons and Clark 2008) argue that visibility is the key to distinguishing between communicative and enculturative stylistic attributes. They suggest that stylistic attributes with greater visibility correspond to a wide range of dynamic social identity processes, such as group boundary maintenance, while more obscure or less visible attributes are correlated with conservative behavioral processes such as social learning. Decorative embellishment’s high visibility and exposure to large audiences for extended periods of time when used in public settings lends to it being widely shared across cultural and social boundaries. As a result, patterns in decorative style typically tell us more about general contemporaneity and the nature of interaction at broad regional
scales than at the scale of smaller social groups. On the other hand, subtle or hidden technical features, such as raw material choice and the basic forming or construction techniques of complex technologies such as ceramics and basketry are conditioned by the learning process. By extension, these features are more conservative and far less likely to be shared beyond the immediate social group. Focusing analysis on individual practice represented by low-visibility technical choices, then, facilitates demarcation of smaller-scale groups and their identities. Although there is weight to these assumptions, there is also good reason not to universally assume such a simple relationship between attribute visibility and communicative potential. Some skilled basketweavers, for example, are capable of identifying the work of individual weavers within and outside their community based on low-visibility technical attributes, in addition to designs and design layouts (e.g., Barrett 1908; Bates and Lee 1990; Haeberlin et al. 1928; O’Neale 1932; Pryor and Carr 1995; Puri 2013). While variations in low-visibility technological attributes are usually lost on non-weavers, there is a high probability that each community member exhibits varying degrees of perceptibility as it relates to specific attributes, regardless of archaeologists’ assumptions about their visibility (see also Ortman and Cameron 2011:238-239; Washburn 2001).

The concept of technological style, first developed in the work of Lechtman (1977), and aligned with subsequent research by Lemonnier (1986, 1992, 1993), avoids concerns about the intentionality of stylistic communication by focusing on the social learning process and sequence of specific manufacturing choices made during artifact production, sometimes called the chaîne opératoire (operational sequence).
Technological style assumes that information about the learning process is reflected in an individual artifact’s design in the form of visible production decisions and is representative of the enculturative tradition in which it was produced. Neither Lechtman nor Lemonnier deny the communicative quality of material culture, but instead see the totality of an artifact’s production sequence as conveying the “message,” and focus on what the suite of intersecting production behaviors reveal about the object’s social context (e.g., Lemonnier 2012). In this way, technological style conceives of artifacts’ and technologies’ communicative aspects as uniting both style and function in human social systems and envisions production variability as a consequence of differences within and between social groups. For Lechtman, what is communicated is properly conveyed through production choices deemed “correct” by the society in which they are produced. Lemonnier’s approach overlaps with Lechtman’s in emphasizing technological choice during production, while also stressing connectedness between related technologies, such as textile, basketry, and mat weaving that share many basic structural techniques and work habits. Technological stylistic patterns taken to reflect shared histories of learning thus embody the culturally appropriate ways of making artifacts, even if archaeologists cannot articulate the specific grammar (sensu Hassan 1988) or abstract social group-specific rules that dictated the choices involved in their production.

From this perspective, technological and stylistic traditions are reproduced through the social learning process and ingrained at the level of the individual. Individuals, as parts of larger social groups, interact with each other and through this
interaction ensure the maintenance and reproduction of the tradition through networks of cultural transmission. As technological styles move according to the dominant modes of cultural transmission, that is, vertically and horizontally, tradition is perpetuated through pools of interacting learners termed “learning networks.” Such learning networks constitute bounded entities of interaction with internal coherence determined by historically linked teacher-student relationships. They reflect cultural standards that are consciously and unconsciously embedded with information about social interaction and identities that are reproduced materially.

Craft learning networks are, of course, interwoven with larger social networks governed by kinship and descent group, ritual and linguistic affiliation, as well as economic and political relationships (Bowser 2000; Bowser and Patton 2004; Crown 2016c; DeBoer 1990; DeBoer and Moore 1982; Dietler and Herbich 1998; Gosselain 2000; Lee 2014; Stanislawski and Stanislawski 1978). This is why it is possible to see manufacturing techniques change or be reproduced across space and through time in ways that mirror dramatic demographic and cultural changes, such as population movement and new economic and political developments. A corollary is that social networks are related to various aspects of identity, and this necessarily complicates interpretation of archaeological data. However, patterned stylistic distributions do reflect a quality of social boundaries “within which, on the one hand, cultural closeness, affiliation, or dominance is obviously more important than geographical propinquity, and on the other, people’s sense of belonging is likely to rely on common practices rather than spuriously borrowed traits” (Gosselain 2000:208).
Consequentially, the distribution of material culture learning networks in time and space, as revealed by patterned technological styles, can yield information about social boundaries, interaction and identities. Between-group social interaction can produce learning traditions that overlap, while continuity across a suite of technological variables can be assumed to reflect a shared history of learning. Accepting that learning networks may overlap to varying degrees with other culturally transmitted norms and values, examination of spatiotemporal variability in learning networks provides a productive avenue for investigating ancient cultural and social diversity.

Archaeologically, we can reasonably infer the existence of cultural or social diversity to be reflected at some scale in multiple learning networks that are the product of social interaction and enculturation. Demonstrating this, however, requires identifying correlations with other datasets and learning networks to strengthen an argument that social diversity was present and culturally salient. It would be a mistake to assume, as did early archaeologists, that we can specify the precise social structure or identity reflected by shared styles (Longacre 2000).

Study of the specific cultural transmission biases (i.e., prestige, conformity; see Henrich 2001) that likely influence decisions individuals make about whether to integrate or segregate can be informative, but are likely to provide only generalized insights. As a specific topic, cultural transmission in heterogeneous societies and situations of cultural contact resulting from population movement have received only limited investigation. Examining contemporary transnational migrations, some developmental psychologists have found a clear intergenerational trend towards more
cultural integration and less segregation in second generation immigrants (Nauck 2009; Padilla 2009). Social group discrimination has a weak but positive effect on language retention in migrant families that, in turn, significantly decreases children's acquisition of the language of the host society (Nauck 2009). Padilla (2009) points out the implicit assumption in research on socialization that children are enculturated into a single culture, which neglects important questions about how and why people become bicultural in culturally diverse settings. The possibility of bicultural enculturation has implications for interpreting ancient learning frameworks and networks to the extent that bicultural learning provides one explanation for variability, or the appearance of blending, in contemporaneous learning frameworks or networks. The difficulty, however, lies in recognizing these behavioral processes, which generally run their course within the span of four or five generations.

The idea of learning networks, pools, or spheres, is not new and has been invoked by various other researchers in modified form to reference to interaction among spatially bounded craft producers, but few have attempted to formalize it analytically (Carr and Maslowski 1995; Gosselain 2000; Herbich 1987; Lee 2014; Raney 2005; Roux 2007, 2008, 2013; Roux et al. 2017; Stanislawski and Stanislawski 1978). Importantly, the use of “learning networks” in this sense does not imply that craft learners are separate from other non-producers, nor does it preclude interaction beyond a proposed network or sociocultural boundary. Rather, it serves to remind us that the intensity of interaction and symbolic communicative competence is greatest with those in closest proximity. An individual's interaction certainly extends beyond
those who engage in similar craft production systems, but the reality that interaction with non-craft producers plays a powerful role in guiding the transmission of a craft is typically limited to special cases, such as specialized production, participation in a market economy, or a ritual mode of production (e.g., Hayden and Cannon 1984a; Rice 1984; Roux 2008, 2013, 2015; Roux et al. 2017; Spielmann 2002).

Conceptually, learning networks are related to communities of practice and learning lineages. All three concepts recognize scalar variability in technological traditions, but whereas communities of practice operationalized in archaeology tend to be passive, emphasize general synchronicity of practice (but see Van Keuren 2006), and assume that social participation in learning is a source of identity (Wenger 1998), I suggest that the concept of learning networks better foregrounds the role of historical connections among learners and teachers, as well as the difficulty of specifying the resultant social identities archaeologically. The primary difference between learning networks and lineages lies in the latter’s use of an explicitly evolutionary framework that seeks to identify specific units of cultural replication through the differing visibility (sensu Carr 1995a, 1995b; Clark 2001) of artifact attributes. A more subtle distinction between the terms lineage and network implies differing emphases in their use. Network connotes connectivity and the sending and receiving of information. Lineage by definition, however, more often refers to a relationship of explicitly direct vertical descent and a higher level of internal coherence that risks deemphasizing interaction beyond biologically defined relationships of learning. Van Hoose (2008:21-22) is clearly aware that learning lineages are also products of interaction between populations, but I
prefer the term network because it foregrounds the considerable influence of interaction in the creation of stylistic variation over time and invites integration with other types of social networks receiving scholarly attention (e.g., Borck et al. 2015; Hegmon et al. 2016; Mills et al. 2013, 2015). I appreciate that this is a relatively minor semantic difference, but my interest in cultural and social heterogeneity requires greater recognition of social interaction's role in generating small-scale social boundaries and identities.

**Learning Networks and Basketry Technology**

Having articulated an approach to ancient cultural and social diversity through the examination of technological styles, it is useful to consider the unique potential of worked fiber artifacts including basketry and related crafts for investigating learning network variability. This line of inquiry has implications for understanding prehispanic Chacoan sociocultural diversity and the cultural or geographic affinities of Chaco Canyon’s occupants, as well as those of participants in the regional system. With the notable exception of Webster’s (2006a, 2008a, 2011b; Webster et al. 2014) recent studies focused on basic documentation and regional comparison, basketry has been almost completely neglected in research on Chaco over the last century. This is unfortunate because the assemblages from several Chacoan sites, namely Pueblo
Bonito, Aztec West Ruin, and Salmon Pueblo, have produced three of the largest samples of perishable artifacts from the northern Southwest. These assemblages constituted, until very recently, an untapped source of new data for contributing to our understanding of the remarkable developments that define the Bonito phase. Given basketry’s antiquity, ubiquity, and importance to Native North American subsistence pursuits and the storage and transport of goods (e.g., Mason 1904), when preserved in archaeological contexts it can provide valuable insights into economy, ritual, and social interaction, among many other cultural domains (Jolie and Webster 2017).

In general usage, “basketry” refers to the interworking of a variety of pliable elements into a container or like form. Basketry is typically treated as a single technological unit, subsumed under the broader scope of textile crafts because their overall techniques of construction are the same (Driver 1961:159). As all basketry is hand produced or woven without a frame or loom, it is technically a subclass of textiles, though this term is often restricted to continuous-plane flexible cloth fabrics (Adovasio 2010). While form and degree of rigidity may vary, I use basketry here to specifically include containers, mats, and some varieties of sandals, the latter of which can essentially be viewed as baskets worn on the feet.

It has not been uncommon for students of basketry and textiles to observe the striking correlation between the constellations of technical features manifested in these products and the social groups who produced them (e.g., Adovasio 1986a, 1986b; Adovasio and Pedler 1994; Andrews et al. 2002; Bernick 1987, 2014; Carr and Maslowski 1995; Croes 1989, 1997, 2001; Drooker 2001, 2004; Drooker and Webster 2000; Elsasser
1978; Fowler and Dawson 1986; Horton 2010; Mason 1904; Morris and Burgh 1941; Petersen 1996; Polanich 1994, 1995; Pryor and Carr 1995). What has been lacking, though, is a more explicit approach to these attribute-based patterns that recognizes the causes and complexities of the behavioral processes that produce them. As I argue above, social learning, as a universal human process, holds promise for the study of past social groups because it can help us specify those social processes and products that influence the creation of the technological patterns we see and often attribute (correctly or not) to discrete social entities. Although the vast majority of archaeological research on technological styles has focused on ceramics, it is possible to study technological styles and the social learning context of basketmaking and related textile craft production because the processes by which baskets are manufactured objectify themselves in the finished product (Adovasio and Pedler 1994; Baumhoff 1957; King 1978; Morris and Burgh 1941; Weltfish 1930, 1932a). The structural configuration of the basket and many of the technological choices associated with its production are evident in even the smallest identifiable fragment of the original object.

Learning, Basketweaving, and Technical Choice

In the indigenous Americas, baskets and textiles were (and, in some areas, still remain) critical components of many societies’ material culture. Large ethnographic collections and abundant perishable artifacts excavated from extremely dry caves and rockshelters dotting the landscape of western North America, and to a lesser extent
Pacific northwest coast wet sites, attest to these technologies’ importance in ancient and more recent times (e.g., Adovasio 1986a; Bernick 2014; Carriere and Croes 2018; Connolly et al. 2016; Cressman 1942; Croes 1989, 1997; Elsasser 1978; Fowler and Dawson 1986; Jolie and Webster 2017; Kent 1983a; Loud and Harrington 1929; Morris and Burgh 1941; Rudy 1957; Teague 1998). These sites have also provided some of the longest and most well-dated chronologies for textile crafts in the world, with evidence of basketry manufacture in the Great Basin more than 10,500 years ago (Connolly et al. 2016). In several areas, there is remarkable evidence for long-term cultural continuity in textile traditions. In south-central Oregon, for example, a continuous record of twined basketry technology is associated with an intensive lake-marsh adaptation spanning some 9,000 or more years. Fragments of flexible twined basketry with overlay decoration found in early levels of the regions’ caves persist through younger deposits and evince continuities with baskets made in more recent times by Klamath-Modoc peoples (Adovasio 1986a; Connolly et al. 2016; Cressman 1942; Jolie 2004). A similar case comes from the northern Mexican state of Coahuila and adjacent Trans-Pecos, Texas, where, based on his detailed studies of twined and coiled basketry from this region, Adovasio (1980, 2003) suggests regional continuity in likely linguistically-related (Coahuiltecan) groups for at least the last 9,000 years, an observation supported by other archaeological datasets as well.

Although many large basketry and textile assemblages were made before the advent of modern excavation methods (e.g., Blackburn and Williamson 1997; Loud and Harrington 1929; Webster 2011a), analytical developments in radiocarbon dating such
as the AMS technique have enhanced our ability to directly date textiles using minute samples. This has stimulated considerable revision of earlier technological chronologies and helped us to refine many research questions. Dominant themes of research have included technology, chronology, social interaction, and identities broadly construed (e.g., Connolly et al. 2016; Drooker 2001, 2004; Drooker and Webster 2000; Jolie and Webster 2017; Kent 1983a; Good 2001; Teague 1998; Teague and Washburn 2013; Webster 2006b). In particular, research understanding how spatiotemporal patterns in textile traditions reflect cultural continuity, social boundaries and population movement has gained prominence in light of broader developments in archaeology, such as the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, that redress indigenous concerns with archaeological practice (Ferguson 2004; Edgar et al. 2007; Webster 2007a, 2012b, 2013, 2018; Webster and Jolie 2011, 2014; Webster and Loma’omvaya 2004). This shift has, in general, brought increased visibility to basketry and textile technologies and their applicability to the study of cultural interaction and change.

As yet, no systematic survey of the ethnographic literature has been conducted that documents cross-cultural trends in the social learning context of basketry and textile production. However, research has examined childhood learning in basketry, textile and string bag production in sufficient detail to allow the following basic sketch of textile art transmission (Franquemont 1979; Franquemont and Franquemont 1987; Greenfield 2000, 2004; Hayden and Cannon 1984a; Coy 1989; Jolie 2014a; Lee 2014; MacKenzie 1991; Minar 2001a; O’Neale 1932; Pearsall 1950; Pryor and Carr 1995; Puri
Learning typically begins when children are young, usually between five and eight. Although the precise learning frameworks are variable, formal teaching is often preceded by periods of play and experimentation, during which toy-like baskets, bags or weavings are made. Certain tasks, such as gathering and processing raw materials, are performed repeatedly with the teacher so that particular procedures become routine and the learner comes to appreciate cultural norms associated with these tasks. In most cases, basket and textile crafting knowledge is transmitted vertically, often from mother to daughter.

Absent detailed ethnographic accounts and ethnoarchaeological study of basketry learning frameworks, we can still obtain important insights from ethnographic and archaeological specimens. Production of a coiled basket, for example, requires mastery of a body of practical knowledge about the acquisition and preparation of the requisite plant materials in addition to the fine motor skills to manipulate them during raw material preparation and basketweaving. Once weaving elements of appropriate dimensions have been acquired, they must be sorted, scraped of their bark, split, thinned, or otherwise removed of blemishes before weaving can commence. The spiral start is the first, as well as one of the hardest, portions of the basket to complete because of the difficulty of maintaining a tight spiral while compressing the foundation elements with one hand while the first stitches are sewn with an awl in the other. This is also one of the most structurally important parts of the basket. A weak start and base will lessen the vessel's ability to hold liquids and stand up to wear from rough or
repetitive use. Coiled basket starts are frequently sites of mends, and numerous
archaeological specimens are lacking their bases or evidence an entirely new base sewn
into the basket. Fine motor skills are further required to sew the stitches with consistent
spacing according to intended vessel use and community standards. Complicated
foundation arrangements consisting of multiple rods and/or fibrous bundles must be
compressed consistently in one hand while being sewn to maintain uniform coil
thickness. Successive circuits of stitches sewn while the basket wall grows outwards and
upwards must also be properly and evenly placed so as to sufficiently engage the
preceding coil for structural integrity and to maintain proper coil height. Although stitch
and foundation elements are often soaked or moistened prior to weaving to enhance
pliability, they are still rigid and the weaver must have sufficient hand size and strength
to help bend the collected foundation unit as the basket wall grows. Foundation
elements and stitching threads are not of infinite length, so new material must be
spliced in, which poses another complicated technical decision. There are numerous
ways to splice in coiled basketweaving, but material, structural, skill level, and
community-defined aesthetic factors all influence how this is accomplished, producing
great variability in outcomes, sometimes even within a single complete basket.
Generally, the desire is to conceal splices as much as possible because when executed
poorly, they have the potential to disrupt or distract from the texture of the basket wall
and can introduce structural weakness. Shaping the growth of the basket wall to achieve
the desired final form further requires sufficient visuomotor skill, while the woven-in
decoration common to many coiled baskets only exacerbates the dexterity and technical
challenges of manufacture, adding another layer of preparation and planning that goes into the execution of a culturally appropriate coiled basket.

In 1926, Pliny Earle Goddard of the American Museum of Natural History (AMNH) in New York collected the basket bowl shown in Figure 4.1 from the Second Mesa Hopi village of Songoopavi. The basket’s description on the museum catalog reads: "Shallow bowl-shaped basket, multiple foundation, the bottom part started by a little girl when she was two years old and finished a year later." Though research in neurophysiology, psychology, and education gives us strong reason to doubt that the weaver was only two or three years of age when she wove this, we can be certain that it was produced by a novice, and that she more than likely received help from a more experienced weaver to start it. The first five coils of the basket differ markedly in metric measurements and overall execution, indicating that they were made by a more skilled weaver guiding the young girl’s learning. Though perhaps not the work of a master weaver, the skill level represented in these first coils is still much greater than that of the rest of the basket, suggesting the assistance of an elder sister or some other young female of intermediate skill level. The starting spiral is very tight, and the coil and stitch dimensions approach what one would expect from a well-made Hopi coiled basket. The rest of the basket, however, demonstrates a suite of technical features suggesting imperfect fine motor control and dexterity, including inconsistent gaps between stitches, exaggerated stitch slants, variable wall (coil) thickness, loose stitches, and “sloppy” or highly varied stitch and foundation bundle splices. Notably, the woven-in design’s execution follows a more general Hopi convention for color use and placement
Figure 4.1. Coiled basket bowl made by a young Hopi girl in the 1920s (52.2/2734). Courtesy of the American Museum of Natural History.
but lacks the planning and precise placement seen in the work of skilled weavers, such as can be seen in the small plaque in Figure 4.2 (see also Teiwes 1996).

This ethnographic example can be compared with one of several archaeological baskets probably woven by novices that I have identified in the collections at the AMNH and elsewhere. Figure 4.3 represents a Basketmaker II period example recovered from Mummy Cave in Canyon del Muerto, Arizona, that was directly radiocarbon dated during this study to ca. A.D. 200. Similar to the historic Hopi example just described, this piece also suggests collaborative learning. It is a small cup-like bowl that was both started and finished by a more experienced basketweaver. Like the Hopi case, the coils forming the wall of this basket demonstrate many errors, including uneven wall texture and haphazard coils, stitching, and splices. That the final coils were completed by someone more skilled is attested to by their comparative consistency with each other in contrast to the preceding coils and their general resemblance to the quality and execution of other Basketmaker-age specimens I have examined (see also Morris and Burgh 1941). Several stitches dyed dark brown are found on the base but they are almost random in their incorporation into the fabric. Interestingly, the last five to six coils exhibit a solely yucca fiber bundle foundation, while the preceding coils are in the “classic” Basketmaker foundation type consisting of two horizontal rods surmounted by a yucca fiber bundle. This uncommon foundation variability within a single small piece could plausibly represent an adjustment by the teacher to make it easier on the learner to sew stitches, as the bundle would be easier to manipulate and possibly more forgiving to mistakes than rigid rods.
Figure 4.2. A small Hopi coiled basketry plaque (50.2/2368) woven prior to 1923. Note the general design color and layout similarity to the bowl in Figure 4.1. Courtesy of the American Museum of Natural History.
Though the plaiting (interlacing) technique is substantively different than coiled basketweaving, it has its own set of required motor skills that must be mastered. Some of these include tight strip packing, maintenance of a consistent interval of interlacement, sometimes with an additional complicated pattern of strip shifts to produce woven-in designs, as well as splicing and finishing techniques. The examples illustrated by Figures 4.4 and 4.5 represent comparable technical choices made during the production of two plaited mat-like forms. Figure 4.4 is the first cattail mat ever made by the author in 2007 under the guidance of Mi’kmaq First Nation basketweaver Stephanie Labillois at the Weaving Together conference held at the Metepenagiag Heritage Park in Miramichi, New Brunswick, Canada. Note the difficulty I had as a novice learner in keeping the strips tightly packed. Errors were also made when bulrush
Figure 4.4. The author’s first 1/1 simple plaited cattail mat woven in November 2007.
Figure 4.5. Unfinished plaited ring basket start woven by a novice from Room 139 at Aztec Ruin West, New Mexico, dated to the A.D. 1200s (29.0/9474). Courtesy of the American Museum of Natural History.
elements were used to implement a row of weft twining for structural reinforcement (a common finishing technique) around the edges. Weft twining is defined structurally by two horizontal elements that twist around the vertical elements, and in places one can see how I lacked the repetitive motor habit that would have allowed me to do this quickly, consistently, and without error. The small yucca leaf mat depicted in Figure 4.5 is a striking example from Room 139 in Aztec West that I interpret as the work of a novice. It is probably a novice’s attempt at the start of a yucca ring basket, the majority of which begin as small mats that are later shaped to fit inside their osier "rings." This individual made manufacturing errors identical to my own, exemplified by the looseness of the strips and similarly unskilled execution of the twining reinforcement.

The foregoing illustrates some of the cognitive and neuromuscular outcomes attendant to the process of learning to produce "appropriate" baskets in a given society. Though presently lacking a large enough sample to examine regional variability in learning frameworks like Crown (2001, 2002, 2010, 2014) has done with prehispanic ceramics, several of the specimens that I have examined suggest that collaboration was a part of some learning frameworks for basketry production among historic and ancient Pueblo peoples. However, collaboration almost certainly does not characterize all learning frameworks associated with basketry. A vessel from Mesa Verde that I view as the work of a learner (Figure 4.6) contrasts with the Mummy Cave and Hopi examples by providing no evidence for collaboration. Rather, from start to finish the construction of this bowl appears to have been executed without obvious assistance from a second party. If this observation were to be supported by additional like pieces, it could add a
Figure 4.6. Complete coiled plaque from Mesa Verde, Colorado, woven by a novice during the A.D. 1200s (O.631.1). Courtesy of the History Colorado Center.
difference in basketry learning frameworks to the list of behaviors and craft products that distinguish ancient peoples of the Mesa Verde region from populations occupying neighboring portions of the Colorado Plateau.

A related issue that is relevant to identifying learning networks concerns the technical choices of basketry production and the extent to which specific technical features scale according to cultural or social group size. For one, we may reasonably expect that the degree to which a particular production choice is essential to the basic construction of a woven object will be positively correlated with the value placed on its correct transmission in learning contexts and the likelihood that it will be copied by a learner without error. Such fundamental construction or forming techniques in material culture tend to be widely dispersed and are indicative of culture-historical relationships at the regional- or culture area-scale, as illustrated by broad regional traditions recognized cross-culturally in ceramic and basketry production. This is what allows us to distinguish Great Basin Native American baskets from Southwest baskets, or O’odham baskets from Pueblo baskets, and Hohokam ceramics from Mesa Verdean ceramics.

Although there is potentially great variability in the basic structural mechanics involved in the production of the three predominant weave structures in basketry (twining, coiling, and plaiting), or in their combination in a single basket, it is clear that most, if not all, societies’ basketry repertoires are dominated by a limited number of basic structural types. This includes on the one hand the proportions of wares produced according to each of the three major weave structures and, on the other hand, the proportions of select subtypes within each structural class. For instance, in societies
producing coiled basketry, foundation type and arrangement are basic structural features that scale to regions and culture areas. Several well documented examples of this pattern include half rod and bundle stacked foundations among the archaeologically known Fremont (Adovasio et al. 2002), three rod and one rod foundations in northern and central California and the Great Basin (Elsasser 1978; Fowler and Dawson 1986), bundle foundations in southern California and adjacent Nevada (Elsasser 1978), and two rod and bundle and one rod foundations in the prehispanic American Southwest (Morris and Burgh 1941). Such a pattern where a limited subset of available weaving techniques are commonly employed is not restricted to Native Americans and, instead, appears to represent a common trend cross-culturally and throughout the past (e.g., Adovasio 2010; Croes 1989; Ellen 2009; Morris and Burgh 1941; Newton 1981; Novellino and Ertuğ 2006; Silvestre 2000; Wendrich 1999). Table 4.1 summarizes the formal and technical choices in basketry production by major weave structure and the social scales at which they typically sort based on ethnographic and archaeological research over the last century.

**Basketry Learning Networks and Diversity**

Continuity across a suite of technological variables is assumed to reflect a shared history of learning and, in this sense, basketry learning networks describe systems of individuals linked by the shared origin of their learning the craft. Within basketry technology, it is suites of independent technological features that are the consequence
Table 4.1. Summary of Trends in Form and Technical Choice Variation According to Weave Structure and Approximate Social Scale for Archaeological Analyses.

<table>
<thead>
<tr>
<th>Weave Structure</th>
<th>Approximate Social Scale&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Region/Culture Area</td>
</tr>
<tr>
<td>Twining</td>
<td>-percent twined vs. other weaves</td>
</tr>
<tr>
<td></td>
<td>-raw materials</td>
</tr>
<tr>
<td></td>
<td>-forms and uses</td>
</tr>
<tr>
<td></td>
<td>-decorative techniques and designs</td>
</tr>
<tr>
<td></td>
<td>-weft twist direction</td>
</tr>
<tr>
<td></td>
<td>-weave texture</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Coiling</td>
<td>-percent coiled vs. other weaves</td>
</tr>
<tr>
<td></td>
<td>-raw materials</td>
</tr>
<tr>
<td></td>
<td>-forms and uses</td>
</tr>
<tr>
<td></td>
<td>-decorative techniques and designs</td>
</tr>
<tr>
<td></td>
<td>-foundation type and arrangement</td>
</tr>
<tr>
<td></td>
<td>-stitch type</td>
</tr>
<tr>
<td></td>
<td>-work surface and direction</td>
</tr>
<tr>
<td></td>
<td>-weave texture</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Plaiting</td>
<td>-percent plaited vs. other weaves</td>
</tr>
<tr>
<td></td>
<td>-raw materials</td>
</tr>
<tr>
<td></td>
<td>-forms and uses</td>
</tr>
<tr>
<td></td>
<td>-decorative techniques and designs</td>
</tr>
<tr>
<td></td>
<td>-weave texture</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Based upon previous research (Adovasio 2010; Adovasio and Gunn 1986; Carr and Maslowski 1995; Croes 1989; Dawson 1970-1990; Elsasser 1978; Fowler and Dawson 1986; Mason 1904, Polanich 1994; Pryor and Carr 1995; Shanks 2006, 2010, 2015; Weltfish 1930, 1932a, 1950) and the author’s personal observations. Cell contents identify stylistic features by approximate social scale at which variability tends to be best suited to distinguishing those social groups. Note that “weave texture” denotes the combined effect of raw materials with element (warp/weft, or coil and stitch) density and metric variability.
of repetitive motor habits and socially learned manufacturing decisions that allow 
discrete learning networks to be differentiated. These same individual production 
choices also afford multiple points of comparison between artifacts and assemblages. As 
a result, patterned variability in the technological styles of basketry and related crafts 
can reflect the distribution of basketry learning networks in time and space, yielding 
information about social boundaries and interaction that inform questions of cultural 
and social diversity. If sociocultural diversity existed within Chaco Canyon and across the 
regional system, then it should be reflected at some scale in multiple learning networks 
that are the product of social interaction and enculturation. Concordance with other 
datasets (e.g., architecture, ceramics) and learning networks, as well as evidence for 
spatially patterned basketry learning network variability, would further strengthen the 
argument that such diversity was present and culturally salient.

Importantly, several prior studies of ancient and recent basketry assemblages 
illustrate the behavioral significance of fine-scale technological stylistic patterning and 
show that the present study is not without precedent. Croes and Davis (1977) sought to 
identify individual basketweavers within an assemblage of ca. 600 year-old basketry 
from a house at the Ozette Site in Washington. Preliminary results of their distributional 
study indicated a clear north-south patterning that they interpreted as possibly the 
result of individual weavers or, alternatively, family- or class/status-specific 
basketweaving traditions. Similarly, Adovasio and Gunn (1977:139-142) were able to 
statistically distinguish the work of three documented Washoe weavers within a sample 
of 29 complete coiled baskets. This successful test case prompted them to adopt a
similar approach to the basketry and matting from Antelope House in Canyon del Muerto, Arizona, which was most intensively occupied between A.D. 1100 and 1270. Adovasio and Gunn (1977, 1986) found that suites of basketry and matting technological features patterned in a statistically significant way with different room blocks, suggesting at least two, and perhaps as many as three, distinct clusters in different residential units. From this they argued that the patterned variability was the product of discrete basketweaving cohorts within an otherwise homogeneous setting.

Pryor and Carr (1995) took the innovative approach of examining ethnoarchaeological data on baskets woven by several known Pomo women related by kinship and through the social learning context of basketweaving to evaluate the role of different processes and constraints that affect technological and design style in basketry. Although they make many significant observations and inferences, it is pertinent to the present discussion that enculturation is most basic at the level of the family and interacting artisans, whereas at the level of the language group, broad stylistic patterns are largely determined by group interaction through which high visibility attributes can be shared more quickly and widely.

Drawing on cultural transmission theory, Polanich (1994, 1995) looked at the migration of Western Mono peoples in eastern California through a detailed technical attribute study of their basketry traditions and that of their neighbors, the Yokuts. Her findings suggest patterns of basketry adoption, innovation, and obsolescence corresponding with the migrations of the tripartite Mono dialect divisions. She found that in all three cases, coiled basketry was copied from Yokuts models. Jordan and
Shennan (Jordan 2007, 2015; Jordan and Shennan 2003, 2005, 2009), also looking at California basketry traditions from the perspective of cultural transmission, found evidence for the history of twined basketry traditions being more heavily influenced by vertical transmission (through related adults) and coiling by horizontal transmission (through peers of the same generation). Polanich (2005) later built on her and Jordan and Shennan’s work in an attempt to provide finer grain resolution for reconstructions of technological change reflected in California basketry traditions. Focusing on the differential retention and adoption of culinary basketry in California, her preliminary findings suggest that culinary basket forms may be well suited to sorting out the details of cultural transmission because they are among the most conservative types of baskets and least likely to be replaced by a new weaving technique.

**Summary**

As revealed through analysis of patterns in technological styles, learning networks are *not* isomorphic with discrete identities. Rather, I argue that the social context of craft learning is such that there is stronger chance that craft learning networks reflected by technological styles will overlap with other cultural and social identities. This overlap is never complete, of course, nor should we expect it to be, given the dynamic nature of identities and lifelong social learning and interaction. That
cultures and social groups "exist" in some describable way, and can be a means for
individuals and groups to differentiate themselves, is in large part a product of social
learning and enculturation processes shaping an ever-changing suite of behavioral and
cognitive outcomes. Learning networks and identities are both moving targets, and
neither are ever perfectly in focus from the perspective of the archaeological record.
The best we can do is look for instances in which spatial and temporal patterns suggest
a form or forms of scaled social identity to the exclusion of alternative interpretations of
the data. Evidence for ancient cultural and social diversity, then, comes from the
delineation of variability in learning networks at multiple scales, which I argue
reasonably serve as a proxy for diversity in identities at those same scales. From this we
can begin to generate models that account for the patterned variability in learning
networks in terms of possible or likely sociocultural units and evaluate other
independent lines of evidence for cultural and social identities.

To be sure, specific craft learning networks do not provide singular insight into
ancient identities and diversity, nor do they track them perfectly. Cultural and social
diversity cannot and should not be reduced solely to artifact style. Artifacts are not
simply products of cognitive and neuromuscular processes resulting from social
learning, they are influenced by a range of overt and subtle social variables and
decisions. Artifact technological style merely provides one vector by which we can
explore variability in learning networks as indirect evidence of past diversity. What is
important is that the concept of technological style recognizes these converging factors
through its emphasis on what a suite of intersecting behaviors reveals about the social
context of artifact production. When approached from multiple scales, we may begin to ask questions about variability in learning networks as they relate to scaled and nested cultural and social identities and look for concordance, or lack thereof, within other classes of data. This highlights the fact that we are typically unable to make assumptions upfront about which stylistic features will be key to delineating learning network boundaries in a given archaeological assemblage. Linking spatiotemporally coherent material cultural variability to social units is, consequently, post hoc and contingent upon the consideration of other datasets and ethnographic analogy to help constrain interpretation. Acknowledging its limitations, a strength of this approach is that it explicitly identifies the growing body of literature on social learning and cultural transmission as an important tool for understanding material cultural variability and linking it to the ways in which archaeologists may recover aspects of ancient social identities, interaction and, ultimately, diversity.

Critics of this approach may point out that such analysis proffers a passive view of material culture in which technological styles may be equated with identity groups. Some scholars further see the portability of artifacts as hampering the use of technological style. These concerns are only paralyzing if analysis goes no further and eschews consideration of social and archaeological context and the multiple roles individual artifacts had in ancient lifeways (Hegmon 1998). In the case of perishable artifacts such as basketry, preservation often mitigates against fuller understanding of such objects' various roles during their use lives, but this problem can be minimized through attentiveness to details of artifact form, technology, provenience, and
consideration of ethnographic and archaeological data on the organization of
production. That some woven artifacts clearly convey symbolic content provides an
alternative means of exploring their active roles in ancient Puebloan life (see Chapter 8).
At this juncture it is sufficient to note that while not providing all of the answers
archaeologists seek about ancient societies, approaches to technological style afford a
strong theoretical foundation for investigating questions about complex social
phenomena including social interaction, boundaries, and diversity.

The details of prehispanic Southwestern basketry and related crafts’ production
have largely been neglected as a source of information for understanding ancient social
boundaries, interaction and sociocultural diversity. This is particularly true in the case of
Chaco archaeology, which has been dominated (and understandably so) by research on
ceramics, lithics and architecture. Examining basketry technological styles to identify
learning network variability within Chaco Canyon and across the regional system has the
advantage of providing independent lines of evidence by which archaeologists may
discern the cultural or geographic affinities of the system’s participants, evaluate
existing proposals for cultural and social diversity, and enhance our understanding of
the role of sociocultural heterogeneity in demographic and cultural developments
during the Bonito phase.

To elaborate on the role of basketry and related crafts in historic and prehispanic
Puebloan lives, I next turn to a discussion of the organization of basketry and related
crafts’ production in the Southwest in Chapter 5. The traumatic effects of contact with
the Spanish and other Euro-American settlers since the A.D. 1500s have made this task
difficult, but cross-cultural analogs help develop a plausible reconstruction. With this necessary foundation, I then identify the sites bearing perishable artifact assemblages that I have examined, and the methods and analytical procedures I employed, to investigate questions surrounding cultural and social diversity in Chaco Canyon and throughout the regional system.
We found that of the hundreds of objects, filling five large display cases and many storage drawers, there would have remained no more than a score or so of chipped flints, a handful of bone awls, and a few beads of stone and shell. The whole lot would have gone into a good-sized soup plate. That pitiful residue would have told us nothing of how the Basket-makers cradled and diapered their babies, how they dressed, how they wore their hair... It would have given us no inkling of their extraordinary skill as weavers and wood-workers. As it is, we have intimate knowledge of all these and many other details of Basket-maker life, knowledge which in the case of the overwhelming majority of ancient cultures is lost beyond recall [Kidder 1947:vii].

Baskets and the results of related crafts that entail the transformation of animal and vegetal products have provided important contributions to human societies for at least the last 30,000 years, and the complexity and sophistication of the earliest known industries strongly suggest their probable existence tens of thousands of years earlier (Adovasio et al. 2007; Hardy 2008; Hardy et al. 2013; Kvavadze et al. 2009; Soffer 2004; Soffer et al. 2000; Stone 2011). Critical to many activities in which humans engage, ranging from the construction of shelter to the manufacture of food procuring equipment, perishable technologies constituted (and in some societies today still constitute) a significant fraction of human societies’ material culture. Tellingly, archaeologists working in environments where perishable artifacts are recoverable have found that roughly 90% of many traditional societies’ material culture is represented by plant- and animal-based manufactures (e.g., Andrews et al. 2002; Collins 1937; Croes 1997; Guernsey and Kidder 1921). Taylor (1966:73), for example, noted of his
excavations in Coahuila, Mexico, that *finished* fiber-based artifacts outnumbered stone tools by a ratio of 20:1. What is striking about these observations is their implication for the high degree to which archaeological interpretations of the past are dominated by studies of ceramic, lithic, osseous, and other more durable materials in the absence of exceptional organic preservation. As observed more than six decades ago by Southwest archaeologist A.V. Kidder, archaeologists are in most cases working from an alarmingly incomplete record to develop their reconstructions.

While we can, and do, work with what we have available, we are especially fortunate that the archaeological record of the arid Southwest has yielded substantial perishable artifact data for enhancing our reconstructions of the past. Indeed, the detailed perishable artifact record for the Southwest is only exceeded in antiquity and abundance in North America by the hunter-gatherer material culture recovered from the numerous dry caves and rockshelters of the arid Great Basin (e.g., Adovasio 1986b; Connolly et al. 2016; Fowler et al. 2000; Hattori and Fowler 2009). The early Southwest record is limited, but sandals and baskets from sites on the Colorado Plateau provide tantalizing clues to perishable industries going back more than 10,000 years (Geib 2000; Geib and Jolie 2008, 2018; Jolie and Geib 2010).

Prior to the Late Archaic/Early Agricultural Period (ca. 1500 B.C. to A.D. 500), Southwestern basketweaving traditions exhibit broad similarity to adjacent traditions in the eastern Great Basin, western Plains, and northern Mexico that indicate a deep shared history for most major weave structures and, to a degree, forms and uses (Adovasio 1980, 1986b, 2012; Hyland et al. 2003; Jolie and Geib 2010; Webster 2011a;
Webster and Jolie 2011, 2014). Although regional variability is apparent in the earliest known traditions, for all intents and purposes Archaic basketry provides the foundation from which increasing regional variability emerges with time. Irrespective of the widespread early similarities that most basketry researchers (including myself) see among traditions of the Desert West, there is agreement that the Southwest cultural province exhibits greater internal coherence in basketry and related crafts from an early date, such that wares examined out of their regional context are readily recognizable as Southwestern-derived, rather than from the adjacent Great Basin, northern Mexico, or Trans-Pecos, Texas, areas (Adovasio 1970, 1972, 1974, 1980, 2012; Morris and Burgh 1941; Weltfish 1930, 1932a, 1932b).

The best records of Southwestern perishable material culture come from the Colorado Plateau and date to the Basketmaker era, when early farmers made extensive use of caves and rockshelters conducive to the preservation of organics (Adovasio and Illingworth 2014; Blackburn and Williamson 1997; Guernsey 1931; Guernsey and Kidder 1921; Kidder and Guernsey 1919; Morris and Burgh 1941, 1954; Webster 2011a; Webster and Hays-Gilpin 1994; Webster and Jolie 2011, 2014; Weltfish 1932b). Some of these sites have also yielded smaller quantities of younger Pueblo era material. The dearth of Pueblo I period perishables relative to earlier and later times may be more apparent than real, as few artifacts that may date to this time frame have been studied in detail or directly dated and a great many survived by virtue of carbonization (Adams 1993; Webster 2009a, 2012a, 2014). Published assemblages dated to Pueblo II are best represented by the material from Pueblo Bonito in Chaco Canyon (Pepper 1920; Judd
1954) and the assemblages from Aztec West and Salmon Ruins (Morris 1919, 1924; Webster 2006a, 2008a, 2011b). Pueblo III perishables are well represented by the assemblages from Antelope House (Adovasio and Gunn 1986; Magers 1986a, 1986b) and other ruins in canyons del Muerto and de Chelly, Arizona, Aztec and Salmon Ruins, the Navajo National Monument area, and the Mesa Verde region (Anderson 1969; Fewkes 1909, 1911a, 1911b; Judd 1930; Morris and Burgh 1941; Osborne 2004). Thereafter, the perishable artifact record is spotty and what material has survived is typically very poorly preserved or unevenly reported (Mitchell 1960; Tschopik 1939; Webster 1997). Unfortunately, no assemblages of a size even remotely comparable to those from the above mentioned sites and regions are known after about A.D. 1300.

Appreciating the complex nature of the perishable artifact record, this chapter fleshes out the above remarks to provide necessary background to the present study through a consideration of salient geographic and chronological trends in Colorado Plateau basketry and related craft production. I then use this broad outline of linked technological and cultural trajectories to sketch a plausible reconstruction of the organization of basket, mat, and sandal production during the Bonito phase. After situating the production of woven artifacts in the more general archaeological literature on the organization of craft production, I next examine the place of woven artifact production in the corpus of research on Chaco era craft production. Doing so helps highlight some of the implications of basketry and related crafts’ organization of production for investigating questions of social interaction and diversity. The chapter concludes by detailing the research methods and analyses employed in this study to
investigate the cultural or geographic affinities of Chaco Canyon’s occupants and the evidence for cultural and social diversity within Chaco Canyon and across the regional system.

Southwestern Basketry in Time and Space

All three of the major subclasses of basketweaves (twining, coiling, and plaiting) are represented in the prehispanic and historic Southwest, but each is differentially represented within sites and among social groups depending on time and geography. Structurally, twining describes a technique in which active horizontal elements called wefts are twisted around vertical elements called warps (Figure 5.1). Coiling describes a structure produced by sewing a passive horizontal element or set of elements called the foundation with moving vertical elements called stitches (Figure 5.2). The result of successive stitches engaging the foundation is the coil, circuits of which provide the structural framework for the basket. In plaiting, as opposed to twining and coiling, all of the elements are active. Also known as interlacing, plaiting is accomplished by passing single elements or a set of elements called strips over and under each other at a typically fixed angle, usually about 90°. In simple (or plain) plaiting, elements (often flat “strips”) pass over and under each other in single intervals (denoted 1/1) (Figure 5.3). In twill plaiting, a common variant, the weaving elements (or strips) of one set pass over
two or more in the other set (e.g., 2/2, 3/3, 4/4) at staggered intervals to produce a
diagonal or herringbone appearance (Figure 5.4). In addition to basketry, plaiting is also
represented by braided and loom woven cloth fabrics, which differ in production
method but not in the way their constituent elements interact. In sum, the forms and
consequent functions of wares produced with twining, coiling and plaiting, or
combinations of these structures, are limited only by the raw materials available and the
weaver’s imagination.

Figure 5.1. Schematic illustration of weft twined basketry technology (from Adovasio
2010:Fig. 7b; reprinted with permission). Shown is open simple twining with s-twist
wefts.

Figure 5.2. Schematic illustration of close coiled two rod and bundle bunched
foundation basket sewn with noninterlocking stitches and a leftward (R-L, or right-to-
left) work direction (from Adovasio 2010:Fig. 76e, reprinted with permission). This
structural type is the most common among prehispanic Southwestern coiled baskets.
Figure 5.3. Schematic illustration of simple plaited basketry technology with a 1/1 interval of interlacement (from Adovasio 2010:Fig. 117a, reprinted with permission).

Figure 5.4. Schematic illustration of 2/2 interval twill plaited basketry technology (from Adovasio 2010:Fig. 118, reprinted with permission).

My emphasis here is primarily on traditions known from that portion of the Southwest coterminous with Puebloan occupations, and more specifically, what is known about the use and distribution of coiled baskets, plaited mats, and sandals that form the focus of this study. Although this emphasis largely limits the geographic scope to the Colorado Plateau, where pertinent I remark on other Southwestern traditions for comparative purposes. The literature on ancient and ethnographic basketry and related crafts is large, but somewhat obscure. For elaboration on the sketch I provide below, I

In general, the use of twining is restricted in the Puebloan Southwest. It is most prevalent in Archaic and Basketmaker footwear, as well as Basketmaker tumpbands, blankets, aprons, and bags and mats of various shapes and sizes. Twining’s use declined markedly by the onset of Pueblo II times coincident with the arrival of cotton loom weaving and an increase in the production of plaited items. A few twined baskets are known throughout the Southwest cultural sequence, but they are rare and appear to have principally been rigid containers. By historic times, some twined burden baskets are known from the western Pueblos. A single row of twining frequently shows up as a reinforcement for selvages (edges) in matting and loom woven textiles. Coiling, by comparison, appears to have been the dominant basket weave structure from the Archaic period up through the Pueblo era, at least until more recent times. It decreased somewhat in importance during the early Pueblo era, however, with increased production and elaboration of ceramic technologies. All Southwestern groups produced coiled baskets, though the percentage of wares that coiling contributes relative to other techniques (predominately plaiting) often varies by group. A wide variety of bowls, trays, storage vessels, burden baskets, and several unique forms are known to have been produced with coiling. The earliest Southwestern plaiting comes in the form of Archaic period sandals and persists during Basketmaker times in the form of sashes,
aprons, sandals, and, occasionally, baskets. Plaiting witnessed a demonstrable
efflorescence beginning by Pueblo II times when loom woven cloth, twilled mats, ring
baskets, sandals and several types of containers were produced in large quantities. By
far the most distinctive plaited basket was the twilled ring basket, named for its circular
rim rod, which continues to be made today in several Pueblo communities. Another
common, if comparatively more recent, plaeting variant encompasses the so-called
“wickerwares.” Wicker baskets employ rigid elements exclusively, as opposed to flexible
or semi-flexible strips, and are found in the form of trays, burden baskets, and
occasionally bowls. Wicker baskets are found in more recent times principally among
Hopi and Zuni peoples, though some Navajo burden baskets are also produced in this
way.

Direct links between the basketweaving traditions of ancient and contemporary
Southwestern societies exist, but there are also marked differences that cannot be
ignored. The most salient of these differences are worth discussing briefly because they
underscore the limits of the ethnographic record for understanding prehispanic
perishable industries, highlight plausible geographic affinities that become significant in
later chapters and, lastly, complicate attempts to link contemporary tribes to ancient
assemblages solely on the basis of primary weave structure. One of the first and most
striking observations is that woven sandals of any type (plaied and twined) do not
appear to have been produced much, if at all, by about A.D. 1375 on the Colorado
Plateau. This is surprising because multiple styles of fiber footwear were produced and
worn throughout the Southwest for 10,000 years (e.g., Geib 2000; Hays-Gilpin et al.
1998; Teague and Washburn 2013). Salwen’s (1960) review of ethnographic, ethnohistoric, and archaeological evidence points to an increase in the availability of hide suitable for moccasin production as accounting for sandal manufacture’s demise, and this seems plausible given that hide footwear appears to suffer abuse better and last longer (cf. Roediger 1941:131). Prior to about A.D. 1300, depictions of sandals in rock art and other media are widespread and frequent, but seemingly disappear after that time (e.g., Judd 1954:75; Schaafsma 1980). Furthermore, in the surviving corpus of Pueblo IV period painted murals (e.g., Dutton 1963; Hibben 1975; Smith 1952; Webster 2007b, 2017) there are no depictions of sandals but only moccasins. Thus, in the nearly sixty years of archaeological research since Salwen’s article was published, no data have arisen to challenge his argument for sandal’s obsolescence by circa A.D. 1375 or earlier.

Historic coiled basketry poses a more interesting challenge. I have observed in passing a disjuncture between prehispanic Pueblo coiled basketry and historic Pueblo wares, at least in terms of weave texture and decorative style, that I propose owes much to the trauma of contact with the Spanish and other Euro-American settlers. Coiled basketry production appears to have waned considerably among the Pueblos by at least the A.D. 1700s with the introduction of metal containers, the continued use and elaboration of ceramic technologies, and the ease of acquisition of baskets from nomadic neighbors, including the Ute, Apache, and Navajo (see Ellis and Walpole 1959; Tanner 1983; Whiteford 1988, 1989). Many ethnographic Rio Grande Pueblo pieces that I have seen in publications and in museums exhibit generally thicker coils and wider stitches, as well as relatively simpler and sparser designs, as compared with prehispanic
wares. Kidder (1932:298) picked up on some differences in weave texture, too, and observed during his work at Pecos Pueblo that:

A marked difference exists between the presumably eighteenth century baskets from the rooms and the prehistoric ones... The early fabrics had relatively narrow coils and relatively broad sewing-splints. The later specimens have broad coils (three to five to the inch) and narrow splints (the coarsest twelve to the inch, the finest twenty-two).

Pueblo coiled baskets post-dating A.D. 1700 bear more than a passing stylistic resemblance to historic Navajo and Apache coiled baskets, and this likely results from years of extended contact and cultural exchange, particularly following the Pueblo Revolt of 1680. Navajo basketry itself faced extinction by the early twentieth century and, prior to its renaissance in recent decades (e.g., Dalrymple 2000; McGreevy 2001; Menlove 2013; Simpson 2003), much coiled basketry used in Navajo societies was made-to-order by Ute and Southern Paiute weavers, partially to circumvent increasingly restrictive taboos on Navajo weavers (Stewart 1938; Tschopik 1938, 1940). In form and decoration, such coiled baskets are unmistakably Navajo, but their origin is revealed by subtle details of manufacture, such as stitch splices, that identify their maker as San Juan Paiute or Ute. The question of historic Pueblo coiled basketry thus requires further investigation, but I concur with earlier scholars that much of it ceased to be made during the eighteenth century (Mason 1904; Morris and Burgh 1941; Whiteford 1988). That which remained was subject to considerable influence from, and blending with, neighboring non-Pueblo basketmaking groups, including Ute, Apache, Navajo, and Havasupai peoples, many of whom engaged in trade and intermarried with Pueblo peoples (e.g., Ellis and Walpole 1959; Ford 1972, 1983; Hough 1918:266; Kania and
Furthermore, because Puebloan coiled burden basket production appears to have declined by the historic period (and possibly as early as the A.D. 1300s), and given that Apache peoples produced twined burden baskets in large quantities, it seems most likely to me that the similarly shaped twined and wicker plaited burden baskets produced by historic Pueblo peoples reflect reacquisition of the form based on Apachean models. As to the wicker burden baskets from some western Pueblos, the form was modeled after Apachean burden baskets but executed in the familiar wicker technique still in use today. Higher proportions of “old Pueblo” baskets in early ethnographic collections from Acoma, Laguna, and Zuni suggest the possibility that coiled basketry production was maintained longer within these communities than among the Rio Grande Pueblos, before eventually being superseded by basket trade wares in the nineteenth century as well (Whiteford 1988). I am not suggesting that historic Pueblo basketry is not Pueblo, nor that all eastern Pueblos entirely ceased production of coiled basketry or adopted their neighbor’s wares, but rather that the limited historic sample of Pueblo basketry appears to reflect most clearly the dynamic social landscape in which it was produced and the craft learned, as opposed to its direct relationship with technological antecedents during the preceding millennia.

A somewhat different situation obtains to Hopi peoples, among whom coiled basketry production seemingly persisted without interruption. In historic and recent times, coiled basketry has been produced exclusively on Second Mesa, while wicker plaited wares are produced only on Third Mesa. Hopi coiled basketry is distinctive
among all Pueblo wares for its use of thin yucca (*Yucca* sp.) leaf strips for its stitches and a bundle of yucca or grass culms for its foundation. The woven result gives Hopi coiled baskets their distinctive appearance characterized by relatively fat coils and tightly packed stitches. What is interesting is that bundle foundation coiling, though known by Basketmaker times, was a rare technique on the Colorado Plateau until sometime after roughly A.D. 1300. Coiling with a two rod and bundle bunched foundation, which served as a hallmark of Puebloan groups (e.g., Ellis and Walpole 1959; Mitchell 1960; Morris and Burgh 1941; Whiteford 1988), appears to have fallen out of production at Hopi during the A.D. 1700s, as indicated by the assemblage recovered during renovations at Walpi Village on First Mesa (Adovasio and Andrews 1985). The origins of bundle foundation coiling and the reasons for its rise to prominence at Hopi are murky, but I concur with Webster (2007a, 2012b) that its earlier production in the Hohokam and Mogollon regions makes them the most likely sources, and this accords well with Hopi oral tradition identifying a southern origin for women’s basketry societies and dances (Teiwes 1996:173-181; Stephen 1936; Webster and Loma’omvaya 2004). Bundle foundation coiling of considerable antiquity also prevails in much of southern California, Mesoamerica, and South America. Once established among Hopi peoples, bundle foundation coiling became the sole method for making coiled baskets and, together with Hopi wickerware, comprises one of the Southwest’s most distinctive basketry traditions.

Wickerware provides another example of an anomalous weave structure common to Hopi and Zuni during the historic era. It is also found in early Navajo burden
baskets (Brugge 1981:91-93; Vivian 1957), but not among other Southwestern groups.

Teiwes (1996:32; see also Finger and Finger 2006) notes that prior to the late nineteenth century, wicker baskets were probably produced at villages on the other Hopi mesas because a few weavers in those villages today still produce wicker burden baskets, trays, and cradles. If not trade items, the presence of wicker baskets at historic Walpi on First Mesa may attest to their earlier and more widespread production among the Hopi villages (Adovasio and Andrews 1985). The limited spatial distribution of historic wicker plaque (and perhaps coiled basket) production is potentially explained by Teiwes’ (1996:186) note that,

The use of plaques was almost entirely ritual and ceremonial before plaques became commercial items in the twentieth century. At one time the two women’s societies, Lalkont and Owaqölt, whose members constituted the sole basket weavers, had a great influence over where certain plaques were made, and to a great degree this is still true today.

Archaeological evidence suggests wickerware first appeared abruptly at around A.D. 1300, notably coincident with the increase in popularity of bundle foundation coiling on the Colorado Plateau (Adovasio and Andrews 1985; Teiwes 1996; Webster 2012b). Excluding Late Archaic/Basketmaker “wicker” yucca sandals that differ substantively from the baskets, wicker-style plaiting is unknown before that time, making its origins somewhat mysterious. Navajo wicker burden baskets would initially seem to complicate reconstruction of origins if not for the fact that neither they nor any other form of plaiting were produced in the vicinity of Navajo people’s northerly homeland, nor at any points in between, during the historic period or, apparently, in the past. An in situ invention of wicker in the Hopi region cannot be ruled out, but seems
less likely to me in light of the accumulating evidence for ties to societies located at points south. Whiteford (1988) notes some willow wicker baskets produced among the Rio Grande pueblos, but the evidence suggests that they are of historic Mexican and/or Spanish derivation, similar to Teiwes’ (1996:187) conclusion about the wicker baskets made by Mayo peoples of lower Sonora. I agree with Whiteford (and Teiwes), but would add that there are documented instances of missionaries teaching wicker weaving with osiers to Indians outside the Southwest as a source of income, as well as such basketry techniques being taught to Indian children in boarding schools (e.g., Whiteford 1988; Wyckoff 2001). Whiteford (1988) also refers to the ancient wickerware burden baskets produced within the circumscribed Lovelock archaeological region of western Nevada between roughly 2000 B.C. and A.D. 1300 (see Jolie 2004; Tuohy and Hattori 1996), but their extremely unique construction, arguable in situ invention, and distance from the Southwest remove this tradition from consideration as a source for Southwestern wares.

Interestingly, when one looks for a proximate source for Southwestern wicker basketry production, there exists only the ancient, if limited, wicker basketry traditions of Mesoamerica; it is apparently absent or poorly reported if known at all from northern and northwest Mexico, and Trans-Pecos, Texas (Adovasio 1972; Andrews and Adovasio 1980; Carter 1992; Foster 1967; Johnson 1971; King 1974; MacNeish et al. 1967; McGregor 1992; Mefford 1992; Rodriguez Lazcano and Torres Quintero 1992; Taylor 1966; Zingg 1940). Given wickerware’s apparent antiquity and, to an extent, similarity in forms produced, I submit that Mesoamerica is presently the most likely source for
Southwestern varieties, though the route for a northward spread of the technique requires elucidation.

Finally, twill plaited matting persists into the historic era, but we know little about the extent of its production by that time, owing to a dearth of examples. The early record of twill matting is poorly known because poor preservation has made it difficult to identify fragments as definitively matting, as opposed to plaited sandals or baskets (cf. Webster 2009a, 2012a). Raw material is usually a good clue because mats are generally rush (*Schoenoplectus* sp.), and sometimes split cane (*Phragmites australis*), but researchers frequently misidentify the raw material when preservation is poor, or assume yucca because of its ubiquity in Southwestern perishable artifact assemblages. Given twill plaited matting’s prevalence among, and significance to, historic O’odham peoples (Drucker 1941; Kissell 1916; Russell 1908), archaeologists can infer that it was important to peoples of the Hohokam region despite its scarcity in the archaeological record (Di Peso 1956; Fewkes 1912; Haury 1945a, 1950; King 1965). In the Mogollon region, however, twill plaited matting is present between A.D. 550 and 700 and increases markedly in popularity by A.D. 1000 (Bluhm 1952, 1956; Cosgrove 1947; Webster 2007a). In all cases, however, Mogollon examples lack the diagnostic intricate selvages of later Colorado Plateau mats. Matting remains recovered from Trans-Pecos, Texas (Andrews and Adovasio 1980; McGregor 1992) and northern/northwestern Mexico are also seen to lack intricate salvage configurations (Clune 1960; King 1974; Lister 1958; O’Neale 1948; Sayles 1936; Sutherland 2014; Taylor 1966; Zingg 1940). In Trans-Pecos, Texas, and Mesoamerica plaited matting dates back well into the Archaic
Twilled matting persists as the predominant style in later Mesoamerican societies, eventually acquiring important status as a symbol of community affairs, authority, and royalty by at least 500 B.C. (Robicsek 1975).

Twill plaited mats first appear on the Colorado Plateau sometime during Pueblo I, possibly late, but may have been preceded or anticipated by earlier manipulations of twined mat selvages. Examples of twined mats with twisted and braided side selvages are known from Basketmaker times (Guernsey 1931; Webster and Jolie 2011), and these are followed chronologically by twined examples that exhibit plaited selvages (e.g., Guernsey 1931:97). One unprovenienced twined mat from Antelope House that could be of Basketmaker III or Pueblo I age exhibits a twill plaited intricate end selvage that resembles the twilled intricate selvages of Pueblo II and III times (Adovasio and Gunn 1986:313, Fig. 116).

My survey of published excavation reports hints at a curious spatial distribution for twill matting between circa A.D. 1000 and 1300. Relative to the large quantities of matting from sites such as Antelope House (Adovasio and Gunn 1986) and Aztec West Ruin (Morris 1919, 1924), perishable artifact collections from dry sites in the Glen Canyon, Kayenta, Mesa Verde, and Navajo Reservoir regions have markedly fewer mats per site than one might expect, given contexts conducive to their preservation (e.g., Adovasio and Illingworth 2014; Fewkes 1909, 1911a, 1911b; Kidder and Guernsey 1919; Guernsey 1931; Nordenskiold 1893; Osborne 2004; Rohn 1971; Webster 2012a). For instance, in her analysis of the large Wetherill perishable artifact collections from Mesa
Verde, Osborne (2004) notes fewer than two dozen specimens, and if we add to this fragments recovered by other researchers, the number of mats represented across so many sites does not increase appreciably. I infer from this that despite twill matting being widely known in the northern Southwest, it was not uniformly important to, or abundant among, all groups. Rather, it seems that the core of twill mat production and use in the northern Southwest during Pueblo II and III times was centered on that area spanning from roughly Canyon de Chelly National Monument to Chaco Canyon, and north to Aztec Ruins.

Geography aside, and allowing for poor archaeological representation, it is clear that after A.D. 1300 twill matting does not appear to have been nearly as popular as it had been in former times, and that the elaborate edge finishes or borders characteristic of Colorado Plateau matting in previous centuries had all but disappeared. After A.D. 1300, the remains of mats appear to occur most frequently in burial contexts, indicating that they continued to be used as wrappings in mortuary, and perhaps also ceremonial, contexts, even if they experienced a decline in production or were supplanted by hide and cotton items (Hough 1918:264; Smith et al. 1966:240-241; Webster 1997). This view is supported by the available prehispanic record but cannot be effectively demonstrated, given that early archaeologists prioritized excavation of burials where mats would be most likely to be recognized, if preserved. Mats with preserved edges are scarce, or at best poorly reported, except for one preserved mat selvage fragment from the roof beams of Room 24 at Pecos Pueblo (Kidder 1932:299-300). This piece evidences a simple side selvage that implies that the intricate selvages characteristic of Pueblo II
and III period mats had ceased to be produced by the A.D. 1500s, if not one or two centuries earlier.

In retrospect, it seems that the general character of historic basketweaving traditions in the Puebloan Southwest began to coalesce sometime during the fourteenth century A.D. in response to widespread population movement and the establishment of new social and, by extension, learning networks. Ultimately, many of these crafts were dramatically transformed by increased contact with Euro-American settlers and neighboring groups, particularly Athabaskan language-speakers. Although the aforementioned developments present formidable challenges to attempts to sketch reconstructions of the organization of basketry production systems in the prehispanic Southwest, the substantive archaeological record and cross-cultural analogs, when combined with ethnographic insights, facilitate the development of a preliminary outline for how production may have been organized during the Bonito phase.

**Basketry Production Systems in the Prehispanic Southwest**

Archaeological investigation of craft production, that is, how raw materials are turned into finished goods, has wide relevance to research attempting to reconstruct ancient Southwestern economies and social, ritual and political organization (Bayman 1999, 2002; Mills and Crown 1995; Spielmann 2000, 2002). Knowledge of how various
dimensions of crafts’ production are organized enriches understanding of daily life during the Chaco era while also providing information fundamental to reconstructing corollary social developments. In particular, data on multiple crafts within a society may facilitate the untangling of the relationship between sociopolitical power and craft production (Bayman 1999; Watson 2012).

Work by Costin and colleagues (e.g., Costin 1991, 2001, 2005; Costin and Hagstrum 1995; Costin and Wright 1998) has helped formalize archaeological study of craft economies over the last twenty years. Since Costin’s (1991) initial formulation of a typology describing how craft production may variously be organized, she has expanded her ideas to recognize multiple interrelated components that illuminate how producers are embedded in relationships with the people who use craft goods and who shape their production and distribution. The raw materials, tools, knowledge and skill required to manufacture goods, as well as the principles and mechanisms structuring their transfer, are equally important to studying craft production systems. Craft specialization, in which differentiated producers manufacture more goods than they can use themselves, remains a topic of special interest because of a cross-cultural tendency for levels of craft specialization to increase in line with sociopolitical scale and complexity (Clark and Parry 1990; Schortman and Urban 2004; Smith 2004). Craft standardization, describing homogeneity of product, can sometimes provide a relative measure of specialization insofar as the degree of variability or standardization of a product is related to the number of producers and the broader organization of production, but other variables, including production intensity and chronology of
assemblage accumulation, also need to be considered (Costin and Hagstrum 1995:622-623). Significantly, as more attention has been given to craft production and specialization in small-scale and middle-range societies, archaeologists have come to appreciate that there is no simple linear relationship between specialization and sociopolitical complexity (Bayman 1999, 2002; Cobb 1993; Cross 1993; Mills 2000; Mills and Crown 1995; Spielmann 2002).

Acknowledging advancements in modeling ancient craft economies and specialization, the four organizational parameters originally delineated by Costin (1991) continue to be useful for developing preliminary reconstructions of the organization of production. Costin’s four parameters, or dimensions, include the context of production, concentration of production, scale (or composition) of production units, and intensity of production. \textit{Context} refers to the affiliation of the producers and the nature of the demand for their products. It is often dichotomized between independent and attached producers, the former of whom make domestic and utilitarian wares that serve primarily household needs but may circulate within the local economy, whereas the latter manufacture specific goods with social or political symbolic significance that move according to relationships that serve to create or reinforce social and political difference. Production and distribution of goods made by attached producers tends to be controlled by the patrons or elites who commission them. \textit{Concentration} speaks to the spatial relationships between producers and consumers, such as whether producers are evenly distributed among a population of consumers or nucleated in a single production location to which consumers or distributors must travel. \textit{Scale} describes the
size and relationships of producers and spans the continuum from households to workshops and factories. Lastly, intensity identifies the relative amount of time individual producers spend on craft production relative to other tasks and ranges from part-time to full-time. Significantly, intensity of production is conditioned by broader task diversity and scheduling, which in turn is guided by the gendered division of labor, underscoring the importance of the producer’s social identities.

The issues of task diversity and scheduling are critical and draw attention to the fact that, in many societies, crafts are embedded in households where the amount of time invested in a given craft can vary widely between households as well as throughout the year depending on the range of subsistence and other economic strategies a household pursues. Importantly, Hagstrum (2001:49-50) recognizes that some crafts can be considered “complementary technologies” in that they complement each other and subsistence pursuits on a daily or seasonal basis. Basketry and related textile crafts are prime examples. They may be taken up or put down relatively easily, which allows them to fit snugly within the interstices of complicated or “tight” task schedules. Textile crafts also operate as “intersecting technologies” in that they share technological knowledge, raw materials, and labor (Hagstrum 2001). That all textile crafts overlap to some degree in their fundamental construction techniques means that knowledge about raw material preparation and manipulation is generally transferrable between these crafts. Such an emphasis on craft production activity moves analysis away from the amount of time producers spend on crafting to how it is situated within domestic economies in which
increased productivity and craft diversity to mitigate risk of subsistence shortfall are important concerns (Costin 2005; Hagstrum 2001; Hirth 2009a).

To this end, it is arguably more profitable to think about the dimension of crafting intensity in domestic contexts in terms of work periodicity and production diversity. Hirth (2009a) advocates deemphasizing the categories of part- and full-time production in favor of intermittent and continuous crafting, which refer to periodic and constant production in domestic contexts, and multicrafting, the practice of a household engaging in multiple crafts. Like categories of relative time investment, such as part- and full-time, work periodicity represents a continuum of non-mutually exclusive craft activity. I find this approach preferable because it foregrounds how craft production contributes to our understanding of the economic and social strategies of individuals and households and, consequently, how some may seek to augment their social position and identity (or identities) through changes in the organization of craft production.

Spielmann (1998, 2002) observes that in small-scale and middle-range societies where communal ritual is key to social reproduction, as in the Pueblo Southwest, ceremonial activity creates greater demand for socially valued goods that stimulate economic intensification. Individual and household production to meet these needs thus not only supports the community, but also provides opportunities for craft producers and their kin to participate in and perform activities that "fulfill ritual obligations and create and sustain social relations" (Spielmann 2002:197). Although Spielmann’s objectives are to underscore the role of ritual production in economic intensification and the creation of functioning adults in a society, this does not diminish the reality that ritual practice
remains an important context in which aspiring leaders compete, and serves to remind us that the scale of demand for socially valued goods is important to distinguishing the goals of the many, from those of the few or the individual.

While by no means exhaustive in encompassing the full range of variables that can structure craft economies (see Costin 2005; Hirth 2009b; Hruby and Flad 2007; Shimada 2007; Wells and McAnany 2008), Costin’s four organizational dimensions provide a useful starting point for reconstructing the fundamentals of the organization of basket, mat, and sandal production that provide a necessary basis for evaluating and interpreting observed patterns in stylistic variability. It is with these parameters in mind that I develop a sketch below of how each of these crafts may have been organized during the prehispanic era, drawing on ethnographic and cross-cultural analogies. I conclude by summarizing problems with the available evidence for perishable artifact production within Chaco Canyon and at Chaco-affiliated sites and situating the organization of basketry production within the broader literature on Chacoan craft production.

**Sandals**

As noted earlier, descriptions of historic sandal production are wholly lacking because Pueblo peoples appear to have ceased producing them by the late A.D. 1300s (Salwen 1960), and there exists scant evidence that Navajo peoples ever produced many, if at all (Kluckhohn et al. 1971; Stephen 1888; see also Webster 2009a). Plausible
analogies for sandal production may lie in the ethnographic record of hide footwear manufacture, but detailed ethnographic descriptions of Puebloan footwear production are themselves scarce. What the available accounts suggest is a trend towards male-dominated footwear production within the context of dispersed households, although women also reportedly made moccasins in several Pueblos too (Ortiz 1979; Roediger 1941; Underhill 1944). Given the more general association of hideworking with men among historic Pueblo peoples, it may be premature to extend this gender assignment into the past for fiber-based footwear, as archaeological evidence strongly suggests that the bulk of yucca fiber-working to make baskets and other textiles was performed by women (cf. Parsons 1939:38). For instance, Osborne (1965, 2004:421-431; see also Morris and Burgh 1954:61-63) has marshaled convincing evidence that the so-called deer humeri “scrapers” or “fleshers” that were abundant during the Pueblo II and III periods were one among several types of women’s yucca fiber processing tools. These observations raise the possibility that fiber footwear production may have been female dominated in prehispanic times. Ultimately, however, it is perhaps best to presume that either gender (or both) could have been responsible for sandal production. Regardless of the gender of the producer, prehispanic sandal production was likely centered on the household, performed episodically when time permitted or need required outfitting the family or meeting gift-giving or bartering obligations.

*Mats*
Lamentably, we know virtually nothing about matweaving during the historic period, except that twill plaited mats were produced at least at Hopi and Zuni until the late nineteenth or early twentieth centuries (Hough 1918; Smith et al. 1966; Stephen 1936; Tanner 1983:77, Fig. 4.25 background; Underhill 1944:24; see also Zuni mat AMNH cat. no. 50.2/272). Women appear to have been the producers, and this corresponds well with cross-cultural evidence from small scale and middle range societies in which matweaving is female-dominated and performed by individuals living in dispersed households (e.g., Driver and Massey 1957; Petersen 1963). In colonial and more recent times, some villages in Mexico have specialized in the manufacture of mats and baskets for sale, and in these cases men are typically full-time specialist producers (Driver and Massey 1957; Foster 1967; Gámez Martínez 1991, 1997, 2004; Ugent 2000; Vazquez-García and Munguía-Lino 2015; Zaldívar Guerra 1976). However, it is unclear to what extent male matweavers existed in prehispanic Mesoamerica or whether its later organization was influenced by the Spanish. In any case, some specialized production seems likely among the more sociopolitically complex prehispanic societies of the region. Considering the limited information, it seems probable that prehispanic Southwestern women engaged in intermittent matweaving oriented towards the needs of the household.

Coiled Baskets
Relative to sandals and mats, we know more about basketry production among historic Pueblo peoples, yet there are still significant gaps in our knowledge. What information we have indicates that women were the primary basketweavers and that the coiling and plaiting of basketry for utilitarian and ceremonial uses persisted up until the mid-nineteenth century among the Western Pueblos, Rio Grande Keresans, and possibly at Jemez Pueblo (Ellis and Walpole 1959; Gifford 1940; Mitchell 1960; Parezo et al. 1987; Tanner 1983; Whiteford 1988). There are accounts of male basketweavers active at several pueblos over the last century (e.g., Jemez, Santo Domingo), but a persuasive argument can be made based on available documentary and stylistic evidence that these individuals and/or their teachers ultimately acquired the craft from non-Pueblo spouses, relatives, or the Spanish (see Ellis and Walpole [1959] and Whiteford [1988]). The sole exception to this is the more substantive evidence for Hopi men producing a restricted set of basket forms, such as pack baskets (Stephen 1936; Teiwes 1996). By the late nineteenth century, nearly all basketry in use at most eastern Pueblo villages was acquired through trade from Hopi, Navajo, Apache, Southern Paiute, and Ute peoples, indicating a thriving trade in coiled wares. Today, basketweaving has survived uninterrupted only at Hopi. There, both coiled and wicker basketry persist, with village-scale specialization evidenced by the production of coiled wares on Second Mesa and wicker wares on Third Mesa (Teiwes 1996).

Cross-cultural data identify basketweaving as a female-dominated craft (Adovasio et al. 2007; Murdock and Provost 1973), and the relative abundance of processed raw materials and baskets found with Basketmaker period female burials
imply that women have been the primary, if not sole, basketweavers in the Southwest for millennia (Webster and Jolie 2011, 2014). Notably, one twelfth century A.D. female burial from the Chaco-affiliated site of Salmon Ruins was interred with a coiled basket containing an awl (Webster 2006a), supporting the inference that basketweaving was female dominated during Pueblo III times. More broadly, little research exists on the cross-cultural organization of basketry production, but two findings of a preliminary study are broadly relevant here (Jolie 2006b). First, cross-cultural comparison indicates an increase in male involvement in production and in the number of independent basketry specialists in line with greater sociopolitical complexity. Second, continuous or full-time single-craft specialists are generally rare outside of state-level societies, although men and women in middle-range societies may spend additional time weaving during the agricultural off-season in order to provide supplemental income (e.g., Silvestre 2000; Wendrich 1999). However, less-specialized forms of production and multicrafting do persist in societies exhibiting higher degrees of sociopolitical complexity. Taken together, these observations suggest that prehispanic Pueblo basketry production was likely performed intermittently by independent households who were generally dispersed on the landscape, but may have periodically aggregated in villages, analogous to the scenario observed among historic Hopi peoples.

Perishable Artifact Production in Chaco Canyon and Beyond
Assessing direct evidence for Chacoan perishable artifact production is complicated by issues of preservation, the fact that production of most non-loom woven items requires few or no tools, and the reality that some raw material sources, such as yucca (*Yucca* sp.), had multiple uses and may evince little insight as to how they were used. Preservation is the biggest limiting factor and, as such, prevents us from effectively exploring differences within and between sites from the perspective of unfinished objects, stored raw materials, and production debris. This is especially true if production routinely took place outside of architectural units, as seems plausible. The two largest Chaco-related perishable artifact assemblages from Pueblo Bonito and Aztec West afford the best preservation and, of the two, Aztec has yielded the best preserved material. Although this may provide us with a biased view of Chacoan perishable artifact production, at present these are the only substantive data that we have. Given the greater size and importance of these two sites relative to others within the canyon and affiliated with the regional system, it is reasonable to assume that any evidence for specialized or intensive perishable artifact production at these sites constitutes a probable upper bound for ancient Pueblo societies in general.

*Production Implements.* Production implements clearly associated with coiled basket, mat, and sandal production are few, and of these three related crafts, only coiled basketry necessitates the use of a tool, specifically a fine-tipped awl. Hand-held wood, bone, and stone items for flattening rush culms during matmaking are variously documented in ethnographic literature of the Americas but are by no means required. If analogy to plaited rush mat production in Mexico obtains, as seems plausible giving the
similarity in raw material and techniques used, then at least some of the rubbing or abrading stones recovered during excavations in Chaco Canyon could be matweaving stones. Matweaving stones documented in Michoacan, Mexico, range from about 7 to 10 cm in diameter and 3 to 4 cm thick, fit comfortably in one's hand, and are used to flatten rush culms comprising the mat’s structural elements (Williams 2014a, 2014b; see also Harvey 1973). Judd (1954:125, Plate 25f-h) reports the presence of stones fitting this description from Pueblo Bonito, and Akins (1997) reports other examples from multiple site that she identifies as active abraders that exhibit grinding or polish, and which compare favorably in size and shape to Mexican examples.

Although spatulate bone tools, picks, and needles are used by some societies to facilitate the manufacture of mats and sandals, they are by no means required or universal. Awls were numerous in excavated cultural deposits at both Pueblo Bonito and Aztec Ruins, as well at small sites within Chaco Canyon, but assigning function is difficult given that they could have been used equally well for a number of tasks requiring perforation. Awls were the most common bone tool encountered during Pepper’s (1920) and Judd’s (1954:140-145; see also Crown 2016c) excavations at Pueblo Bonito. Many fragments and 417 relatively intact specimens were recovered, but they are scarce in burial rooms and, by implication, burials (Akins 2003; Judd 1954:325-342). From his excavations at Aztec West, Morris (1919:39-41, 1924) reported 280 awls, also rare in mortuary contexts, and presumed use of an unspecified number in basketweaving.
Stored Raw Materials and Unfinished Artifacts. The raw materials employed in prehispanic Southwestern basket, mat and sandal production are identical to those used in more recent times and include entirely locally available plants. Scheduling constraints in perishable artifact production concern raw material availability, but this is typically overcome by stockpiling. Yucca fiber is employed as a bundle in many coiled basket foundations, while sumac (\textit{Rhus} sp.) is preferred for stitches and foundation rods. Plaited mats are made from rush (\textit{Schoenoplectus} sp.) culms, and most plaited sandals are of yucca leaves in various states of processing, although three Early Bonito subphase specimens from Room 32 at Pueblo Bonito are rush. Preserved examples of unfinished baskets and sandals and bundles of stored fiber provide the best evidence for on-site production, and some preliminary data from surveys of museum collections are available (Jolie and Webster 2009). However, it is important to keep in mind that some cached raw materials, such as coils of yucca leaves, may have alternatively served as pot rests or been intended as raw material for cordage or other items, rather than purely for basket and sandal manufacture. There are no unequivocal unfinished baskets known from Pueblo Bonito, but there are three coils of sumac splints and another three of yucca leaves and fiber. From primarily Late Bonito subphase (Morris’ “Chacoan”) deposits, there are numerous raw material bundles at Aztec West. These include 15 coils and bundles of sumac, 37 coils and bundles of yucca leaves and fiber, and ten coils and bundles of rush stems. The rush bundles seem appropriate for mat weaving, the most common use of rush culms at both sites. Additionally, two coiled basket starts
from Aztec West appear to derive from room refuse ascribed to occupation during the A.D. 1200s (Morris’ “Mesa Verde” occupation).

Prehispanic sandals from the Colorado Plateau came in two principal structural varieties: plaited and twined (Deegan 1995, 2006; Hays-Gilpin et al. 1998; Kankainen 1995). Plaited sandals, of which the fine 2/2 twill type are a focus of this study, employ whole or minimally processed yucca leaves and are the most abundant type, while twined sandals make use of very highly processed yucca fiber cordage and are technologically sophisticated and numerically fewer. Twill plaited yucca sandals are ubiquitous during the Pueblo II and III periods in the northern Southwest, but the earliest examples come from the Falls Creek Rockshelters near Durango, Colorado, where they date to late Basketmaker III times (Webster and Jolie 2011, 2014, unpublished data), and the Dolores River Valley of Colorado where Pueblo I examples are known (Webster 2012a). Comparable twill plaited sandals were present at Pueblo Bonito in Chaco Canyon by at least the earl A.D. 900s if not earlier. Should future discoveries and dates continue to suggest southwest Colorado as the original source of fine 2/2 twill plaited sandals, then the movement of people south along the Chaco River and its tributaries during the Pueblo I period may well account for the technology's later appearance in the south and west (see Chapter 3). Two unfinished plaited sandals are known from Pueblo Bonito, one from post-A.D. 1070 deposits in Room 24, the other assignable more generally to the Bonito phase and from Room 53 or 56. Additional unfinished specimens likely exist but are unrecognizable owing to the relatively poor preservation of most of the Pueblo Bonito perishables. Twelve comparable examples of
unfinished plaited sandals come from Late Bonito subphase refuse at Aztec West, while a thirteenth dates to the A.D. 1200s occupation. No unfinished twined sandals come from either site, but a clue to their production may lie in the so-called bone scrapers or fleshers abundant at both sites and postulated by Osborne (1965, 2004) to be women’s yucca fiber processing tools. Together, Pepper (1920) and Judd (1954) found about 60 of these tools at Pueblo Bonito and, significantly, one was present in each of the unique elliptical coiled baskets recovered from the four female burials interred in room 326. Morris (1919:36-37, 1924:147) excavated 55, including three with a single female burial in Room 33 at Aztec West. Conclusive support for the role of these tools in fiber processing comes from the recovery at Antelope House in Canyon del Muerto of an unfinished twined sandal bundled with a bone scraper (Magers 1986a:274).

The Organization of Chacoan Woven Artifact Production

In scholarship on the Chaco regional system, durable manufactures including ceramics, lithics, worked bone, and ornaments have received the most focused attention (Cameron and Toll 2001; Mathien 2001; Toll 2006; Watson 2012). Many of these studies have evaluated evidence for craft production, exchange, and specialization with the goal of trying to understand how these crafts intersected the rapid development of large communal structures and their corresponding evidence for increased sociopolitical complexity. Most craft production within and beyond Chaco Canyon is believed to have been conducted at the level of individual households,
wherein production and consumption were dictated by kin-based units depending on the needs of the household (Hagstrum 2001; Toll 2006). Several scholars have posited the existence of intermittent household- and community-scale specialized production of ornaments and ceramics at small sites, with peak intensity during the Early and Classic Bonito subphases (Mathien 2001; McKenna 1984; Toll and McKenna 1997). Watson’s (2012) analysis of bone artifacts from 14 sites within Chaco Canyon suggests an intensification of bone tool production during the Early and Classic Bonito subphases, followed by a reduction during Late Bonito times when he detects an increase in demand for bone ornaments. Notably, Watson (2012:357) also reports greater standardization in Early and Classic Bonito awl forms that he posits may imply an intensification of hideworking and coiled basketry production. However, given the diversity of awl forms, evidence for curation, and the breadth of applications for which bone awls are suited, I suggest that this interpretation be treated cautiously. In sum, it is generally inferred from these developments that intensification in craft production was at least partially motivated by ritual needs. Although the precise nature and role of ritual specialists or elites in Chacoan craft economies is still open to debate, most scholars agree that any such leaders did more to manage craft production than control it (Mills 2002; Toll 2006).

In light of the foregoing, it is reasonable to conclude that prior to, during, and for a century or more after the Bonito phase, basket, mat and sandal manufacture occurred intermittently in dispersed production units coeval with households, as previously proposed by Hagstrum (2001). Though comparable, contemporaneous production data
are scarce, well preserved finished fiber-based artifacts, probable production
implements (i.e., awls, fiber scrapers), and stored raw materials from Antelope House, a
roughly 90 room pueblo in Canyon del Muerto, Arizona, considered by some to be a
Chacoan outlier (e.g., Kantner 2003a), support this general reconstruction (Adovasio and
Gunn 1986; Magers 1986a, 1986b; Sparling 1986). Collectively, this is not surprising
given that outside of state-level societies, basket, mat, and sandal production are not
typically the domain of continuously working specialist producers. Intermittent
multicrafting involving one or more of these or related crafts is almost certain, given the
overlap in requisite knowledge and materials, as well as ethnographic examples, and so we might expect that during periods of intensification in crafting that some households may have intensified production beyond their own needs. Based on ethnographic accounts, and compared to matweaving and sandal-making, coiled basketry may be the best candidate for any such specialized production.

There is no evidence to suggest trade in mats in the Southwest, and cross-
cultural analogy tells us that when mats are exchanged, they are typically very high
quality items that move through culturally proscribed socioeconomic channels (e.g.,
Kaeppler 1999; Schoeffel 1999; Whiteford and Rogers 1994). Likewise, it is probable that sandals only ever moved as far from their site of production as the person(s) wearing them. Even so, we have little knowledge of sandal use-life that might tell us how long they would last before needing to be replaced. Anecdotal accounts and analyses of large sandal and moccasin assemblages (Billinger and Ives 2015; Geib 2000; Hays-Gilpin et al. 1998:26, 81; Osborne 2004; Taylor 2003) suggest that footwear wears out and is
replaced relatively rapidly, but certainly this depends on the nature and frequency of use, construction method, and terrain. In contrast to mats and sandals, evidence for some degree of nucleated basketry production on the Hopi Mesas in historic times raises the possibility that some degree of community-scale specialization could have existed in prehispanic times, particularly for coiled (and, perhaps, later wicker) basketry. Baskets figure prominently in historic accounts of trade among groups of the Pacific Northwest, California, and the Great Basin (Davis 1974; Fowler and Hattori 2011, 2012; Heizer 1978; Merriam 1955; Turner and Loewen 1998), as well as in the Pueblo Southwest (Ellis and Walpole 1959; Ford 1972, 1983; Whiteford 1988), so it seems likely that quantities of coiled wares were always involved in exchange transactions and that there was an ebb and flow to their movement among and between communities that depended on broader social and political factors. Owing to the apparent post-A.D. 1700s decline in coiled basketry production in the Pueblo Southwest noted earlier, I submit that in prehispanic times the extent of coiled basketry exchange was probably below that suggested by the apparent peak in basketry exchange between Pueblo communities, Athabaskan language-speakers, and other neighbors during the historic period.

For the purposes of the present study, the above discussion implies that exchange of baskets, mats, and sandals would likely play little to no role in obfuscating robust evidence for cultural and social diversity indexed by variability in basketry styles, particularly if trade wares stand out in an assemblage. Plausible trade wares have been previously identified among perishable artifact assemblages (Croes 2001; Jolie 2004;
Fowler and Hattori 2011, 2012; Peck 1950; Sutton and Ritter 1984; Tuohy 1986), and it stands to reason that such imports may be recognizable in Chacoan assemblages on the basis of formal or stylistic grounds. An advantage to investigating spatial and temporal trends of technological style in coiled baskets, mats, and sandals is that each product reflects a distinct if overlapping production sequence wherein the patterns elucidated by one class can serve as an independent point of comparison with patterns observed in another class. Furthermore, in the absence of direct evidence for the scale and intensity of basketry and related craft production at Chacoan sites, one inference that may be derived from detailed analysis of the woven artifacts themselves is their relative degree of standardization as it may relate to the number of producers. That is, changes over time and across space in metric data (e.g., element dimensions, stitches and strips per cm) and other attributes reflective of artifact technological style (e.g., selvages, mechanics of splicing in new material) may indicate variability in the number of producers or composition of production units (Costin and Hagstrum 1995:622) and provide an additional avenue for probing questions of cultural and social diversity.

The increasingly prevalent assertion made by many contemporary Chaco scholars that, based on ethnographic analogy, some degree of cultural and linguistic diversity must have existed with Chaco Canyon and throughout in the regional system (e.g., Hays-Gilpin and Ware 2015; Judge and Cordell 2006; Lekson et al. 2006; Reed 2004, 2008; Toll 2006) implies that we need consider in greater detail the role of such diversity in terms of how it may have impacted Chacoan household and community economies. Cultivating and maintaining social and economic networks between diverse
peoples occupying spatially proximate or removed locales would have provided various opportunities for alleviating stress resulting from shortfalls in economic productivity, as well as opportunities for community integration, alliance building, and political competition. To this point, it is noteworthy that in some ethnographically documented middle-range societies, where women remain the dominant producers of baskets and mats, male kin frequently appropriate female relatives’ craft labor and products to support their own political aspirations. In Polynesia, for example, where finely woven and elaborately decorated mats are highly valued, chiefs routinely ask female relatives to produce fine mats for them to give away during participation in formalized reciprocal exchange networks (Kaeppler 1999; Schoeffel 1999). Significantly, often such relationships also afford opportunities for the female relatives producing the mats to accrue power and prestige. If local production of unique or specialized forms by Chacoan weavers can be demonstrated, then it may shed light on the contributions of women to the development of social inequality in Chaco Canyon, as well as their roles as active agents in other developments during the Bonito phase.

**Investigating Cultural and Social Diversity through Basketry**

The selection of baskets, sandals, and matting as foci for evaluating evidence for prehispanic cultural and social diversity through learning networks reflected in
technological styles makes sense both because of the relative abundance of these three artifact types in Colorado Plateau perishable artifact assemblages and the recognition that they are products of distinct, if intersecting, basketry production regimes. The latter fact allows stylistic patterns among and between these artifacts to be examined for concordance or discordance and compared against prior research suggesting evidence for cultural and social diversity at different spatio-temporal scales. This study evaluates models suggesting that the Chaco regional system contained multiple learning networks that may indicate cultural and/or social diversity by documenting patterns in basketry technological style at three spatial scales (site-, community-, and regional-scale) using data from sites within the Chaco regional system during the Bonito phase.

The three spatial scales correspond to three working models of Chacoan cultural and social diversity guided by previous research (see Chapter 3) and yield expectations about variability in basketry technological style and learning networks. One implication of the presence of multiple learning networks is that such evidence contributes to our understanding of Chacoan cultural and social diversity by complementing previous research that suggests that there were at least two different sociocultural or biological groups within Chaco Canyon and perhaps more throughout the regional system. The results of these analyses enhance our understanding of past social interaction and shed light on the geographic and/or cultural affinities of the populations who inhabited the study sample sites. I do not claim, however, that baskets and learning networks by themselves provide a privileged perspective on the full spectrum of social boundaries and interaction that may have existed in Chacoan society, nor do I uncritically equate
learning networks with discrete tribal, ethnic, and/or linguistic entities. The data on patterns in basketry technological style must be interpreted in conjunction with previous research and other independent lines of evidence. I also recognize that the patterns I document may be more complex, or that one, none, or all of the following models may work; they are not mutually exclusive.

Model 1: Site-Scale Diversity

Architectural, ceramic, and bioarchaeological studies (Akins 1986, 2003; Baldwin 1987; Bustard 1996, 2003; Heitman and Plog 2005; Judd 1954, 1964; Morris 1986; P. Reed 2006, 2008, 2011a; Schillaci 2003; Schillaci and Stojanowski 2002a, 2002b, 2003; Schillaci et al. 2001; Wills 2009) indicate the possibility of sociocultural and/or biological diversity within individual sites within Chaco Canyon and at several outliers. The presence of two or more spatially discrete learning networks within a single site may reflect the co-residence of diverse cultural or social groups. Examined in conjunction with other lines of archaeological evidence, the nature of the similarity or distinctiveness of multiple learning networks at a single site may allow the discrimination of culturally or biologically distinct groups from smaller scale social units, such as descent groups.

Model 2: Community-Scale Diversity
Cultural and social diversity at the scale of the Chaco Canyon community is suggested by human remains and mortuary patterning (Akins 1986, 2001, 2003; Plog and Heitman 2010; Schillaci 2003; Schillaci et al. 2001), as well as ceramic and architectural variability that specifically includes the observed size dichotomy between Great Houses and small sites (Bustard 1996, 2003; Ford et al. 1972; Judge and Cordell 2006; Kluckhohn 1939; Lekson et al. 2006; Sebastian 2006; Vivian 1970, 1989, 1990; Windes et al. 2000). Basketry learning networks that correlate with sites of similar size within a site cluster would indicate cultural or social diversity at the community scale. Overlap between basketry learning networks in Chaco Canyon and the Cibola region of east-central Arizona and west-central New Mexico would provide support for the co-traditions model of Chacoan cultural and social diversity that posits two co-resident populations from different cultural traditions (Vivian 1989, 1990, 1997). Serial reoccupation of Chaco Canyon after A.D. 1090 by one or more additional groups with different backgrounds (Wills 2009) could be difficult to discern, but may be inferred from a demonstrable increase in the number of basketry learning networks after A.D. 1090. Lastly, the presence or absence of basketry styles unique to Mesoamerican traditions can be used to evaluate proposals that some of the individuals who occupied Chaco Canyon were from Mesoamerica (Kelley and Kelley 1975; Reyman 1978; Turner and Turner 1999).

*Model 3: Regional-Scale Diversity*
This model builds on research positing regional cultural and social diversity through time and across space and rests on evidence of population increase in excess of local growth and variation in architecture, settlement layout, and ceramics, although the precise geographic or cultural affinities of sites is not always clear. Currently, studies of outlier site architecture, settlement layout, and ceramics suggest variability in social organization, geographic and cultural ties, or some combination thereof (Kantner 2003; Kantner and Kinitgh 2006; Meyer 1999; Van Dyke 1999a, 2007b; Wilshusen and Dean 1995; Windes 2007). The presence of basketry learning networks corresponding to multiple site clusters distributed across the northern Southwest would reflect cultural diversity, and likely attendant social diversity, at this scale. Bonito phase basketry with affinities to Mesa Verde traditions may lend support to arguments favoring a southward movement of peoples from the Northern San Juan River region between A.D. 850 and 950, and/or between about A.D. 1090 and late 1200s (Dean et al. 1994; Vivian 1990; Wills 2009; Windes and Van Dyke 2012). Similarly, overlap in basketry learning networks between Chaco Canyon and/or Aztec Ruins and Salmon Ruins may improve understanding of the extent to which migration, emulation, or a combination of both are responsible for Chacoan features in the Middle San Juan River region during the late eleventh and early twelfth centuries A.D. (Cameron and Duff 2008; Reed 2008, 2011a; Vivian 1990). Ultimately, the relative visibility or strength of the affinities of any regional basketry learning network(s) may shed further light on whether the Chaco regional system tended towards a high degree of integration or was, as many recent Chaco
scholars have come to view it, "a disconnected heterogeneity" (Kantner and Kintigh 2006:175).

Research Methods

The assemblage is the principal unit of comparison for this study and is defined here as a group of basketry specimens from a single site through time. It is an appropriate unit because the time-depth of most of the study sites allows for the establishment of a general picture of spatial and temporal variability in basketry technological attributes. Variation in basketry technological style was assessed through detailed attribute-oriented analyses of individual baskets and fragments, while the identification of patterns corresponding to multiple basketry learning networks was explored statistically. Select artifacts were also sampled for neutron activation analysis, organic residue analyses, and radiocarbon dating to improve our understanding of basketry items’ production and use and to verify chronological assignments based on associated tree ring or ceramic dates.

For this study, detailed metric and technological data were collected on basketry artifacts from over 20 sites, including several that have yielded the most extensive Pueblo II and Pueblo III period basketry assemblages (Table 5.1; see also Figure 3.1). Included in the study sample are baskets, sandals, and mats from 13 sites within Chaco
Canyon and from four “outlier” sites located beyond the bounds of Chaco Canyon that are considered to have been participants in the Chaco regional system. The inclusion of outlier assemblages allows me to examine learning networks at a regional scale, consider social relations across the Chaco system, and examine the cultural or geographic affinities of Chaco Canyon’s occupants. Samples of earlier Basketmaker coiled baskets from northeastern Arizona, and thirteenth century A.D. baskets, sandals, and mats from sites in the Mesa Verde region are also employed for comparative purposes and to facilitate evaluation of hypotheses that suggest shared cultural or geographic affinities at various points in time.

Although not included as part of the tabulated study sample, additional basketry assemblages from multiple other Southwestern archaeological sites were consulted that help situate the Chacoan and Mesa Verdean assemblages in their broader spatiotemporal and cultural contexts. Separate research and analysis projects, in conjunction with dissertation-related travel to various museums and artifact curating institutions, provided me with opportunities to examine these assemblages. Some of the major assemblages examined include the Basketmaker II period Falls Creek Rockshelters near Durango, Colorado (Morris and Burgh 1954; Webster and Jolie 2011, 2014); Mantles Cave, Colorado (Burgh and Scoggin 1948), several caves in the Upper Gila River region (Cosgrove 1947; Hough 1914), the Grants Basket Site (Jolie and Schaafsma 2008; Schaafsma 1984), and material from the Winona-Ridge Ruin area in Arizona (McGregor 1941, 1943). Examination of these collections allowed me to begin to redress chronological and geographic gaps in the study sample while simultaneously
better contextualizing the technological and spatial variability of Bonito phase Chacoan collections. By examining samples from sites that are contemporaneous with, and that both pre- and post-date the Bonito phase, I have attempted to control for changes in technological style through time and space, and mitigate any potential effects of exchange by providing a long-term perspective on social learning networks. The advantage to this approach is that it moves beyond individual sites to examine broader relationships within and between Chacoan communities.

Trade or exchange that results in the export of local products or the import of “foreign” baskets is a factor that complicates the identification of learning network boundaries. However, the ethnographic and historic evidence reviewed earlier suggests that this is a negligible concern for all products except possibly coiled baskets. In the case of coiling, where sufficient data are available to characterize assemblage variation in time and space, plausible trade wares can be recognized based on their technological features and raw material.

Artifact Sampling and Analysis

In general, published descriptions of most of the study sites’ basketry assemblages are minimal to non-existent and vary in quality and accuracy (see Table 5.1 references). Complicating matters is that depending on an artifact’s state of preservation, there is the possibility that data on only a few technological variables are measurable. For this reason, collecting a random sampling of data from each study site’s
assemblage was unlikely to provide data sufficient for the study of the multiple, independent variables in which I am interested. Fortunately, detailed information about method of manufacture and technological style can be acquired from even small or poorly preserved basket, sandal, and mat fragments. As a consequence, I conducted the first detailed analyses of several assemblages and reexamined other previously analyzed materials to acquire additional data and mitigate inter-observer error. Except for a few cases where access to a small number of burial-associated artifacts was not possible, I analyzed the assemblages of coiled basketry, twill plaited sandals, and twill plaited mats from all thirteen study sites located in Chaco Canyon, as well as Aztec West and Salmon Ruins, in their entirety in order to maximize data recovery. Webster (2006a, 2008a) previously examined the Salmon Ruins perishable artifacts and performed basic analyses on the Aztec material. My examination of these two outlier assemblages was geared towards collecting more detailed metric measurements and stylistic data and affirming preliminary structural identifications.

Beyond Salmon Ruins, the perishable artifacts from National Park Service excavations at Antelope House reported by Adovasio and Gunn (1986) and Magers (1986a, 1986b) constitute the only other site-specific assemblage that has been analyzed in detail. However, these studies do not include a small amount of earlier material collected in the 1920s from Antelope House by Earl H. Morris and A. V. Kidder, curated at the American Museum of Natural History. In the interest of time, the Antelope House material from both the National Park Service and Kidder and Morris
Table 5.1. Prehispanic Southwestern Woven Artifact Assemblages Examined for this Study by Archaeological Site Name and Sample Size.

<table>
<thead>
<tr>
<th>Site Name and Location</th>
<th>Analyzed Artifact Sample (n=)</th>
<th>Approx. Sample Age Range</th>
<th>Sample Repositories</th>
<th>Primary Artifact and Site References</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coiled Baskets</td>
<td>Fine Twill Plaited Sandals</td>
<td>Twill Plaited Mats</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaco Canyon, New Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bc 51</td>
<td>2</td>
<td>0</td>
<td>10</td>
<td>A.D. 900-1200s</td>
<td>MMA, PMAA</td>
</tr>
<tr>
<td>Bc 52</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>A.D. 900-1200s</td>
<td>MMA</td>
</tr>
<tr>
<td>Bc 53</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>A.D. 900-1200s</td>
<td>CM</td>
</tr>
<tr>
<td>Bc 57</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>A.D. 900-1200s</td>
<td>CM</td>
</tr>
<tr>
<td>Bc 59</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>A.D. 900-1200s</td>
<td>CM</td>
</tr>
<tr>
<td>Bc 288 (Gallo Cliff Dwelling)</td>
<td>2</td>
<td>8</td>
<td>10</td>
<td>A.D. 1150-1200s</td>
<td>CM</td>
</tr>
<tr>
<td>Chetro Ketl</td>
<td>14</td>
<td>13</td>
<td>21</td>
<td>A.D. 990-1200s</td>
<td>MIAC, MMA</td>
</tr>
<tr>
<td>Kin Kletso</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>A.D. 1125-1200</td>
<td>CM</td>
</tr>
<tr>
<td>Leyit Kin</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>A.D. 900-1200s</td>
<td>MIAC</td>
</tr>
<tr>
<td>Peñasco Blanco</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>A.D. 900-1200s</td>
<td>AMNH</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>89</td>
<td>45</td>
<td>72</td>
<td>A.D. 850-1200s</td>
<td>AMNH, NMAI, NMNH, RSPM</td>
</tr>
<tr>
<td>Pueblo del Arroyo</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>A.D. 1060-1200</td>
<td>NMNH</td>
</tr>
<tr>
<td>Tsin Kletsin</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>A.D. 1100s</td>
<td>CM</td>
</tr>
<tr>
<td>General Chaco Canyon</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>A.D. 900-1200s</td>
<td>CM</td>
</tr>
<tr>
<td>Chaco Canyon Total</td>
<td>117</td>
<td>78</td>
<td>123</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5.1. Continued.

<table>
<thead>
<tr>
<th>Chacoan Outliers</th>
<th>139</th>
<th>197</th>
<th>221</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antelope House, Canyon de Chelly, Arizona</strong></td>
<td>30</td>
<td>82</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>A.D. 825-1270</td>
<td>AMNH, WACC</td>
<td>Adovasio and Gunn 1986; Magers 1986a; Morris 1986</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Aztec East Ruin, New Mexico</strong></td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>A.D. 1100-1290</td>
<td>CM, WACC</td>
<td>Brown et al. 2008; Richert 1964</td>
</tr>
<tr>
<td><strong>Aztec West Ruin, New Mexico</strong></td>
<td>80</td>
<td>76</td>
<td>169</td>
</tr>
<tr>
<td><strong>General Aztec Ruins</strong></td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>A.D. 1100-1290</td>
<td>CM</td>
<td></td>
</tr>
<tr>
<td><strong>Kin Bineola, New Mexico</strong></td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>A.D. 940-1150s</td>
<td>CM</td>
<td>Dungan 2009</td>
</tr>
<tr>
<td><strong>Salmon Ruins, New Mexico</strong></td>
<td>24</td>
<td>17</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>A.D. 1060-1300</td>
<td>SRM</td>
<td>Baker 2008; Potter 1981; Reed 2006; Webster 2006a, 2008a</td>
</tr>
<tr>
<td><strong>White House, Canyon de Chelly, Arizona</strong></td>
<td>3</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A.D. 1040-1300</td>
<td>AMNH, NMNH</td>
<td>Morris and Burgh 1941; Tsosie 2009; Weltfish 1932b</td>
</tr>
<tr>
<td><strong>Mesa Verde, Colorado</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cliff Palace</strong></td>
<td>4</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>A.D. 1190-1280</td>
<td>HCC, NMNH, RSPM</td>
<td>Fewkes 1911a; Nordby 2001; Osborne 2004</td>
</tr>
<tr>
<td><strong>Long House</strong></td>
<td>4</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>A.D. 1200-1280</td>
<td>MVNP</td>
<td>Osborne 1980, 2004</td>
</tr>
<tr>
<td><strong>Spruce Tree House</strong></td>
<td>2</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>A.D. 1210-1280</td>
<td>NMNH</td>
<td>Fewkes 1909; Osborne 2004</td>
</tr>
</tbody>
</table>
Table 5.1. Continued.

<table>
<thead>
<tr>
<th>General Mesa Verde</th>
<th>48</th>
<th>108</th>
<th>22</th>
<th>A.D. 1190-1300</th>
<th>HCC, NMNH, NMAI, PMAA</th>
<th>Osborne 2004</th>
<th>Oak Tree House (C n=1, S n=4, M n=1), Painted Kiva House (M n=1), Sixteen Window House (M n=1), Square Tower House (C n=1), Unprovenienced (C n=45, S n=104, M n=19), Yucca House (C n=1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesa Verde Total</td>
<td>58</td>
<td>143</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Basketmaker Comparative Sample

<table>
<thead>
<tr>
<th>Aggregate Canyon de Chelly/del Muerto, Arizona</th>
<th>21</th>
<th>0</th>
<th>0</th>
<th>A.D. 50-750</th>
<th>AMNH, NMNH, PMAA, WACC</th>
<th>Morris and Burgh 1941</th>
<th>Mummy Cave (n=19), Tseahtso Cave (n=2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate Prayer Rock District, Arizona</td>
<td>28</td>
<td>0</td>
<td>0</td>
<td>A.D. 50-750</td>
<td>AMNH, ASM, NMNH</td>
<td>Haury 1936; Morris 1980; Morris and Burgh 1941</td>
<td>Amphitheater Cave (n=2), Boomerang Cave (n=1), Broken Flute Cave (n=2), Deer Track Canyon No. 3 (n=1), Last Chance Cave (n=2), Obelisk Cave (n=18), Unprovenienced (n=1), Vandal Cave (n=1)</td>
</tr>
</tbody>
</table>

Basketmaker Total | 49 | 0   | 0   |

GRAND TOTAL     362 420 345

a Repository abbreviations: AMNH=American Museum of Natural History, New York, New York; AZRU=Azttec Ruins National Monument, Aztec, New Mexico; ASM=Arizona State Museum, Tucson, Arizona; CM=National Park Service’s Chaco Museum at the University of New Mexico, Albuquerque, New Mexico; HCC=History Colorado Center, Denver, Colorado; MIAC=Museum of Indian Arts and Culture, Santa Fe, New Mexico; MMA=Maxwell Museum of Anthropology at the University of New Mexico, Albuquerque, New Mexico; MVNP=Mesa Verde National Park, Mesa Verde, Colorado; NMAI=Smithsonian Institution’s National Museum of the American Indian, Washington, D.C.; NMNH=Smithsonian Institution’s National Museum of the Natural History, Washington, D.C.; PMAA=Peabody Museum of Archaeology and Ethnology at Harvard University, Cambridge, Massachusetts; RSPM=Robert S. Peabody Museum of Archaeology at the Phillips Academy, Andover, Massachusetts; SRM=Salmon Ruins Museum, Bloomfield, New Mexico; UCMNH=University of Colorado Museum of Natural History, Boulder, Colorado; WACC=National Park Service’s Western Archaeological Conservation Center, Tucson, Arizona.

b A recent AMS date from Obelisk Cave yielded an early Pueblo I age (Freer-Waters and Jacobs 2014), but in light of other chronometric evidence I am not concerned that this invalidates a Basketmaker ascription for the baskets examined.
excavations was sampled for data on coiled baskets and twill plaited sandals to acquire information not provided in the published reports and for comparative purposes. A substantial twill plaited mat assemblage was recovered during Park Service research but adequate comparative data on stylistic variability are available from Adovasio and Gunn’s (1986) report. In the case of all other study sites, assemblages were sampled to the extent possible for Pueblo II and III basket, sandal, and mat data, recognizing that assemblage size and the quality of provenience information associated with each collection varies considerably. For example, the substantial early Wetherill collections of perishable artifacts from Mesa Verde (Osborne 2004) complement the much smaller quantities recovered during excavations by Fewkes (1909, 1911a) from Cliff Palace and Spruce Tree House, but only a fraction of the Wetherill’s artifacts can be attributed to specific sites within the National Park. To this end, for statistical analyses, only larger aggregated regional samples were generated as comparative samples for Basketmaker coiled basketry and Mesa Verde coiled basketry, sandals, and mats (see Table 5.1).

Individual specimens of basketry, sandals, and matting were identified and classified according to primary structural type following Adovasio (2010) and Emery (1995). For coiled basketry, technological subtypes were defined on the basis of coil spacing, foundation composition and arrangement, and stitch type (e.g., close coiling, two rod and bundle bunched foundation, noninterlocking stitch). Plaited objects were allotted to technological subtypes based on the number of elements in a set passing over one another and the interval of element interlacement (e.g., Twill Plaiting, 3/3 interval). With the basic weave structure identified, ascertaining the form or function of
fragmentary specimens was generally straightforward, facilitated by the
archaeologically well-attested and consistent use of specific raw materials of certain
dimensions to produce baskets, sandals, and mats. This is to say that a fragment of a
twill plaited sandal is generally easy to distinguish from a fragment of a twill plaited mat
(or any other plaited item) on the basis of raw material, element dimensions, and other
stylistic features. In cases for which doubt existed as to the object’s original form or use,
such as whether the fragmentary object was a sandal or tumpband, this information
was recorded and the specimen eliminated from comparative analyses.

During data collection, particularly with respect to the analyses of the Pueblo
Bonito and Aztec West collections, I discovered that multiple discrete artifacts often
shared the same catalog number and, more frustratingly, that multiple pieces of a single
artifact were often distributed among two or more catalog numbers. Consequently, I
adopted a conservative approach and spent a considerable amount of time trying to
reunite various fragmented artifacts. In doing so I relied on provenience data, published
and archival documentation, structural identity, and other visual features (e.g.,
preservation, stains, wear) to aid the process. When confident re-associations were
made, as was frequently possible, individual tags were attached to each of the
specimens stored together to identify those fragments from the same object, and
handwritten tags were left in artifact boxes or trays to explain the re-association and
indicate the location of associated fragments. In instances where multiple separate
artifacts share a catalog number, I assigned either a letter or number (to minimize
confusion with the curating institution’s catalog numbering system) as a suffix to the
catalog number to help identify specific fragments in my analysis notes, photographs, and databases (e.g., “.d” or “.4” for the fourth distinct artifact). In several cases unique to the Aztec West assemblage, a single catalog number was found to contain more than twenty individual fragments that represented a dozen or more individual mats. Because my examination of several complete twill plaited mats indicated that intricate selvage (edge) treatments did not vary within single objects, I used selvage construction, along with plaiting interval and other stylistic features to separate and reunite fragments in these cases. In some instances, multiple edgeless fragments could not confidently be associated with another mat (or resembled multiple mats). These were separated and tabulated but not analyzed further because they were assumed to be fragments of already identified mats and/or provide redundant data.

Each artifact was inspected macroscopically, with a 10X hand lens and, as needed, with a stereoscopic microscope. Raw material identifications were made with the naked eye and a 10X hand lens based on distinctive visual characteristics such as epidermis or bark appearance and cross-sectional morphology, when possible. Botanical identification of worked fiber artifacts, especially using non-destructive methods, is notoriously difficult even under the best of circumstances, and so, while I am confident in my identifications, they should be treated as preliminary. Metric measurements were taken using a tailor’s tape measure and Mitutoyo digital point calipers. Both quantitative and qualitative data were recorded according to the standardized methods and procedures outlined by Adovasio (2010; see also Jolie 2014b, Jolie and McBrinn 2010). Table 5.2 lists the primary metric data and technological variables that were
recorded for each type of basketry artifact. These data were ultimately entered, with provenience information, into three Microsoft Access 2010 databases according to structural type (coiled baskets, plaited sandals, plaited mats) to facilitate data analysis. Recorded room numbers follow the original excavator’s conventions, except in the case of Aztec West where Morris (1919, 1924, 1928) used superscript numbers (e.g., Room 136³) to distinguish second story rooms. For data entry, and to minimize confusion with

Table 5.2. Primary Metric and Stylistic Data Recorded for this Study by Artifact Type and Data Type.

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>Quantitative Data</th>
<th>Qualitative Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coiled Basket</td>
<td>-specimen dimensions</td>
<td>-foundation composition and arrangement</td>
</tr>
<tr>
<td></td>
<td>-coil height</td>
<td>-stitch type</td>
</tr>
<tr>
<td></td>
<td>-coils per cm</td>
<td>-rim (edge) treatment</td>
</tr>
<tr>
<td></td>
<td>-coil gap</td>
<td>-starting method</td>
</tr>
<tr>
<td></td>
<td>-stitch width</td>
<td>-work surface and direction</td>
</tr>
<tr>
<td></td>
<td>-stitches per cm</td>
<td>-stitch splices</td>
</tr>
<tr>
<td></td>
<td>-stitch gap</td>
<td>-decorative techniques and mechanics</td>
</tr>
<tr>
<td></td>
<td>-% split stitches, work surface</td>
<td>-use wear, mends, residues</td>
</tr>
<tr>
<td></td>
<td>-%split stitches, nonwork surface</td>
<td>-raw material(s)</td>
</tr>
<tr>
<td>Twill Plaited Sandal</td>
<td>-specimen dimensions</td>
<td>-plaiting interval</td>
</tr>
<tr>
<td></td>
<td>-strip width</td>
<td>-selvage (edge) treatment</td>
</tr>
<tr>
<td></td>
<td>-strips per cm</td>
<td>-starting and finishing method(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-strip splices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-decorative techniques and mechanics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-right or left foot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-toe and heel shape</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-tie system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-use wear, mends, residues</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-raw material(s)</td>
</tr>
<tr>
<td>Twill Plaited Mat</td>
<td>-specimen dimensions</td>
<td>-plaiting interval</td>
</tr>
<tr>
<td></td>
<td>-strip width</td>
<td>-selvage (edge) treatment</td>
</tr>
<tr>
<td></td>
<td>-strips per cm</td>
<td>-starting and finishing method(s)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-strip splices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-decorative techniques and mechanics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-use wear, mends, residues</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-raw material(s)</td>
</tr>
</tbody>
</table>
in-text notes, I distinguish Aztec West’s second story rooms with a “-2,” as in Room 136-2. Nearly all basketry specimens and their salient attributes of construction were photographed with a Nikon D200 digital SLR camera for reference.

An important assumption I make is that all, or at least some, of the technical features of basketweaving that I have selected can help distinguish between learning networks operating at different spatial scales, given region- and culture-specific social pressure to conform to particular manufacturing practices. This is an appropriate assumption based on previous research on ethnographic and archaeological textile crafts that indicates the strong role of the conservative learning process in guiding production choices during weaving (see Chapter 4). For example, different ways of splicing in new stitching thread during coiled basketweaving are expected to vary between learning networks owing to the fact that these and other technical decisions have been learned to an automatic level and correspond to different analytically measurable motor habits. Furthermore, this corpus of research suggests that not only is it difficult for a weaver to change production techniques, but that documented cases of this happening are rare.

Although each stylistic feature is analytically independent, it is often the constellation of features that is useful for identifying learning networks and social interaction (e.g., Adovasio and Gunn 1977, 1986; Adovasio and Pedler 1994; Adovasio et al. 2002; Croes and Davis 1977; Held 2006; Polanich 1994; Pryor and Carr 1995; Roux et al. 2017). There is no a priori assumption about which features will be most significant for distinguishing learning network boundaries in a given basketry assemblage, and, as a
result, patterns in technological style that are a product of learning networks can be identified post hoc. This principle allows the analyst to sort baskets of unknown cultural affiliation or, as in the present study, to compare basketweaving traditions.

Data on basketry technological variables were collected at nominal (e.g., stitch type), ordinal (e.g., light, moderate, or heavy use wear) and ratio scales (e.g., strip width) of measurement. Scatter plots and basic descriptive statistics were used to explore spatiotemporal patterning among and between assemblage datasets, while the coefficient of variation for specific technological attributes in a structural subtype of basketry artifacts was used as a relative indicator of product standardization.

Use of the coefficient of variation (CV), common to ceramics analyses, is rarely used in basketry artifact studies and so warrants some additional discussion here. Sampling, poor chronological control, products spanning multiple generations, inadequate data on the number of weavers and production intensity, and a lack of information about emic vessel classifications are all well-acknowledged problems associated with interpreting CV in archaeological assemblages (e.g., Crown 1995; Longacre et al. 1988; Schleher 2010). However, I maintain that CV holds value in the present context as a rough indicator of basket standardization that can be used to gauge variation through time and between sites.

To the best of my knowledge, only Silvestre (2000) has recorded comparative ethnographic data on percent CV for metric variables of basketry production. His examination of the twill plaited products of specialist male basketweavers among the Kalinga of the Philippines shows that weaving specialists routinely produce wares with
CV values less than 10 percent. Values a few percentage points higher are occasionally reported, but the highest percent CV, close to 34 percent, are comparatively rare. Thus, lacking more comparative data on specialist or even non-specialist basketweavers, observations on standardization in ceramic form variation may provide an imperfect yardstick. Cumulative cross-cultural ethnographic and archaeological data on ceramic percent CV suggest a typical range between about 10 percent and 30 percent, with standardized and, thus, presumably specialized products, exhibiting a coefficient of variation under 10 percent (Crown 1995; Schleher 2010). Of course, these values are not absolute thresholds for determining standardized vs. non-standardized products, but they do constitute a useful starting point for comparisons. Although comparing basketry and ceramic metric variation is like comparing apples and oranges, they are both complex technologies that are typically the domain of women and thus provide the best available point of comparison for assessing standardization. That the limited data on specialized basketry products compare favorably with ceramic findings supports the cautious use of percent CV to explore questions about standardization.

*Neutron Activation Analysis*

Several unique artifacts consisting of coiled baskets coated with a thin layer (or layers) of red clay were recovered from several Southwestern sites, including two study sites. Clay spalls from a small sample of these artifacts were submitted to Jeff Ferguson at the University of Missouri Research Reactor’s Archaeometry Laboratory for neutron
activation analysis (NAA) to determine the elemental composition of the clays. Specimen data were then compared to one other and the Archaeometry Lab’s large database of Southwestern ceramic sherds and clays in an effort to identify the potential geographic affinities of the clay sources used to coat the baskets.

Residue Analyses

Published accounts (e.g., Judd 1954; Morris 1919, 1924; Pepper 1920) indicated the presence of unidentified food-like residues adhering to the interstices of a handful of complete baskets and fragments. Available evidence demonstrates that basketry (Judd 1954; Morris and Burgh 1941; Odegaard and Hays-Gilpin 2002), like ceramics (e.g., Crown and Hurst 2009; Crown and Wills 2003; Plog 2003; Toll and McKenna 1997), played an active role in both sacred and secular settings in Chacoan society, however, poor documentation and heavily disturbed depositional contexts have left us with minimal contextual information to elaborate on these roles. Residue analyses were conducted on selected artifacts to identify lipids, starches, pollen, or phytoliths that could provide crucial contextual information that would enhance our understanding of diet and how basketry was actively used by members of Chacoan society, as well as to complement accumulating results from ceramic residue analyses (Borck and Crown 2008). When appropriate, potential residue samples were collected under the guidance of Dr. Linda Scott Cummings of Paleo Research Institute, Golden, Colorado, who oversaw their analysis. Three spalls of red clay from the surface coatings of two coiled
baskets were additionally submitted for cacao residue analysis to Patricia L. Crown and W. Jeffrey Hurst for inclusion in their research on prehispanic Southwestern cacao use (Crown 2012; Crown and Hurst 2009; Crown et al. 2015).

Radiocarbon Determinations

Despite well-known construction sequences for several of the study sites based on multiple tree-ring dates and ceramic cross-dating (e.g., Lekson 1986; Lekson 1983; Morris 1986; Reed 2006; Windes 2010), every individual artifact cannot be securely dated to a relatively narrow span of several decades owing to room re-use and stratigraphic mixing. Direct accelerator mass spectrometry (AMS) radiocarbon determinations, with standard errors ranging between 20 and 60 years, were run to double check date ranges assigned to rooms or room blocks on the basis of ceramic and tree ring dates, as recent radiometric assays for Chaco Canyon have suggested that continued chronological reassessment is warranted (e.g., Coltrain et al. 2007; Cordell et al. 2008; Kennett et al. 2017; Plog and Heitman 2010; Watson 2012; Watson et al. 2015; Wills 2009). Additional samples were selected and run on baskets from study (and other) sites that are stylistically unique, could help constrain the age of other specimens, or inform on regional temporal trends in technological style. Table 5.3 presents the radiocarbon dates acquired on specific artifact technologies for comparative purposes, while assays from study sites are provided and discussed in Chapter 6. In all cases the locations of sample removal were documented before and after with digital
Table 5.3. Accelerator Mass Spectrometry Radiocarbon Dates on Perishables from Non-Chacoan Archaeological Sites Acquired for Technological and Chronological Comparisons.

<table>
<thead>
<tr>
<th>Site</th>
<th>Catalog No.</th>
<th>Lab No.</th>
<th>(^{14}C) Age (uncal BP)</th>
<th>(\delta^{13}C) (%)</th>
<th>Cal age B.C./A.D. (2 (\sigma))</th>
<th>Cal age B.C./A.D. Median</th>
<th>Artifact Technology</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roth Cave, CO</td>
<td>UCMNH 7936.a</td>
<td>AA85138</td>
<td>4191±38</td>
<td>-22.9</td>
<td>2894-2636 BC</td>
<td>2777 B.C.</td>
<td>close coiling, half rod and bundle stacked, noninterlocking stitch</td>
<td>see Lister and Dick (1952), McDonald (1997)</td>
</tr>
<tr>
<td>Atlatl Cave, Chaco Canyon, NM</td>
<td>CHCU 32860/FS 354</td>
<td>Beta-273384</td>
<td>2240±40</td>
<td>-25.1</td>
<td>392-203 B.C.</td>
<td>283 B.C.</td>
<td>close coiling, 1 rod and bundle stacked, noninterlocking stitches</td>
<td>parching tray, Grid 28, Level 1; see Elliott (1986), Gillespie (2018); Paseka et al. (2018)</td>
</tr>
<tr>
<td>Atlatl Cave, Chaco Canyon, NM</td>
<td>CHCU 32881</td>
<td>Beta-273388</td>
<td>2200±40</td>
<td>-20.3</td>
<td>382-174 B.C.</td>
<td>279 B.C.</td>
<td>close coiling, 1 rod and bundle stacked, noninterlocking stitches</td>
<td>parching tray, provenience unknown; see Elliott (1986), Gillespie (2018); Paseka et al. (2018)</td>
</tr>
<tr>
<td>Atlatl Cave, Chaco Canyon, NM</td>
<td>CHCU 32843/ FS 215</td>
<td>Beta-273385</td>
<td>2110±40</td>
<td>-26.9</td>
<td>351-4 B.C.</td>
<td>134 B.C.</td>
<td>close coiling, 1 rod and bundle stacked, noninterlocking stitches</td>
<td>parching tray, Grid 48, Level 1; see Elliott (1986), Gillespie (2018); Paseka et al. (2018)</td>
</tr>
<tr>
<td>Atlatl Cave, Chaco Canyon, NM</td>
<td>CHCU 32880</td>
<td>Beta-273387</td>
<td>2080±40</td>
<td>-19.2</td>
<td>201 B.C.-A.D. 5</td>
<td>102 B.C.</td>
<td>close coiling, 1 rod and bundle stacked, noninterlocking stitches</td>
<td>parching tray, provenience unknown; see Elliott (1986), Gillespie (2018); Paseka et al. (2018)</td>
</tr>
<tr>
<td>Mummy Cave, AZ</td>
<td>AMNH 29.1/3757</td>
<td>AA88131</td>
<td>1822±43</td>
<td>-22.7</td>
<td>A.D. 81-325</td>
<td>A.D. 190</td>
<td>close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>probable work of a novice</td>
</tr>
<tr>
<td>Mantles Cave, CO</td>
<td>UCMNH 5943</td>
<td>AA85135</td>
<td>1805±35</td>
<td>-23.3</td>
<td>A.D. 126-332</td>
<td>A.D. 207</td>
<td>close coiling, half rod, interlocking stitch</td>
<td>ladle, see Burgh and Scoggin (1948), Goff (2010)</td>
</tr>
<tr>
<td>Crater Shelter, NM</td>
<td>NMNH A345916</td>
<td>AA84732</td>
<td>1764±36</td>
<td>-23.2</td>
<td>A.D. 139-382</td>
<td>A.D. 279</td>
<td>close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>see Hough (1932)</td>
</tr>
<tr>
<td>Luster Cave, UT</td>
<td>UCMNH 8811</td>
<td>AA85137</td>
<td>1498±38</td>
<td>-25.3</td>
<td>A.D. 435-644</td>
<td>A.D. 570</td>
<td>close coiling, half rod and bundle stacked, noninterlocking stitch</td>
<td>see Lister and Dick (1952), McDonald (1997)</td>
</tr>
</tbody>
</table>
Table 5.3. Continued.

<table>
<thead>
<tr>
<th>Location</th>
<th>Institutional Abbrev.</th>
<th>Sample Code</th>
<th>Project Code</th>
<th>Radiocarbon Age</th>
<th>Calendar Age</th>
<th>Style</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basket Cave, CO</td>
<td>UCMNH 5906</td>
<td>AA85136</td>
<td></td>
<td>1156±34</td>
<td>-22.5</td>
<td>A.D. 778-972</td>
<td>close coiling, half rod and bundle stacked, noninterlocking stitch</td>
</tr>
<tr>
<td>Bear Creek Cave, NM</td>
<td>NMNH A246138</td>
<td>AA84733</td>
<td></td>
<td>1017±39</td>
<td>-23.2</td>
<td>A.D. 898-1154</td>
<td>close coiling, 1 rod and bundle horizontal, noninterlocking stitch</td>
</tr>
</tbody>
</table>

a Institutional abbreviations follow Table 5.1.
b Dates calibrated with OxCal 4.2 (Bronk Ramsey 2009) using the IntCal09 curve (Reimer et al. 2009).
photographs and the samples were shipped to established labs for standard
pretreatment processes and analysis. New radiometric dates from Chaco Canyon, or any
site, help demonstrate artifact or stylistic contemporaneity and have further value for
refining site- and region-specific cultural chronologies.

*Study Limitations and Caveats*

Imperfect preservation of perishable industries is the biggest limiting factor in
reconstructing the range of basketry and related craft forms and technological styles
available to peoples of the prehispanic Southwest, as well as answering questions about
ancient learning network variability. This problem diminishes slightly for material post-
dating roughly 400 B.C., after which time the number and size of perishable artifact
assemblages from the Southwest greatly increases. However, despite the relative
abundance of data for this later period our record is still biased towards depositional
contexts conducive to preservation of perishables and, thus, can safely be assumed to
reflect only those activities centered in and around caves, rockshelters, and massive
masonry architecture, such as great houses. Less frequently, carbonized remains from
open and closed sites round out the available database and complement data from
other depositional contexts.

A corollary sampling problem is the extent to which the majority of the
assemblages examined are products of early archaeological research for which little
detailed contextual documentation exists. For example, while many Chaco Canyon
artifacts have room assignments, for sites from Mesa Verde we frequently do not know the specific site they derive from, even if we can be certain it came from one among several geographically proximate sites. The level of recorded detail for artifact contexts and associations also varies by site and excavator, but the century- or decadal-scale resolution of dendrochronological and ceramic stylistic dating often allow for finer temporal placement. In cases where specific artifacts could not confidently be ascribed to a specific occupational episode or phase at a site, I have eliminated them from statistical analyses but included them in my broader considerations of technical variability because their presence or absence is informative.

Future museum research and new excavations will undoubtedly yield new discoveries and add new forms and weave structures to those presently known from the prehispanic Southwest. However, it is unlikely that any amount of new work will substantially modify the existing outline of the general spatiotemporal trajectory of the dominant basket forms and technical styles. I am confident despite the current, somewhat spotty record that my consideration of the regional perishable artifact record, combined with attentiveness to available provenience information, permits sound, if cautious, comparison of site assemblages.

_Baskets ≠ People_

The “pots equal people” fallacy in archaeology refers to the now-abandoned, uncritical assumption pervasive in archaeology prior to the 1960s that pottery types
correspond directly to ancient cultural groups. Simply put, distinctive ancient pottery
styles do not reflect ancient bounded cultural units in which artifacts (culture) equal
people (genes) equal language. I am keenly aware of this concern and have made a
concerted effort in the present study to account for it by being attentive to
contemporary social theory on identity, as well as Southwestern ethnographic, historic,
and cross-cultural data that bear on our understanding of woven crafts’ organization of
production, consumption, and dynamic role(s) in social life. While I do focus on spatial
and temporal patterning in basket, mat, and sandal styles as reflective of learning
network variability that may overlap with social identity groups, I do so by treating them
as independent lines of evidence, complementary to an understanding of the artifacts’
possible secular and symbolic significance, and against which patterning in other
artifacts and features may be compared.

This is Not a Study Identifying Ancient Ethnic Groups

I am explicitly not attempting to equate contemporary Southwestern Indian
tribes, as sovereign nations (and proper ethnic entities), with the archaeological record,
and by extension, proposing to establish relationships of direct lineal descent. As I
argued in Chapter 1, such a proposition is fatally flawed from the outset on both
theoretical and empirical grounds. Ethnic groups and related social identities as we
conceptualize them today simply did not exist in prehispanic times; it is foolhardy to
assume that group socio-political formations of today or the recent past have remained
unchanged over the passage of centuries. Most critically, rare or nonexistent are the classes of archaeological data that are indicative of their exclusive production and use by a single social identity group. Add to this the complicating factors provided by imperfect preservation, and site formation and transformation processes, and we are confronted with the fact that invariably all archaeological data pose serious challenges to identifying any type of social group. This is not to say that forms or aspects of human social identities cannot or do not endure very long periods of time (they can and do), but rather that as social constructs, they are scaled to human societies and groups in complex ways such that their predominance in lived experience strongly mitigates against a complete one-to-one correspondence over very long periods of time.

A stated goal of this project is to examine variability in learning networks reflected in basketry technological style by sidestepping concerns with identifying tribal-level social identity groups, whoever they may (or may not) be related to today. In so doing I specify that I am not looking at discrete identity groups, but rather technological stylistic patterns that we may interpret as reflecting historical relationships among learners and teachers of a craft. Given the generally conservative nature of learning and teaching these crafts, it stands to reason that, depending on the scale, such networks may overlap all or in part with the varieties of social groups documented ethnographically. Although learning networks do not correspond to discrete social identities, they are approachable through artifacts, and so, out of practical necessity, archaeologists must assume some degree of overlap between the enculturative behaviors that produce craft traditions and social identities. Of course, ultimate support
for or against a link between basketry stylistic patterns, learning networks, and social identity groups depends upon concordance with other lines of evidence that would support such a proposal.

With Chaco archaeology we have the benefit of extensive prior research that raises the possibility of cultural and social diversity on the basis of ceramic, architectural, and biological evidence. In the next chapter I present the results of my detailed attribute-oriented analyses of basketry at several spatial and temporal scales and the findings from complementary neutron activation, residue, and radiometric analyses.
Chapter 6

Formal and Functional Variation in Chacoan Baskets, Mats, and Sandals

This chapter presents study findings that help place the examined coiled baskets, twill plaited mats, and twill plaited sandals in their particular chronological and functional contexts. After reviewing of the implications of radiocarbon dates acquired for this project, I turn to an analysis of formal and functional variation in order to enhance our understanding of the active role that basketry artifacts likely played in Chacoan and broader prehispanic sacred and secular life. Additional insights are gleaned from the results of neutron activation analysis of clay coated baskets, select organic residue analyses, and exploratory strontium isotopic sourcing. As a unit, this information complements the results of the technological stylistic analyses that constitute Chapter 7, which have the most direct bearing on questions about cultural and social diversity at different spatiotemporal scales.

Artifact and Site Chronologies

Space and time are the two critical dimensions along which variation in basketry artifacts is explored to examine evidence for distinct or overlapping learning networks
that may support models of cultural or social diversity within Chaco Canyon and across the regional system. The spatial dimension is investigated with attention to each artifact’s available provenience information, but this cannot be completely divorced from site chronology because of the complex construction histories and use lives of the sampled sites. As basketry artifacts are often unevenly preserved across individual study sites, when possible I also employed within-site spatial divisions recognized by the original excavators or later researchers based on architectural and artifactual differences to group samples for within-site comparison. At Antelope House, for instance, the original excavators identified strong architectural differences between the northern and southern room blocks that, while partly chronological, also clearly reflect some real social distinction as suggested by corresponding variability in utilitarian ceramics, maize, and baskets and mats (Morris 1986). Such within-site lumping of artifacts allowed me to compare larger sets of artifacts as groups and evaluate their internal stylistic homogeneity as a unit in relation to within-site spatial divisions that can safely be presumed to reflect chronologically, if not also socioculturally, meaningful differences.

The fact that many of the study sites’ rooms or room blocks have known construction ranges based on tree-ring dates frequently allows us to constrain the age of a particular room’s assemblage, but a variety of natural and cultural site transformation processes can and do complicate interpretation. In order to facilitate exploration of stylistic patterns through time, both within and between sites, it was necessary to make some assumptions about the likely age of an object or set of objects
coming from a given room. To do this I relied principally on the original excavator’s published observations as well as current interpretations of the construction and use histories of the sites in my study sample (see Table 5.1 references). The quality of chronological data bearing on construction and use history varies widely both within and between sites, so I recognize that future research may revise room- or site-specific chronologies. However, I believe that in most cases any such changes would not substantively alter the cautious conclusions that I draw based on extant interpretations of site histories.

The temporal period of primary interest is the Bonito phase (A.D. 850 to 1140), but when warranted by chronological information afforded by associated tree-rings and ceramic cross-dating, I attempted to narrow the likely age range of an artifact in order to explore stylistic patterns with even greater chronological resolution. For Chaco Canyon, this meant a subphase within the Bonito phase (e.g., Early, Classic, or Late Bonito subphase), and beyond Chaco, it meant site-specific stages or phases based on current research at those sites. Fortunately, broad occupational overlap among study sites made it possible to equate construction or occupational episodes at these sites with subphases within the Bonito phase system for comparative purposes. In cases where secure chronological refinements were not possible, it was sometimes necessary to compare lumped samples, such as Bonito phase versus post-Bonito phase. I appreciate that reconstructed building stages or phases are not equivalent to occupational periods, and that some rooms or room blocks may have been used for long (or short) periods of time, and sometimes discontinuously, but I also reason that artifact
temporal assignments made conservatively in light of available evidence are a justifiable course of action for increasing within-site temporal resolution and making the most of the often unevenly distributed data.

Radiocarbon Determinations

Selective radiocarbon dating of ancient baskets, mats, and sandals from study sites, as well as several other Southwestern sites, was employed for two primary reasons. First, the direct dating of a selection of artifacts from the two largest and, arguably, most important assemblages from Pueblo Bonito and Aztec West provides a means of refining an object’s age in light of complicated depositional histories while simultaneously testing for a mismatch between an object’s actual age and the age range that I originally assigned based on construction timber tree-ring dates and ceramic cross-dating information. Reasonable correspondence between existing chronological information and new radiocarbon results provides support for assigning ages to artifacts from less securely dated contexts based on extant tree-ring and ceramic dates. Second, the direct dating of individual artifacts from sites outside of Chaco Canyon, including those beyond the bounds of the regional system, affords a way to assess contemporaneity among weaving styles and object forms as distributed over a much wider area. In this way individual objects can inform a larger regional perspective on spatiotemporal variability in specific styles and potentially contribute to our
understanding of the cultural and/or geographic connections of Chaco-affiliated peoples.

Because radiocarbon determinations are probability estimates they are associated with a statistical margin of error which, due to fluctuations in atmospheric radiocarbon during an interval that overlaps with the Bonito phase, results in somewhat wider age range assignments for samples dating to this period than for those dating earlier or later. In some cases a calibrated radiocarbon date range associated with a 95 percent confidence interval spans the entire Bonito phase, which is certainly useful for broad chronological refinement, but less so for determining whether the sample dates to the Early or Late Bonito subphase. Despite this loss of precision for the timeframe of primary interest, other chronometric data, as well as the radiocarbon determination’s median calibrated calendar age, can be used judiciously to argue when a particular sample is more likely to have fallen within the Bonito phase, even though the calibrated age estimate spans the entire Bonito phase at 95 percent confidence.

The results of radiocarbon assays run on artifacts from sites included in this study’s sample are presented in Table 6.1. Specific radiocarbon determinations are variously referenced throughout the text, but a summary of general observations and implications is presented below.

Pueblo Bonito. Reconstruction of the chronology of dynamic construction and use of Pueblo Bonito between roughly A.D. 850 and the A.D. 1300 (Figure 6.1) has benefitted from decades of investigation and the synthesis of chronometric information acquired from ceramic and architectural cross-dating, radiocarbon and archaeomagnetic
dates, and more than 600 tree-ring dates on construction timbers (Judd 1964; Lekson 1986; Windes 2003; Windes and Ford 1996). Over the last decade, research on various questions not directly related to site chronology has produced several dozen direct radiocarbon dates (e.g., Coltrain et al. 2007; Cordell et al. 2008; Kennett et al. 2017; Paseka et al. 2018; Plog and Heitman 2010; Price et al. 2017). Significantly, these are considered more reliable than the handful of previous radiocarbon dates from the canyon because of concerns attendant to sampling and considerable advancements in radiocarbon dating methods over the past 30 years. The result is a relatively detailed site chronology that highlights the site’s growth as well as specific rooms’ or room blocks’ repair, progressive disuse and periodic reuse during the Bonito phase and after. The most current reconstruction is provided by Windes (2003), and this is what I principally rely upon, with consideration of more recent radiocarbon data where appropriate (e.g., Kennett et al. 2017; Plog and Heitman 2010).

The 10 direct accelerator mass spectrometry (AMS) radiocarbon dates acquired for this study complement current reconstructions and contribute to our understanding of the use of both specific artifact styles and the portions of the site from which they were excavated. At least one date comes from each of the four quadrants of the pueblo, but the majority (n=7) of the dates come from northern rooms, because this was the source of the bulk of the site’s perishable artifacts. The quadrants to which I occasionally refer were arbitrarily defined for my own convenience during analysis using the north-south trending central plaza room block as one dividing line, and an invisible
Table 6.1. Accelerator Mass Spectrometry Radiocarbon Dates on Coiled Baskets, Twill Plaited Mats, and Twill Plaited Sandals from Pueblo Bonito, Aztec Ruin West, and White House.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Lab No.</th>
<th>$^{14}$C Age (uncal BP)</th>
<th>$\delta^{13}$C (%)</th>
<th>Cal age A.D. (2 σ)</th>
<th>Cal age A.D. Median</th>
<th>Room</th>
<th>Artifact Technology</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo Bonito</td>
<td>AMNH H-9182</td>
<td>AA88115</td>
<td>1196±38</td>
<td>-10.7</td>
<td>692-950</td>
<td>829</td>
<td>Room 111</td>
<td>2/2 twill plaited sandal from debris on floor</td>
</tr>
<tr>
<td></td>
<td>AMNH H-4602</td>
<td>AA84735</td>
<td>1085±56</td>
<td>-24.4</td>
<td>780-1032</td>
<td>949</td>
<td>Room 32</td>
<td>2/2 twill plaited sandal from general debris; <em>Schoenoplectus</em> sp. strips</td>
</tr>
<tr>
<td></td>
<td>AMNH H-493</td>
<td>AA88117</td>
<td>1077±46</td>
<td>-18.8</td>
<td>830-1032</td>
<td>960</td>
<td>Room 2</td>
<td>2/2 twill plaited sandal found in debris</td>
</tr>
<tr>
<td></td>
<td>AMNH H-7156</td>
<td>UCIAMS 68767</td>
<td>1020±20</td>
<td>unk</td>
<td>986-1031</td>
<td>1010</td>
<td>Room 62</td>
<td>2 rod and bundle bunched, noninterlocking stitch basket from floor pocket 2; 1 of multiple baskets represented by fragments; sampled for $^{87}$Sr/$^{86}$Sr sourcing</td>
</tr>
<tr>
<td></td>
<td>AMNH H-3190</td>
<td>AA88119</td>
<td>1007±43</td>
<td>-24.6</td>
<td>901-1156</td>
<td>1025</td>
<td>Room 25</td>
<td>3/3 twill plaited mat with double 90° self selvage from refuse</td>
</tr>
<tr>
<td></td>
<td>AMNH H-7040, H-7041</td>
<td>AA84737</td>
<td>984±34</td>
<td>-20.8</td>
<td>990-1155</td>
<td>1063</td>
<td>Room 83</td>
<td>2 rod and bundle bunched, noninterlocking stitch clay coated steep-sided bowl from debris above main room near west wall; sampled for NAA and cacao residue analysis; same basket as NMAI 051118 and NMAI 064583</td>
</tr>
<tr>
<td></td>
<td>NMNH A335359</td>
<td>AA84734</td>
<td>959±35</td>
<td>-23.8</td>
<td>1017-1160</td>
<td>1094</td>
<td>Room 300A</td>
<td>1 rod, noninterlocking stitch clay coated basket sampled for NAA</td>
</tr>
<tr>
<td></td>
<td>AMNH H-3946</td>
<td>AA88116</td>
<td>952±31</td>
<td>-19.7</td>
<td>1022-1157</td>
<td>1096</td>
<td>Room 24</td>
<td>2/2 twill plaited sandal from debris</td>
</tr>
<tr>
<td></td>
<td>AMNH H-5792</td>
<td>AA88118</td>
<td>923±32</td>
<td>-24.5</td>
<td>1026-1185</td>
<td>1102</td>
<td>Room 54</td>
<td>3 rod bunched, noninterlocking stitch basket from debris, apparently fell from upper story room</td>
</tr>
<tr>
<td></td>
<td>AMNH H-3188</td>
<td>AA88120</td>
<td>892±43</td>
<td>-24.1</td>
<td>1031-1221</td>
<td>1134</td>
<td>Room 25</td>
<td>2/2 twill plaited mat with intricate self selvage from refuse</td>
</tr>
<tr>
<td>Aztec West</td>
<td>AA</td>
<td>Ta</td>
<td>TL</td>
<td>1H</td>
<td>Warning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.1/3219</td>
<td>AA84736</td>
<td>969±34</td>
<td>-22.4</td>
<td>1014-1159</td>
<td>2 rod and bundle bunched, noninterlocking stitch clay coated ladle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/7373</td>
<td>AA88121</td>
<td>942±36</td>
<td>-25.6</td>
<td>1020-1170</td>
<td>half rod and bundle stacked, noninterlocking stitch basket, possibly a tray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/5293</td>
<td>AA88122</td>
<td>930±44</td>
<td>-18.9</td>
<td>1022-1208</td>
<td>2/2 twill plaited sandal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/9662.7</td>
<td>AA88127</td>
<td>911±35</td>
<td>-25.8</td>
<td>1032-1208</td>
<td>3/3 twill plaited mat with intricate self selvage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/8386</td>
<td>UCIAMS 68768</td>
<td>890±20</td>
<td>unk</td>
<td>1045-1215</td>
<td>2/2 twill plaited mat lacking selvage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/8452</td>
<td>AA88123</td>
<td>861±46</td>
<td>-11.5</td>
<td>1042-1262</td>
<td>2/2 twill plaited sandal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/9662.2</td>
<td>AA88128</td>
<td>847±36</td>
<td>-26.7</td>
<td>1049-1265</td>
<td>2/2 twill plaited mat with intricate self selvage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/6793.1</td>
<td>AA88126</td>
<td>840±40</td>
<td>-23.9</td>
<td>1049-1271</td>
<td>2 rod and bundle bunched, noninterlocking stitch wide mouthed bowl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/9694</td>
<td>AA88125</td>
<td>802±45</td>
<td>-19.5</td>
<td>1155-1285</td>
<td>half rod and bundle stacked, noninterlocking stitch bowl</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/9984</td>
<td>AA88124</td>
<td>796±38</td>
<td>-23.1</td>
<td>1171-1279</td>
<td>2/2 twill plaited sandal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.1. Continued.

<table>
<thead>
<tr>
<th>White House</th>
<th>AMNH 29.1/7668</th>
<th>AA88130</th>
<th>985±39</th>
<th>-26.3</th>
<th>989-1155</th>
<th>1065</th>
<th>Room 6, upper level</th>
<th>2/2 twill plaited sandal</th>
<th>NPS Room 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMNH 29.1/7590</td>
<td>AA88129</td>
<td>817±35</td>
<td>-23.9</td>
<td>1162-1272</td>
<td>1225</td>
<td>Room 3</td>
<td>3 rod bunched, noninterlocking stitch basketry shield</td>
<td>NPS Room 10</td>
<td></td>
</tr>
</tbody>
</table>

* Dates have been calibrated with OxCal 4.2 (Bronk Ramsey 2009) using the IntCal09 curve (Reimer et al. 2009).
Figure 6.1. Planview map (CHCU 65956) of Pueblo Bonito, Chaco Canyon, New Mexico, showing room locations. Courtesy of the National Park Service and Thomas C. Windes.
line extending from the northern wall of Room 148 in the central plaza as an east-west dividing line.

This sample of dates is certainly too small to allow detailed reconstruction of trends in basketry artifact use, but does help double-check age assignments made on the basis of existing chronological data and Windes’ (2003) reconstruction. As one example, a sandal dated from Room 111 was selected for dating because it appeared to resemble putatively early twill plaited sandals dating to late Pueblo I or early Pueblo II times from the Prayer Rock District of eastern Arizona (e.g., Morris 1980) and lacked a toe jog. This is the oldest date that I acquired, and among the very oldest from Pueblo Bonito, corresponding well to other early dates from nearby Room 33 (Coltrain et al. 2007; Plog and Heitman 2010). The latest date acquired, on a twill plaited mat fragment from Room 25, appears to fall within the Late Bonito subphase, or perhaps as late as the first decades of the A.D. 1200s, as expected based on Windes’ (2003) synthesis.

Significantly, all of the dates processed returned age estimates that are consistent with initial, conservative assessments of their ages that I made based on Windes’ (2003) proposed date ranges for construction and use of the rooms that bore them. In one case, two dates were run on separate mat fragments from Room 25, the artifacts from which I assigned an estimated age of A.D. 1040 to 1140 (Classic to Late Bonito subphase) based on evidence marshaled by Windes (2003) for initial room construction during the A.D. 1070s and 1080s and likely reuse in the first half of the A.D. 1100s, given the room’s proximity to others with documented reuse. Using the R_combine function in OxCal 4.2 (Bronk Ramsey 2009; Ward and Wilson 1978), these
two radiocarbon determinations are, statistically speaking, only marginally consistent with the hypothesis of contemporaneity ($X^2$: df=1, $T=3.6$ [5% 3.8]), suggesting that they reflect two separate events. Radiocarbon dates on two human coprolites from Room 25 show a similar age distribution and support this interpretation (Paseka et al. 2018). In this light, the age of the 3/3 twill mat fragment is most likely Classic Bonito subphase (A.D. 1040-1100), while the 2/2 twill mat fragment is probably of Late Bonito subphase (A.D. 1100-1140) age. Here, the radiocarbon dates facilitate a refinement of the age of these specific artifacts, while also affirming Windes’ (2003) reconstruction.

**Aztec West Ruin.** Our understanding of the development of Aztec West and, to a lesser degree, that of nearby Aztec East and the larger Aztec community has advanced considerably in recent years with the acquisition of systematic survey data and a suite of new tree-ring dates. The present reconstruction of Aztec West offered by Brown et al. (2008) employs these dates to identify three Late Bonito subphase construction sequences between about A.D. 1100 and 1130, during which the majority of the site was built, and that encompass the colonizing Chacoan occupation first identified by Morris (1919, 1924, 1928). However, current interpretations do not support evidence of a sequential population replacement by Mesa Verde-affiliated peoples following Chacoan abandonment, as originally proposed by Morris. Rather, Brown et al. (2008) see evidence for continuous occupation and episodic construction from A.D. 1130 until the site was vacated about A.D. 1290. The post-Chacoan (or post-Bonito phase) occupation of the site is presently understood to consist of a transitional period between roughly
A.D. 1130 and 1200 referred to as McElmo phase, and a final Mesa Verde phase occupation ceasing with the close of the thirteenth century A.D.

In the course of my analyses, it was frequently possible to distinguish deposits of Late Bonito subphase age from those of the succeeding phases based on Morris’ observations and associated artifacts. Distinguishing between McElmo and Mesa Verde materials, however, was not possible, so artifacts ascribable to any post-Chacoan deposit were lumped together for analytical purposes. Materials from undifferentiated refuse were assigned to the entire duration of the site’s occupation. Figure 6.2 is a working map of Aztec West modified by former park archaeologist Gary M. Brown to identify sectors within the site that function as analytical units for summarizing chronometric, architectural, and artifactual data. Spatial divisions are based on architectural nuances and aspects of construction history and are used here to facilitate my study of horizontal artifact patterning.

A total 10 of AMS radiocarbon dates were processed from Aztec West. Except for one date from Kiva D in the southeast sector, all derive exclusively from northernmost sectors, which also yielded the overwhelming majority of the site’s perishable artifact assemblage. Five dates come from the northwest sector of the site. The Aztec dates span the entire occupation of the site, with three assignable to the Late Bonito subphase occupation and the remainder falling into the post-Chacoan occupation. None of the results are surprising, and all are consistent with assumptions made prior to direct dating about artifact age inferred from Morris’ original observations and associated artifacts. At first glance, the two dates on different mat fragments associated
Figure 6.2. Planview map of Aztec West Ruin, New Mexico, showing room locations and architectural sectors defined by Gary M. Brown. Courtesy of the National Park Service.
with Grave 29 from Room 141 suggest the possibility of separate events, but a statistical test of contemporaneity in OxCal 4.2 indicates that they represent the same event (X2: df=1, T=1.6 [5% 3.8]) and can be averaged. The average of these two dates, 880±26 radiocarbon years BP, produces a calibrated median age of A.D. 1167 and a calibrated age range of A.D. 1045 to 1220 at 95.4 percent confidence. This suggests a probable post-Chacoan age for the mixed burial and associated artifacts, even though the determination falls along a relatively flat portion of the calibration curve. These results are further consistent with Morris’s (1924:167, 1928:370) remarks that this burial lay atop Mesa Verde refuse.

*White House.* Two radiocarbon determinations on a single twill plaited sandal and the sole coiled basketry shield from the site are broadly consistent with the site’s occupational span as presently understood from tree-ring dates and ceramics (Tsosie 2009). To the best of my knowledge, these are the first radiocarbon dates from White House. The age of the shield is noteworthy in that it corresponds to the presumed A.D. 1200s age of the other five basketry shields previously known, as well as the timeframe during which shield imagery increases in rock art (Anderson 1969; Morris and Burgh 1941; Osborne 2004; Schaafsma 1980, 2000; see also Chapter 8).

*Summary*

The 22 radiocarbon determinations processed from three study sites comprise samples too small, with age ranges too broad, to substantively refine site occupational
histories. However, they have great value as independent checks of the ages of artifacts against existing chronological information from tree-rings, architecture, and ceramics. Most significantly, all of the dates acquired from Pueblo Bonito and Aztec West lend general validity to the assumptions that I made about the likely ages of undated artifacts based on available chronological information. In some cases, consideration of calibrated median ages in conjunction with contextual data serves to strengthen arguments for refining individual artifacts’ ages. Two dates from Room 25 at Pueblo Bonito attest to the prolonged use of some rooms, as had been inferred previously. Taken as a unit, the radiocarbon results do not guarantee that the chronological assignment of undated objects based on other information is universally secure, but alleviate some concern that considerable mixing as a consequence of cultural and natural site transformation processes should not prohibit attempts to explore within-site spatial and temporal patterning.

Additional radiometric dates on artifacts from several other sites with broad comparative value were also acquired, and these are presented in Table 5.3. When and where appropriate these dates are referenced in the context of my evaluation of artifact geographic and chronological stylistic affinities.

Formal and Functional Variation
Variability in basket, mat, and sandal shape or form can be informative when one appreciates that certain shapes may be preferred (or required) for certain tasks and that such tasks often sort with other cultural or social practices. Speaking generally, the overall form of a basketry object is largely independent of primary weaving technology. Though certain techniques may be preferred for specific forms, twining, coiling, and plaiting can all be used to produce similar forms, as is the case with mats and sandals, both of which are known to have been made at various times and places in the world with each of the three major basket weaves. Among each of the three major weave types, structural variability tends to matter even less when it comes to producing a desired form. This makes it worth considering morphological variation separately from technological variation. For example, a burden basket or wide mouthed bowl can be made by the coiling technique and employ any one of a number of foundation types with little or no impact on the finished form. Depending on the structural technique, there may be minor variations in the weave texture of the finished product, but either a one rod or a three rod bunched foundation can be used to make a bowl or burden basket fitting a group’s proscribed standards for vessel size and shape. Significantly, it is very rare for multiple techniques to be used in one object.

Previous research, specifically Morris and Burgh’s (1941) synthetic study of ancient Pueblo basketry, facilitates identification of a range of coiled vessel forms and their attested or inferred functions, as well as offers some observations about changes in vessel from through time. Owing to uneven preservation, we have neither access to the full complement of coiled basket forms that may have existed in one area at any
given time, nor can we always infer with confidence the original form of a basket based on just one or even multiple fragments unless diagnostic wall, base, or rim sections have survived. For this reason, it is prudent to consider the presence or absence of particular forms or broader classes of forms based on cautious identification according to fragments’ shapes, and this is the approach that I take.

Compared to coiled baskets, little can be said about morphological variability in plaited matting and sandals. The broadest and most obvious trends in these object forms tend to relate weave structure, not form, though there are observable changes in sandal shape over millennia. As noted in Chapter 5, the twining technique was preferred for matting and footwear until late Basketmaker times, after which plaiting increased in frequency and presumably importance. Recognizing mats and sandals from imperfectly preserved fragments is, fortunately, almost always possible because of consistency in raw material choice and fabric texture; twilled mats utilize rather wide flattened rush strips, while twilled sandals usually employ demonstrably finer strips of yucca. Changes in mat form are nearly impossible to assess because we have no (or very few) relatively complete twined mats, and those examples of twined matting that have survived do not indicate any dramatic changes in overall mat shape as compared to later and better represented plaited examples. The biggest difference in sandal form during the Pueblo era appears to be a shift towards the shaping of individual sandals’ toes to correspond to one or the other foot, as well as the addition of a jog or offset to the curvature of the toe. Sandals worn on the left foot or right foot can often be discerned in Archaic and Basketmaker era footwear on the basis of wear patterns, but intentional shaping of
sandals to make distinctive left or right footed sandals does not appear to have become commonplace until at least late Pueblo I times when sandal toes across the Colorado Plateau become less rounded and more contoured, mimicking the angle of human toes.

To minimize confusion over identification of form between prior analyses and my own it should be noted that earlier imprecision and inaccuracy in identifying raw materials and describing artifact form have often meant that published and archival references to mats and baskets of reed, rush, yucca, grass, or osier, often confuse and/or refer to a number of different objects ranging from baskets to mats and even sandals. The label "mat" is variously used by early excavators and subsequent scholars citing them to refer to objects that, upon scrutiny, are revealed to be twill plaited rush (*Schoenoplectus* sp.) mats, plaited yucca (*Yucca* sp.) ring baskets, "matted" (compressed and tangled) masses of vegetal fiber, or sewn osier (*Salix* sp.) screens/doors, among other items. As but one example, Pepper (1909:197, 1920) reports a rolled up "burial mat" standing in the corner of Room 33 at Pueblo Bonito. However, reexamination revealed that it is more specifically a sewn willow structure distinct from the typical rush plaited mats, whether or not it was used as a platform or mortuary wrapping. These sewn willow items were more frequently used as screens covering doorways and as interior roofing components in Chacoan sites (e.g., Morris 1919, 1928), though a stronger mortuary association in the Mesa Verde region suggests use as bedding and burial wrappings (Osborne 2004).
Coiled Basket Form

This section reviews the results of the analysis of available data on variation in coiled basket form within the study sample, and where appropriate, offers some extended remarks on several unique vessel forms that apparently served very specialized functions. The unique vessel forms warrant further discussion because of their rarity and patterned spatiotemporal distribution in the northern Southwest, subjects which are considered in Chapter 8.

*Pueblo Bonito*

Vessel forms were identifiable for 47 specimens from Pueblo Bonito that variously span the Bonito phase and are generally consistent with the identifications offered by Pepper (1920) and Judd (1954:162-171). Figure 6.3 shows the frequency of the major vessel forms identified. The most numerous forms are perhaps the easiest to identify because their unique shapes make identification based on fragments much easier. Preservation of basketry was generally poor throughout Pueblo Bonito as compared to other study sites, but the material from Pepper’s excavations is better preserved than Judd’s. However, Pepper and his field crew were less successful in recovering vessels intact, so few vessel forms in his collection are discernible with confidence. Judd and his field crew, on the other hand, always used liberal coats of
ambroid or paraffin to consolidate specimens during excavation and for transport to the Smithsonian. For this reason, they were able to preserve the overall form of multiple baskets found in a terrible state, including, for instance, cylinder and bifurcate baskets from the western burial complex. The downside is that, despite valiant efforts by Judd and colleagues, the paraffin could not be removed and in some cases obscures fine-scale structural details. Fortunately, a number of in-progress excavation photos, published and unpublished, enhance our ability to interpret the remains curated at the Smithsonian.

![Graph showing counts of vessel forms identified at Pueblo Bonito.](image)

**Figure 6.3. Counts of vessel forms identified at Pueblo Bonito.**

The most abundant forms in the Pueblo Bonito sample include, in order of quantity, the unique cylinder baskets, bowls, oval or hourglass-shaped trays, and bifurcated burden baskets. A small number of globular and burden baskets, and a single tray, round out the remaining identified forms. As a broader class of forms, “bowl”
obscures some variation since it groups together bowls of various sizes that I observed, including steep-sided bowls and three miniature bowls. With the exception of several of the more abundant unique forms, it is not possible to say much about chronological patterns. Vessel forms such as bowls and trays are common and not particularly temporally diagnostic, even when the vessel is complete or nearly so (cf. Morris and Burgh 1941:Fig. 11). Two (or more) globular baskets derive from subfloor pits in “Pocket 2” of Room 62 and may date to Early Bonito subphase times based on a direct radiocarbon date (Pepper 1920:227, 234; see Table 6.1). Both were inverted and each was nested with other baskets and smashed pots in what may have been a ritual deposit (Pepper 1920:234; Webster et al. 2014). Found near them was also a large conical burden basket that is clearly visible in Pepper’s (1920:227; see also Judd 1954:171, 234) excavation photo, but could not be discriminated among the surviving lots of mixed basket fragments from the room. This specimen provides the clearest example of a burden basket, and adds to the two probable burden baskets counted in Figure 6.3, both of which are likely of Early Bonito subphase age.

The remaining vessels forms, including bifurcated burden baskets, clay coated baskets, cylinder baskets, and oval or hourglass-shaped trays deserve more detailed comment because of their uniqueness in the archaeological record and apparent importance at Pueblo Bonito. These unique specimens are listed in Table 6.2 with pertinent contextual and technological data.

*Bifurcated Burden Baskets*. Bifurcated baskets from Pueblo Bonito were identified as burden baskets based on their size and similarity in overall plan to other
conical burden baskets from Southwestern sites. Their distinguishing feature is, of course, a cleft or bifurcation of the base that was accomplished by producing an elongated oval basket start and then folding the opposing ends toward each other’s exterior surface to achieve an acute angle, generally about 45° or less. The vessel walls then grew upwards, with the exaggerated and sloping coils of the baskets’ lower half created by foundation element and arrangement manipulations, ultimately resulting in two lobes or “feet” that vary in profile from tear drop- to wedge-shaped. Coiling proceeded normally for the remainder of the basket except that, in the Pueblo Bonito specimens, as the walls grew they were increasingly pinched in towards the center of the basket perpendicular to its width. By the terminal (rim) coil, the pinching was quite extreme, giving the appearance, in profile, of the lobes growing with the basket wall. The end product is a split-base wedge-shaped burden basket with an hourglass-shaped opening when seen from above (Figures 6.4, 6.5).

Pepper (1920) did not procure any examples of this form, but Judd’s (1954:311-316) work resulted in the reported recovery of five or six, with one coming from Room 320 and the rest coming from the complex mortuary deposits of adjacent Room 326, both rooms comprising part of the recognized western burial cluster at the site. My analyses identified five examples, of which the only complete specimen is also the best preserved example from Room 320 (see Table 6.2). If there was a sixth specimen, I could not discern it with confidence among the many poorly preserved fragments distributed across the several jumbled cataloged lots. The five examples are largely interchangeable
Table 6.2. Unique Vessel Forms from Pueblo Bonito, Chaco Canyon, New Mexico.

| Catalog No.
<table>
<thead>
<tr>
<th>Context</th>
<th>Approx. Date</th>
<th>Structural Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bifurcated Burden Baskets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NMNH A335293</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>found on floor leaning against east wall in SE quarter of room</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>with cylinder basket A335299 at its rim and cylinder baskets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A335296 and A335300 and pitcher A336419 beyond its feet;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>burials a few feet away but no clear association (Judd 1954:325);</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>complete, 41 cm L x 30 cm W x 20.5 cm T; decorated with</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>overpainted woven-in design</td>
</tr>
<tr>
<td>NMNH A335294</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>incomplete; orange paint flecks on surface consistent with</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>museum labeling paint</td>
</tr>
<tr>
<td>NMNH A335295</td>
<td>Room 326,</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td></td>
<td>Burial 8/9</td>
<td></td>
<td>found at head of female skeleton 8 at post 5; burials also</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>associated with 2 cylinder baskets and 2 hourglass-shaped trays;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>incomplete, 22-24 cm L x 10.5 cm W x 8.5 cm T; smallest example</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>of form</td>
</tr>
<tr>
<td>NMNH A335313.1</td>
<td>Room 326,</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td></td>
<td>Burial 10</td>
<td></td>
<td>from SE corner above infant Burial 10, possibly associated with</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>cylinder basket A335305 but Judd (1954:169) questions Burial 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>association; incomplete; painted decoration</td>
</tr>
<tr>
<td>NMNH A335313.9</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>among mixed burials in center of room; incomplete; painted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>decoration</td>
</tr>
<tr>
<td>Clay Coated Baskets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH NAA/687</td>
<td>Room 13</td>
<td>A.D. 850-1040</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;altar painting&quot; on floor in eastern part of room (Pepper 1920:68-69)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>probable burden basket; incomplete; painted decoration</td>
</tr>
<tr>
<td>AMNH NAA/370 (H/5094?)</td>
<td>Room 37?</td>
<td>A.D. 850-1040?</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&quot;from debris&quot; if H/5094, as is likely (cf. Pepper 1920:184);</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>incomplete; clay similar to NAA/687 but weave impression best</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>resembles appearance of 2 rod and bundle foundation; painted</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>decoration</td>
</tr>
<tr>
<td>AMNH H/7040, H/7041; NMAI 051118, 064583</td>
<td>Room 83</td>
<td>A.D. 1063, AMS 14C median</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>from debris above main room near west wall; steep-sided bowl;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>incomplete; painted decoration; some spalls burned</td>
</tr>
<tr>
<td>NMNH A335359</td>
<td>Room 300A</td>
<td>A.D. 1094, AMS 14C median</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>wide or steep-sided bowl; incomplete; painted decoration; burned</td>
</tr>
</tbody>
</table>
Table 6.2. Continued.

<table>
<thead>
<tr>
<th>Cylinder Baskets</th>
<th>Room</th>
<th>A.D.</th>
<th>Coil Type</th>
<th>Stitch Type</th>
<th>Additional Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMNH H/12758</td>
<td>Room 33, Burial 14</td>
<td>Late A.D. 800s</td>
<td>Unknown</td>
<td>with adult male burial; associated with large quantity of beads and other ornaments; none of original basket remains; turquoise mosaic-covered</td>
<td></td>
</tr>
<tr>
<td>NMNH A335296</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>from beyond feet of bifurcated basket A335293 and near cylinder basket 335299; near but not clearly associated with a burial (Judd 1954:167); incomplete; possible woven-in decoration</td>
<td></td>
</tr>
<tr>
<td>NMNH A335297</td>
<td>Room 330A, Burial 24</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>found under original floor level of room at feet of Burial 24 with a bowl and pitcher; incomplete; decorated with woven-in design overpainted in polychrome</td>
<td></td>
</tr>
<tr>
<td>NMNH A335298</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>from NE corner behind A335301, with skulls and pottery; incomplete; possible woven in decoration</td>
<td></td>
</tr>
<tr>
<td>NMNH A335299</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>lay on floor on side a couple inches in front of bifurcated basket A335293; mostly complete; 1 vestigial handle/lug; woven-in decoration</td>
<td></td>
</tr>
<tr>
<td>NMNH A335300</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>from beyond feet of bifurcated basket A335293 and near cylinder basket 335299, near but not clearly associated with burials (Judd 1954:167); mostly complete; woven-in decoration</td>
<td></td>
</tr>
<tr>
<td>NMNH A335301</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>from NE corner in front of A335298, with skulls and pottery; incomplete</td>
<td></td>
</tr>
<tr>
<td>NMNH A335302.1</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle stacked, noninterlocking stitch</td>
<td>near but not positively associated with burials (Judd 1954:167); incomplete; final 2 coils are 1 rod and bundle stacked foundation</td>
<td></td>
</tr>
<tr>
<td>NMNH A335303.1</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>this is either the 2nd cylinder basket from Burial 8/9 or the separate cylinder basket adjacent post #3 found to contain small ceramic bowl A336249 in Judd/Havens NGS photo neg. 28465; incomplete</td>
<td></td>
</tr>
<tr>
<td>NMNH A335304</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>this is either the 2nd cylinder basket from Burial 8/9 or the separate cylinder basket adjacent post #3 found to contain small ceramic bowl A336249 in Judd/Havens NGS photo neg. 28465; incomplete; rare rim plaiting; woven-in decoration</td>
<td></td>
</tr>
</tbody>
</table>
Table 6.2. Continued.

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Room/Location</th>
<th>Date</th>
<th>Weaving Technique</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMNH A335305</td>
<td>Room 326, Burial 10</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>from SE corner above infant Burial 10, possibly associated with bifurcated basket A335313.1 but Judd (1954:169) questions Burial 10 association; incomplete; woven-in decoration</td>
</tr>
<tr>
<td>NMNH A335313.5</td>
<td>Room 326, Burial 8/9</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>1 of 2 cylinder baskets found with female burials; incomplete</td>
</tr>
<tr>
<td>NMNH A335313.11*</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>among mixed burials in center of room; incomplete</td>
</tr>
<tr>
<td>NMNH A335313.12*</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>among mixed burials in center of room; incomplete</td>
</tr>
<tr>
<td>NMNH A335320*</td>
<td>Room 246A</td>
<td>A.D. 1040-1140</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>incomplete</td>
</tr>
<tr>
<td>NMNH A335322.2*</td>
<td>Room 298A</td>
<td>A.D. 850-1300</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>incomplete</td>
</tr>
<tr>
<td>NMNH A335324*</td>
<td>Room 296A</td>
<td>A.D. 850-1300</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>complete/finished plaque or unfinished basket base; either way, cylinder basket form is hard to substantiate</td>
</tr>
<tr>
<td>NMNH A335325*</td>
<td>Room 226</td>
<td>A.D. 1040-1140</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>incomplete</td>
</tr>
<tr>
<td>NMNH A335326*</td>
<td>Room 227I</td>
<td>A.D. 1040-1140</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>incomplete</td>
</tr>
<tr>
<td>NMNH A335330*</td>
<td>Room 323</td>
<td>A.D. 850-1040</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>may date later and indicate room reuse, as documented in adjacent rooms (Windes 2003:Figs. 3.9, 3.10); incomplete</td>
</tr>
</tbody>
</table>

**Oval/Hourglass Trays**

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Room</th>
<th>Date</th>
<th>Weaving Technique</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMNH H/455.3, H/457.2</td>
<td>Room 2</td>
<td>A.D. 850-1040</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>found on original floor and contained 2 worked wooden sticks; incomplete</td>
</tr>
<tr>
<td>AMNH H/5792</td>
<td>Room 54</td>
<td>A.D. 1040-1140</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>from debris that apparently fell from upper story room; incomplete</td>
</tr>
<tr>
<td>NMNH A335306.1</td>
<td>Room 326, Burial 6</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>at head of Burial 6 at post 4; contained pot A336267 and pair of twined sandals (Judd 1954:76); bone &quot;scraper&quot; A335161 with basket; incomplete; sporadic red mineral pigment and possible woven-in decoration</td>
</tr>
</tbody>
</table>
Table 6.2. Continued.

<table>
<thead>
<tr>
<th>NMNH A335307</th>
<th>Room 326, Burial 12</th>
<th>A.D. 850-1110</th>
<th>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</th>
<th>contained “scraper” A335163; incomplete</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMNH A335313.2</td>
<td>Room 326, Burial 8/9</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle stacked, noninterlocking stitch</td>
<td>found at head of Burial 9 with inlaid &quot;scraper&quot; A335162, bowl A336262 lay under basket; incomplete; sporadic red mineral pigment</td>
</tr>
<tr>
<td>NMNH A335313.4</td>
<td>Room 326, Burial 8/9</td>
<td>A.D. 850-1110</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>found near head of Burial 9 with “scraper” A335164; Judd’s (1954:166) finest coiled basket collected; incomplete</td>
</tr>
</tbody>
</table>

a AMNH NAA prefix is a general "North American Archaeology" collection prefix indicating that the artifact has lost its original tag. b Asterisk after catalog number indicates possible cylinder vessel based on Judd’s observations. Additional contextual data are from Judd’s (1921-23, 1921-27a, 1921-27b) and Blom’s (1924) archived field notes.
Figure 6.4. Front (left) and back (right) views of the complete bifurcated burden basket (A335293) from Room 320 at Pueblo Bonito. Decoration consists of black dyed stitches that were later overpainted with turquoise and black pigment on the front only. Courtesy of the Smithsonian’s National Museum of Natural History.
when it comes to general form, but there was apparently variability in the depth of basal cleft as well as basket size. The specimen from Room 320 (NMNH A335293) is clearly the largest of the five and measures 41 cm tall by 30 cm maximum width by 20.5 cm thick, and tapers to about 4.5 cm at the end of each of the lobes (Figure 6.6). By comparison, the bifurcated basket from double Burial 8/Burial 9 measures, in its current state, 21 cm tall by 10.5 cm maximum width by 8.5 cm thick tapering to about 2 cm at the ends of the lobes (Figure 6.7). Even though the rim is missing, this basket’s shape and proportions suggest that the original basket was not much more than 22 to 24 cm tall, making it almost half the size of the largest known example. Functionally, the baskets exhibit neither evidence of carrying straps nor any remarkable wear or evidence
Figure 6.6. Profile view of the complete bifurcated burden basket (A335293) from Room 320 at Pueblo Bonito. Courtesy of the Smithsonian’s National Museum of Natural History.

Figure 6.7. Overview of the smallest bifurcated burden basket (A335295) from Burial 8 in Room 326 at Pueblo Bonito. Note the heavy coating of paraffin and wire mesh support structure used to preserve the specimen’s shape. Courtesy of the Smithsonian’s National Museum of Natural History.
of having been mended, suggesting that they were used gently, if at all, prior to their deposition.

The distribution of this form at Pueblo Bonito is highly localized, restricted to just two rooms (320, 326) of the five rooms of the western burial cluster (Rooms 320, 325, 326, 329, and 330). Only two baskets, both from Room 326, have unequivocal burial associations, while the others were found near disturbed skeletal remains or were possibly just placed in the room by themselves. Association with burials implies use as a mortuary offering, while those that are unassociated may reflect general displays of respect or offerings left later for one or more of the deceased. Notably, Judd (1954:316-320) also recovered six ceramic effigies of bifurcated baskets, two from the east trash mound and one each from rooms 329, 330, 347, and 350 (Figure 6.8; see also Chapter 8). Except for the trash mound specimens and the piece from Room 350, at the south end of the west court, the other three effigies come from rooms within or very close to the western burial cluster.

It is very difficult to say with precision when any of the bifurcated baskets were produced, and generous application of paraffin and amborid make radiocarbon dating challenging. The rooms in which they were found are some of the earliest constructed at Pueblo Bonito, dating to the last half of the ninth century A.D. (Windes 2003). However, in looking at the total ceramic assemblage from rooms 320 and 326, one finds examples of ceramic types produced throughout the entire Bonito phase, and recent dating efforts show that the burials accumulated over multiple generations (Price et al. 2017). A best estimate for their age, based on relative proportions of earlier versus later
Figure 6.8. Examples of bifurcated burden basket effigies from Pueblo Bonito showing variation in form and decoration. From left to right, specimens are from Room 329 (A336061), Room 350 (A336062), and Room 330 (A336063). Courtesy of the Smithsonian’s National Museum of Natural History.
of bifurcated burden baskets remains enigmatic, but their unique shape, lack of obvious use-related wear, patterned distribution, mortuary associations, and representation in effigy form strongly implies a ritual function. This is consistent with interpretations proposed by Morris and Burgh (1941:54-56) and Judd (1954:306-320) for this vessel form, and I am largely in agreement with their views. In Chapter 8, I briefly discuss the probable uses and symbolic connotations of these vessels at Chaco in light of the form’s regional distribution and depositional contexts.

*Clay Coated and Painted Baskets.* Although, strictly speaking, not a distinctive shape or form like a bowl or burden basket, clay coated coiled baskets stand out for their rarity and apparent importance of function. As the label implies, these are coiled vessels to which a thin coat (2-3 mm) or several coats of a clay, varying from pinkish-red to dark red in color, was applied over their entire surface. In the literature, they are sometimes described as decorated with “overlay” or are called “lacquered” baskets (e.g., Morris and Burgh 1941:26). The latter is, however, a misnomer because true lacquering is a dramatically different technology. All Chacoan specimens that I have seen exhibit one or two thin clay coats that together total no more than 5-6 mm thick. The first was applied to fill the stitch interstices, while the second helped to smooth the undulations of the underlying basket’s coils and prepared the vessel surface to receive
All clay coated vessels appear to have been painted, usually on the exterior surface, with at least turquoise or blue-green pigment, while others were clearly polychrome with the addition of yellow, black, and/or red paint.

Pepper’s (1920) excavations yielded three examples, one each from Rooms 13, 37(?), and 83, now principally represented by small clay spalls (generally the size of a quarter or smaller) from the interior and exterior surfaces of the basket (see Table 6.2). Actual basketry is occasionally preserved, but most information about these baskets comes from negative impressions left on the clay spalls. Of the three examples recovered, Pepper only acknowledged one specifically in his report. This specimen from Room 13 (AMNH NAA/687; Figure 6.9), is also the largest, and is one in the same with Pepper’s (1920:68-69) “altar painting.” Examination of this object was hampered by the considerable means that Pepper and his crew took to extract and transport it, and the fact that it is still encased in a very large (70 cm long by 34 cm wide and 22 cm thick) and heavy block of matrix in the museum. The object itself is incomplete, but what survives is some 53 cm long by 17 cm wide. The sheer size, orientation of the coils (parallel to the object’s long axis), and lack of any real curvature to the coils visible strongly suggests the remains of a coiled burden basket (non-bifurcated) that collapsed onto itself while lying flat on the original floor, similar to the burden basket from Room 62 (cf. Pepper 1920:227, Fig. 100).
Figure 6.9. Top, overview of Pepper’s “altar painting” from Room 13 in Pueblo Bonito that is actually the remains of a clay coated and painted coiled burden (?) basket still encased in matrix and cheesecloth (NAA/687). Bottom, close up showing surviving turquoise pigment. Darkening and discoloration are due to gum arabic applied by Pepper for stabilization. Courtesy of the American Museum of Natural History.

The specimen likely from Room 37 is diminutive and its original basket shape cannot be determined, but the object from Room 83 was clearly a steep-sided bowl with an intricate polychrome design painted on its exterior (Figure 6.10). This artifact survives as clay spalls too numerous to count, but the majority of the vessel’s coating is probably
present. In terms of vessel shape, this basket finds a companion in the sole clay coated fragment recovered by Judd (1954:321, Fig. 101) from Room 300, which also appears to have come from a steep-sided bowl.

Except for the example from Room 37, which is located near the northern burial cluster, the other three examples constitute a tight cluster from rooms in the northeastern portion of the pueblo that also happen to be near Rooms 296 and 298 at Pueblo Bonito, which yielded the possible cylinder baskets discussed in the next section. All of these rooms are within the earliest room blocks, dating to the late A.D. 800s or early 900s. We are fortunate to have direct AMS radiocarbon determinations on the Room 83 and Room 300 specimens (see Table 6.1), which suggest that the baskets were most likely made and used during the last half of the eleventh century A.D., the Classic Bonito subphase.

Functionally, we do not yet know how these baskets were used, but the existence of clay coated steep-sided bowls, as well as a burden basket, indicates that there may have been multiple tasks for which they were employed. A ritual association for this class of coiled baskets is strongly indicated by the uniqueness of their construction and rarity and finds substantive support in information on the depositional contexts of similar specimens found outside of Chaco Canyon (Odegaard and Hays-Gilpin 2002; see also Chapter 8).
Figure 6.10. Obverse (left) and reverse (right) views of a selection of spalls from a clay coated and painted steep-sided basket bowl from Room 83 in Pueblo Bonito (H/7040 and H/7041). Note post-depositional charring. Courtesy of the American Museum of Natural History.
Cylinder Baskets. Cylinder baskets (see Table 6.2) are so named because of their distinctive shape and striking similarity to the unique ceramic cylinder vessels now known to have been used in ritual(s) involving cacao beverage consumption (Crown 2012, 2013, 2018; Crown and Hurst 2009; Crown et al. 2015, 2018). This vessel form, as represented in basketry in Chaco Canyon, is only known from Pueblo Bonito at this time, and it seems reasonable that it was used in a fashion similar to the ceramic examples. Few additional clues to function come from the baskets themselves, but one cylinder basket found leaning against post number 3 in Room 326 contained a small black-on-white bowl with a checkerboard hachure-filled design (Judd 1954:Plate 54i). This association is not noted in Judd's (1954) report, but the basket and bowl it contained are both depicted in situ in an O. C. Havens photograph (NGS Neg. 28465; Chaco Research Archive 2014). Unfortunately, the catalog number of the precise cylinder basket depicted is indeterminate. The pot found in the basket is NMNH catalog number A336249 (Field No. 1642), a black-on-white bowl 12 cm in diameter and 5.7 cm tall. Judd's (1921-1927a) artifact card for field number 1642 clearly indicates that the bowl was found in a definite cylinder basket, as opposed to a questionable one, and this is consistent with the form of the basket seen in Havens' photo. Since none of Judd's (1921-1927b) Room 326 notecards indicate a burial near post 3, which was located near the middle of the room based on excavation notes and room dimensions (Judd 1964), the only numbered burials that the basket and bowl could have potentially been recovered near are disarticulated Burials 1-4 from the middle of the room. A process of elimination leaves thus only two unequivocal cylinder baskets as possible associates of
the bowl: NMNH catalog numbers A335303.1 and A335304. Cylinder basket A335304 seems the most likely candidate to me based on comparison with Havens' photo and preservation, but I cannot be certain.

Pepper (1909:227, 1920:164, 173-174) reported recovering two cylindrical baskets, both with exterior mosaic decoration, with Burial 14 (Skeleton 14 in Pepper’s terms) in Room 33 during his excavations. Both baskets are notably associated with late ninth century A.D. direct radiocarbon dates on Burial 14 (Coltrain et al. 2007; Kennett et al. 2017; Plog and Heitman 2010). The first (AMNH H/12758) was described as 7.6 cm in diameter and 15.2 cm tall, covered in 1,214 pieces of turquoise mosaic, and found with what can appropriately be described as “riches” partially filling it and spilling from its mouth. This included 2,150 turquoise beads, 152 small turquoise pendants, 22 large turquoise pendants, 3,317 shell beads and small pendants, 68 large shell pendants, some with turquoise inlay, and an animal form pendant with inlay. The basket has not survived, but a museum reconstruction incorporating some of the original turquoise exists (Figure 6.11). It is unclear if the original was only partially covered in mosaic, as the late nineteenth-century museum reconstruction suggests.

The second object found near Burial 14, but not associated with the deposit just described, may not have been a cylinder basket in the sense of a container. Based on Pepper’s description, it was about 4 cm in diameter and at least 6 cm tall, which would make it the smallest cylinder basket known if his measurements applied to a complete
Figure 6.11. Reconstruction of turquoise mosaic-covered cylinder basket from Burial 14 in Room 33 at Pueblo Bonito (H/12758). This reconstruction of the original appears to be a sheet of celluloid rolled into a cylinder onto which original mosaic pieces have been glued. Slightly less than half of the back of the vessel (not visible) is undecorated. Courtesy of the American Museum of Natural History.
artifact. This object consisted of turquoise and shell beads apparently strung as a shingled mosaic over a basketry foundation that was itself “woven over a wooden body, or at least over a form of fibrous material (as a piece of cactus stalk)...” (Pepper 1909:230, 1920:174-175). How the beads were strung is not known, but Pepper’s description recalls shell beaded coiled baskets from indigenous California, some of which can effect a shingled appearance depending on how the beads are attached (cf., Elsasser 1978; Shanks 2006). Upon reflection, given the extent and nature of coiled basketry’s decay at Pueblo Bonito, I believe that there was no solid wooden core, but perhaps only the remaining rotted woody fiber of the basket’s rods and stitches. In my experience, such decayed basketry can resemble the skeletal architecture of decayed cactus stalk.

Pepper (1909:230) initially gave the catalog number for this second cylindrical basket as H/12758, but this museum number is presently assigned to the reconstructed turquoise mosaic encrusted cylinder basket. The corresponding text on page 174 of his 1920 report omits reference to this number, perhaps suggesting it was mislabeled in his 1909 chapter. However, the AMNH Hyde Expedition catalog (“H-Catalog”) entry for this number mentions “Wickerwork cylinder ornamented with turquoise and shell beads,” which suggests this number originally applied to the second, diminutive cylindrical mosaic basket, as the larger cylinder basket lacks shell beads. Successive catalog numbers (H/12759-12761) appear to describe (mixed?) mosaic pieces collected from both objects, but none of the mosaics that I have examined can be unequivocally
associated with either basket. Thus, the remains of this second vessel, if collected, have not yet been located.

In his summary of the basketry he recovered from Pueblo Bonito, Judd (1954:166-171) noted 19 cylinder baskets and fragments. Eleven of these are clearly cylinder baskets, based on their current form and documentary photos (Figures 6.12, 6.13, 6.14), but that leaves eight for which we must take his word, given their fragmentary and generally poor state of preservation. If we assume that Judd based his identifications on relatively intact in situ specimens, then that number can be taken at face value. However, the fragmentary nature and widespread within-site distribution of such basket fragments leaves me to wonder whether all of his cylinder baskets were observed as such in the field. Based on my examination of the possible cylinder basket fragments, it seems that in some cases Judd’s cylinder basket attribution may have been based on the flatness and roundness of the recovered basket base. Unfortunately, neither basket base roundness nor flatness are features exclusive to cylinder baskets. One of Judd’s possible cylinder baskets (NMNH A335324) consisted of a flat base with a self rim finish, suggesting that it was originally a complete small plaque or, equally possible, an unfinished basket’s base. Either view effectively discounts this piece as a cylinder basket.

Since neither Judd's publications nor his archived notes specify exactly which specimens were preserved well enough upon excavation to be unequivocal cylinder baskets, I have taken a conservative approach that recognizes a minimum of 11 cylinder baskets based on form, context, and available documentary evidence. This means that
there are an additional eight basket fragments in Judd’s sample of 19 that I consider to be possible cylinder baskets, and as noted above, one seems disproven. Note that the count for cylinder baskets provided in Figure 6.3 is the most generous estimate and assumes that vessels that Judd identified as cylinder baskets were in fact said vessel form.

Figure 6.12. Two profile views of a cylinder basket from Room 320 in Pueblo Bonito (A335299). Faded woven-in polychrome design of black, red, and undyed stitches appears to consist of interlocking zig-zag and serrated fret motifs that resemble Gallup-Dogoszhi painted ceramic designs. Note lug or handle below rim in photo at left. Courtesy of the Smithsonian’s National Museum of Natural History.
Figure 6.13. Two profile views of a cylinder basket from Room 320 in Pueblo Bonito (A335300). Faded woven-in polychrome design in black, red, and undyed stitches appears to consist of stepped linear elements and possible frets. Courtesy of the Smithsonian’s National Museum of Natural History.
Figure 6.14. Three profile views of the polychrome painted cylinder basket from Burial 24 in Room 330 of Pueblo Bonito (A335297). Original dyed stitch design was overpainted and modified with turquoise, yellow, and black pigment. A layer of plaster was added to the interior post-excavation for structural support. Courtesy of the Smithsonian’s National Museum of Natural History.
A few words should also be said about the remains of a polychrome painted coiled basket recovered by Moorehead (1906) from Room 53 or 56/63 (RSPM 32328; see also Chapter 7), two adjacent rooms abutting Pepper’s (1920:210, 216, 236) northern burial cluster that he excavated during the winter of 1897-1898. Room 63 comprises a second story room overlying Room 56. Rooms 53 and 56 yielded multiple human burials. Specimens that I analyzed in Moorehead’s collection at the Robert S. Peabody Museum of Archaeology at the Phillips Academy, Andover, Massachusetts, came from one or both of these two rooms, but we cannot be sure of their exact provenience, or which specific materials were originally burial-associated. The fragmentary remains of this vessel bear a curvature indicating that it originally was a form of steep-sided vessel, and that is how I recorded it. Given its recovery from a room near room 33, the relative fineness of the weave, and the resemblance of its decoration to the painted cylinder basket from Room 330A (NMNH A335297; see Figure 6.14, Table 6.2; Judd 1954:166-171, 306-307, Fig. 98, Plate 84), it is worth entertaining the possibility that it, too, was a cylinder basket. This is speculation, but the stylistic evidence and curvature of the surviving wall fragments are suggestive and warrant acknowledgement here.

Combining Pepper’s and Judd’s findings, we arrive at a minimum of 12 cylinder baskets from Pueblo Bonito, with perhaps as many as 20 if the possible examples are assumed to have been accurately identified during excavation. The diminutive cylindrical beaded basket found by Pepper in Room 33 would make 21 if we were to include it too. Compared to the 166 ceramic cylinder vessels known from Pueblo Bonito
(Crown and Hurst 2009), 20 is a small number, but preservation is a mitigating factor in recovery. The bulk of the ceramic cylinder vessels come from Room 28 (n=111) which is situated adjacent to the early block of rooms in the northern portion of the site and very close to northern burial cluster Room 33 that yielded the turquoise encrusted cylinder basket. Other ceramic cylinder vessels are known from elsewhere within the site, including the western burial cluster where some were found in close proximity to cylinder baskets. These associations indicate temporal overlap in the production and use of both vessel types, with the distribution of the 12 unequivocal cylinder baskets most strongly tied to mortuary contexts associated with ceramic assemblages weighted towards the late eleventh century A.D. Secure dating of the Room 33 cylinder basket based on its association with Burial 14 (Plog and Heitman 2010) raises the possibility of temporal priority for basketry versions of cylinder vessels, but only if ceramic specimens are truly restricted in their production to between about A.D. 1040 and the early 1100s (Toll 1990:290). When the recovery locations of the eight possible cylinder baskets are added and compared with rooms yielding ceramic cylinder vessels (see Table 6.2; cf. Neitzel 2003:Fig. 9.10; Toll 1990:Table 1), we observe a distribution similar to that of the ceramic cylinder vessels, but with greater representation of cylinder baskets in the western burial cluster, and ceramic cylinder vessels in the northern burial cluster.

Nine unequivocal cylinder baskets were intact enough either to allow measurement of maximum vessel height and diameter or to permit reasonable estimation of one or both dimensions close to the original value (within 2-3 cm), based on fragment shape and structure (see Figures 6.12, 6.13, 6.14). Although these data
provide only a coarse indication of variation in cylinder basket size, they are still of value for comparison against the ceramic forms. The average cylinder basket height \((n=7)\) is 22 cm, with a range from 12 to 26 cm and cylinder basket diameter \((n=9)\) averages 13.5 cm and ranges between 7.7 and 15.25 cm. The largest vessel in terms of both height and diameter is from Room 320 (NMNH A335298), while the shortest vessel is the polychrome painted vessel from Room 330 (NMNH A335297, see Figure 6.14), which also exhibits the second smallest diameter (approx. 12 cm). The vessel with the smallest diameter is the Room 33 example (AMNH H/12758, 7.7 cm). The remaining unequivocal cylinder baskets would all appear to fall comfortably within the aforementioned height and diameter ranges. When compared to Toll’s (1990: Table 2) data on ceramic cylinder vessel height \((n=137, \text{mean}=23.65 \text{ cm}, \text{range}=14-35 \text{ cm})\) and neck diameter \((n=120, \text{mean}=10.77, \text{range}=6.5-17 \text{ cm})\), all of the basketry vessels seem to compare favorably, except that the average diameter of cylinder baskets may be slightly greater. Post-depositional distortion and uneven preservation of cylinder baskets makes it difficult to evaluate variation in overall form, but a few specimens may have slightly narrower bases than orifices or even some slight wasting or tapering in the middle of the vessels. Only one specimen (NMNH A335299; see Figure 6.12) evidences the remains of a single small horizontal loop handle or lug below the rim that resembles those seen on most ceramic cylinder vessels (Toll 1990).

**Oval, Hourglass- or Figure-eight-shaped Trays.** Shallow round trays are suggested by fragments of several vessels from Pueblo Bonito, but the most intriguing are those that appear to have been oval, figure-eight-, or hourglass-shaped in plan (see Table 6.2).
Pepper (1920) did not identify any such vessels, but my reexamination of his material identified two likely examples, based on their distinctive oval center, form, and wall morphology. Judd (1954:165-166, 327-328) reported four, each accompanying a female burial in Room 326, and referred to them as shallow oval or elliptical trays. However, some of his published and archival photos of these burials show taller walls and unambiguous hourglass- or figure-eight-shaped plans created by the pinching inward of the basket’s wall. The resulting shape is analogous to that formed by the mouth or opening of Pueblo Bonito’s bifurcated baskets (see Figure 6.5), suggesting a functional if not conceptual relationship. Associated with each of the burial trays was a humerus “scraper” or “flesher” that was more likely used for yucca fiber processing than hide preparation (see Osborne 1965, 2004). Two trays evidence red ochre on their interiors, one of which also contained a small pot (Judd 1954:Plate 54d) and a fragment a pair of fine twined yucca sandals (Judd 1954:76), which could imply that twined sandal production was a female-associated task.

All six trays are very poorly preserved and none suffered excavation well, so ascertaining variation within this form is impossible (e.g., Judd 1954:Plate 44). Judd observed the best preserved example (NMNH A335306.1, Figure 6.15) to be some 33.7 cm long by 16.5 cm wide and about 5.5 cm tall after excavation. Based on wall morphology, I believe these measurements are accurate to within several centimeters and are likely representative of all four trays, given the fragments that have survived. One fragment suggests that basket wall height may have been as high as 14.8 cm. If this measurement is accurate and also reflective of the other vessels, then it would suggest
that these vessels should be more appropriately thought of as types of ovoid bowls rather than trays, but I continue to refer to them as trays in deference to Judd’s on-site observations.

![Figure 6.15. Overview of the interior of the best preserved oval or hourglass-shaped tray from Burial 6 in Room 326 of Pueblo Bonito (A335306.1). Sporadic rust-colored areas are a deep red mineral pigment. Courtesy of the Smithsonian’s National Museum of Natural History.](image)

The trays could date to Early or Classic Bonito times, but the weight of the evidence from the varied ceramic types in Room 326 suggests a late A.D. 1000s age (Thomas C. Windes, pers. comm. 1/2010). The function of these containers is unknown, but their contents, and those of other examples found beyond Chaco Canyon (see Chapter 8), suggest dual but not necessarily mutually exclusive uses as work and
medicine baskets. The scrapers and twined sandal fragment accompanying the burial
trays support a work-related interpretation, but the location of these specific burials
suggests that these baskets held greater significance, as did their owners.

Coiled Baskets in Mortuary Contexts. The forgoing discussion demonstrates the
strong correlation between unique vessel forms and mortuary contexts at Pueblo
Bonito. Excluding the small cylindrical beaded basket reported by Pepper (1920:174-
175) with Burial 14 in Room 33, Table 6.2 lists the 10 coiled baskets unequivocally
associated with numbered burials. Including all 11 specimens, a conservative total of 34
individual vessels were associated with rooms in Pepper’s northern (32, 33, 53, and 56)
and Judd’s western (320, 326, 329, 330) burial clusters, though not all of these rooms
that yielded human remains also produced perishable artifacts. It is clear that all of the
bifurcated burden baskets and the majority of the cylinder baskets and oval/hourglass
trays derive from burial cluster rooms, even if all cannot be assigned to a numbered
burial. In instances where a unique vessel form cannot be linked to a numbered burial, it
stands to reason that either a burial was disturbed or, in the case of some baskets (e.g.,
NMNH A335293, A335296, A335299), they were left as generalized offerings in the
room. Less clear is what other vessel forms were also originally included with burials. Of
the 34 burial room baskets, 10 are of indeterminate form. Represented in this subset
are at least one small bowl, a steep-sided vessel (RSPM 32328, possibly a cylinder
basket, see above), a possible burden basket, and seven other baskets of indeterminate
form. Two of the baskets of unknown form were associated with unnumbered mixed
burials that Judd (1954:329) recovered from the center of Room 326. We cannot be
certain of the original form of these baskets, but their surviving curvature suggests bowls or trays and not bifurcated or cylinder vessels. Suffice it to say that although unique vessel forms are overrepresented in Pueblo Bonito’s burial cluster rooms, it is highly probable that a number of other vessel forms, such as bowls and trays of various configurations and possibly burden baskets, were also interred with some of the deceased. Some of these vessels may have entered burial cluster rooms as later offerings or refuse.

_Additional Chaco Canyon Vessels._ Data on vessel forms from other Chaco Canyon sites are scarce, but my analyses identified one unpublished fragment clearly from a steep-sided bowl from Chetro Ketl (MIAC 27371/11) and a single bowl from an unspecified cliff cavity or cist (CHCU 251). Additionally, Kin Kletso yielded multiple fragments of what was very likely a bifurcated basket (CHCU 1007.a). In either case, the vessel’s unique form went unrecognized by its original excavators (Vivian and Mathews 1965:102). This specimen probably dates to the McElmo phase (A.D. 1140-1200), which would make it the youngest bifurcated basket known from the canyon. No doubt several forms present at Pueblo Bonito were also in use at other Chaco Canyon sites, but these fragments remain mute as to their original vessel shape.

_Aztec West Ruin_

Thirty-nine vessel forms were identified among the typically well preserved baskets from Aztec West Ruin. The most numerous forms were bowls of various shapes
and sizes, plaques, and trays (Figure 6.16). In fact, so numerous were bowls and plaques that Morris (1928:382) had no qualms about discarding two plaques and a steep-sided bowl (“truncated cone”) excavated from Room 136-2. Several other forms infrequently encountered in archaeological basketry assemblages were also noted, including a ladle, a shield, and an oval or hourglass-shaped tray. The unique oval/hourglass tray, as well as six examples of clay coated baskets, are of particular interest in light of the Pueblo Bonito specimens (Table 6.3). Bifurcated and cylinder baskets are seemingly absent, though it should be noted that Morris (1919:56, 1924:155, 1928:412) reported the presence of three cylinder baskets that have never been located and so cannot be verified (Webster 2008a:173-174). Aware of early researcher’s inconsistencies in describing basket forms, I am inclined to view these putative cylinder baskets as less like the Pueblo Bonito examples and more like the “truncated cones” or “waste-basket-shaped,” steep-sided vessels known already known from Aztec West and Mesa Verde (Figure 6.17, see also below Figure 6.21).

Bowls of various types are represented throughout the occupation of the site, spanning from about A.D. 1100 to 1290. Plaques, however, have a more restricted temporal distribution and all appear to post-date the end of the Late Bonito subphase at Aztec, around A.D. 1130 (Figure 6.18). Excluding the oval/hourglass tray, the four trays from Aztec include one postdating A.D. 1130, while the other three can only be generally assigned to the site’s entire occupational span. The two restricted mouth vessels are similarly dated.
Table 6.3. Unique Vessel Forms from Aztec West, New Mexico.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Structural Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clay Coated Baskets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/5376</td>
<td>Room 122-2</td>
<td>A.D. 1100-1130</td>
<td>Unknown</td>
<td>none of original basket survives; impression in clay suggests 2 rod and bundle foundation; painted design</td>
</tr>
<tr>
<td>AMNH 29.0/7481</td>
<td>Room 65</td>
<td>A.D. 1100-1130</td>
<td>Unknown</td>
<td>from refuse; none of original basket survives; impression in clay suggests 2 rod and bundle foundation; no design preserved</td>
</tr>
<tr>
<td>AMNH 29.0/9345</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>incomplete; painted design</td>
</tr>
<tr>
<td>AMNH 29.1/3219</td>
<td>Room 189</td>
<td>A.D. 1090, AMS (^{14}C) median</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>from lower level, among Chacoan refuse; ladle; mostly complete; handle is hollow with unknown contents acting as rattle; only very small amount of clay coat and paint remains</td>
</tr>
<tr>
<td>AZRU 3560</td>
<td>Exterior NW corner</td>
<td>A.D. 1100-1290</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>incomplete; painted design</td>
</tr>
<tr>
<td>UCMNH 5932</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>inverted on floor in SE quadrant of kiva; Morris and Burgh (1941:26) indicate was large bowl about 60 cm diameter and 10 cm tall; incomplete; painted design</td>
</tr>
<tr>
<td><strong>Oval/Hourglass Tray</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMNH 29.0/6871</td>
<td>Room 33, Grave 9</td>
<td>A.D. 1130-1290</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>found at north end of room with Grave 9, adult female (Morris 1924:147, Fig.1, 1928:293); behind skull under inverted ceramic bowl; under bowl were 3 bone &quot;scrapers,&quot; roll of cotton cord and bundled yucca leaves; incomplete; reported as plaque</td>
</tr>
</tbody>
</table>
Figure 6.16. Counts of vessel forms identified at Aztec Ruin West.

Figure 6.17. Incomplete, heavily worn steep-sided bowl from Room 189 at Aztec West (AZRU 1270). Courtesy of the National Park Service and the American Museum of Natural History.
The oval or hourglass-shaped tray (AMNH 29.0/6871) comes from Grave 9 in the north end of Room 33 and was called a plaque by Morris (1924:147, Fig.1, 1928:293). It was recovered from beneath an inverted ceramic bowl that had been placed adjacent to head of the adult female. Associated with the basket were three humerus "scrapers," a roll of cotton cord, and bundled yucca (?) leaves. The basket is incomplete but was minimally 16 cm long. This burial is thought to date between A.D. 1130 and 1290.

Of the two basketry shields that I examined from Aztec West, the most famous is that which was found with the so-called “Warrior’s Grave” (AZRU 777), the relatively rich burial of a nearly 6’2” tall adult male (Grave 83) uncovered against the north wall of Room 178 (Morris 1924:193-194, 1928:387). The basket itself was found above matting
and feather blanket wrappings and covered the man and his wrappings from his mid-thigh to forehead, parallel to the long axis of his body. It is in a poor state of preservation today, sewn to muslin and glued to plywood, and does not greatly resemble its former appearance as photographed by Morris (1924:Fig. 18) shortly after excavation. The wooden handle has been missing since at least 1956, according to records on file at Aztec Ruins National Monument.

Technologically, the basket is close coiled with a three rod bunched foundation sewn with noninterlocking stitches. It presently measures 88 cm long by 75 cm wide, a few cm smaller than the 91.4 cm by 78.7 cm dimensions recorded by Morris. Overall, the shield is slightly ovoid in plan and concave in profile, more so in the very center presumably to accommodate a hand holding the wooden handle. There is no evidence for woven decoration, but the outermost 5-6 coils (4-4.5 cm) of the exterior were lightly pitched and then sprinkled with flaked and ground selenite, producing a sparkling light gray to violet iridescence, depending on the lighting. Morris indicated that the next 5 coils were stained dark red, but I only observed dark wine-colored (reddish-purple) fungus-related damage (cf. Blanchette et al. 2004:204), which is likely what he saw. The rest of the basket’s exterior was evenly coated with a finely ground mixture of blue-green mineral pigment that, under 10x magnification, has mineral flecks that resemble malachite. One can imagine that, when held up in bright sunlight, the basket’s surface would have shimmered brilliantly. Ceramics and tree-ring dates suggest that this burial post-dates A.D. 1130.
I identified a second fragmentary shield from post-Chaco refuse in Room 95 at Aztec West (AMNH 29.0/8937.1, and fragments AMNH NAA/256, 261, 278) after having the opportunity to examine several other known shields in detail. The remains of a large tray at least 45 cm in diameter, it is constructed with a three rod bunched foundation and bears white mineral pigment on its convex surface that may have effected vertical bands or stacked triangles emanating from the center. Remains of a sewn hide thong near the center suggests formerly pendant objects, as observed on other shields. Although it is incomplete and fragmentary, the basket’s original size, curvature, construction technique, wall thickness, and painted decoration leave me with little doubt that it was a shield.

The final unusual vessel form is a coiled basket ladle with a rattle handle (AMNH 29.1/3219; Figure 6.19) from Room 189. This also happens to be one of five examples of clay coated painted baskets from Aztec West. The four other examples also come from rooms spread across the pueblo’s north wing but, with one exception, their original vessel shape is indeterminate. Morris and Burgh (1941:26) report that a specimen (UCMNH 5932) brought back to the University of Colorado, Boulder, for stabilization and analysis was found inverted on the floor in the southeast quadrant of Kiva L, the earliest structure at Aztec West (Brown et al. 2008). Although incomplete, Morris determined that it was a large bowl some 60 cm in diameter and at least 10 cm tall. Today it is represented only by many fragments heavily coated with sediment, the largest about 12 by 9 cm.
Figure 6.19. Late Bonito phase clay coated and painted coiled basketry ladle or dipper with rattle handle from Room 189 at Aztec West (29.0/3219). Note remains of black pigment on clay in cupped portion. Courtesy of the American Museum of Natural History.

Two additional coiled basket fragments are of note because they appear to mimic the practice of coating a coiled vessel with clay. Yet, instead of using clay, these employ what appears to be single layer (0.3-0.5 mm thick) of felted highly processed yucca (?) fiber (or animal skin/hide?) impregnated with red mineral pigment. This fiber coating adheres to the basket’s exterior surface by unknown means, but small areas beneath it are yellow (ochre?) in color and may be the remains of some mastic. One specimen is unprovenienced (AZRU 1379.d), whereas the second (AZRU 1488.1) was collected by Aztec Ruin custodian George Boundey (Morris 1928:411) and may come from Room 199. These specimens are highly fragmented and exhibit two rod and bundle bunched foundations sewn with noninterlocking stitches. The similar appearance and
technology of the fragments distributed across the two catalog numbers suggests to me that they may in fact represent parts of the same basket, which their curvature indicates was likely a bowl.

Although not baskets, in this context two sherds from a mixed sherd lot (AZRU 5020) recovered from Room 193 may be significant. Reed (2007:15, Fig. 4) identifies the sherds as having coming from an undiagnostic whiteware vessel with a partial Gallup-style design and a nonlocal Cibola Gallup Black-on-white jar. Both sherds bear traces of intricate geometric designs executed in yellow and black on a red background over their Gallup designs. Morris (1928:363) commented on the striking similarity of their designs to the polychrome mortar and painted board from Pueblo Bonito (cf. Pepper 1920:156, 266) and I find them to be very reminiscent of the clay coated and painted basket designs that I have observed in the Aztec and Pueblo Bonito assemblages. The Room 193 assemblage is predominately post-Chaco material but with some Late Bonito subphase admixture (Reed 2007), so these sherds could date to the Chacoan occupation or somewhat later.

Neither the felted fragments nor a clay coated specimen recovered outside of Aztec West’s northwest corner can presently be resolved to a finer date range than that associated with the whole of the site, however the other five clay coated specimens all come from refuse or floor deposits linked to the Late Bonito subphase Chacoan occupation of the site dated between about A.D. 1100 and 1130. Of these four only the ladle has been dated radiometrically and affirms this chronological placement. The condition and, in one case, form, of these Aztec examples does little to enhance our
understanding of how clay coated baskets were used, except to add large bowls and ladles to the existing list forms possibly utilized at Pueblo Bonito. However, the depositional contexts of three specimens are potentially informative. Two come from Kiva L, and another specimen was found adjacent to Kiva F in Room 65. Although the context of deposition of the other clay coated baskets is opaque, those with kiva associations add support to a likely ritual function for these vessels and a possible direct connection to aspects of Chacoan ritual, given their probable temporal restriction of use. The two fragments bearing a fibrous coating impregnated with red pigment, perhaps from a single vessel, along with the two polychrome painted ceramic vessels from Room 193 may be of further significance if they collectively reflect attempts to mimic clay coated and painted basketry technology with other media during the Late Bonito subphase occupation or shortly thereafter.

*Coiled Baskets in Mortuary Contexts.* Of the 186 burials (or graves, as he referred to them) that Morris (1924) recovered from Aztec West, only 11 were accompanied by coiled baskets. Twenty individual baskets are assigned to these 11 burials, all post-dating A.D. 1130, which are spread across nine different rooms in the pueblo. Although Morris was dubious about some of the basket and burial associations, I take Morris’ burial assignments at face value and list the coiled funerary vessels in Table 6.4.

Bifurcated burden baskets and cylinder baskets are apparently absent from the burials at Aztec West, as well as any other context in the pueblo. Regardless of the deceased’s age, where vessel form for Aztec burial vessels is determinable, there is a
Table 6.4. Coiled Baskets from Numbered Graves at Aztec West.

<table>
<thead>
<tr>
<th>Grave No.</th>
<th>Room</th>
<th>Burial Data</th>
<th>Associated Basket(s)</th>
<th>Structural Type</th>
<th>Approx. Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>29</td>
<td>adult female</td>
<td>Incomplete small bowl (AMNH 29.0/6741.1)</td>
<td>Open coiling, 1 rod, intricate interlocking stitch and wrap</td>
<td>A.D. 1130-1290</td>
<td>2 vessels recorded as 1 inverted over skull (Morris 1924:146, 1928:292); intricate stitch is Morris and Burgh's (1941:Fig. 6h) Spaced Coiling 6, but differs by having 2 wrapping to 1 intricate stitch</td>
</tr>
<tr>
<td>8</td>
<td>29</td>
<td>adult female</td>
<td>Incomplete small bowl (AMNH 29.0/6741.2)</td>
<td>Open coiling, 2 rod stacked, intricate interlocking stitch and wrap</td>
<td>A.D. 1130-1290</td>
<td>2 vessels recorded as 1 inverted over skull (Morris 1924:146, 1928:292); intricate stitch is Morris and Burgh's (1941:Fig. 6h) Spaced Coiling 6, but differs by having 8 wrapping to 1 intricate stitch</td>
</tr>
<tr>
<td>9</td>
<td>33</td>
<td>adult female</td>
<td>Incomplete oval/hourglass-shaped tray (AMNH 29.0/6871)</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>behind skull under inverted ceramic bowl with 3 bone &quot;scrapers,&quot; a roll of cotton cord, and bundle of yucca leaves (Morris 1924:147, Fig.1, 1928:293); reported as a plaque</td>
</tr>
<tr>
<td>10</td>
<td>37</td>
<td>10-14 yr child</td>
<td>Incomplete, form unknown (AMNH 29.0/6878.1)</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>in front of body (Morris 1924:147; Morris 1928:297); mended; carbonized</td>
</tr>
<tr>
<td>10</td>
<td>37</td>
<td>10-14 yr child</td>
<td>Incomplete, form unknown (AMNH 29.0/6878.2)</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>in front of body (Morris 1924:147; Morris 1928:297); double coiling in wall; carbonized</td>
</tr>
<tr>
<td>20</td>
<td>95</td>
<td>infant?</td>
<td>Incomplete shield or very large tray (AMNH 29.0/8937.1)</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>from surface of refuse &quot;in front of&quot; infant Grave 20 in northeast corner of room, so burial association is dubious (Morris 1924:161; 1928:347); decorated</td>
</tr>
</tbody>
</table>
Table 6.4. Continued.

| 20 | 95 | infant | Complete small bowl (AMNH 29.0/8958) | Close coiling, 3 rod bunched, noninterlocking stitch | A.D. 1130-1290 | between cradle and north wall and partially covered by feather cloth (Morris 1924:161, 1928:347); brown and white speckled feathers bound under rim termination |
| 20 | 95 | infant | Nearly complete small bowl (AMNH 29.0/8959) | Close coiling, 3 rod bunched, noninterlocking stitch | A.D. 1130-1290 | found west and south of burial mats on which burial rested (Morris 1924:161; 1928:347) |
| 25 | 111 | 2 adults | Incomplete small bowl (AMNH 29.0/8791) | Close coiling, 3 rod bunched, noninterlocking stitch | A.D. 1130-1290 | Morris questioned burial association (Morris 1924:163, 1928:355) |
| 25 | 111 | 2 adults | Incomplete, form unknown (AMNH 29.0/8792.1) | Close coiling, 2 rod and bundle bunched, noninterlocking stitch | A.D. 1130-1290 | Morris questioned burial association (Morris 1924:163, 1928:355) |
| 25 | 111 | 2 adults | Incomplete, form unknown (AMNH 29.0/8792.2) | Close coiling, 2 rod and bundle bunched, noninterlocking stitch | A.D. 1130-1290 | Morris questioned burial association (Morris 1924:163, 1928:355) |
| 29 | 141 | ca. 10 individuals, including 1 adult, infants and children | Incomplete, form unknown (AMNH 29.0/9679) | Close coiling, 2 rod and bundle bunched, noninterlocking stitch | A.D. 1167, AMS \(^{14}\text{C} \text{ median} | presumed mortuary offering (Morris 1924:167, 1928:370) |
| 30 | 141 | young child | Incomplete wide mouthed bowl (AMNH 29.0/9685) | Close coiling, 1 rod, interlocking stitch | A.D. 1130-1290 | inverted over black-on-white mug AMNH 29.0/9684 (Morris 1924:169, 1928:370) |
| 32 | 138 | young adult female (?) | Mostly complete shallow bowl (AMNH 29.0/9694) | Close coiling, half rod and bundle stacked, noninterlocking stitch | A.D. 1231, AMS \(^{14}\text{C} \text{ median} | behind shoulders, with AMNH 29.0/9695 inverted in it (Morris 1924:170, Fig. 11, 1928:389) |
| 32 | 138 | young adult female (?) | Mostly complete wide mouthed bowl (AMNH 29.0/9695) | Close coiling, 3 rod bunched, noninterlocking stitch | A.D. 1231, AMS \(^{14}\text{C} \text{ median} | behind shoulders, inverted in AMNH 29.0/9694 (Morris 1924:170, Fig. 11, 1928:389); mended |
Table 6.4. Continued.

<table>
<thead>
<tr>
<th></th>
<th>136-2</th>
<th></th>
<th>Complete plaque (AMNH 29.1/3220)</th>
<th>Close coiling, 3 rod bunched, noninterlocking stitch</th>
<th>A.D. 1130-1290</th>
<th>found at same level as child, presumed mortuary offering (Morris 1924:177, Fig. 13, 1928:380); decorated</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>136-2</td>
<td>small child</td>
<td>Complete bowl (AMNH 29.1/3221)</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>found between west wall and head of burial (Morris 1924:177, Fig. 13, 1928:380); turquoise pigment at rim termination; decorated; contained food residue</td>
</tr>
<tr>
<td>40</td>
<td>136-2</td>
<td>child</td>
<td>Complete bowl (AMNH 29.1/3222)</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>found between west wall and head of burial (Morris 1924:177, Fig. 13, 1928:380); decorated; contained food residue</td>
</tr>
<tr>
<td>40</td>
<td>136-2</td>
<td>child</td>
<td>Incomplete shield (AZRU 777)</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>&quot;Warrior's Grave,&quot; found above mat and feather blanket wrappings covering from mid-thigh to forehead, long axis parallel body (Morris 1924:193, 1928:387); decorated; wood handle missing</td>
</tr>
<tr>
<td>83</td>
<td>178</td>
<td>adult male</td>
<td>Mostly complete tray (AZRU 1271)</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>A.D. 1130-1290</td>
<td>&quot;Warrior's Grave,&quot; found at back of skull (Morris 1924:193, 1928:387); decorated</td>
</tr>
</tbody>
</table>
decided preference for the inclusion of bowls of various sizes. Plaques and trays are also attested, as well as the notable inclusion of a single oval/hourglass tray with one adult female, and the large basket shield covering the adult male “warrior” in Grave 83.

*Salmon Ruins*

Webster’s (2006a) analysis led to proposed vessel form identifications for a number of specimens. Included in her catalog of possible vessel forms are two steep-sided bowls, one bowl, one plaque, two miniatures, a basket “paho,” and as many as seven conical baskets. The latter are specifically likened to two vessels from Mesa Verde depicted by Morris and Burgh (1941:Fig. 29a; see also Osborne 2004), that are sometimes confusingly referred to as cylindrical, truncated cone, or waste basket-shaped baskets in the literature. Based on personal examination of most of the so-labeled specimens, I consider them equivalent to steep-sided bowls and so prefer that designation. Because the two miniature baskets were not relocated during Webster’s or my own study, I think that they should be treated cautiously since we know little about their preservation, completeness, or the accuracy of the original identifications. The possible “basket paho” was identified by Webster based on the object’s large central aperture at its start and its possible bundle foundation and was likened to several bundle foundation baskets with painted decoration recovered by Hough (1914:123, Fig. 317, Pl. 24) from Bear Creek Cave that sat atop sticks akin to ethnographic pahos or prayer sticks. However, large central apertures in coiled baskets are not out of the
ordinary, and given that this basket is represented by only a single surviving and poorly preserved central coil, I think that the foundation type is misidentified. Initial coils in ancient (and historic) Pueblo baskets often start with a bundle of pure fiber, or a rod and fiber, in order to achieve a tight spiral. Acknowledging this fact, and the poor preservation, I think that a basket paho is highly unlikely. The summary results of my examination are thus more conservative than Webster’s. I recorded at least one bowl and five additional vessels that I am comfortable calling steep-sided bowls. These specimens occur throughout Salmon Ruin’s occupation, dated from about A.D. 1060 to 1300 and, despite the small sample, it is noteworthy that none of the unique vessel forms observed at Pueblo Bonito and Aztec West were encountered.

A single coiled vessel was recovered with each of five Late San Juan period (A.D. 1190-1300) burials from three different rooms at the site (Webster 2006a). One of these vessels is a bowl buried with a 30 to 40 year-old female (SRM 80,128), but the original form of the others is unknown. The bowl is noteworthy for having contained a bone awl.

*Antelope House*

A tally of the coiled vessel forms identified by Adovasio and Gunn (1986), irrespective of structural technique, yielded 46 shallow trays, nine steep-sided bowls, six bowls, one burden (carrying) basket, three bifurcated burden baskets, and one hourglass-shaped tray (counted as a shallow tray by Adovasio and Gunn). The remaining 12 specimens, comprising 16 percent of the total coiled basketry assemblage,
could not be identified as to form. Shallow trays are thus the most abundant coiled form, and together with bowls of various shape, persist in relatively constant frequency throughout the Pueblo II and III occupations of the site (Adovasio and Gunn 1986:384). There is evidence that a few trays were used for parching, but aside from these, the other trays and bowls are assumed to have been used for utilitarian purposes based on their wear. The three bifurcated burden baskets, of which one is mostly complete, all appear to date between A.D. 1140 and 1270, and two of the three securely post-date A.D. 1200. The fourth (non-bifurcated) burden basket likely dates to the A.D. 1100s.

With respect to the sample of coiled specimens that I examined, my identifications of form largely jive with Adovasio and Gunn’s, but tend to be more conservative when it comes to identifying small fragments as bowls or trays. There are also some differences, however. One of their shallow trays I consider a small plaque, and another fragment’s curvature strongly suggests a restricted-mouth or possibly globular-shaped vessel. Although I only examined slightly less than half of the total coiled basketry assemblage from this site, Dr. J. M. Adovasio kindly made available to me his original analysis data and photographs, which are in his possession. These materials included significant additional data that were not included in the published report because of space concerns and so considerably enhanced my understanding of the Antelope House assemblage, especially in light of my work with other Southwestern assemblages.

Germaine to our understanding of coiled basket formal and functional variability at the site are new insights into the depositional contexts of the unique vessel forms
represented at the site (Table 6.5). The spectacular decorated hourglass-shaped tray, whose contents strongly suggest use as a ritual or medicine basket (Adovasio and Gunn 1986:327-328; Magers 1986b:284-285), derived from the South Plaza (Room 88) immediately adjacent to Kiva D and Room 29. The tray measures 38.5 cm long by 20 cm at its widest and is 8.6 cm tall. Room 29 yielded the best preserved, but still heavily worn and mended, bifurcated burden basket (Adovasio and Gunn 1986:326-327). This basket had most of its original bifurcated base completely replaced in antiquity with a new non-bifurcated base, but the original basket was at least 34 cm tall. Its width measured 30 cm and its thickness 19 cm. The basket was associated with the burial of an adult male (Burial 11) that also contained nine decorated and four utility pots and is considered the richest burial excavated at the site (Bryant and Morris 1986:497; Popelish 1986:443; Schaefer 1986:406). Room 29 further produced abundant economic pollen, suggesting food processing and/or consumption (Bryant and Weir 1986:68), as well as the largest samples of worked yucca and sandals (Magers 1986a:274-275). Room 23, located two rooms to the north, yielded a wall fragment of a bifurcated basket. This room was remodeled into a kiva between about A.D. 1230 and 1270, and in addition to loom anchors, also produced pollen spectra suggestive of ritual activity as opposed to food preparation or consumption. Perhaps most significant about this room is that its north wall is the best example of Chaco-like masonry at Antelope House (Bryant and Weir 1986:70; Morris 1986: 30-31, 50-51). The third bifurcated burden basket was excavated from Room 44, whose north wall abuts the architectural southern boundary of the North Room Block, but as a whole, technically falls within the (somewhat
Table 6.5. Unique Vessel Forms from Antelope House, Arizona.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Structural Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bifurcated Burden Baskets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CACH 18623</td>
<td>Room 29, Burial 11</td>
<td>A.D. 1140-1200</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>mostly complete but heavily worn with new, un-bifurcated base sewn onto basket; apparently undecorated but could just be worn or faded; humped appearance to final coils of front and back faces and wall becomes excursive as approaches rim; tumpline attachments present (Adovasio and Gunn 1986:326); with adult male burial considered “richest” from site, associated with 9 decorated pots and 4 utility pots</td>
</tr>
<tr>
<td>CACH 19138</td>
<td>Room 23 (kiva)</td>
<td>A.D. 1230-1270</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>wall fragment only, apparently undecorated; heavily worn; room’s north wall is site’s best example of Chaco-like masonry (Morris 1986:30-31, 50)</td>
</tr>
<tr>
<td>CACH ? (FS 641)</td>
<td>Room 44, unnumbered disturbed burial in pit</td>
<td>A.D. 1200-1270</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>incomplete and heavily worn upper third only; partial painted design of slanting zig-zags covers original dyed stitch design (Adovasio, unpublished data; Adovasio and Gunn 1986:Fig.132); design possibly reflects that commonly seen on bifurcated baskets; rare rim plaiting; associated with decorated ceramic ladle, 4 wood prayer stick fragments, and 20 cm length of cotton string</td>
</tr>
<tr>
<td><strong>Oval/Hourglass Tray</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CACH 2287</td>
<td>South Plaza (Room 88), Grid G1-34</td>
<td>A.D. 1100-1270</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>complete; found wrapped in a textile and containing numerous ritual accoutrements (Magers 1986b:284-285); decorated with 6 quadrupeds on wall originally executed with dyed stitches and later overpainted on exterior with red, turquoise, and black pigment (Adovasio and Gunn 1986:327)</td>
</tr>
</tbody>
</table>

*a* CACH number is unknown because Adovasio’s basketry analysis was undertaken before the artifacts were entirely accessioned at WACC, and I was not permitted to examine this basket because of its burial association.
arbitrarily defined) Central Room Block. Along its south wall, Room 44 abuts the Central Plaza (Kiva B), which has been suggested by some to have functioned for a time as a great kiva (Morris 1986:14, 25). This specimen came from a pit containing a disturbed burial (unnumbered) associated with a decorated ceramic ladle and the basket, which itself contained or was associated with four worked wood objects and string that may represent the remains of prayer sticks (Adovasio, unpublished data). Based on my review of Adovasio’s analysis notes and photographs, the Antelope House bifurcated baskets, as a group, appear to differ slightly in overall shape, if not size, from the Pueblo Bonito specimens. The clearest difference is that the Antelope House specimens appear to lack the distinctive wall pinching that produces an hourglass-shaped opening, but other contrasts may be revealed if the baskets are ever made available for study again.

Taken as a unit, the distribution of the hourglass tray and bifurcated burden baskets at Antelope House imply a strong association of the two forms with ritual activity and, more specifically, integrative communal architecture such as kivas. Two of the bifurcated baskets come from mortuary contexts, suggesting that they may have been “retired” with specific individuals knowledgeable of their proper use.

Chronologically, the earliest that either form may have been in use at Antelope House was during twelfth century A.D., and while bifurcated baskets were apparently in service until the final decades of site use. Unfortunately, published data are not available on the distribution of other vessel forms from mortuary contexts.

Additional Canyon de Chelly National Monument Vessels
Other collections from Canyons de Chelly and del Muerto have yielded sizable collections of perishable artifacts, but most of these are poorly provenienced and minimally reported (e.g., Morris 1938, 1941; Morris and Burgh 1941; Weltfish 1932b). What is known about these materials indicates that they appear to replicate the typical forms seen elsewhere, such as bowls and trays of various sizes. Notable observations include the existence of one unfinished bifurcated burden basket from an unknown del Muerto site, and two three rod foundation coiled basket shields with mineral pigment decoration, one each from Mummy Cave and White House. Until my analysis, the latter shield had not been recognized for what it was and has been directly dated to about A.D. 1225 as part of this study (see Table 6.1). These three objects are discussed further in their regional context in Chapter 8.

Mesa Verde Region

The aggregate sample of coiled baskets from the Mesa Verde region dating to the thirteenth century A.D. provides more accurate data on vessel forms in use during prehispanic times, due to better preservation in the cliff dwellings relative to most other study sites. However, the bulk of these data come from early collecting expeditions that generally paid little attention to fragments, so that forms that may have been subject to higher rates of fragmentation are underrepresented. Furthermore, these collections frequently have no or only sketchy information about mortuary associations. Of the
sample examined for this study, nearly half (n=29) could be classified by form, and their frequencies are shown in Figure 6.20. The types of forms represented, in order of their popularity, include a range of different bowl types, plaques, and trays (Figures 6.21, 6.22).

A single coiled basket shield is also known from Room 6 at Cliff Palace (HCC O.574.1; Figure 6.23). It exhibits a three rod bunched foundation sewn with noninterlocking stitches and measures at least 49 cm in diameter (the rim is missing) and is 6 cm deep at its center. The center coils are lacking, but this was clearly the most concave portion, presumably to facilitate holding the shield, although no handle remains. Considered undecorated by previous analysts (Morris and Burgh 1941; Osborne 2004), my close inspection revealed an application of red mineral pigment and white-to-gray-colored clay to the exterior surface. The design is obscure, but appears to be concentric bands or alternating arcs of red- and white-pigmented coils.

Previously published reports discussing Mesa Verde basketry (Morris and Burgh 1941; Osborne 1980, 1981, 2004; Rohn 1971), largely replicate the forms that I examined during my study, but they also describe vessels that I did not examine that may be comparable to the oval/hourglass trays seen elsewhere. One vessel illustrated by Morris and Burgh (1941: Figs. 21, 31a) is a rectangular tray executed with a three rod bunched foundation and interlocking stitches measuring 29 cm long by 16 cm wide and 6 cm tall. The second vessel, identified as a “trinket basket” (Osborne 2004:327), is a small rectangular single rod foundation basket 8.7 cm long by 5.8 cm wide and 3.4 cm deep. The trinket basket label is probably based on its size and analogy to small coiled
Figure 6.20. Counts of vessel forms identified at Mesa Verde sites.

Figure 6.21. Two polychrome steep-sided bowls from Mesa Verde. Bowl on left (O.577.1) employs dyed stitches and is 15 cm in diameter by 20 cm tall. Bowl on right (O.576.1) bears comparable painted design and is 24.5 cm in diameter by 21 cm tall. Courtesy of the History Colorado Center.
Figure 6.22. Top, a wide mouthed bowl (O.615.1) and, bottom, a tray (O.612.1) from Mesa Verde. Both exhibit woven-in decoration using split turkey feather quill stitches. Bowl is 32.5 cm in diameter and 10 cm tall. Courtesy of the History Colorado Center.
baskets used in indigenous California for storing valuables (cf. Elsasser 1978). Little else is known about it, so calling it a trinket or treasure basket may be inappropriate. Published photos suggest the possibility of some pinching of the walls to create a weak hourglass shape, but this may be an optical illusion and needs to be verified. Other than these possible examples, there are no unequivocal oval/hourglass trays from the central or eastern Mesa Verde region.

A final basket deserves mention, though it is undated and only generally proveniened to a “southern Colorado cliff dwelling” (NMAI 169765; Figure 6.24). Measuring 28 cm tall by 26 cm wide and 14.5 cm thick, in overall form it approximates
two conjoined cylinder baskets, but more than likely reflects one weaver’s attempt to copy the bifurcated burden basket form. It began as two separate coiled bowls that were joined together during manufacture. The walls were intentionally creased or pinched inwards during the growth of the basket wall to suggest a conjoining of two cylindrical baskets akin to a bifurcation. Viewed from above, the opening resembles a figure eight more than an hourglass. The basket is all the more curious because it employs a left to right (L-R or rightward) work direction and a one rod foundation sewn with stitches that are intentionally split on both faces, technical choices quite uncommon in the prehispanic northern Southwest. So far as I can tell, except for a single small unprovenienced bowl (ECPR 3918) at the Edge of the Cedars Museum in Blanding,
Utah, that is structurally and texturally identical, this weaving technology is anomalous for the Mesa Verde region and, indeed, the entire Colorado Plateau.

**Twill Plaited Mat Forms**

Little can be said about matting due to poor preservation and a lack of evidence for morphological variability. The few complete (or nearly so) twill plaited mats are all rectangular to square in plan. Most were encountered in burials, but they also appear to have been used for sleeping and floor coverings. I examined four mats that were complete or complete enough to determine their full dimensions. All four mats are from burials and include two from Burial 20 in Room 95 at Aztec West dated between A.D. 1100 and 1290, and one each from an unknown Mesa Verde site and the “Tomb of the Weaver” (see Morris 1948), both of which date to the A.D. 1200s. The latter specimen is relevant to Antelope House because the burial from which it came is contemporaneous with, and was recovered across the canyon floor from that site in Canyon del Muerto. Of the four mats, lengths range from 94 to 142 cm and average 115.25 cm, and their widths range from 93 to 114 cm and average 102.5 cm.

Based on excavation accounts, matting was routinely encountered in burials at sites in this study’s sample, but the dearth of matting from burial cluster rooms at Pueblo Bonito, for example, suggests that it was collected only when reasonably well
preserved, or worse, intentionally destroyed and discarded with other mortuary
wrappings to facilitate the recovery of skeletal remains and durable artifacts (Judd
1928:379, 382, 412; Pepper 1920:217). This fact no doubt accounts for the
underrepresentation of matting in burial contexts at Pueblo Bonito, and likely in other
rooms and sites at Chaco as well.

At Pueblo Bonito, six surviving fragments come from western burial cluster
rooms 320B, 326 and 330, but only one (NMNH A335308.2) from Burial 5 in Room 326 is
directly associated with an individual. Moorehead’s (1906) excavations in Room 53 or
56/63 yielded five fragments, only one of which was clearly associated with a burial. Five
post-Chaco burials from Aztec West (Graves 20, 25, 29, 37, and 54) produced two
complete and 19 fragmentary mats, with two or more mats associated with Graves 20,
25, and 29. Webster (20008a:188) notes that Morris recorded plaited mats with 93
percent of the post-Chaco (Mesa Verde) burials he excavated. Mortuary matting is
better represented at Salmon Ruins where seven fragmentary mats out of the 12
recovered from the site derive from five burials (4A002, 33W012, 43W003, 43W005,
and 43W057) distributed across three rooms. Here, three different mats accompanied
one burial (43W057).

Twill Plaited Sandal Form
Approaching variation in sandal shape from the perspective of only one of several sandal styles in active use in the prehispanic Southwest during the ninth through thirteenth centuries A.D. is limiting and, ideally, would be considered across sandal styles, specifically including the twined varieties that are the second most abundant. However, it is still useful to explore variation in shape within 2/2 twill plaited sandals employing narrow strips, the most popular and best represented style during the Pueblo II and Pueblo III eras. The two primary dimensions along which morphological variability is investigated here are tie systems and the presence or absence of a toe jog. The tie system refers to the means by which the sandal was secured to the wearer’s foot. Broadly speaking, prehispanic sandal tie systems are either of the toe-heel variety (Figure 6.25), in which one or more loops at the toe are connected to a strap or set of straps engaging the heel of the foot, or the side loop variety (Figure 6.26), in which running loops parallel the sandal’s lateral margins and are engaged with a running cord or cords to enclose the foot. The presence or absence of a toe jog (see Figure 6.25) corresponding to the location of the fifth or outermost (pinky) toe of the foot appears to represent an aesthetic or ideological choice of uncertain significance (see Chapter 7; Crown et al. 2016), since a functional explanation is elusive. On the Colorado Plateau, toe jogs seem to become popular during Pueblo II times and do not persist beyond the close of the thirteenth century A.D.
Figure 6.25. Top view of a fine 2/2 twill plaited broad leaf yucca sandal with toe jog and toe-heel tie system (29.0/8452) from Room 72 at Aztec West. Courtesy of the American Museum of Natural History.

Figure 6.26. Top view of a fine 2/2 twill plaited yucca sandal with side loop tie system but lacking a toe jog (H/9182) from Room 111 at Pueblo Bonito. This specimen has been directly radiocarbon dated to between cal A.D. 692 and 950 (see Table 6.1). Courtesy of the American Museum of Natural History.
The ultimate meaning(s) of variation along these dimensions is subject to debate, but it is reasonable to assume that in tie system preference reflects either the tasks for which the sandals were worn or a more general cultural or social group preference for a particular “look and feel.” The former possibility may be inseparable from wider cultural or social preferences if different groups engaged in proportionally different activities to which particular ties systems were better suited. Patterned spatiotemporal variation in sandal toe jogs may reveal something about an aspect of ideological variation among and between groups, as implied by the numerous representations of sandals across various media and the potential symbolic link to polydactylism (Crown et al. 2016; Hays-Gilpin et al. 1998; Judd 1954, 1959; Pepper 1920; Schaafsma 1980, 2008, 2016; Webster 2008a, 2011b). Twill plaited sandals have only been found in rooms containing human remains, but not directly associated with burials. Except for a pair of twined sandals that Judd (1954:76) found in the oval tray with Burial 6 in Room 326 at Pueblo Bonito, twined sandals do not appear to have been found with any burials at Aztec West, Salmon, or indeed, any other study site after Basketmaker times. Variability in sandal tie systems and toe jog presence/absence are considered below, both within-site and by region where data are available.

_Tie Systems_

_Chaco Canyon._ Twenty-one sandals from Pueblo Bonito exhibit the remains of identifiable tie systems. Twelve (57 percent) of these are of the toe-heel variety and
nine are side loop. Toe-heel varieties span the Bonito phase and come from throughout the site. Where the age of sandals with side loop ties can be constrained within Pueblo Bonito, they date to the Early Bonito period in the pueblo’s northern rooms. When tie system data for the entire canyon are considered, the sample is increased to 33 specimens, of which 20 are toe-heel and 13 are side loop. These data indicate that toe-heel ties were employed from the Early Bonito through McElmo phases, whereas side loop varieties are absent from the sample during the Classic and Late Bonito subphases. A slight preference for toe-heel tie systems is suggested, with the possibility that side loop varieties were more prevalent during the Early Bonito subphase, but generalizations from this small sample should be made cautiously.

*Canyon de Chelly National Monument.* Of the sandals from White House, nine have toe-heel ties and seven have side loop ties. My Antelope House sample included 56 sandals with ties, of which 35 (63 percent) derive from the South Area/Room Block at the site. As a unit, the sample suggests near parity between toe-heel (n=29) and side loop (n=27) varieties, but with some potential differences through time. Figure 6.27 shows the frequencies of sandal tie systems through time in this sample and suggests that toe-heel types were preferred prior to A.D. 1140 but declined during the A.D. 1100s until becoming slightly less popular than side loop varieties during the A.D. 1200s. That this bar chart is misleading is demonstrated by the results of Mager’s (1986a:Table 113) analysis of the *entire* fine twill plaited sandal assemblage (n=172), in which she found that, contrary to Figure 6.27, toe-heel varieties were consistently preferred in all time periods, representing about 65 percent of both the fine plaited and twined sandal
assemblages. This comparison amply illustrates the effects that sample size can have on the interpretation of perishable artifact assemblages when only small samples are available.

![Figure 6.27. Counts of toe-heel and side loop sandal tie systems from Antelope House in study sample by temporal period.](image)

Middle San Juan. Salmon Ruins yielded one sandal with toe-heel ties and two with side loops. To the north, at Aztec West, 47 sandals evidence tie systems that include 27 toe-heel and 20 side loop examples. The Aztec sample spans the site’s occupation but is not evenly distributed across the site. All of the sandals come from northern sectors within the pueblo, 21 from the Northeast Sector and 16 from the Northwest Sector. The remainder are distributed among the West and East North Wing sectors. There is no apparent within-site patterning, but examination of tie system
frequencies through time suggests that toe-heel varieties were preferred after about A.D. 1130 (Figure 6.28). However, this may well be a product of small sample size.

![Figure 6.28. Counts of toe-heel and side loop sandal tie systems from Aztec Ruin West by temporal period.](image)

**Figure 6.28. Counts of toe-heel and side loop sandal tie systems from Aztec Ruin West by temporal period.**

*Mesa Verde.* Sandals with preserved tie systems from Mesa Verde sites dating to the thirteenth century A.D. (n=113) appear to be close to evenly split between toe-heel and side loop varieties. Sixty-three were found to have side loop ties and 50 exhibited toe-heel ties.

**Toe Jogs**

*Chaco Canyon.* At Pueblo Bonito only 13 sandals, constituting 29 percent of the fine twill plaited sandal sample, and unevenly distributed across the site, were well preserved enough to determine if a toe jog was present or absent. Seven came from rooms in the northwestern quadrant of the pueblo, five came from the southeast, and a
single specimen came from the southwest. The specimens span the Bonito phase, but all those from the northern portion of the site appear to date to the Early or Classic Bonito subphases. Specimens attributable to the Classic or Late Bonito subphases are restricted to the southern portion of the site. To facilitate comparison of toe jog presence/absence, I grouped samples into larger temporal spans within the Bonito phase. Figure 6.29 shows the frequencies of sandals with and without jogs through time at Pueblo Bonito. Though quite small, the available sample suggests the possibility of a shift towards increased use of jogs during the Classic and Late Bonito subphases or, alternatively, that occupants of the southern rooms may have preferred toe jogs. The small and uneven distribution of the sample makes it difficult to ascertain which is more likely if the pattern is real.

![Figure 6.29. Counts of sandals with and without toe jogs from Pueblo Bonito by grouped temporal periods.](image)

Four sandals from Pueblo Bonito directly radiocarbon dated as part of this study all had intact toes and potentially shed some light on the antiquity of toe jog use (see
Table 6.1). The sandal from Room 24 has a jog and appears to fall within the Classic or Late Bonito subphase, as expected. More informative are the dates on sandals from Rooms 2, 32, and 111 (see Figure 6.26), all three of which lack jogs and pre-date A.D. 1030, firmly placing them in the Early Bonito subphase. This would suggest a possible terminus post quem date for the onset of a rise in toe jog popularity were it not for the fact that the only other two twill plaited sandals from Room 32 (AMNH H/4600, H/4601) are strikingly similar in technical execution to the directly dated jogless specimen and both evidence toe jogs. The unusual use of rush culms as a raw material for these three sandals (the only cases known), as well as their similarity in preservation and other stylistic features, strongly suggests that they are of comparable age (Figures 6.30, 6.31). If this is an accurate assessment, as I believe it to be, then the earliest use of sandals with toe jogs at Pueblo Bonito can be indirectly dated to no later than the last half of the tenth or first decades of the eleventh centuries A.D.

Small numbers of sandals with toe jogs also exist within the samples from Chetro Ketl (n=2) and Bc 288 (n=3), but these data are too few for generalization. In the case of Bc 288, the presence of jogs attests to their persistence in some frequency into the late A.D. 1100s or early 1200s in Chaco. Single specimens each from Chetro Ketl and Peñasco Blanco were clearly made without jogs.

*Canyon de Chelly National Monument*. Magers’s (1986a) original analysis of the entire sandal assemblage from Antelope House found that 23 percent of the fine twill plaited sandals from all time periods had jogs, while 37 percent of the twined sandals had jogs. This study’s sandal sample from Antelope House includes 53 fine twill plaited
sandals for which data on jog presence/absence are available. This represents about 31 percent of the 172 fine twill plaited sandals recovered from Antelope House. Of these

Figure 6.30. Upper view of jogless fine 2/2 twill plaited sandal of rush culms (H/4602) from Room 32 at Pueblo Bonito. Note use of tensioned strips to affect edge border and interior zig-zag design running parallel to sandal’s long axis. This sandal has been directly radiocarbon dated to between cal A.D. 780 and 1032 (see Table 6.1). Courtesy of the American Museum of Natural History.

Figure 6.31. Top view of a jog-toed fine 2/2 twill plaited sandal of rush culms (H/4601) from Room 32 at Pueblo Bonito. Note use of tensioned strips to affect edge border and interior zig-zag design. Courtesy of the American Museum of Natural History.
53, 31 have jogs and 22 lack them. The sample is differentially distributed in space, with 36 (68 percent) deriving from the South Area/Room Block and the remaining provenienced specimens nearly evenly split between the North and Central Areas/Room Blocks, which problematizes investigation of spatial patterning. The peak of occupation at Antelope House is dated to between about A.D. 1140 and 1200 (Morris 1986:550), so unsurprisingly, the majority of the sample (30 specimens or 57 percent) dates to this timeframe and later. Figure 6.32 shows the frequency of sandals with and without jogs in this study’s sample by the major temporal periods defined by the excavators. The earliest time period is the longest, and the less dramatic difference between the numbers of sandals with and without jogs during this period may plausibly reflect the adoption of sandal toe jogs at some point during this time. Coincident with the peak of site occupation during Middle PIII times, sandals with jogs increase substantially, only to decline at the expense of an increase in jog-less sandals during Late PIII times at Antelope House.

Although she did not discuss temporal trends in toe jogs specifically, my results reaffirm Magers’s (1986a:Table 113) earlier findings. The waxing and waning seen in toe jog popularity in my sample in Figure 6.32 becomes starker when Magers’s percentages of sandals with jogs are compared against a summation of her data on the percentage of jogless toe shape variants through time (Table 6.6). There is a decided decline in toe jog popularity across the fine twill plaited and twined sandal types that apparently began by the beginning of the thirteenth century A.D.
Figure 6.32. Counts of sandals with and without toe jogs from Antelope House by temporal period.

Table 6.6. Percentages of Fine Twill Plaited and Twined Sandals with and without Toe Jogs from Antelope House by Temporal Period. Data are from Magers (1986a:Tables 113, 114).

<table>
<thead>
<tr>
<th></th>
<th>A.D. 825-1140 (PI-EPIII)</th>
<th>A.D. 1140-1200 (MPIII)</th>
<th>A.D. 1200-1270 (LPIII)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fine Twill Plaited</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jog Absent</td>
<td>67</td>
<td>24</td>
<td>74</td>
</tr>
<tr>
<td>Jog Present</td>
<td>29</td>
<td>65</td>
<td>21</td>
</tr>
<tr>
<td><strong>Twined Sandals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jog Absent</td>
<td>66</td>
<td>28</td>
<td>60</td>
</tr>
<tr>
<td>Jog Present</td>
<td>33</td>
<td>71</td>
<td>40</td>
</tr>
</tbody>
</table>

Data from a sample of White House’s sandals, unfortunately, do not add much to this picture. Here, 11 sandals lack jogs and six have them. Demographic trends at this site are poorly understood, but the two AMS radiocarbon determinations acquired as part of this study include one on a jog-toed sandal with a median calibrated calendar age of A.D. 1065 (see Table 6.1), a date which is line with the earliest occupation of this
site. Other de Chelly sites have yielded low frequencies of jog-toed sandals (Quirolo 1987) and so these data appear to affirm the possibility of greater toe jog use on twined sandals, similar to the pattern Magers documents at Antelope House.

**Middle San Juan.** The poorly preserved Salmon Ruins assemblage yielded one toe with a jog, but at Aztec West, where better preservation prevails, 47 sandals were found to have sufficiently intact toes to determine jog presence/absence. As with perishable artifacts generally at Aztec West, the majority of the sandals derive from rooms in the north. Twenty-three sandals (49 percent) come from the Northwest Sector, 13 (28 percent) come from the Northeast Sector, and the remaining 11 are unprovenienced or come from the West or East North Wing Sectors. Jog preference seems to be independent of location within the pueblo, but when jog popularity is examined by time, it is clear that jogless sandals constituted only a small fraction of the fine twill plaited sandals worn by Aztec West’s inhabitants throughout the site’s occupation (Figure 6.33).

**Mesa Verde.** Excellent preservation of Mesa Verde footwear allowed for 92 sandals to be assessed for sandal toe jog presence/absence. Seventy-six sandals constituting 83 percent of the sample have jogs, while only 16 specimens are jogless. Given a lack of contextual data for these artifacts, it is not possible to explore spatiotemporal patterning, but that the vast majority of sandals have toe jogs suggests that they were frequently employed by Mesa Verde peoples more or less continuously throughout the thirteenth century A.D.
Qualitative assessment of usewear can provide insight into patterns of use, although generalization is problematic given the uneven preservation of the assemblages examined, and this was a limiting factor in the present study. Yet, evidence of mending events in the form of elements added to bind or secure breaks in an object's fabric (they tend to preserve better because they thicken the mended portion of a fabric) can inform on the use life and deposition of items based on their presence or absence.
Percentages of mended coiled baskets from study sites with samples greater than 20 specimens are 2.2 percent for Pueblo Bonito, 12.5 percent for Aztec West, and 8.3 percent for Salmon Ruins. Adovasio and Gunn (1986) report three mended coiled baskets out of the 77 recovered from Antelope House, and if we add to this three potentially mended vessels I identified in this study’s sample from the site, we arrive at 7.8 percent of the assemblage. As noted earlier, with one exception, the best preserved examples of cylinder baskets, clay coated baskets, cylinder baskets, and oval/hourglass trays, from all study sites, bear no clear evidence of use or mends. The singular exception is the nearly complete bifurcated basket from Antelope House that had had its base completely replaced with new coils to effect a non-bifurcated base. Eliminating the 35 unique vessel forms that may have had atypical use-lives, the percentage of mended vessels from Pueblo Bonito only increases to 3.5 percent. At a larger spatial scale, only 3.5 percent (4.9 percent if excluding unique vessel forms) of the Chaco Canyon sample exhibits mends, while 11.4 percent of the Middle San Juan sample is mended. The Mesa Verde sample, representing multiple sites with good preservation, yielded 29 percent with mends.

By virtue of their weave structure, plaited mats can be difficult to mend without re-weaving substantial portions. Three mats bearing possible mends in the form of reinforcing or binding stitches derive from Aztec West, though one may well be the remains of a handle or carrying strap. A fourth example from a Mesa Verde site exhibits a corner loosely re-woven with yucca leaves.
Sandals were apparently more frequently mended, and this is plausibly due to the constant abuse suffered. No mended sandals were observed in the Pueblo Bonito sample, but three from Bc 288 constitute the 3.8 percent reported for the Chaco Canyon sandal sample. Salmon Ruins produced no obviously mended sandals, while 5.1 percent of the Aztec West assemblage was mended. Magers (1986a) does not report data on sandal mends for Antelope House, but I found that about 11 percent of this study’s sample was mended. Mesa Verde sites, collectively, exhibited mends on 27.8 percent of their sandals. None of these site-specific percentages are substantively increased by the aggregation of samples at a regional scale.

**Trends in Formal and Functional Variability**

**Coiled Vessel Form and Function**

The presence/absence and frequency data for coiled basketry vessel forms in this study yields some interesting insights into similarities and differences between sites in the Chaco regional system, as well as potential affinities with Mesa Verde sites. At the most basic level, bowls and trays of various shapes and sizes are the most common forms represented, but this is unsurprising given abundant evidence that these forms were important components of household equipment for millennia. Plaques of
unspecified function are demonstrably more abundant at Aztec Ruins and Mesa Verde than anywhere else, and the restriction of plaques at Aztec to post-A.D. 1130 contexts suggests a temporal pattern as well as the possibility of increased social ties with the Mesa Verde region during this time (Figure 6.34).

![Figure 6.34. Concave view of a complete small plaque from Mesa Verde (O.633.1). Courtesy of the History Colorado Center.](image)

What is more telling are the unique vessel forms, such as bifurcated baskets, clay coated baskets, cylinder baskets, and hourglass trays that are rare and/or have apparently restricted distributions within Pueblo Bonito and beyond. At Pueblo Bonito, cylinder baskets are the oldest unique basketry vessel form, based on the turquoise
mosaic encrusted example with Burial 14 dated to the late A.D. 800s, and they also appear to have the widest distribution, known from the northwest, northeast, and southeast quadrants of the site. Like bifurcated burden baskets, they clearly have a strong mortuary association, particularly with the western burial cluster. Clay coated baskets cluster in some of the oldest rooms in the northeastern part of the building, including three rooms in close proximity, but all lack any documented burial association. Hourglass trays are few in number and have a strong burial association in the west, but also appear to derive from non-mortuary contexts in at least two instances. Dating all of these unique artifacts is tricky, but the majority seem most likely to have been produced and used during the Classic Bonito subphase, between about A.D. 1040 and 1110. A single possible bifurcated basket of McElmo phase age from Kin Kletso, as well as ceramic bifurcated baskets effigies from Pueblo Bonito and several localities within Chaco Canyon, suggest that this form was longer-lived and saw wider distribution within the canyon, an observation that at present cannot be extended to clay coated baskets, cylinder baskets, or oval/hourglass-shaped trays.

In the Middle San Juan region, none of the unique basketry forms found at Pueblo Bonito were recovered from Salmon Ruins, but Aztec West produced examples of clay coated and painted baskets from Late Bonito subphase deposits and a single oval or hourglass-shaped tray post-dating A.D. 1130. In contrast to Pueblo Bonito, clay coated vessels are more widely dispersed across the northern rooms of Aztec West and suggest stronger spatial ties to ritual given their frequent association with integrative architecture. Significantly, most if not all of the clay coated baskets clearly come from
Late Bonito subphase deposits, strengthening a link to Chacoan ritual practice. Cylinder baskets and bifurcated baskets are altogether absent, as far as we know, although two cylinder vessel fragments have recently been identified at Aztec West (Washburn and Reed 2011).

Antelope House provides an important site for comparison because of its greater distance from Chaco Canyon as compared to Salmon and Aztec Ruins. Here, at least three examples of bifurcated baskets were recovered, but they are not exact copies of earlier Pueblo Bonito forms. These vessels derive from both mortuary and non-mortuary contexts, and all were found in or in close proximity to kivas. An additional hourglass-shaped tray from a non-mortuary context near a kiva, complete with ritually charged contents, enhances our understanding of the use of this form.

Vessel form data for Mesa Verde sites tell a different story and are significant, not only because they share a number of basic vessel types with the rest of the northern Southwest, but also because they lack several of the forms attested elsewhere, namely burden baskets and the entire suite of unique vessel forms, including bifurcated baskets, clay coated baskets, cylinder vessels and, perhaps, oval or hourglass-shaped trays. The possible Mesa Verde “imitation” bifurcated basket is a bona fide anomaly and, lacking better contextual information, is difficult to interpret beyond the possibility that it represents a copy made by someone who had seen or heard about such vessels. Even then, its technological style is geographically “out of place.” The absence of these unique vessel forms could be attributed to chronological factors since the Mesa Verde sample is later than the bulk of the material studied from the Chaco regional system,
but this seems unlikely given that versions of all of these forms except cylinder baskets are known from the Kayenta region and elsewhere during the A.D. 1200s (e.g., Morris and Burgh 1941; Odegaard and Hays-Hilpin 2002). Thus, ritual preference, broader cultural differences, or the nature of social ties between Mesa Verde peoples and their neighbors to the south and west seems a more plausible explanation.

The total absence of burden baskets at Aztec West, Salmon, and Mesa Verde is harder to account for, as it is inconceivable that these peoples did not transport things. Sampling bias can arguably be eliminated because of the sheer volume and generally excellent preservation of Aztec West and Mesa Verde perishables. The most likely explanation is be found in substitute technologies, such as pottery and the constructions convincingly interpreted as backpacks or carrying frames by Osborne (2004:277-280). Osborne’s identification of the backpacks at Mesa Verde allowed her to reinterpret four of the “cradleboards” interred with post-Late Bonito subphase (Morris’ Mesa Verde occupation) female burials at Aztec West as backpacks or carrying frames. Taken together with the abundance of plaques in post-A.D. 1130 deposits at Aztec, there is suggestive evidence of increased Mesa Verde influence after this time at the site, adding to the observations made decades earlier by Morris based on durable material culture.

Nothing about the coiled vessel forms documented at any of these sites immediately suggests trade or exchange of vessels. However, this cannot be entirely ruled out on the basis of the available vessel form data. If anything, at a regional scale, variability within classes of forms is most pronounced between regions, especially the
Mesa Verde area and its neighbors, and so vessels moving short distances would be virtually indistinguishable.

If the well-preserved Aztec and Antelope House assemblage samples can be taken at face value as generally indicative of mending frequency for sites of their size, they suggest percentages of mended coiled baskets and fine plaited twill sandals between about 5 and 12 percent. The exact number of sites represented by the Mesa Verde sample is unknown, but the higher percentage of mended vessels for this region is not anomalous given that multiple sites are certainly reflected. Pueblo Bonito constitutes the next largest sample, and even considering its less favorable preservation and its lengthier occupation, it is surprising that more evidence of mending is not attested. If it is fair to state that the mending of baskets and sandals at Pueblo Bonito occurred less often than at other sites of comparable size and is not a function of sampling, it suggests two possible explanations. One is that there was a cultural rationale for not mending, which seems unlikely in light of the other sites and the ubiquity of mending such items in other societies for which perishable industries have survived. The alternative is that fewer mended items were discarded at Pueblo Bonito because their owners were away from the site when these objects were mended in the later stages of their use-lives. This might suggest something about the nature of occupation at Pueblo Bonito. If a fraction of the site's occupants were temporary, or there was a seasonally reduced residential population, then we might expect a smaller proportion of the site's assemblage to reflect the latter stages of object use, repair, and ultimately discard. This is admittedly speculation based on limited data, and suffers
from the absence of comparable data for small sites, but the relative dearth of mended items is suggestive, as is the lack of obvious usewear on the unique vessels forms.

That all of the unique coiled basket forms appear to have strong ritual connotations reveals the role of ritual in the development of Pueblo Bonito and Chacoan society more broadly. This observation in and of itself is nothing new, as ritual is widely recognized as a central dimension for understanding Chaco, but what the basketry form and function data do contribute in this area, however, is the opening up of a new avenue of inquiry into the spatiotemporal dimension of ritual at Pueblo Bonito and outliers, one that complements our rapidly changing understanding of the role and uses of ceramic cylinder vessels and the importance of long distance social ties. This generally poor understanding of how ritual may have worked at Chaco is a serious lacunae in research, which has been lamented by some scholars (Crown and Wills 2003; Mills 2002; Plog 2010, 2011; Van Dyke 2013). These observations, then, may not directly bear as much on questions of cultural and social diversity as the technological data discussed further below, but they enhance those data and yield insights into the role that diversity in ritual practice may have played in dividing or uniting the inhabitants of Pueblo Bonito and perhaps the regional system.

Briefly, let us consider that cylinder baskets are known only from Pueblo Bonito, where their analogs in clay are numerically most abundant. This suggests that these baskets were components of the same ritual complex as the ceramic vessels and centered on this important site to the near exclusion of all others within and beyond Chaco Canyon. The association of cylinder baskets and bifurcated burden baskets with
mortuary settings arguably indicates more about Pueblo Bonito mortuary practice than coterminal use of both forms in the same suite of ritual practices. The wider distribution of bifurcated vessels, at sites such as at Antelope House, and their representation in effigy form, supports the idea that these vessels reflect a distinct but arguably related set of symbols and attendant ritual practices complementary to the cylinder vessels and their uses. Clay coated baskets are intriguing because the variety of documented forms, minimally including bowls, ladles and burden baskets, suggest varied uses while their depositional contexts at Pueblo Bonito and Aztec West are notable in their exclusion from burials (Figure 6.35). Still, the distribution of these vessels within Pueblo Bonito and Aztec differs. They are more tightly spatially clustered at Pueblo Bonito as compared to Aztec West, and in the latter, their recovery from (perhaps exclusively) Late Bonito subphase deposits implicates them as a facet of Chacoan belief and ritual practice that was likely carried directly from Chaco during Aztec’s founding (see also Webster 2011b), but one that apparently lacked longevity at Aztec after the regional system’s decline. Importantly, given the extensive excavations at these sites, the observed clay coated basket distributions are likely representative of reality and not subject to serious sampling bias because the clay coatings survive rather well, even when their woven armature does not. By comparison, oval or hourglass-shaped trays appear to be the most widely distributed unique form among this study’s sampled sites, which suggests that the activities for which they were deployed cross-cut a range of cultural and social boundaries and reflect aspects of belief systems and activities more widely shared among prehispanic peoples of the northern Southwest.
Figure 6.35. At left, partially burned clay coated and painted basket from Room 300 at Pueblo Bonito (A335359). At right, clay coated basket with faint design in black paint from exterior northwest corner of Aztec West (AZRU 3560). Courtesy of the Smithsonian’s National Museum of Natural History (left), and the National Park Service and Aztec Ruins National Monument (right).

More to the point, I propose that variation in both the timing of introduction and the spatial patterning of unique vessel forms such as bifurcated baskets, cylinder baskets, and clay coated baskets indicates that such classes of ritual basketry reflect distinctive but intersecting sets of beliefs and practices administered or controlled by different social groups. The precise character of these social groups is obscure, but the linking of unique vessel forms to different ritual associations or sodalities is a reasonable interpretation in light of Pueblo ethnographies and existing hypotheses about Chacoan social organization (Judge and Cordell 2006; Van Dyke 2007b:99-102; Ware 2001, 2002a,
2002b, 2014; Ware and Blinman 2000). Suffice it to say, there is more to be mined from this line of thinking, and the further implications of these insights are returned to in Chapter 8 in light of this study’s findings.

**Twill Plaited Matting**

As noted in the preceding chapter, twill plaited matting appears to become ubiquitous in the northern Southwest after its introduction sometime during the Pueblo I era, but appears unevenly distributed at sites across the Colorado Plateau. When preservation is conducive to its survival at Chacoan sites, matting is abundant, but we lack sufficient data to characterize spatiotemporal variation in its use and form. One decorated mat from Pueblo Bonito (NMNH A335289) stands out because it apparently exhibited an indeterminate but complicated design and/or had been shaped into a non-rectangular form. Deriving from mortuary contexts in Room 330 of the western burial cluster, its provenience may add weight to the inference that it was atypical in form and function (cf. Hughes 1956).

Yet, it is the excellent preservation at Mesa Verde sites that makes the paucity of matting there so striking (Osborne 2004:361-366). I would estimate that fewer than 75 twill plaited mats or fragments are known from Mesa Verde sites. This is surprising given the exceptional preservation of Mesa Verde material when compared to other sites with good preservation and chronological overlap, such as Aztec West that produced more than 170 individual mats or Antelope House that yielded more than 180 (Adovasio and
Gunn 1986). Thus, for whatever reason(s), matting never attained the popularity or significance among thirteenth century A.D. Mesa Verde peoples as it did elsewhere.

_Twill Plaited Sandals_

I considered variation of form in fine twill plaited sandals along two dimensions: tie system configuration and presence or absence of toe jog. The two primary tie system types, toe-heel and side loop, are represented at every site, but generally small sample sizes urge interpretive caution. Data from Pueblo Bonito and Aztec Ruins suggest that toe-heel varieties were more popular, but there also exists the possibility of a shift in preference for toe-heel tie systems after A.D. 1130 at Aztec. The large dataset from Antelope House shows that toe-heel tie systems were almost twice as popular as side loop varieties throughout its occupation. At Mesa Verde sites, if both tie systems were not equally popular, there may have been a preference for side loops. These data are not especially informative except insofar as they may indicate slight regional preferences for tie systems.

There is no correlation between tie system variety and toe jog presence/absence at any of the sampled sites, and while consideration of variability in sandal toe jog presence/absence also suffers from sampling concerns, it does afford some insight into possible chronological and areal patterns. At Pueblo Bonito we have, at present, the earliest sandals with toe jogs coming from contexts dating to the late tenth or early eleventh centuries A.D. There also exists the possibility of a spike in jog popularity
during the Classic or Late Bonito subphases. Within Chaco Canyon, data on jogs are limited, but Bc 288 specimens attest to continued production of jogged and jogless sandals into the late A.D. 1100s or early 1200s (Figure 6.36). Both the Aztec West and Mesa Verde samples show an abundance of toe jogs in use alongside small numbers of jogless sandals into the A.D. 1200s. Antelope House stands out in contrast to all of these sites because toe jog popularity appears to have peaked between A.D. 1140 and 1200, only to decline thereafter at the expense of an increase in popularity of jogless sandals.

Figure 6.36. Top view of a mostly complete fine 2/2 twill plaited yucca sandal with side loop ties and mended toe from Gallo Cliff Dwelling (Bc288, CHCU 33288) in Chaco Canyon. A toe jog was present but is only partially preserved now. Courtesy of the National Park Service and Chaco Culture National Historical Park.
This is the only shift in jog preference observed in the study’s sites during this time period and could reflect some aspect of an aesthetic or ideological departure for the site’s inhabitants. Antelope House never exhibited strong material ties to the Chaco regional system, as evidenced by small quantities of Chaco ceramic types and a near complete absence of Chaco-style core-veneer masonry (Morris 1986), in contrast to White House, whose strongest material ties to Chaco date to the A.D. 1000s (Tsosie 2009). Though yet to be demonstrated, if sandal toe jogs originated in and spread from Chaco Canyon, their waxing and waning popularity at Antelope House during the twelfth century may index fluctuations in east-west social ties. The post-A.D. 1140 occupation of Antelope House is characterized by widespread evidence for demographic contraction within Canyon de Chelly, drought-induced stress, and the possible arrival of migrants from Mesa Verde (Morris 1986). There is also some evidence for increasing regional exchange and, by extension, social ties during the A.D. 1200s. Although it is a speculative proposal at this time, the apparent late A.D. 1100s or early A.D. 1200s decline in toe jogs may parallel a restructuring of de Chelly peoples’ social and economic networks in the wake of the Chaco regional system's decline.

That sandals and the sandal form were potent symbols within and beyond the Chaco regional system for centuries prior to and during the Bonito phase is well attested by their various representations in rock art, etchings in wall plaster, various other media (painted wood, yucca, ceramic), sandal-impressed clay tablets, and unpainted wood and stone models, some of the latter of which may have served as templates for production (Bellorado et al. 2013; Hays-Gilpin et al. 1998; Hurst 2004; Mathien 2003; Pepper 1920;
Judd 1954; Schaafsma 1980, 2008, 2016; Toll 2013; Webster 2008a, 2011b). Jogs themselves are more enigmatic but have been informally suggested by several scholars (i.e., Bruce Bradley, Kelley A. Hays-Gilpin, Laurie D. Webster) in conversations and public presentations to symbolize a sixth digit, a manifestation of polydactyly that is a developmental defect of the hands or feet that can be genetically inherited. This proposition may have merit as polydactyly frequently afflicts the fifth toe in the form of a bifurcated metatarsal. Polydactyly has been identified in three burials from Pueblo Bonito from Rooms 33 (Burial 13), 326, and 330, and is seen two footprints and a handprint in wall plaster, in addition to being represented in ornaments and effigies, and in rock art near the pueblo (Crown et al. 2016; Barnes 1994; Judd 1954:223; Marden 2011:204; Marden et al. 2010). Several other Southwestern sites have also yielded human remains and rock art depictions of feet evidencing polydactyly (Barnes 1994; Case et al. 2006). How individuals expressing polydactyl hands or feet were treated by other community members is a matter open to further investigation, but the evidence from Chaco Canyon, and Pueblo Bonito specifically, suggests that they were accorded special status (Crown et al. 2016). Case et al. (2006) report the burial of an infant from Tapia del Cerrito, Arizona, a Salado site, expressing bifurcated fifth metatarsals. The mortuary treatment and burial location of this infant in the context of other burials at the site suggest that he or she may have been accorded special status. Farther afield, but potentially informative, is a study of Classic Period (A.D. 250-900) polydactyly in the Maya region of Mesoamerica that provides corroborating evidence that special significance was attached to some (but not all) individuals expressing polydactyly.
(Wrobel et al. 2012). Mayan peoples’ iconographic representations of supernumerary digits suggest they served as a supernatural trait, a marker of divinity and deified ancestors. Available data from the prehispanic Southwest indicate that under some circumstances polydactyloous individuals may have been accorded special status, but the precise nature of this recognition is unclear and is not always reflected in mortuary treatment, nor is it obvious whether a connection to sandal toe jogs can be assumed. Regardless, the accumulating evidence suggests an ideological rather than aesthetic or functional motive behind sandal toe jog use.

**Residue Analyses**

As much as the shape of a basketry object can be indicative of its function, direct evidence of use in the form of adherent residues is a better source of information about an object’s specific contents and uses. Although the organic or inorganic residue preserved on an artifact can clearly indicate but one type of specific use (the final use), it must also be kept in mind that identification of such residues may not simply reflect a single use or type of content but, owing to preservation and analytical constraints, an averaging of all of the prior uses of the vessel. Aware of these limitations, I noted basketry objects during analysis that exhibited organic residues visible to the naked eye or under magnification with a 10x hand lens. My goal was to identify specimens suitable
for residue analysis that could contribute to a fuller understanding of how basketry objects were used in daily life at Chacoan sites. Excavators’ published reports of artifacts thought to exhibit residues provided guidance, but several of these identifications could not be substantiated (e.g., Pepper 1920:36).

A secondary concern with residues arose after publication of Crown and colleagues’ (Crown and Hurst 2009; Crown et al. 2015) discovery of cacao (*Theobroma cacao*), or chocolate, residue that had seeped into the clay fabric of several ceramic vessels from Pueblo Bonito, notably including the enigmatic cylinder vessel form. Although the nature of poorly preserved plant-based baskets does not make them suitable for the types of analyses conducted by Crown and Hurst, the existence of a small number of clay coated coiled baskets from Chacoan sites raised the possibility that they might be worth testing, given their rarity and high probability of use in ritual activities. To test the possibility that some of these unique vessels were used in the preparation or consumption of a cacao-based beverage, I submitted three samples from two different vessels to Dr. Patricia L. Crown for inclusion in her analyses (Table 6.7). The spalls from single clay coated basket containers came from Pueblo Bonito and Aztec West. Analysis of these specimens was conducted according to the methods and procedures detailed by Crown and Hurst (2009), and their results indicate that all of the submitted specimens tested negative for cacao (P. L. Crown, pers. comm. 12/19/2012). Importantly, this does not preclude the possibility that such clay coated vessels may have been used in ritual food preparation or consumption, or that other as-yet-untested clay coated vessels might yield evidence of cacao residue, but only that these particular
vessels show no evidence of having been used to prepare or consume cacao.

Furthermore, because Crown and Hurst’s analysis only tested for cacao biomarkers, there remains the possibility that future research might be able to extract other organic residues that soaked into the clay coatings.

Table 6.7. Spalls from Clay Coated Coiled Baskets Tested for Cacao Biomarkers and Yielding Negative Results.

<table>
<thead>
<tr>
<th>Site</th>
<th>Catalog No.</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Sample Weight (g)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo Bonito</td>
<td>AMNH H/7040 and H/7041</td>
<td>Room 83</td>
<td>A.D. 1063, AMS $^{14}$C median</td>
<td>1.1</td>
<td>Sample EAJ2; same basket as EAJ3 but painted spall from vessel exterior; same basket as NMAI 051118 and NMAI 064583</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>AMNH H/7040 and H/7041</td>
<td>Room 83</td>
<td>A.D. 1063, AMS $^{14}$C median</td>
<td>1.38</td>
<td>Sample EAJ3; same basket as EAJ2, but unpainted spall from vessel interior; same basket as NMAI 051118 and NMAI 064583</td>
</tr>
<tr>
<td>Aztec West</td>
<td>UCMNH 5932</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>0.42</td>
<td>Sample EAJ1; unpainted spall; additional fragments of vessel at UNMNH lack cat. no.; see Morris and Burgh (1941:26)</td>
</tr>
</tbody>
</table>

Regrettably, very few basketry objects exhibited obvious residues, and of the six that I identified, all were coiled baskets that derive from Aztec West (Table 6.8).

Samples of all identified residues were collected and sent to Dr. Linda Scott Cummings and her staff at Paleo Research Institute in Golden, Colorado, for analysis. Also included was a single sample of basketry fiber from the coiled basket ladle from Room 189 at Aztec West that, during analysis, I suspected might be a raw material other than sumac ($Rhus$ sp.), the principal raw material source for prehispanic Pueblo coiled basketry. The residue samples consisted of carbonized macrobotanical remains, as well as scrapings of greasy and pulpy residues adhering to the stitch interstices of several baskets. The organic residues were only subjected to paleobotanical analysis, therefore the presence
or absence of non-plant constituents has not been established. Following analysis, the remains of the samples were returned to the American Museum of Natural History for object re-association and curation. The full details of the analyses conducted by Cummings and colleagues (2011) are available from the author, but a brief summary is presented here.

Table 6.8. Summary Results of Paleobotanical Analyses of Basket Residue Samples from Aztec West Conducted by PaleoResearch Institute (Cummings et al. 2011).

<table>
<thead>
<tr>
<th>AMNH Catalog No.</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Sample Weight (g)</th>
<th>Notes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.0/6795</td>
<td>Kiva D</td>
<td>A.D. 1200, AMS $^{14}$C median</td>
<td>0.87</td>
<td>charred material for ID; same object as 29.0/6793 and 6794</td>
<td>carbonized conglomerate of <em>Zea mays</em> kernel and cupule fragments</td>
</tr>
<tr>
<td>29.0/7373</td>
<td>Room 54</td>
<td>A.D. 1098, AMS $^{14}$C median</td>
<td>0.4</td>
<td>residue scraping for ID</td>
<td>probable cooked, ground <em>Zea mays</em> starch grains, possibly other grasses</td>
</tr>
<tr>
<td>29.0/9993</td>
<td>Room 135-2</td>
<td>A.D. 1130-1290</td>
<td>1.22</td>
<td>residue fragment for ID</td>
<td>probable cooked, ground <em>Zea mays</em> starch grains, possibly other grasses</td>
</tr>
<tr>
<td>29.1/3219</td>
<td>Room 189</td>
<td>A.D. 1090, AMS $^{14}$C median</td>
<td>0.01</td>
<td>fiber from basket foundation for ID</td>
<td><em>Rhus</em> sp.</td>
</tr>
<tr>
<td>29.1/3220</td>
<td>Room 136-2, Grave 39</td>
<td>A.D. 1130-1290</td>
<td>&lt;0.01</td>
<td>residue scraping for ID</td>
<td>1 uncharred <em>Amaranthus</em> seed, leaves or fruits of <em>Chenopodium</em> or <em>Atriplex</em>, probable cooked, ground <em>Zea mays</em> starch grains, unidentifiable plant tissue</td>
</tr>
<tr>
<td>29.1/3221</td>
<td>Room 136-2, Grave 40</td>
<td>A.D. 1130-1290</td>
<td>1.25</td>
<td>pulpy-looking residue fragment for ID; thought to be squash by Morris (1924:177)</td>
<td>2 uncharred <em>Achnatherum</em> floret fragments, one uncharred <em>Chenopodium</em> seed, probable cooked, ground <em>Zea mays</em> starch grains, other grass seeds, unidentifiable starchy roots, diatoms</td>
</tr>
</tbody>
</table>
First, the coiled basket ladle from Aztec West did, in fact, turn about to be woody sumac (*Rhus* sp.) fiber, rather than some type of grass, as I originally speculated. This result is not unexpected as sumac appears to have been the primary if not sole raw material source used for coiled basket foundation elements at Chacoan sites, as evidenced by diagnostic pith and bark characteristics when preserved. The other residues, which collectively appear to span the occupation of the site, attest to the unsurprising consumption of maize (*Zea mays*), a well-known dietary staple of ancient Native Americans in the northern Southwest. Kernels were present in one carbonized basket, while four others evidence starch grains that indicate cooked ground corn meal, possibly mixed with other grasses (Poaceae), although their potential species could not be determined. The vessels from Kiva D, Room 54, and the second floor of Room 135 all came from unspecified or refuse deposits and likely indicate use in food preparation or serving, since none appear to have come from baskets unambiguously used for cooking (Figure 6.37). More interesting is that the residues from the baskets accompanying Burials 39 and 40 in Room 136 attest to the mixing of a greater variety of economically important foods. In addition to cooked ground maize meal, the basket found near Grave 39, that of a small child, included amaranth (*Amaranthus* sp.), and goosefoot (*Chenopodium* sp.) or saltbush (*Atriplex* sp.), as well as some unidentified plant tissue (Figure 6.38). The basket with Grave 40, also a child, yielded evidence of rice grass (*Achnatherum* sp.), goosefoot, and unidentified starchy root tissue mixed with cooked ground maize meal. The presence of centric and pennate diatoms further indicates that water had been added to this mixture.
Figure 6.37. Remains of a well-mended coiled basket tray with organic residue from Room 54 at Aztec West (29.0/7373). Residue analysis identified cooked and ground maize, possibly mixed with other grasses. This specimen has been directly radiocarbon dated to between cal A.D. 1020 and 1170 (see Table 6.1). Courtesy of the American Museum of Natural History.

Figure 6.38. Plaque found near Grave 39 in Room 136-2 at Aztec West (29.1/3220). Dark splotches between the coils near the center are organic residue found to include amaranth, goosefoot or saltbush, and maize, among other possible plants. Courtesy of the American Museum of Natural History.
These data, though limited and telling us little about ingredient proportions, suggest that food left as a mortuary offering did not simply consist of unprocessed individual plant foods, but prepared wild and domesticated plants mixed together as if to constitute a proper meal. The maize and wild plants documented are not unknown foods in the context of what is understood about ancient Pueblo diets, but offer additional clear evidence of the consumption of a variety of readily available local wild plants alongside the crop staple maize at Aztec West.

**Neutron Activation Analysis**

Neutron activation analysis (NAA) has become a well-established technique in archaeology for identifying the sources of clays used to make ceramic pots by quantifying their major, minor, and trace element compositions, and it has been used on a variety of Southwestern ceramic assemblages for several decades, including material from Chaco Canyon (e.g., Crown 1994; Glascock and Neff 2003; King 2003; Neitzel and Bishop 1990; Pollard et al. 2007:123-136). In brief, the technique works by bombarding the unknown sample with neutrons, which causes its constituent elements to form radioactive isotopes. With knowledge of the radioactive decay of the isotopes, it is possible to study spectra of the emissions of the radioactive sample to ascertain the concentrations of the elements within the sample. These may then be compared with
the results of analyses of clay sources to determine the possible origin of the clay(s) used to produce the ceramic vessel.

In the present case, virtually nothing is known about the materials or production of the unique clay coated coiled baskets, so any new data are welcome. Macroscopic examination of surviving pieces suggested that a dark red to pinkish-red clay was applied as a slurry in one or two very thin coats to the interior and exterior surfaces of the baskets. Thus, it seemed possible to subject these clays to NAA. Sampling of the clay coating from select vessels was undertaken as an exploratory measure to determine if they could be linked to any known clay sources or ceramic sherds in the large Archaeometry Laboratory database at the University of Missouri Research Reactor (MURR). A total of 10 samples representing nine different baskets from Aztec West (n=5), Pueblo Bonito (n=3), and one unknown site were analyzed (Table 6.9). Dr. Jeffrey R. Ferguson performed the analyses and consulted on the interpretation of the results.

The NAA findings indicate that although there were no clear matches in the MURR database, the samples show a broad affinity to ceramics from the northern Southwest. Internally the samples are quite heterogeneous, but samples 8 and 9 are very similar, confirming that these virtually identical objects (UCMNH 5932 and other samples lacking catalog numbers at the UCMNH) are indeed parts of the same object from Kiva L at Aztec West. Figure 6.39 shows a hierarchical cluster analysis of the basket sample elemental data. Notably, with the exception of samples 8 and 9 from the same object, no sample in this dataset has a single match at a Euclidian distance of 0.02 or
less, which is a generous cutoff considering that a distance of 0.015 or less is typically used to establish matches by MURR staff (Ferguson, pers. comm. 7/14/2011).

Table 6.9. Spalls from Clay Coated Baskets Analyzed by Neutron Activation Analysis at the University of Missouri Research Reactor.

<table>
<thead>
<tr>
<th>Site</th>
<th>Catalog No.</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Sample Weight (g)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo Bonito</td>
<td>AMNH NAA/687</td>
<td>Room 13</td>
<td>A.D. 840-1040</td>
<td>0.75</td>
<td>Sample EAJ1; &quot;altar painting&quot; object described by Pepper (1920:68-69)</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>AMNH H/7040 and H/7041</td>
<td>Room 83</td>
<td>A.D. 1063, AMS 14C median</td>
<td>0.3</td>
<td>Sample EAJ2; same basket as NMAI 051118 and NMAI 064583</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>NMNH A335359</td>
<td>Room 300A</td>
<td>A.D. 1094, AMS 14C median</td>
<td>0.267</td>
<td>Sample EAJ3; see Judd (1954:321)</td>
</tr>
<tr>
<td>Aztec West</td>
<td>AMNH 29.0/5376</td>
<td>Room 122-2</td>
<td>A.D. 1100-1130</td>
<td>0.3</td>
<td>Sample EAJ4</td>
</tr>
<tr>
<td>Aztec West</td>
<td>AMNH 29.0/7481</td>
<td>Room 65</td>
<td>A.D. 1100-1290</td>
<td>0.28</td>
<td>Sample EAJ5</td>
</tr>
<tr>
<td>Aztec West</td>
<td>AMNH 29.0/9345</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>0.56</td>
<td>Sample EAJ6</td>
</tr>
<tr>
<td>Aztec West</td>
<td>AMNH 29.1/3219</td>
<td>Room 189, lower level</td>
<td>A.D. 1090, AMS 14C median</td>
<td>0.05</td>
<td>Sample EAJ7; coiled basket ladle from Chacoan refuse</td>
</tr>
<tr>
<td>Aztec West</td>
<td>UCMNH 5932</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>0.47</td>
<td>Sample EAJ8; sample from UCMNH no cat. no. to verify that specimen is same as 5932</td>
</tr>
<tr>
<td>Aztec West</td>
<td>UCMNH 5932</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>0.59</td>
<td>Sample EAJ9; sample from UCMNH no cat. no. to verify that specimen is same as 5932</td>
</tr>
<tr>
<td>unknown</td>
<td>SWMAI 3068-G-4</td>
<td>unknown</td>
<td>A.D. 900-1150?</td>
<td>~0.25</td>
<td>Sample EAJ10; best preserved clay coated basket known</td>
</tr>
</tbody>
</table>

*a NAA prefix is a general "North American Archaeology" collection prefix indicating that the artifact has lost its original tag.

The scatterplot of calcium (Ca) and iron (Fe) concentrations in Figure 6.40 illustrates the differences in elemental composition between ceramic sherd samples submitted for research by Glowacki (2009) from the Mesa Verde region and L. Reed (2007; Reed et al. 2011) from the Middle San Juan region, and the clay coated basket
Figure 6.39. Hierarchical cluster analysis of NAA elemental data from clay spalls from clay coated baskets. Arsenic (As) is excluded because it is a frequent contaminant of museum objects. Samples 8 and 9 are from the same artifact. Excluding these two, the absence of a single match at a Euclidean distance of 0.02 or less suggests a high degree of sample dissimilarity. Consult text and Table 6.9 for individual sample details. Figure prepared by Jeffrey R. Ferguson.

Figure 6.40. Scatterplot of calcium (Ca) and iron (Fe) concentrations illustrating differences in elemental composition between ceramic sherd samples submitted to the MURR by Glowacki (2009) from the Mesa Verde region and L. Reed (2007, Reed et al. 2011) from the Middle San Juan region, compared with clay coated basket spall samples (solid black circles). Figure prepared by Jeffrey R. Ferguson.
spall samples submitted for this study. Clay coated basket samples clearly stand apart but are quite different from one another, which suggests to Ferguson (pers. comm. 7/14/2011) that, given their difference in major element compositions, they likely reflect a different material altogether, perhaps one that is not typically used for manufacturing ceramics.

I propose that ground argillite, a locally available mud stone, is a potential source for the clay coatings. Argillite is abundant in mineral and ornament collections from Chaco Canyon and elsewhere in the northern Southwest (e.g., Jernigan 1978; Mathien 1997; Mattson 2016a). Soft and hard varieties of argillite used for ornaments of varying quality are known from several localities within Chaco Canyon (F. Joan Mathien, pers. comm. 7/12/11). Interestingly, this variability corresponds well with my own observations about variability in the hardness and texture of the red clay coatings of different baskets. Further, the range of pink and red argillite that I have observed in Chaco museum collections bears a striking similarity to the range of colors reflected in the clay coats on baskets. In the future, I plan to subject samples of argillite collected in Chaco Canyon to NAA to test this proposal.

In sum, although the NAA data not suggest any specific geographic sources, a regional affinity with the northern Southwest is implied. This is useful insofar as it helps substantiate relatively local production of these items, as opposed to importation from a great distance. Perhaps the most useful observation is that the unprovenienced and exceptionally well-preserved clay coated basket curated at the Autry Museum of the
American West in Los Angeles appears to have been coated with red clay acquired from the same general area as the extant samples from Pueblo Bonito and Aztec Ruins.

**Strontium Isotopic Sourcing**

My prior involvement in research attempting to geochemically source the geographic origins of plants used in Archaic basketry from western Nevada with Dr. Larry V. Benson and others (2006b), as well as Benson and colleagues’ (Benson 2010, 2012; Benson et al. 2003, 2008, 2009; Cordell et al. 2008) progress in sourcing maize from Chaco Canyon and several outlying sites, made it tempting to explore the possibility that basketry artifacts could also be sourced. In these studies, strontium (Sr) isotopic sourcing relies on measurements of $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of basket plant fiber and maize that are compared to like measurements of ratios of regional sediment samples. Similarity in the isotopic ratios between the objects and the sediment samples can be used to constrain the likely area in which the maize, or plants used to make baskets, grew. Subsequent research has shown that a number of factors complicate the unequivocal assignment of source areas based on sediment sample measurements, but given the increasing number of sediment samples acquired for Chacoan maize sourcing, Benson and I considered it worth exploring whether Chacoan basketry could be sourced isotopically.
To this end, I acquired two samples of basketry artifacts for exploratory testing that included one coiled basket fragment from Pueblo Bonito and one twill plaited mat fragment from Aztec West (Table 6.10). Each sample came from an individual AMNH catalog number lot that contained multiple distinct objects from one room that were mixed together during or after excavation or during curation. Both pieces selected for this destructive analysis consisted of fragments that could not confidently be associated with any of the artifacts identified during my technological analyses, and so were considered redundant. Before being processed for sourcing, each sample fragment was analyzed and documented in detail, as well as sampled for an AMS radiocarbon determination (see Table 6.1) to minimize information loss. While the entire Pueblo Bonito sample was consumed during analysis, some of the Aztec mat sample remained and was returned to the museum, along with an additional 0.04 g of fiber from the same specimen that was leftover from sampling for an AMS radiocarbon determination.

Table 6.10. Data on $^{87}\text{Sr}/^{86}\text{Sr}$ Ratios for Two Woven Artifacts Analyzed by Dr. Larry V. Benson for Exploratory Isotopic Sourcing.

<table>
<thead>
<tr>
<th>Context</th>
<th>AMNH Cat. No.</th>
<th>Age</th>
<th>Sample Wgt. (g)</th>
<th>$^{87}\text{Sr}/^{86}\text{Sr}$</th>
<th>Error (2 SD)</th>
<th>Avg. Al ($\mu$g/g)</th>
<th>Al SD</th>
<th>Avg. Sr ($\mu$g/g)</th>
<th>Sr SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo Bonito, Rm. 62</td>
<td>H/7156</td>
<td>A.D. 1010, AMS $^{14}\text{C}$ median</td>
<td>5</td>
<td>0.717018</td>
<td>0.000014</td>
<td>396</td>
<td>0.03</td>
<td>22.62</td>
<td>0.004</td>
</tr>
<tr>
<td>Aztec West, Rm. 80</td>
<td>29.0/8386</td>
<td>A.D. 1156, AMS $^{14}\text{C}$ median</td>
<td>5</td>
<td>0.716856</td>
<td>0.000013</td>
<td>44</td>
<td>0.008</td>
<td>5.35</td>
<td>0.000</td>
</tr>
</tbody>
</table>
The results of the Sr analysis are not encouraging. Both samples yielded Sr signatures deemed erroneously high and best explained by silicate contaminants not fully removed during pre-processing cleaning (cf. Benson et al. 2010:89). As recent publications on the sourcing of Chaco Canyon corn demonstrate, Benson and colleagues have improved their success at removing contaminants that can skew Sr isotopic ratios, but contamination remains a problem, perhaps even more so with poorly preserved vegetal artifacts that are difficult to clean well. These findings suggest that contamination will pose a serious problem to any future attempts to geochemically source basketry, particularly if their preservation or method of construction makes them difficult to clean without leaching away substantive amounts of the desired elements.

**Summary**

The findings detailed in the previous pages enhance our understanding of the complex nature of sites such as Pueblo Bonito and Aztec Ruins, while underscoring the important, active roles that woven plant-based artifacts played in the lives and lifeways of Native Americans occupying the northern Southwest in prehispanic times. Chronological insights from direct radiocarbon dates on woven artifacts complement data from tree-rings and ceramics and generally support the making of inferences about the age of particular artifacts based on a cautious consideration of the data pertaining
to each sites' architectural development and use. Consideration of formal and functional variation in woven products not only shows that atypical coiled vessel forms such as bifurcated, cylinder, and clay coated baskets were critical components of diverse ritual activities at Pueblo Bonito and beyond, but also provides evidence for variation in when, where, and how such vessels were used. I have suggested that these observations indicate that the practices associated with such forms were likely administered, if not controlled by, different social groups, perhaps in the character of distinct ritual associations or sodalities. Along these lines, enigmatic sandal toe jogs may reflect a symbolic link to polydactylism and, by extension, to any individuals exhibiting this pathology that may have been accorded special status. Based on existing sandal data and other lines of evidence (Crown et al. 2016), toe jogs and associated beliefs about six-toed personages may have emerged as a stylistic and symbolic phenomenon at Pueblo Bonito during the tenth century A.D., after which time the practice of adding toe jogs to sandals ultimately spread throughout the northern Southwest before waning in the thirteenth century.

Conversely, the presence of vessel forms such as bowls and trays, which are typically associated with utilitarian activities, attest to some of the more mundane tasks that the inhabitants of study sites engaged in, and this is amplified by the results of residue analyses of a small number of vessels from Aztec West that offer a glimpse into food preparation and mortuary practices. The most marked difference in vessel forms exists between study sites in the Chaco regional system and Mesa Verde sites, where the absence of certain unique vessel types and a paucity of matting in the Mesa Verde
region are best explained by cultural differences, rather than chronology. Although the exploratory strontium isotopic sourcing of basketry yielded invalid results, NAA analyses of clays from clay coated baskets implies a local origin for these unusual vessels. This is consistent with available information indicating that none of the aforementioned woven products were physically imported from distant places.

In the next chapter, I build on these observations through an analysis of spatial and chronological variation in technological stylistic features of coiled baskets, twill plaited mats, and twill plaited sandals in an attempt to identify craft learning networks that may shed light on the cultural or geographic affinity of Chaco Canyon and outlying sites’ occupants. Results of these analyses complement the insights from formal and functional variation and allow evaluation of interpretive models that envision sociocultural diversity operating at three different spatial scales within the Chaco regional system and beyond.

**Note**

1. The burden basket and bifurcated basket counts given here are my own. There are discrepancies in Adovasio and Gunn (1986) as to the actual number of "bifurcated base baskets" and plain "carrying baskets" in the assemblage. Adding to the confusion is that the only vessel form known to exhibit a bifurcate base is the burden or carrying basket
form. The Type XVII (close coiling, two rod and bundle bunched, noninterlocking stitch) coiling description identifies two bifurcated baskets and a single carrying basket. The bifurcate baskets include one unambiguous carrying basket, and it is reasonable to assume that the second fragmentary specimen is another given the demonstrable correspondence between bifurcated bases and burden or carrying baskets elsewhere. The second bifurcated basket is also identified as a bifurcated carrying basket on its original analysis form. However, Table 146 indicates that there are three bifurcate base baskets, only one of which is explicitly a carrying basket. Adovasio's original analysis data consistently refer to two bifurcate base carrying baskets (CACH 18623 and CACH 19138) and a single carrying basket (CACH 19396). In light of the foregoing, I would be inclined to view Table 146 as in error were it not for the statement later (Adovasio and Gunn 1986:384) that "Bifurcated base carrying baskets are ascribable to Early PIII and PIII (subperiod unknown). The single bifurcated base ceremonial basket occurs in Middle PIII." This quote implies that three bifurcated burden baskets were identified during analysis, with possibly a fourth "plain" carrying basket also present in the assemblage. Muddying the waters further, Figures 132 and 133 illustrate geometric designs from two different carrying baskets (likely FS 641/CACH ? and CACH 53317, respectively), whereas neither of the bifurcated baskets nor the single carrying basket discussed in the type description or in Adovasio's original analysis notes clearly indicate decoration. These figure captions, then, either imply that there are two additional non-bifurcate base carrying baskets or these captions are in error with reference to vessel form. After examining the original analysis form for the basket in Figure 133 (CACH 53317), I
conclude that Adovasio or another analyst viewed it as a tray or bowl, not a carrying basket. However, it is disconcerting that the design illustrated bears a striking similarity to that pattern commonly seen on thirteenth century A.D. bifurcated baskets. Figure 132 appears to be FS 641 (CACH ?), which, in my examination of Adovasio's notes and unpublished photos of the object, strongly suggests a carrying basket, possibly even a bifurcate basket given its stylistic features and contents. The design on the basket is very reminiscent of that depicted in Figure 132, but Adovasio’s analysis photos illustrate steeper slanting lines that are in actuality not stepped lines, but closely packed, diagonally slanted zig-zags. Based on these facts, and until I can examine the actual artifacts, I am inclined to view the Figure 133 caption as erroneous when it says "carrying basket" and Figure 132 as very likely representing the third bifurcate carrying basket or, minimally, a fourth (and second non-bifurcate) carrying basket. To rub yet more salt in this wound, I hasten to point out that the apparently “regular” non-bifurcated carrying basket (CACH 19396) exhibited an average of 9 stitches per cm, which is quite fine by any standard and unusually fine for a utilitarian burden basket, given that the three other bifurcate baskets from Antelope House evidence 4 to 6 stitches per cm! The upshot of this is that three baskets are very likely bifurcated base ceremonial burden baskets, while the fourth burden basket is conspicuously fine for utilitarian use and may also have been a ritual basket.

Lastly, in unpublished Antelope House documents in the possession of Adovasio and the Western Archaeological Conservation Center, reference is occasionally made to the “Rockefeller bundle.” This label was at first obscure to me, but refers specifically to
the contents of the hourglass-shaped basket from the site (CACH 2287) that was accidentally found by former Vice President Nelson A. Rockefeller during a site visit. Apparently, while touring the site, Rockefeller tripped over a rock, revealing some of the basket’s contents and spurring excavation of the material (J. M. Adovasio, pers. comm. 1/2013).
Chapter 7

Technological Stylistic Variation in Chacoan Baskets, Mats, and Sandals

The previous chapter’s treatment of variation in form and inferred function of study sample coiled baskets, twill plaited mats, and twill plaited sandals afforded the opportunity to contextualize these artifacts and offer a reconstruction of their roles in the ancient cultural systems of which they were a part. These findings yielded insight into when and how the basketry artifacts were used and variability within and between sites in the study sample. To this end, I argued for greater appreciation of the importance of ritual basketry and, on the basis of patterns in formal and functional variation, proposed that the practices associated with such diverse objects were likely administered by different social groups in the form of distinct ritual associations or sodalities whose genesis can arguably be traced to developments at Pueblo Bonito.

Yet, these observations only tangentially approach the questions of cultural and social diversity that are central to this study. Since highly visible features such as vessel form, decorative embellishment, and the addition of toe jogs are easily shared among and between peoples, they provide, at best, marginal insight into learning networks and questions about multiscalar demographic composition. It is with these concerns in mind that I now move to an evaluation of the technological stylistic evidence for learning network variability from coiled baskets, mats, and sandals within Chaco Canyon and across the regional system at three spatial scales: site, community, and region.
Variation in Technological Style

Not surprisingly, preservation proved to be the limiting factor when it came to documenting variation in basketry artifact metrics and technological choices (e.g., splicing, starting and finishing method) in sufficient numbers to allow delineation of spatial and temporal patterns and, thus, learning networks at any spatial scale. In spite of this limitation, the available samples do indicate general trends in certain technological features and, in a few cases, suggest patterns that are meaningful in the context of questions about sociocultural diversity. It should also be noted that in most cases my technological identifications differ in minor ways, or simply add greater detail to, previously published descriptions, but in others they differ substantially. In instances of marked disagreement I acknowledge the differences in-text or a note, but I make no effort to address all contradictions.

Because of the importance of decorative embellishment, both in terms of technological choice and ultimately understanding the significance of specific designs’ or design elements’ possible symbolic content, attention is also given to variation in the technological execution of design style. However, decoration on basketry artifacts is often difficult to assess because, like overall form, it is adversely impacted by use and preservation. Depending on how the decoration is executed, whether it be structurally integral or applied post-production, heavy use-related wear and/or poor preservation
may obscure its evidence. Designs woven into coiled baskets or mats with dyed elements frequently fade, and if the design is well worn, such decoration may only be discernible if the fragment is large enough for patterns in stitch or strip splices (reflecting the systematic insertion and deletion of colored elements) to be identified. An additional complication is distinguishing alterations to an artifact’s fabric that are decorative as opposed to functional. In the vast majority of cases this is relatively straightforward and the weaver’s (or subsequent user’s) intent to add decorative embellishment is unequivocal. However, it cannot be denied that aesthetic considerations may influence decisions to mend or repair a damaged object, or that a poorly preserved mending event could be confused with imperfectly preserved structural decoration. Cognizant of these factors I took a very cautious approach and only recorded as decorated those artifacts for which I was confident that the modification was not a repair/mend, but did note likely attempts to modify, repair, or rejuvenate an object’s decoration.

As permitted by the study sample, technological stylistic data are examined below at site, community and regional scales by class of basketry artifact (coiled basketry, twill plaited matting, fine twill plaited sandals). At the scale of individual sites, an attempt to assess spatiotemporal trends was made only for the largest assemblages in this study’s sample, which includes Pueblo Bonito, Aztec West Ruin, Antelope House, and Salmon Ruins. Here I reiterate that because I collected data on only a fraction of the coiled baskets and fine twill plaited sandals from Antelope House, my discussion of technological variability at this site relies heavily on Adovasio and Gunn’s (1986)
basketry and matting analysis results, and Magers’ (1986a) findings from her study of the sandals. Their results are supplemented with my own observations, particularly in reference to sandal stylistic variability, which Magers only treated in general terms.

Examination of community-scale patterning is limited to sites within Chaco Canyon. With the exception of Pueblo Bonito, the very small assemblages from other Chaco Canyon sites only allow for tentative comparison and observations. However, this analysis is worthwhile given long-standing scholarly interest in relationships between canyon sites over time. For these reasons, and to the extent possible, emphasis is placed on insights gleaned from the comparison of small site and great house assemblages, and Bonito phase and McElmo phase materials.

At a regional scale, aggregate Chaco Canyon, Middle San Juan, Canyon de Chelly, and Mesa Verde samples are examined to explore broader geographic and cultural affinities. There are obvious caveats to this endeavor with respect to geography and sampling, but I believe that these are balanced as best they can be by additional, complementary insights that are afforded by a broader consideration of specific basketry artifact technologies and forms in Chapter 8. A small Basketmaker period sample of coiled basketry is also included to explore the potential roots of regional coiled basketry traditions, though similar caveats obtain.

I intend to present more detailed descriptive data on several of the study sample assemblages in future reports, and so the artifact-specific analytical data on which the following analyses are based are available upon request. Assemblage database outputs will also ultimately be deposited with the appropriate curating institution(s). Finally, I
have attempted to minimize basketry and textile jargon (see Adovasio 2010; Emery 1995), but some technical terms are necessary and so I briefly explain key terms, technological features, and certain measurements when they are first introduced while describing technical variation in Pueblo Bonito coiled basketry, plaited matting, and sandals.

**Site-Scale Stylistic Patterning**

*Coiled Basketry*

Frequencies of coiled basketry structural types in this study’s sample, classified following Adovasio (2010), are given in Table 7.1 by site. In the paragraphs that follow, I summarize data on stylistic choices for each of the largest assemblages that I examined. I begin with raw material and then consider variation in primary structural type, a suite of production choices, and lastly metric variation.

*Pueblo Bonito*

Coiled basketry is represented throughout Pueblo Bonito, but is most abundant in rooms from the northern half of the site (see Figure 6.1). The richest rooms are those from the arbitrarily defined northwest quadrant that includes both burial clusters. From the northwest, 53 specimens were recovered that amount to almost 60 percent of the
entire coiled basketry assemblage. The northeast produced 21 and the southeast 10 baskets. A scant two specimens come from rooms in the southwest quadrant.

*Raw Material.* As can best be discerned, sumac (*Rhus* sp.) shoots were the plant of choice for coiled basketry foundation rods and dyed (decorative) and undyed stitches across the site throughout its occupation, though some use of willow (*Salix* sp.) shoots cannot be excluded without more systematic botanical examination. Where a fiber bundle is included in the foundation, as in two rod and bundle bunched foundation coiling, it is without exception yucca (*Yucca* sp.) leaf fiber. In most cases the fiber appears to have been processed to make a bundle, in others the leaves may have been unprocessed or only minimally processed, but poor preservation makes it impossible to ascertain consistently. Only two specimens exhibit yucca leaf fiber stitches. One specimen (AMNH H/4076) derives from Room 25 in the southwest quadrant of the pueblo and is sewn in noninterlocking stitches on a two rod and bundle bunched foundation. The second example (AMNH H/8398, Figure 7.1) was recovered from Room 107 in the northwest and is sewn in noninterlocking stitches on a single rod foundation. The former fragment likely dates to Classic Bonito subphase times, while the latter dates between the Early Bonito subphase and Mesa Verde phase.

*Structural Type.* Seven different structural types are documented for Pueblo Bonito, with 72 percent of the assemblage consisting of two rod and bundle bunched foundation baskets sewn with noninterlocking stitches (Table 7.1). The next most abundant type, at about 11 percent of the assemblage, is one rod foundation coiling sewn with interlocking stitches. The remaining 17 percent consists of small quantities of
technologically related types and unclassifiable specimens. Most of the five less common types exhibit, structurally speaking, minor alterations to the two most common types, differing either in stitch type (e.g., interlocking vs. noninterlocking) or foundation element arrangement (e.g., two rod and bundle bunched vs. two rod and bundle stacked).

Spatially, the two most common types have pan-site distributions and are best represented in those rooms yielding larger basketry assemblages (Table 7.2). For example, the rooms yielding the largest samples of coiled basketry (≥5 specimens) at the site are dominated by two rod and bundle bunched foundation, noninterlocking stitch coiling, and include Rooms 53 or 56/63 (n=5), 62 (n=9), 320A (n=6), and 326 (n=15). These rooms are also, by and large, the same rooms that yielded examples of minority structural types (Figure 7.2). Notably, Rooms 320A and 326 of the western burial cluster each yielded three different structural types and, when combined, evidence four of the seven structural types documented at Pueblo Bonito.

Aggregated data for basketry types through time at Pueblo Bonito suggest that at least four of the seven types are attested throughout the Bonito phase, with the three minor types being specific to Early Bonito subphase contexts (Table 7.3). In general terms, however, the coiled basketry sample appears biased towards Early through Classic Bonito subphase times. The sample of coiled baskets directly AMS radiocarbon dated for this study affirms these general findings, with the earliest assay on a two rod and bundle bunched foundation, noninterlocking stitch basket dating to the Early Bonito subphase (Table 6.1). A direct AMS radiocarbon determination on one
Table 7.1. Coiled Basketry Primary Structural Type Variation by Site Sample.

<table>
<thead>
<tr>
<th>Primary Structural Type</th>
<th>Chaco Canyon</th>
<th>Chacoan Outliers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bc 51</td>
<td>Bc 59</td>
</tr>
<tr>
<td>Close Coiling, Half Rod, Interlocking Stitch</td>
<td>1 (50)</td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Interlocking Stitch</td>
<td>2 (14.3)</td>
<td>10 (11.2)</td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Noninterlocking Stitch</td>
<td>1 (50)</td>
<td>3 (3.4)</td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Interlocking Stitch and Wrap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Noninterlocking Stitch and Wrap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 2 Rod Stacked, Noninterlocking Stitch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 2 Rod Stacked, Intentionally Split on Nonwork Surface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, Half Rod and Bundle Stacked, Noninterlocking Stitch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod and Bundle Stacked, Noninterlocking Stitch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 2 Rod and Bundle Stacked, Noninterlocking Stitch</td>
<td>1 (7.1)</td>
<td>2 (2.2)</td>
</tr>
<tr>
<td>Close Coiling, 2 Rod and Bundle Bunched, Interlocking Stitch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 2 Rod and Bundle Stacked, Noninterlocking Stitch</td>
<td>1 (50)</td>
<td>11 (78.6)</td>
</tr>
<tr>
<td>Close Coiling, 2 Rod Bunched, Noninterlocking Stitch</td>
<td>1 (50)</td>
<td>4 (4.5)</td>
</tr>
<tr>
<td>Close Coiling, 3 Rod Bunched, Noninterlocking Stitch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7.1. Continued.

<table>
<thead>
<tr>
<th>Type Description</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Coiling, 1 Rod, Intricate Interlocking Stitch</td>
<td>1</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Open Coiling, 1 Rod, Intricate Interlocking Stitch and Wrap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Coiling, 2 Rod Stacked, Intricate Interlocking Stitch and Wrap</td>
<td>1</td>
<td>1 (1.3)</td>
</tr>
<tr>
<td>Untyped (Close Coiling, Foundation and/or Stitch Type Unknown)</td>
<td>1</td>
<td>1 (100)</td>
</tr>
<tr>
<td>Sample Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Structural Types</td>
<td>2</td>
<td>2 (4.5)</td>
</tr>
<tr>
<td>Number of Structural Types</td>
<td>4</td>
<td>4 (5.2)</td>
</tr>
<tr>
<td>Number of Structural Types</td>
<td>2</td>
<td>2 (2.5)</td>
</tr>
<tr>
<td>Number of Structural Types</td>
<td>1</td>
<td>1 (4.2)</td>
</tr>
</tbody>
</table>

* a n (percent of sample)
* b Data from Adovasio and Gunn (1986) revised and supplemented with my observations. The coiling sample includes only a portion of the 1 rod (n=11) and 2 rod and bundle bunched foundation specimens (n=19) from the site.
* c Probably Navajo.
Figure 7.1. Concave view of a one rod foundation coiled basket sewn with noninterlocking *Yucca* sp. leaf stitches from Room 107 at Pueblo Bonito (H-8398). It exhibits an alternating right-to-left and left-to-right work direction and may be the work of a novice basketweaver. Courtesy of the American Museum of Natural History.

Figure 7.2. Profile view of a three rod bunched foundation coiled bowl sewn with noninterlocking stitches from Room 320A at Pueblo Bonito (A335309). Courtesy of the Smithsonian’s National Museum of Natural History.
Table 7.2. Pueblo Bonito Close Coiled Basketry Structural Type Presence by Room.

<table>
<thead>
<tr>
<th>Close Coiled Basketry Structural Type</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Rod, Interlocking</td>
<td>2, 6, 13, 53 or 56/63, 55, 109, 170</td>
</tr>
<tr>
<td>3 Rod Bunched, Noninterlocking</td>
<td>54, 298B, 320A, 323</td>
</tr>
<tr>
<td>1 Rod, Noninterlocking</td>
<td>107, 159, 300A</td>
</tr>
<tr>
<td>2 Rod and Bundle Stacked, Noninterlocking</td>
<td>320A, 326</td>
</tr>
<tr>
<td>1 Half Rod, Interlocking</td>
<td>6</td>
</tr>
<tr>
<td>2 Rod and Bundle Bunched, Interlocking</td>
<td>326</td>
</tr>
</tbody>
</table>

Table 7.3. Pueblo Bonito Close Coiled Basketry Structural Type Abundance (n) by Temporal Period.

<table>
<thead>
<tr>
<th>Close Coiled Basketry Structural Type</th>
<th>Early-Classic Bonito (A.D. 850-1110)</th>
<th>Classic-Late Bonito (A.D. 1040-1140)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Rod and Bundle Bunched, Noninterlocking</td>
<td>38</td>
<td>14</td>
</tr>
<tr>
<td>1 Rod, Interlocking</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>3 Rod Bunched, Noninterlocking</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1 Rod, Noninterlocking</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2 Rod and Bundle Stacked, Noninterlocking</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1 Half Rod, Interlocking</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2 Rod and Bundle Bunched, Interlocking</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

three rod bunched foundation, noninterlocking stitch basket (Figure 7.3) is consistent with a Classic or Late Bonito subphase age, but the other three examples of this type are less securely dated. Chronological information from tree-rings and ceramics associated with these three artifacts suggest the possibility of Early Bonito production, but it is more likely that they all date to Classic Bonito times or later given the radiometric assay, their origins in rooms in or near others documented to have been reused during the twelfth century A.D. (Windes 2003: Figs. 3.9, 3.10), and the technique’s prevalence in the northern Southwest after A.D. 1200 (e.g., Morris and Burgh 1941).
Examination of coiled vessel form by weave structure (Figure 7.4) reveals that the greatest structural variation is present within the broad class of bowl-shaped vessels, for which four different structural types are documented. This is not surprising given the diversity of bowl-shaped forms noted earlier. The next most variable forms are cylinder baskets and oval or hourglass-shaped trays in which each form is produced using three different structural types. However, in this case, the two minority weave structures employed were each used in only one vessel. Clay coated vessels and burden baskets are woven in the two most abundant structural types at Pueblo Bonito, while the remaining forms are the ubiquitous two rod and bundle bunched foundation coiling sewn with noninterlocking stitches.

**Work Surface and Direction.** Work surface denotes the face of the basket into which the awl was inserted to make a hole to receive the stitch, and work direction the direction in which stitch sewing proceeded. Coiled basket work surface may be concave (interior) or convex (exterior), while work direction, as indicated by the slant of stitches (read from top to bottom), may be right to left (syn., R-L, /, leftward) or left to right (syn., L-R, \\, rightward).

Thirty-four baskets with an identifiable work surface are concave and 18 have a convex work surface. The distribution of work surface according to vessel form generally follows the pattern expected for coiled baskets (Adovasio 2010), with vessels with more restricted or enclosed orifices having convex work surfaces and open or wide-mouthed vessels having concave work surfaces (Figure 7.5). In this light, that two cylinder baskets with restricted openings have concave work surfaces is unusual, especially given that all
Figure 7.3. Concave view of fragments from a three rod bunched foundation oval or hourglass-shaped tray sewn with noninterlocking stitches from Room 54 at Pueblo Bonito (H-5792). This specimen has been directly radiocarbon dated to cal A.D. 1026-1185 (Table 6.1). Courtesy of the American Museum of Natural History.

Figure 7.4. Pueblo Bonito coiled basketry structural type by vessel form. The red and bright blue weave structures are the two most common types.
of the others where the work face is discernible exhibit convex work faces. It is noteworthy, however, that both specimens (NMNH A335324, A335330) were originally identified by Judd as cylinder baskets but I consider them to only be possible cylinder baskets. Of the two, NMNH A335324 is a specimen that I believe to have been a finished plaque or, possibly, an unfinished basket’s base and, therefore, highly dubious as a cylinder basket. That said, during my analyses I did record one unequivocal cylinder basket (NMNH A335302.1) that potentially exhibits a concave work surface.

With respect to work direction, Pueblo Bonito coiled baskets are quite uniform, with all but one specimen being sewn R-L. A single specimen (AMNH H/8398) of unknown age (Early Bonito subphase to Mesa Verde phase) recovered from Room 107 in the northwest quadrant of the site is sewn with atypical yucca leaf stitches and exhibits both R-L and L-R work directions (Figure 7.1). The coarseness of, and
inconsistency in, this fragment’s execution is consistent with the work that one would expect from a novice or unskilled basketweaver.

**Starting and Finishing Methods.** Only two varieties of starting method, normal (syn. continuous coil) and oval (syn. flattened continuous coil), were observed among the 53 basket starts identified. Represented by 41 specimens, normal starts are the most common type, while the remaining 12 are oval. There is no correlation between structural type and use of an oval start, as those with oval starts employ three different weave structures. Regarding form, the oval starts include the five figure-eight- or hourglass-shaped trays (Figure 6.15), two bowls, and three bifurcated burden baskets whose bases were folded during production to facilitate the shaping of the vessel.

Normal and oval starts both appear to have been used throughout the Bonito phase and exhibit pan-site distributions. Spatial patterning is absent except insofar as oval starts are necessary to the forms of the oval/hourglass trays and bifurcated baskets that predominate in the western burial cluster.

Finishing method, referring to rim (final or edge coil) treatment and termination manipulation, is preserved all or in part on only 27 specimens. While rim treatment can usually be discerned with confidence from a surviving fragment of the rim coil, rim termination requires preservation of the precise location on the rim that the final ends. Of the 27 rims identified, 24 are of the frequently encountered self variety in which simple stitches are sewn as in the body without any additional manipulation or modification. Two miniature one rod foundation, interlocking stitch bowls (AMNH NAA 446.1, 446.2) from Room 55 that date to Early Bonito times both exhibit rims with
wrapping stitches in a 1:1 ratio with simple stitches. The final specimen from Room 62, assigned to the Early Bonito subphase, exhibits a 2/2 interval false braid around its entire rim circuit (AMNH H/7156.2).

Portions of 10 false braid terminations were identified and, of those that are analyzable, eight are 2/2 interval and one small bowl is 1/1 interval (Figure 7.6). Identifiable vessel forms bearing false braid rim terminations include five cylinder baskets, two bowls, one oval/hourglass-shaped tray, and one tray. Two rod and bundle bunched foundation sewn with noninterlocking stitches, and three rod bunched foundation sewn with noninterlocking stitches are the only structural types represented among the specimens with false braid terminations. All but one of the 11 specimens may be constrained to Early to Classic Bonito times. The only spatial patterning apparent is seen in the high frequency of preserved false braid terminations among the cylinder vessels from the western burial cluster.

An unusual feature was observed on the rim of a two rod and bundle bunched foundation, noninterlocking stitch cylinder basket from Room 326 in the western burial cluster (NMNH A335304). The vessel, which has a self rim and false braid termination, exhibits an unusual manipulation in which a length of stitching thread is interlaced (plaited) in a 1/1 rhythm with the simple stitches of the self rim along the apex of the coil (Figure 7.7). This produces a slightly raised or undulating line in the middle of the top of the coil that runs around the basket’s circumference.

*Stitch Splices.* Splicing describes the act of introducing new sewing elements into the fabric during manufacture. In coiled basketry a stitch splice consists of both the
Figure 7.6. Close-up concave surface view of a 2/2 interval false braid rim termination preserved on a cylinder basket from Room 320A at Pueblo Bonito (A335299). A portion of the self rim treatment is out of focus but visible at right. Courtesy of the Smithsonian’s National Museum of Natural History.

Figure 7.7. Close-up convex surface view of 1/1 rim plaiting (beading) on a cylinder basket with self rim treatment from Room 326 at Pueblo Bonito (A335304). Courtesy of the Smithsonian’s National Museum of Natural History.
initiation of the new stitch on the work face, called the fag end, and the termination of the exhausted stitch on the opposite face, known as the moving end. Although fag and moving end treatments are analytically independent, combined splice types may be defined, as I have done here, to capture the treatment of both the fag and moving ends in a basket. Because splicing is one of the most idiosyncratic features in coiled basketry, there is considerable variation, and so I limited my focus to those specimens for which I could determine both fag and moving end treatments to define an overall splice type or pattern for the basket. This endeavor was, unfortunately, severely impacted by preservation, as splices can be difficult to locate even in new baskets owing to weavers’ frequent desire to hide these blemishes on the basket’s surface.

At Pueblo Bonito, seven splice types were identified among 16 baskets distributed across northern rooms. As Table 7.4 shows, each splice type is represented by at most three specimens. Five splice types are distributed across two or three rooms, but only in Room 320A is the same splice type represented twice. In this case, the vessels in question are a cylinder basket and a bifurcated burden basket (NMNH A335300, A335293). More generally, cylinder basket and bowl forms both yielded examples of three different splice types. The seven splice types are represented by five foundation structural types, but all seven splice types are also seen in examples of the common two rod and bundle bunched foundation, noninterlocking stitch weave structure. The sample is too small, and too poorly controlled chronologically, to make generalizations about splicing preferences through time, but it is sufficient to note that six of the seven types are attested during Early to Classic Bonito subphase times, though
some could date later. The fifth type listed in Table 7.4 is confined to Classic to Late Bonito subphase contexts.

Table 7.4. Distribution of Coiled Basketry Stitch Splice Types at Pueblo Bonito by Room.

<table>
<thead>
<tr>
<th>Splice Type</th>
<th>Room (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fag and moving ends clipped</td>
<td>53 or 56/63, 298A, 320A</td>
</tr>
<tr>
<td>Fag and moving ends bound under with work direction</td>
<td>32, 107, 298B</td>
</tr>
<tr>
<td>Fags clipped, movings bound under with work direction</td>
<td>2, 109, 320A</td>
</tr>
<tr>
<td>Fags bound under with work direction, movings clipped</td>
<td>296A, 326</td>
</tr>
<tr>
<td>Fags bound under with work direction, movings bound under against work direction</td>
<td>54, 99</td>
</tr>
<tr>
<td>Fags clipped and bound under with work direction, movings clipped</td>
<td>320A (2)</td>
</tr>
<tr>
<td>Fags clipped and bound under against work direction, movings bound under against work direction</td>
<td>62</td>
</tr>
</tbody>
</table>

Decoration. Decorative embellishment in coiled basketry can be structurally integral, such as woven-in designs created with dyed stitches, or non-structural, such as the application of paint or dry pigment. Varieties of both types of decoration are present in the Pueblo Bonito assemblage. Table 7.5 details the type and manner of decoration for the 17 unequivocally decorated baskets identified from Pueblo Bonito along with pertinent chronological, contextual, and stylistic information. Included are the two mosaic covered baskets from Burial 14 in Room 33, four clay coated and painted baskets, and 11 others that exhibit dyed stitches, paint, pigment, or some combination thereof.
Table 7.5. Decorated Coiled Baskets from Pueblo Bonito.

<table>
<thead>
<tr>
<th>Catalog No.²</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Vessel Form</th>
<th>Structural Type</th>
<th>Decoration Type and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMNH NAA/687</td>
<td>Room 13</td>
<td>A.D. 850-1040</td>
<td>Burden basket</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>Clay coated and painted; Pepper’s (1920:68-69) “altar painting”; remains of ca. 1 cm wide band of turquoise paint visible on red clay background along a ca. 15 cm portion of artifact's long axis interpreted as the basket’s rim (Figure 6.9); basket-impressed face of one spall shows adhering yellow and turquoise pigment that may indicate that the basket was painted prior to being coated with clay; Pepper’s application of gum arabic has darkened clay and paint</td>
</tr>
<tr>
<td>AMNH NAA/370 (H/5094?)</td>
<td>Room 37?</td>
<td>A.D. 850-1040?</td>
<td>Indeterminate</td>
<td>Unknown</td>
<td>Clay coated and painted; indeterminate design employs black, dark red, and turquoise paint set against pinkish red clay background</td>
</tr>
<tr>
<td>AMNH H/7040, H/7041; NMAI 051118, 064583</td>
<td>Room 83</td>
<td>A.D. 1063, AMS ¹⁴C median</td>
<td>Steep-sided bowl</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Clay coated and painted; design on convex face only is a complicated mix of interlocking frets and zig-zags in yellow and blue-green (burned to black in places) set against dark red clay background (Figure 6.10); zig zags radiate outward from center of base; yellow elements are outlined in black in some places, perhaps as guide for painting; one NMAI spall shows linear design correction or overpainting</td>
</tr>
<tr>
<td>AMNH H/12758</td>
<td>Room 33, Burial 14</td>
<td>Late A.D. 800s</td>
<td>Cylinder basket</td>
<td>Unknown</td>
<td>Turquoise mosaic (Pepper 1909:227, 1920:164, 173-174); covered with 1,214 mosaic pieces; based on museum reconstruction mosaic covered about half of basket wall (Figure 6.11)</td>
</tr>
<tr>
<td>AMNH H/?</td>
<td>Room 33, Burial 14</td>
<td>Late A.D. 800s</td>
<td>Cylindrical</td>
<td>Unknown</td>
<td>Turquoise and shell mosaic (Pepper 1909:230; 1920:174-175); turquoise and shell beads strung as a shingled mosaic overlaying basketry foundation itself woven &quot;over a wooden body, or at least over a form of fibrous material&quot;; specimen not recovered/missing?</td>
</tr>
<tr>
<td>NMNH A335293</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Bifurcated burden basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches and painted; original black dyed stitch design of linear elements and elongated interlocking stepped frets was overpainted and modified on front and sides with black and turquoise paint (Figures 6.4-6.6; see also Judd 1954:313); portions remain of a very thin membranous layer (animal skin?) that tightly covered the basket lobes and which was sewn to basket below the framing line effected by the lowest decorated coils</td>
</tr>
<tr>
<td>NMNH A335297</td>
<td>Room 330, Burial 24</td>
<td>A.D. 850-1110</td>
<td>Cylinder basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches and painted; design described by Judd (1954:306) as &quot;ascending diamonds&quot; but is actually a series of /-slanting zig-zags; design first woven in black and later overpainted with yellow and turquoise to affect alternating black/tan/turquoise/yellow zig-zag pattern that is repeated three times around the wall (Figure 6.14)</td>
</tr>
<tr>
<td>NMNH A335299</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Cylinder basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; faint geometric design of zig-zag and fret motifs in black and red that resembles Gallup-Dogoszhi ceramic design style (Figures 6.12, 7.6)</td>
</tr>
<tr>
<td>NMNH A335300</td>
<td>Room 320A</td>
<td>A.D. 850-1110</td>
<td>Cylinder basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; faint geometric design of possible stepped linear elements and frets in black and reddish brown (Figure 6.13)</td>
</tr>
<tr>
<td>NMNH A335304</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Cylinder basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; faint polychrome geometric design in black and reddish brown partly visible beneath rim (Figure 7.7)</td>
</tr>
<tr>
<td>NMNH A335305</td>
<td>Room 326, Burial 10</td>
<td>A.D. 850-1110</td>
<td>Cylinder basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; faint polychrome geometric design in black and reddish brown with some linear elements</td>
</tr>
<tr>
<td>NMNH A335306.1</td>
<td>Room 326, Burial 6</td>
<td>A.D. 850-1110</td>
<td>Oval/hourglass tray</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Pigment and possible dyed stitches; non-patterned, sporadic red mineral pigment on both faces (Figure 6.15)</td>
</tr>
<tr>
<td>NMNH A335313.1</td>
<td>Room 326, Burial 10</td>
<td>A.D. 850-1110</td>
<td>Bifurcated burden basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Painted; turquoise paint on basket exterior but sporadic in preservation across surviving basket fragments</td>
</tr>
<tr>
<td>NMNH A335313.2</td>
<td>Room 326, Burial 8/9</td>
<td>A.D. 850-1110</td>
<td>Oval/hourglass tray</td>
<td>Close coiling, 2 rod and bundle stacked, noninterlocking stitch</td>
<td>Pigment; non-patterned, sporadic red mineral pigment on one face</td>
</tr>
</tbody>
</table>
Table 7.5. Continued.

<table>
<thead>
<tr>
<th>Artifact Code</th>
<th>Location</th>
<th>Date</th>
<th>Type</th>
<th>Coiling Method</th>
<th>Design Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NMNH A335313.9</td>
<td>Room 326</td>
<td>A.D. 850-1110</td>
<td>Bifurcated burden basket</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Painted; turquoise painted design not discernible (Figure 7.8) but may be geometric and similar to A335293</td>
</tr>
<tr>
<td>NMNH A335359</td>
<td>Room 300A</td>
<td>A.D. 1094, AMS (^{14})C median</td>
<td>Steep-sided bowl</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>Clay coated and painted (Judd 1954:321); painted geometric design is a possible zig-zag in blue-green (burned to black) set against dark red clay background; design probably on exterior only</td>
</tr>
<tr>
<td>RSPM 32328</td>
<td>Room 53 or 56/63</td>
<td>A.D. 850-1140</td>
<td>Steep-sided bowl</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches and painted; indeterminate geometric design woven with reddish brown stitches later overpainted and modified on exterior with yellow and black paint (Figure 7.9); slightly reminiscent of A335297</td>
</tr>
</tbody>
</table>

\(^{a}\) AMNH NAA prefix is a general "North American Archaeology" collection prefix indicating that the artifact has lost its original tag.
Three additional baskets not listed in Table 7.5 also exhibit possible woven-in geometric decoration. The convex surface of one cylinder basket from room 320A (NMNH A335298) suggests the faint remains of a possible polychrome geometric design accomplished using black and reddish brown stitches set against undyed stitches. Two other specimens evidence clipped short stitch splices patterned in a manner so as to suggest a now faded woven-in geometric design. One of these is a cylinder basket from Room 320A (NMNH A335296), and the other is a basket of indeterminate form (NMNH A335322.1) collected with the remains of a possible cylinder basket (NMNH A335322.2) from room 298A. The splices on the vessel fragment of unidentified form were patterned in a way that hints at some type of stepped element design.

Judd (1954:314) commented upon flecks of orange paint that he observed on one fragment of a bifurcated basket, but I saw no orange paint of aboriginal derivation.
Figure 7.9. Convex (top) and concave (bottom) surface views of steep-sided bowl (possible cylinder basket) fragments decorated with a dyed stitch design overpainted with black and yellow on exterior (32328). This basket was excavated by Moorehead (1906) from Room 53 or 56/63 at Pueblo Bonito. Courtesy of the Robert S. Peabody Museum of Archaeology at the Phillips Academy.
on any of the baskets. However, I did note one fragment of a bifurcated basket from Room 326 (NMNH A335294) with adhering flecks of orange paint. These flecks are consistent in color and texture with orange paint used by museum staff to apply catalog numbers to some of the Pueblo Bonito artifacts, particularly those that are heavily coated with paraffin.

The cylindrical mosaic baskets and clay coated baskets were discussed at length earlier, but the other 11 decorated vessels warrant comment. Seven baskets exhibit woven geometric designs effected by dyed stitches, and three of these specimens also exhibit painted designs overlaying their woven designs. Two bifurcated basket fragments exhibit traces of paint only, but their preservation is such that if they bore woven decoration, it would no longer be recognizable (Figure 7.8). Two oval/hourglass-shaped trays, one of which may have originally exhibited a woven design, do not exhibit paint, but instead evidence the application of a finely ground red mineral pigment (ochre?) to all or parts of their surfaces. Unfortunately, discerning the precise character of woven and painted designs is not possible except in the case of the relatively well preserved bifurcated burden basket (NMNH A335293, see Figures 6.4-6.6) and the painted cylinder basket (NMNH A335297, see Figure 6.14). In both of these cases, as well as the fragmentary vessel recovered by Moorehead (RSPM 32328, Figure 7.9), it appears that dyed stitch designs were rejuvenated with paint and also modified slightly to accommodate the addition of new colors made possible by paint. That variation in basketry designs existed is clear, but little more can be said beyond pointing out the repetition of linear, fret, and zig-zag or serrated elements, all of which appear in
different permutations in contemporaneous eleventh and twelfth century A.D. black-on-white Chacoan ceramic designs.

Design colors vary depending on material(s) and processing, as well as post-depositional factors and post-excavation treatments, such as paraffin and ambird coatings. The color palette used for designs created with dyed stitches includes black and reddish brown, both typically played off of one another and the natural tan or buff color of undyed stitches. No pigmented stitches are obviously anything other than sumac (Rhus sp.), and no attempt has yet been made to determine the sources of the dyes used. For painted designs, turquoise (blue-green), red, black, and yellow are the colors employed. Hand lens and limited microscopic examination indicate that the primary component of these paints is ground mineral(s), as indicated by visible mineral flecks in the pigment. Likely mineral sources are limonite or yellow ochre for yellow, hematite or red ochre for red, and possibly an organic material for black. Turquoise pigments best resemble malachite, though inclusion of some azurite cannot be eliminated. Several partially burned clay coated and painted baskets with blue designs that burned to black validate malachite as the likely source, since it is known to turn black when heated. This raises the possibility that some of the black pigments include ground heat-treated malachite, but this needs to be tested further.

Excluding clay coated and painted baskets, which exhibit considerable variability in vessel form, all of the baskets with woven-in decoration appear to be examples of unique vessel forms such as bifurcated burden baskets, cylinder baskets, and oval/hourglass-shaped trays. However, rather than conclude that most other wares
were undecorated, I am inclined to think that their apparent absence is due to preservation factors. If the pattern is real, Moorehead’s (RSPM 32328, see Figure 7.9) fragmentary steep-sided basket from Room 53 or 56/63 stands out as the only exception but, as noted earlier in the discussion of Pueblo Bonito’s cylinder baskets, this specimen’s depositional context, surviving shape, and decoration all suggest that it could have conceivably been a painted cylinder basket analogous to the specimen from Room 330. Although the two mosaic cylindrical baskets from Room 33 are dated to the late A.D. 800s (Coltrain et al. 2007; Plog and Heitman 2010), the weight of the provenience and chronological information indicates a strong association of Early to Classic Bonito subphase decorated baskets with the northern and western burial clusters, distinct from the decidedly non-mortuary distribution of the four clay coated and painted baskets.

**Metric Variation.** Spatial and temporal patterning in coiled basketry metric variation can be explored by examining an entire assemblage as a unit and by individual structural types to minimize metric variability introduced by differences in primary weave structure (e.g., foundation type, stitch type). Examining the Pueblo Bonito coiled basketry assemblage as a unit facilitates assessment of broad patterns that may exist at the site, while evaluation of metric variation within the most abundant structural type affords the same opportunities but without the concerns for differences in weave structure influencing results. Two rod and bundle bunched foundation coiling sewn with noninterlocking stitches was the preferred structural type and the only one surviving in sufficient quantity to allow exploration of spatiotemporal patterns (Table 7.3).
A scatterplot of the number of stitches and coils per cm for the entire assemblage by arbitrary spatial quadrants that roughly approximate Pueblo Bonito’s architectural growth over time illustrates broad spatial trends in coiled basketry at the site (Figure 7.10). Although sample sizes are uneven between the quadrants, what is clear is that coiled wares from rooms in the northern quadrants are more similar to each other metrically in terms of stitch and coil density than they are to those from the southeast quadrant. At this scale the data indicate the slight possibility of difference between coiling from the northwestern and northeastern rooms, inasmuch as northeastern baskets tend to be coarser than northwestern ones. While the range of variation in coiled baskets from northern rooms is sizeable, on average northern coiling shows a correlation between higher stitch and coil density, whereas coiling from the southeastern rooms in the pueblo evidence a trend towards increased stitch density at the cost of a thickening of the coils. When this comparison is restricted to two rod and bundle, noninterlocking stitch baskets, the same pattern still obtains and suggests that coiled baskets of this structural type from the southeast are generally coarser in weave texture (wall fineness) than those from northern rooms (Figure 7.11). Chronology may also be a factor, given that baskets from southeastern rooms are probably younger.

Compared to baskets from numbered burials and burial room clusters, non-mortuary baskets tend to be coarser in terms of stitch and coil density, suggesting the plausibility of preferential selection of finer wares for deposition with the deceased (Figure 7.12). No pattern is discernible in stitch and coil metrics when coiled baskets from the northern and western burial clusters are compared, suggesting that there is no
Figure 7.10. Scatterplot of Pueblo Bonito coiled basketry stitches and coils per cm by arbitrary spatial quadrant. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.11. Scatterplot of Pueblo Bonito two rod and bundle bunched foundation, noninterlocking stitch coiled basketry stitches and coils per cm by arbitrary spatial quadrant. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
clear difference in coiled wares between them, or (more likely) that there are currently insufficient data to evaluate the possibility of difference (Figure 7.13). Available data from individual burials indicate a range of variation within Room 326 (Figure 7.14). Baskets associated with Burial 10 are more metrically similar to each other than others from burials in the same room, in contrast to two baskets from double burial 8/9 that are more distinctive metrically. The Burial 10 specimens include a cylinder basket and a bifurcated basket, while Burial 8/9 includes an oval/hourglass tray and a bifurcated basket. All four specimens are two rod and bundle bunched foundation, noninterlocking stitch baskets, so weave structure can be excluded as a source of metric variation.

An interesting correlation emerges when the data are examined through time.

To make the most of small sample sizes and poor artifact-specific chronometric data,
specimens attributable to Early, Early to Classic, and Classic Bonito subphase contexts are lumped together, while specimens from Classic to Late and Late Bonito subphase contexts are aggregated. Despite this coarseness of temporal resolution, the scatterplot in Figure 7.15 largely replicates the correlation seen in Figure 7.10 in which stitch and coil density data are examined by spatial quadrant. Here, however, the shift in coil density is correlated with specimens dated to Classic to Late Bonito times. Notably, the majority of Classic to Late Bonito subphase specimens derive from rooms in the southeast quadrant, suggesting that the observed spatial pattern is at least partly a product of chronology. This chronological trend in stitch and coil density also appears when only two rod bunched noninterlocking stitch baskets are examined, but it is not as robust (Figure 7.16, cf. Figure 7.11).

Figure 7.13. Scatterplot of Pueblo Bonito two rod and bundle bunched foundation, noninterlocking stitch coiled basketry stitches and coils per cm by mortuary room number. Red rooms are Pepper’s northern burial cluster and blue rooms are Judd’s western burial cluster.
Figure 7.14. Scatterplot of Pueblo Bonito western burial cluster coiled basketry stitches and coils per cm by burial. Room numbers are data point labels.

Figure 7.15. Scatterplot of Pueblo Bonito coiled basketry stitches and coils per cm by temporal period. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
Figure 7.16. Scatterplot of Pueblo Bonito two rod and bundle bunched foundation, noninterlocking stitch coiled basketry stitches and coils per cm by temporal period. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Although multiple metric variables are potentially measureable in every coiled basket, in reality preservation allowed for ample data only to be collected consistently on stitch and coil dimensions and densities. Even so, the most abundant and presumably reliable data are for the ubiquitous two rod and bundle, noninterlocking stitch coiling. These data are summarized in Table 7.6. Calculation of the percent coefficient of variation (CV) of metric attributes of basket wall texture affords one means of exploring production standardization. This method is frequently used to explore standardization in ceramics and has the advantage over standard deviation in that it describes relative variation by expressing the standard deviation as a percentage of the mean, removing the effects of scale and yielding a value that is comparative across assemblages of different sizes (Crown 1995; Eerkens and Bettinger 2001; Longacre et al. 1988; Schleher
2010). The higher the percent CV the more variation that exists in an assemblage.

Conversely, the lower percent CV the greater the standardization.

Table 7.6. Descriptive Statistics for Metric Variables of Pueblo Bonito Two Rod and Bundle Bunched Foundation, Noninterlocking Stitch Coiled Baskets.

<table>
<thead>
<tr>
<th>Metric Variable</th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil Diameter</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>56</td>
<td>2.6-7.0</td>
<td>4.2</td>
<td>21.1</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>35</td>
<td>2.7-6.1</td>
<td>4.2</td>
<td>20.1</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>11</td>
<td>2.6-7.0</td>
<td>4.5</td>
<td>25.8</td>
</tr>
<tr>
<td><strong>Coils per cm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>58</td>
<td>1.6-3.6</td>
<td>2.4</td>
<td>19.8</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>36</td>
<td>1.7-3.6</td>
<td>2.5</td>
<td>20.8</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>12</td>
<td>1.6-3.0</td>
<td>2.3</td>
<td>17.1</td>
</tr>
<tr>
<td><strong>Stitch Width</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>57</td>
<td>.8-3.0</td>
<td>1.4</td>
<td>25.1</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>35</td>
<td>.8-2.1</td>
<td>1.4</td>
<td>20.8</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>12</td>
<td>.9-3.0</td>
<td>1.6</td>
<td>33.6</td>
</tr>
<tr>
<td><strong>Stitches per cm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>58</td>
<td>4.0-10.8</td>
<td>6.5</td>
<td>22.4</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>36</td>
<td>4.3-10.8</td>
<td>6.7</td>
<td>20.8</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>12</td>
<td>4.0-7.5</td>
<td>5.6</td>
<td>19.3</td>
</tr>
<tr>
<td><strong>Fineness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>58</td>
<td>8.0-34.3</td>
<td>16.0</td>
<td>40.8</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>36</td>
<td>8.8-34.3</td>
<td>17.0</td>
<td>40.4</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>12</td>
<td>8.0-20.6</td>
<td>12.7</td>
<td>27.0</td>
</tr>
</tbody>
</table>

* Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.

Variation within metric variables of two rod and bundle bunched foundation coiling shows that, in general terms, the basketweavers responsible for Pueblo Bonito's coiled wares adhered to rather consistent standards for coil and stitch dimensions, as well as overall weave texture or fineness, which is a product of weaving element dimensions and how closely coils and stitches are packed. Fineness is calculated by multiplying the number of coils per cm by the number of stitches per cm to determine
the number of stitches per square cm. The resulting value is a quick and easy
assessment of time spent weaving in that, all things being equal, it will take twice as
long to sew 20 stitches per square cm as it would 10 stitches per square cm (see
Polanich 1994).

The data suggest that the average number of stitches per cm decreased during
the Classic and Late Bonito subphases as compared to preceding centuries, a fact also
reflected by the overall decrease in fineness from 17 to 12.7 stitches per square cm
during the same timeframe. Percent CV is more difficult to interpret as certain variation
throughout the Bonito phase is likely due to the small sample of specimens from Classic
to Late Bonito subphase contexts, but the data show that stitch width became less
consistent and overall fineness was more standardized during Classic and Late Bonito
subphase times. This implies that although baskets from Classic and Late Bonito
subphase contexts were on average coarser than preceding times, there was
concurrently less overall variation in fineness.

As noted earlier, information on variability in vessel form is limited save for the
better preserved unique forms with ritual associations. Summary data on these vessels,
by form, are presented in Table 7.7 and compared against combined data for all other
Pueblo Bonito coiled vessels. Data on other forms include bowls, a diverse class of
forms, as well as fragments of indeterminate form, and are provided for the sake of
rough comparison and should be interpreted cautiously.
Table 7.7. Descriptive Statistics for Metric Variables of Pueblo Bonito Coiled Baskets with Unique Forms Compared to Aggregated Data for Other Vessels.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil Diameter</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bifurcated Burden Basket</td>
<td>5</td>
<td>3.2-4.8</td>
<td>4.2</td>
<td>15.9</td>
</tr>
<tr>
<td>Cylinder Basket</td>
<td>18</td>
<td>2.9-7.5</td>
<td>4.2</td>
<td>23.5</td>
</tr>
<tr>
<td>Oval/Hourglass Tray</td>
<td>4</td>
<td>2.9-4.4</td>
<td>3.8</td>
<td>16.7</td>
</tr>
<tr>
<td>All Other Forms</td>
<td>49</td>
<td>2.2-7.0</td>
<td>4.2</td>
<td>28.0</td>
</tr>
<tr>
<td><strong>Coils per cm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bifurcated Burden Basket</td>
<td>5</td>
<td>1.9-3.6</td>
<td>2.3</td>
<td>30.0</td>
</tr>
<tr>
<td>Cylinder Basket</td>
<td>18</td>
<td>1.6-3.33</td>
<td>2.3</td>
<td>18.0</td>
</tr>
<tr>
<td>Oval/Hourglass Tray</td>
<td>6</td>
<td>1.5-3.2</td>
<td>2.5</td>
<td>25.0</td>
</tr>
<tr>
<td>All Other Forms</td>
<td>50</td>
<td>1.5-4.0</td>
<td>2.5</td>
<td>27.0</td>
</tr>
<tr>
<td><strong>Stitch Width</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bifurcated Burden Basket</td>
<td>5</td>
<td>1.1-1.4</td>
<td>1.3</td>
<td>10.1</td>
</tr>
<tr>
<td>Cylinder Basket</td>
<td>18</td>
<td>1.0-1.9</td>
<td>1.4</td>
<td>18.5</td>
</tr>
<tr>
<td>Oval/Hourglass Tray</td>
<td>4</td>
<td>.8-1.5</td>
<td>1.1</td>
<td>28.4</td>
</tr>
<tr>
<td>All Other Forms</td>
<td>50</td>
<td>.8-4.3</td>
<td>1.6</td>
<td>34.0</td>
</tr>
<tr>
<td><strong>Stitches per cm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bifurcated Burden Basket</td>
<td>5</td>
<td>6.1-8.8</td>
<td>6.9</td>
<td>15.9</td>
</tr>
<tr>
<td>Cylinder Basket</td>
<td>18</td>
<td>4.4-8.5</td>
<td>6.4</td>
<td>14.7</td>
</tr>
<tr>
<td>Oval/Hourglass Tray</td>
<td>6</td>
<td>5.7-10.8</td>
<td>8.0</td>
<td>22.0</td>
</tr>
<tr>
<td>All Other Forms</td>
<td>50</td>
<td>1.7-10.5</td>
<td>5.7</td>
<td>29.9</td>
</tr>
<tr>
<td><strong>Fineness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bifurcated Burden Basket</td>
<td>5</td>
<td>12.5-31.5</td>
<td>16.8</td>
<td>49.3</td>
</tr>
<tr>
<td>Cylinder Basket</td>
<td>18</td>
<td>8.8-25.0</td>
<td>15.2</td>
<td>29.5</td>
</tr>
<tr>
<td>Oval/Hourglass Tray</td>
<td>6</td>
<td>11.0-34.0</td>
<td>21.0</td>
<td>43.4</td>
</tr>
<tr>
<td>All Other Forms</td>
<td>50</td>
<td>4.4-34.3</td>
<td>14.3</td>
<td>47.7</td>
</tr>
</tbody>
</table>

* Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.

In terms of coil metrics and average stitch width, the range of variation among the unique vessel forms is comparable given the small samples. The strongest difference is in stitches per cm and the related variable of fineness, wherein the three unique vessels forms are consistently finer than all other specimens, and oval/hourglass trays are the finest. The generally high variability in weave fineness, as indicated by percent CV, is not surprising given that multiple foundation types are represented in the cylinder
and oval/hourglass forms, which would affect coil metrics. This comparison suggests that while unique vessel forms exhibit on average a finer wall texture than other vessels, they still evidence a considerable range of internal variation, an observation buttressed by data presented previously on variation in the overall dimensions of cylinder and bifurcated burden baskets (see Chapter 6). Altogether, this further suggests that while "finer" baskets may be more likely to have been ritual or otherwise special-use vessels, it does not preclude coarser vessels from also having been used in ritual or other specialized contexts.

Aztec West Ruin

Coiled basketry has been recovered from most areas of the site, but no specimens have been recovered from the Central West Wing, Southwest, or South Wing Sectors (Sectors 7-9, see Figure 6.2). Among the areas of the site where it has been found, more than half of the coiling assemblage (51.1 percent) derives from rooms in the Northwest Sector. The East North Wing Sector is the next most abundant, but yielded only nine specimens comprising 11.3 percent of the assemblage. No room produced more than six baskets and only Room 225 in the Northwest produced that many.

Raw Material. All but four baskets appear to employ Rhus sp. stitches and foundation elements, and those with added foundation bundles utilize exclusively Yucca sp. leaf fiber. Two specimens of indeterminate form exhibit Yucca stitches and can only
be generally dated to Aztec West’s occupational span. One was collected by the site
custodian George L. Boundey and may be from Room 199 (AZRU 1265). It is two rod and
bundle bunched foundation coiling sewn with noninterlocking stitches. The second
basket, of one rod, interlocking stitch coiling, is only provenienced to the exterior
northwest corner of the pueblo, but is a clay coated and painted specimen, suggesting
that it could date to the Late Bonito subphase occupation (AZRU 3560). A third basket
(AMNH 29.0/8860) from Late Bonito deposits is a coarse basket base fragment in one
rod, noninterlocking stitch-and-wrap sewn with yucca cordage stitches. The fourth
specimen with atypical raw material, an unfinished basket center (start), employs
*Schoenoplectus* sp. culms for stitches and as its foundation rod (AMNH 29.0/9962). This
example of one rod, noninterlocking stitch coiling comes from Room 135-2 and post-
dates A.D. 1130.

*Structural Type.* Of the ten structural types identified at Aztec West (Table 7.1),
two rod and bundle bunched foundation coiling sewn with noninterlocking stitches is
the most abundant and constitutes 41.2 percent of the assemblage. Three rod bunched
foundation coiling sewn with noninterlocking stitches comprises 27.5 percent of the
collection. These two types clearly dominate the assemblage, together comprising more
than two-thirds of the recovered coiled baskets. One rod foundation coiling with
interlocking stitches is the third most abundant type (15 percent), while the remaining
seven weave structures are represented by but one or two specimens.

Eight structural types are documented from rooms in the Northwest Sector but
no other sectors exhibit more than four different types (Table 7.8). Of the seven
minority structural types, five are found in the Northwest, with examples also coming from the West North Wing, Northeast, and Southeast Sectors. The most common type, two rod and bundle bunched foundation coiling with noninterlocking stitches has a nearly pan-site distribution (Table 7.8), being represented in rooms from northern, eastern, and southeastern portions of the pueblo (Sectors 1-6). Within these rooms, however, it is unevenly distributed, with 57.5 percent (n=19) of the specimens coming from rooms in the Northwest Sector. Three or fewer coiled baskets are known from the other five sectors and the remaining specimens lack provenience.

Table 7.8. Aztec West Coiled Basketry Structural Type Presence by Room.

<table>
<thead>
<tr>
<th>Coiled Basketry Structural Type</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close, 2 Rod and Bundle Bunched, Noninterlocking</td>
<td>33, 37, 48, 49, 111, 124, 136-2, 141, 178, 189, 199?, 202?, 225, 225, Kiva D, Kiva L</td>
</tr>
<tr>
<td>Close, 3 Rod Bunched, Noninterlocking</td>
<td>37, 78, 95, 111, 136-2, 138, 147, 178, 192-2, 197?, 199?</td>
</tr>
<tr>
<td>Close, 1 Rod, Interlocking</td>
<td>80, 115, 135-2, 141, 147, 189, Kiva D, Kiva L</td>
</tr>
<tr>
<td>Close, 1 Rod, Noninterlocking Stitch-and-wrap</td>
<td>115, 135-2</td>
</tr>
<tr>
<td>Close, 2 Rod Stacked, Noninterlocking</td>
<td>189, 201</td>
</tr>
<tr>
<td>Close, 1/2 Rod and Bundle Stacked, Noninterlocking</td>
<td>54, 138</td>
</tr>
<tr>
<td>Open, 1 Rod, Intricate Interlocking Stitch-and-wrap</td>
<td>29, 139</td>
</tr>
<tr>
<td>Close, 1 Rod and Bundle Stacked, Noninterlocking</td>
<td>193</td>
</tr>
<tr>
<td>Close, 2 Rod and Bundle Stacked, Noninterlocking</td>
<td>115</td>
</tr>
<tr>
<td>Open, 2 Rod Stacked, Intricate Interlocking Stitch-and-wrap</td>
<td>29</td>
</tr>
</tbody>
</table>

Three rod bunched foundation coiling sewn with noninterlocking stitches, and one rod coiling sewn with interlocking stitches, have similarly wide spatial distributions at the pueblo, but no examples of the former type are known from the Southeast Sector, while none of the latter come from the Central East Wing Sector. Again, most
examples of three rod (54.5 percent) and one rod (41.6 percent) coiling come from the Northwest Sector, with four or fewer baskets deriving from other areas of the site.

Examining structural types through time (Table 7.9), it is not only clear that the Aztec West sample is biased towards post-Chaco contexts, but that 35 specimens (44 percent) out of the 80 from the site cannot confidently be allotted to either Late Bonito subphase or post-Chaco contexts. Given the comparatively short duration of the Late Bonito subphase occupation, it seems likely that a majority of the temporally unresolved specimens could be assigned to the post-Chaco occupation, but this is conjecture without additional chronometric data. That said, it does constrain analyses of structural type diversity through time, particularly with reference to minority types. The sole example of one rod and bundle stacked, noninterlocking stitch coiling, for example, could come from either Late Bonito or post-Chaco contexts.

Table 7.9. Aztec West Coiled Basketry Structural Type Abundance (n) by Temporal Period.

<table>
<thead>
<tr>
<th>Coiled Basketry Structural Type</th>
<th>Late Bonito (A.D. 1100-1130)</th>
<th>Post-Chaco (A.D. 1130-1290)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close, 2 Rod and Bundle Bunched, Noninterlocking</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Close, 3 Rod Bunched, Noninterlocking</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Close, 1 Rod, Interlocking</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Close, 1 Rod, Noninterlocking Stitch-and-wrap</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Close, 2 Rod Stacked, Noninterlocking</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Close, 1/2 Rod and Bundle Stacked, Noninterlocking</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Open, 1 Rod, Intricate Interlocking Stitch-and-wrap</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Close, 2 Rod and Bundle Stacked, Noninterlocking</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Open, 2 Rod Stacked, Intricate Interlocking Stitch-and-wrap</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Most structural types appear to have been present throughout the site’s occupation, including three of the minority types. Three rod bunched foundation,
noninterlocking stitch coiling is notably absent from Late Bonito subphase contexts, as are the two open coiled, intricate interlocking stitch-and-wrap types. Although this could indicate the arrival of three new structural types after about A.D. 1130, it is difficult to be certain given the small Late Bonito sample.

Where data on vessel form are available, the broad class of bowl-shaped vessel forms exhibits the greatest structural diversity with eight types represented (Figure 7.17). Here, the three most numerous structural types are well represented and also include five minority types. Trays and plaques evidence use of both two rod and bundle bunched, noninterlocking stitch, and three rod bunched, noninterlocking stitch weaves, with a clear preference for the latter among plaques. The remaining vessel forms documented occur as two rod and bundle bunched foundation, noninterlocking stitch baskets, with the exception of the shield, which is three rod bunched.

*Work Surface and Direction.* Work surface was identifiable for 58 baskets, of which 56 are concave and two convex (Figure 7.18). Of the 37 specimens for which a form and work surface could be determined, all but two exhibit concave work faces. One plaque and one restricted mouth vessel exhibit convex work surfaces. Based on the basket forms documented, this pattern is not unexpected, though it is typical for baskets with restricted openings to exhibit convex work faces (Adovasio 2010). That one of the two restricted mouth vessels identified exhibits a concave work face is uncommon, but not impossible as such decision would depend on the overall size of the vessel, diameter of opening and the weaver’s preference.
Figure 7.17. Aztec Ruin West coiled basketry structural type by vessel form. The red and bright blue weave structures are the two most common types.

Figure 7.18. Aztec Ruin West coiled basket work surface by vessel form.
Work direction is almost uniformly R-L. Seventy-eight specimens exhibit R-L work directions and two exhibit L-R. One L-R specimen (AMNH 29.0/8860) is an unusual, very coarse one rod, noninterlocking stitch-and-wrap basket center from Late Bonito subphase contexts in Room 115 that employs yucca cordage for stitching thread. The second specimen (AMNH 29.0/9502), from post-Chaco deposits in Room 139, is the start of an open coiled, one rod, intricate interlocking stitch-and-wrap basket (Figure 7.19). The atypical structural configurations of these baskets may have something to do with their contrary work directions.

Figure 7.19. Concave surface view of a one rod foundation, intricate interlocking stitch and wrap basket center from Room 139 at Aztec West (29.0/9502). Note normal starting method and left-to-right work direction. Courtesy of the American Museum of Natural History.
**Starting and Finishing Methods.** Fifty-one preserved basket centers indicate a preference for normal starts. Although the oval/hourglass-shaped tray was missing most of its base, its wall curvature would have required an oval start, indicating that this starting method was also in use at Aztec. Thirty-one specimens preserve rim treatments, of which 28 are self rims and three exhibit full circuits of 2/2 interval false braiding. Ten of the specimens with self rims evidence false braid terminations. False braid termination interval among these baskets is variable, with one 1/1, four 2/2, three 3/3, and one 4/4. False braid interval could not be determined for the tenth example.

Self rims are attested throughout Aztec West’s occupation and, while one example of false braiding is undated, the other two come from post-Chaco deposits. Baskets with false braid terminations appear to date primarily to post-Chaco times, but three of the ten specimens are not assignable specifically to Late Bonito or post-Chaco contexts. The observed variations in rim treatment occur across the site and in mortuary and non-mortuary contexts.

Unusual rim manipulations are present on two coiled baskets from burials, however (Table 6.4). In a bowl accompanying Grave 20 in Room 95 (AMNH 29.0/8958), unidentified white and brown speckled feathers are secured beneath the last few stitches of the 1/1 interval false braid rim termination and presently extend 3.3 mm beyond the rim (Figure 7.20). In the second vessel, a bowl associated with Grave 40 in Room 136-2 (AMNH 29.1/3221), there are trace amounts of turquoise-colored mineral pigment embedded between stitches over about 2 mm of the 2/2 interval false braid rim termination (Figure 7.21).
Figure 7.20. Concave surface view of a bowl from Grave 20 in Room 95 at Aztec West exhibiting unidentified brown and white speckled feathers (at left) secured beneath its 1/1 interval false braid rim termination (29.0/8958). Courtesy of the American Museum of Natural History.

Figure 7.21. Oblique angled profile and close-up views of a bowl from Grave 40 in Room 136-2 at Aztec West with turquoise pigment adhering to interior of 2/2 interval false braid rim termination (29.1/3221). Courtesy of the American Museum of Natural History.
**Stitch Splices.** From 41 baskets, eleven splice types were identified at Aztec West. Table 7.10 provides a breakdown of splice type distributions in time and space. Two of the three most abundant splice types occur throughout the site's occupation span. The second most abundant type may as well, but most of the examples are undated. Uneven preservation requires caution in interpreting splice types seemingly restricted to either Late Bonito or post-Chaco contexts. Although 63 percent of the sample for which splice type is discernible derives from the Northwest sector, several splice types are documented in other areas of the site and there is no clear spatial patterning, nor is there a correlation between splice type and vessel form. The Aztec West sample also clearly illustrates that splice types are not necessarily exclusive to single structural types, as the most common splice type is observed in baskets employing five different weave structures. The final three splice types listed in Table 7.10 are each associated with a single structural type, three rod bunched foundation for the last two, and two rod and bundle bunched for the third from last.

The three vessels from Room 95 are attributed to Grave 20 (Table 6.4) and each exhibited a different splice type. A similar case obtains to the two vessels found with Grave 32 in Room 138. This could indicate multiple producers for the baskets with these burials, or that they were not all associated with the burials. However, the burial associations seem firm for Grave 32, if not Grave 20. By comparison, the two vessels unambiguously accompanying Grave 40 in Room 136-2 share the same splice type. In this case, a stronger argument could be made that they were produced by one
individual or two persons related through the learning and teaching of coiled basketweaving.

Table 7.10. Distribution of Coiled Basketry Stitch Splice Types at Aztec West by Temporal Period and Room.

<table>
<thead>
<tr>
<th>Splice Type</th>
<th>n</th>
<th>Late Bonito A.D. 1100-1130</th>
<th>Post-Chaco A.D. 1130-1290</th>
<th>Undated</th>
<th>Structural Types (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fag and moving ends bound under with work direction</td>
<td>10</td>
<td>115 (2)</td>
<td>138, 141, 178, 189</td>
<td>199?, unk. (3)</td>
<td>5</td>
</tr>
<tr>
<td>Fags bound under with work direction, movings clipped</td>
<td>8</td>
<td></td>
<td>136-2, 192-2</td>
<td>199?, 202?, 224, unk. (3)</td>
<td>2</td>
</tr>
<tr>
<td>Fag and moving ends clipped</td>
<td>5</td>
<td>189</td>
<td>135-2, 189</td>
<td>78, 147</td>
<td>4</td>
</tr>
<tr>
<td>Fags bound under against work direction, movings clipped</td>
<td>4</td>
<td></td>
<td>95, 139</td>
<td>147, 197?</td>
<td>3</td>
</tr>
<tr>
<td>Fags clipped, movings bound under against work direction</td>
<td>3</td>
<td>48</td>
<td>37, 138</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Fags bound under against work direction, movings bound under with work direction</td>
<td>3</td>
<td></td>
<td>95, 136-2, 189</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Fags clipped, movings bound under with work direction</td>
<td>2</td>
<td>115, 189</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Fags clipped and bound under with work direction, movings bound under with work direction</td>
<td>2</td>
<td>201</td>
<td>193</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Fags clipped and bound with work direction, movings clipped</td>
<td>2</td>
<td></td>
<td>136-2 (2)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Fag and moving ends bound under against work direction</td>
<td>1</td>
<td>95</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Fags clipped, movings bound under with work direction and clipped</td>
<td>1</td>
<td></td>
<td>136-2</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Decoration. Coiled basketry from Aztec West contains 17 whole or fragmentary vessels exhibiting woven-in decoration or the application of paint or dry pigment (Table 7.11). The sample includes six baskets with dyed stitches, four baskets with painted designs, six clay coated and painted vessels, and one or two specimens with adhering pigment-impregnated fiber. One specimen exhibits both a dyed stitch design and a
Table 7.11. Decorated Coiled Baskets from Aztec West Ruin.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Vessel Form</th>
<th>Structural Type</th>
<th>Decoration Type and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMNH 29.0/7481</td>
<td>Room 65</td>
<td>A.D. 1100-1130</td>
<td>Indeterminate</td>
<td>Unknown</td>
<td>Clay coated; paint presumably chipped off</td>
</tr>
<tr>
<td>AMNH 29.0/8937.1</td>
<td>Room 95, Grave 20</td>
<td>A.D. 1130-1290</td>
<td>Plaque</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>Painted; thin coat of red paint (ochre?) applied to first 5 coils of center on work surface only, but amorphous red paint splotches occur sporadically elsewhere; white paint, possibly effecting vertical elements or stacked triangles, emanates from center, in some places overlain by red paint splotches; most paint worn away</td>
</tr>
<tr>
<td>AMNH 29.0/5376</td>
<td>Room 122-2</td>
<td>A.D. 1100-1130</td>
<td>Indeterminate</td>
<td>Unknown</td>
<td>Clay coated and painted; partial yellow zig-zag outlined in black against red clay background</td>
</tr>
<tr>
<td>AMNH 29.1/3220</td>
<td>Room 136-2, Grave 39</td>
<td>A.D. 1130-1290</td>
<td>Plaque</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>Dyed stitches; faded polychrome geometric design of 3 sets of 5 evenly spaced -slanting bars comprised of checkered natural, reddish brown and black stitches; each individual bar set alternates black\red\black</td>
</tr>
<tr>
<td>AMNH 29.1/3221</td>
<td>Room 136-2, Grave 40</td>
<td>A.D. 1130-1290</td>
<td>Bowl</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; polychrome design is 5 roughly evenly spaced Xs around basket wall in checkered natural and dark brown/black stitches framed at rim and wall-base juncture by coils of dark brown stitches; triangles created by negative space above each X is filled with reddish brown stitches; turquoise pigment at rim termination</td>
</tr>
<tr>
<td>AMNH 29.1/3222</td>
<td>Room 136-2, Grave 40</td>
<td>A.D. 1130-1290</td>
<td>Bowl</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; polychrome design consists of 3 evenly spaced elements around the wall that consist of a single stepped fret in black stitches conjoined with another given a twofold rotation; reddish brown stitches fill the closed steps of the frets</td>
</tr>
<tr>
<td>AZRU 2897</td>
<td>Room 147</td>
<td>A.D. 1100-1290</td>
<td>Indeterminate</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>Painted; faded black painted design on non-work face; pattern hard to discern but consists of thick black vertical bar with bird tail-like fan at one end and two thinner crossbars; possibly zoomorphic</td>
</tr>
<tr>
<td>AZRU 777</td>
<td>Room 178, Grave 83</td>
<td>A.D. 1130-1290</td>
<td>Shield</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>Painted; outermost 5-6 exterior coils lightly pitched and sprinkled with flaked and ground selenite that produces light gray to violet iridescence; rest of exterior evenly coated with finely ground mixture of blue-green mineral pigment</td>
</tr>
<tr>
<td>AZRU 1271</td>
<td>Room 178, Grave 83</td>
<td>A.D. 1130-1290</td>
<td>Tray</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; design hard to discern but center appears to have been entirely dark brown/black stitches, possibly with some outward radiating elements; 3 evenly spaced 5-pointed crown-like elements are easiest to see in wall, the centers of which are triangles of undyed stitches</td>
</tr>
<tr>
<td>AMNH 29.1/3219</td>
<td>Room 189</td>
<td>A.D. 1090, AMS $^{14}$C median</td>
<td>Ladle</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Clay coated and painted; little clay coating remains but traces of black paint are visible on interior of ladle bowl</td>
</tr>
<tr>
<td>AZRU 1033.2</td>
<td>Room 189</td>
<td>A.D. 1130-1290</td>
<td>Plaque</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Painted, dyed and turkey quill stitches; woven design consists of three evenly spaced inverted step-triangles comprised of checkered reddish brown dyed stitches and dark brown turkey feather quill stitches; faded black painted design is an abstract, asymmetrical form on exterior bounded by the 3 woven motifs, possibly a bird with wings, tail and feet splayed, or other zoomorph</td>
</tr>
<tr>
<td>AZRU 1488.1</td>
<td>Room 199?</td>
<td>A.D. 1100-1290</td>
<td>Indeterminate</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Pigmented felted fiber coating; probably from same vessel as AZRU 1379.d; nonwork surface has thin layer of felted fine fibers (animal hide or Yucca sp?) adhering that are impregnated with red pigment (ochre?); possibly mimicking clay coated and painted basketry?</td>
</tr>
<tr>
<td>AZRU 1268</td>
<td>Room 202?</td>
<td>A.D. 1100-1290</td>
<td>Wide mouthed bowl</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Dyed stitches; in surviving design black stitches create series of spaced -slanting vertical zig-zags (at least 3-4) that hang pendant from the penultimate coil which is entirely dyed stitches</td>
</tr>
<tr>
<td>AMNH 29.0/9345</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>Indeterminate</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>Clay coated and painted; painted design appears to have consisted of stepped triangles or zig-zags in turquoise paint underlain by earlier white paint (guideline?) set against red clay background</td>
</tr>
<tr>
<td>UCMNH 5932</td>
<td>Kiva L</td>
<td>A.D. 1100-1130</td>
<td>Bowl</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Clay coated and painted; Morris and Burgh (1941:26) describe pattern in black, blue-green, and yellow against red clay background that to them resembled designs on painted board and mortar from Pueblo Bonito (Pepper 1920:228, 266, Rooms 63, 80); at present, painted concave face exhibits turquoise paint applied to effect zig-zag-like design; lines are framed with a thin white line that appears to be an underlying guideline</td>
</tr>
<tr>
<td>AZRU 1379.d</td>
<td>Unknown</td>
<td>A.D. 1100-1290</td>
<td>Indeterminate</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>Pigmented felted fiber coating; probably from same vessel as AZRU 1488.1; nonwork surface has thin layer of felted fine fibers (animal hide or Yucca sp?) adhering that are impregnated with red pigment (ochre?); grainy yellow pigment/residue (binder?) visible under some fibers; possibly mimicking clay coated and painted basketry?</td>
</tr>
<tr>
<td>AZRU 3560</td>
<td>Exterior NW corner</td>
<td>A.D. 1100-1290</td>
<td>Indeterminate</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>Clay coated and painted; very faded and worn painted design consists of black serrated lines emanating from the basket center, some of which bend at 90° angles</td>
</tr>
</tbody>
</table>
painted design. Bowls of various configurations, plaques, trays, a ladle, and the shield comprise the documented decorated vessel forms.

The woven-in geometric design repertoire appears to encompass checkered, linear, triangular, and zig-zag motifs (Figure 7.22). When designs are complete or nearly so, they demonstrate repeated motifs that are sparse on the basket’s surface relative to undecorated wall space. Dyed stitches, all seemingly *Rhus* sp., are frequently a black to dark brown, and include very conservative use of reddish brown dyed stitches in polychrome vessels. A single vessel with a dyed stitch and painted design also employs dark brown turkey feather quill stitches (AZRU 1033.2, Figure 7.23). Painted designs minimally include serrated lines and zig-zags on clay coated vessels, and more abstract designs, some possibly zoomorphic, on others (Figures 7.23, 7.24). Clay coated vessels evidence turquoise, white, black, and possibly yellow painted designs set against their red clay backgrounds (Figures 7.25, 7.26, 7.27). Painted baskets show use of red, white, black and turquoise/blue-green colors. In painted vessels, and the basket where a dyed stitch design co-occurs with painted decoration, there is no clear evidence for the rejuvenation or modification of the designs. Fragments from two specimens bear red pigmented fibrous material (animal skin/hide or yucca fiber?) adhering to them, and these may have originally been from the same vessel, perhaps intended to mimic a clay coated basket (Figure 7.28).

All decorated specimens come from northern rooms of the pueblo and, as expected, more than 60 percent come from the Northwest Sector, which yielded most of Aztec West's coiled basketry. Where finer resolution chronometric data are available,
Figure 7.22. Concave surface view of a bowl fragment exhibiting a dyed stitch design of pendant zig-zags, probably from Room 202 at Aztec West (AZRU 1268). Purplish red staining is fungus. Fragment is 16.8 cm long by 9.4 cm tall. Courtesy of the National Park Service and Aztec Ruins National Monument.

Figure 7.23. Convex surface view of the base of a bowl exhibiting a dyed stitch design that includes turkey feather quill stitches (dark brown) and a painted black bird or other zoomorphic figure from Room 189 at Aztec West (AZRU 1033.2). Note that the base is a complete plaque sewn to the bowl as a replacement base. The entire vessel is 18.5 cm in diameter and 9.5 cm tall, but the plaque is 20 cm in diameter. Courtesy of the National Park Service and Aztec Ruins National Monument.
Figure 7.24. Convex surface view of a basket base exhibiting black painted design, possibly zoomorphic, from Room 147 at Aztec West (AZRU 2897). Fragment is 12.8 cm in diameter. Courtesy of the National Park Service and Aztec Ruins National Monument.

Figure 7.25. Concave surface view of a clay coated and painted basket base exhibiting a black painted design, possibly zoomorphic, from the exterior northwest corner of Aztec West (AZRU 3560). A Spectroline MiniMax (Model UV-4AW) handheld ultraviolet light lamp was used to bring out the faded design. Fluorescing yellow fiber is the epidermis of the Yucca sp. used for stitching thread. Fragment is 11.2 cm in diameter. Courtesy of the National Park Service and Aztec Ruins National Monument.
Figure 7.26. Concave surface view, with close-up, of clay coated and painted basket fragments exhibiting a painted design from Kiva L at Aztec West (UCMNH 5932). Courtesy of the University of Colorado Museum of Natural History.

Figure 7.27. Clay spalls from a clay coated and painted basket from Room 122-2 at Aztec West (29.0/5376). Courtesy of the American Museum of Natural History.
Figure 7.28. Convex and close-up views of fragments of a basket exhibiting adhering matted fibrous material impregnated with red pigment, probably from Room 199 at Aztec West (AZRU 1488.1). Courtesy of the National Park Service and Aztec Ruins National Monument.
clay coated vessels are preferentially associated with Late Bonito subphase deposits, whereas the other decorated vessels principally post-date A.D. 1130. Six of the decorated vessels derive from four post-Chaco burials distributed across three rooms.

**Metric Variation.** Scatterplots of stitch and coil metrics by structural type illustrate the subtle influence of foundation type and arrangement on metric variation (Figures 7.29, 7.30). Although there is overlap, the three most numerous types can be distinguished by observable differences in stitch or coil metrics, or both. One rod vessels tend to have relatively wide and less densely packed stitches but narrow coils. Two rod and bundle bunched foundation baskets exhibit generally finer stitches and coils. Three rod bunched foundation baskets on average have a coarser weave texture as a byproduct of fatter coils, but their stitch width range overlaps with two rod and bundle bunched foundation baskets. Because three rod bunched vessels are absent from Late Bonito contexts we cannot examine chronological change in this type but can attribute some Late Bonito vs. post-Chaco assemblage metric differences to increased use of this structural type. Acknowledging this fact, we may then note the relative similarity in stitch width for the two most abundant types throughout Aztec’s occupation.

Uneven sample distribution throughout the pueblo makes assessment of spatial patterns difficult. Even when restricted to the three sectors yielding the largest samples, sufficient overlap exists in stitch and coil metrics to potentially attribute any apparent differences to sample size (Figure 7.31). However, coiled baskets from the Northeast and East North Wing Sectors do appear more similar to each other metrically than to
Figure 7.29. Aztec Ruin West coiled basketry stitch and coil dimensions by structural type.

Figure 7.30. Aztec Ruin West coiled basketry stitch and coil density by structural type.
baskets from the Northwest Sector. Assemblage stitch and coil metric data plotted by Aztec’s major temporal division show that Late Bonito coiled basketry tends to have narrower stitches and coils as compared to post-Chaco coiling (Figure 7.32). Similarly, stitch and coil density data reveal that Late Bonito coiling appears variable but slightly finer than post-Chaco wares (Figure 7.33). This pattern holds, but is weaker, when only two rod and bundle bunched and three rod bunched foundation baskets are plotted to minimize the effects of variation introduced by other structural types (Figure 7.34).

These data indicate a decided chronological difference, but could also imply a spatial one inasmuch as the majority (10 out of 13) of the Late Bonito specimens derive from rooms in or immediately adjacent the Northeast and East North Wing Sectors. This may
Figure 7.32. Aztec West Ruin coiled basketry stitch and coil dimensions by temporal period.

Figure 7.33. Aztec West Ruin coiled basketry stitch and coil density by temporal period.
Figure 7.34. Aztec West Ruin coiled basketry stitch and coil density by temporal period and two most abundant structural types.

indicate a degree of distinctiveness to Late Bonito wares from the northeastern portion of the pueblo, but the meager Late Bonito specimens from the Northwest Sector makes it difficult to evaluate.

Comparison of vessels from post-Chaco mortuary contexts with those from other contexts illustrates that mortuary baskets are neither the coarsest nor the finest in the assemblage (Figure 7.35), suggesting that there was no preferential placement of finer wares with the deceased. Figure 7.36 shows only baskets from mortuary contexts plotted by stitch and coil density. Of note is that burials associated with two or more baskets provide examples of interments with both metrically similar wares and wares with divergent weave textures. These data may indicate multiple producers for the goods with some burials, single or related producers for others, and the possibility that
Figure 7.35. Aztec West Ruin coiled basketry stitch and coil density plotted by mortuary and non-mortuary contexts.

Figure 7.36. Aztec West Ruin coiled basketry stitch and coil density plotted by room number. Data point labels are Morris’ Grave numbers.
some burials with metrically divergent baskets reflect vessels mixed in from room refuse. Burial baskets exhibit a range of metric variation but specimens from eastern sectors tend to cluster more closely together.

Descriptive statistics for Aztec West coiled basketry amplify the foregoing observations (Table 7.12). Two rod and bundle bunched foundation vessels appear to exhibit similar coil metrics throughout the site occupation while three rod bunched foundation baskets have thicker coils and fewer coils per cm than two rod and bundle, which is expected given the substitution of a compressed fiber bundle with a rigid rod. Stitches may be slightly wider in post-Chaco vessels than during Late Bonito times, and post-Chaco three rod bunched vessels exhibit fewer stitches per cm, which contributes to their coarser overall fineness. Percent CV for metric variables of Aztec West coiling reveals little new insight except that the small samples of chronologically assignable wares may be limiting CV’s comparative utility here. Three rod bunched foundation coiling shows greater standardization than two rod bunched foundation vessels in most metric variables and this is clearest when comparing overall fineness, for which two rod and bundle specimens show the greatest internal variation.
Table 7.12. Descriptive Statistics for Metric Variables of Aztec West Coiled Baskets.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil Diameter</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>76</td>
<td>1.5-11.4</td>
<td>4.9</td>
<td>30.4</td>
</tr>
<tr>
<td>2 Rod and Bundle</td>
<td>31</td>
<td>3.3-6.1</td>
<td>4.5</td>
<td>14.8</td>
</tr>
<tr>
<td>3 Rod</td>
<td>22</td>
<td>3.9-7.5</td>
<td>5.4</td>
<td>13.9</td>
</tr>
<tr>
<td>Late Bonito 2 Rod and Bundle</td>
<td>5</td>
<td>3.3-4.6</td>
<td>4.1</td>
<td>12.6</td>
</tr>
<tr>
<td>Post-Chaco 2 Rod and Bundle</td>
<td>10</td>
<td>3.5-6.0</td>
<td>4.6</td>
<td>16.1</td>
</tr>
<tr>
<td>Post-Chaco 3 Rod</td>
<td>12</td>
<td>4.3-7.5</td>
<td>5.6</td>
<td>15.0</td>
</tr>
<tr>
<td><strong>Coils per cm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>77</td>
<td>.9-4.3</td>
<td>2.1</td>
<td>26.7</td>
</tr>
<tr>
<td>2 Rod and Bundle</td>
<td>32</td>
<td>1.5-3.0</td>
<td>2.1</td>
<td>15.2</td>
</tr>
<tr>
<td>3 Rod</td>
<td>22</td>
<td>1.4-2.5</td>
<td>1.9</td>
<td>16.2</td>
</tr>
<tr>
<td>Late Bonito 2 Rod and Bundle</td>
<td>5</td>
<td>2.0-3.0</td>
<td>2.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Post-Chaco 2 Rod and Bundle</td>
<td>10</td>
<td>1.8-3.0</td>
<td>2.3</td>
<td>16.7</td>
</tr>
<tr>
<td>Post-Chaco 3 Rod</td>
<td>12</td>
<td>1.4-2.5</td>
<td>1.9</td>
<td>17.1</td>
</tr>
<tr>
<td><strong>Stitch Width</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>72</td>
<td>.8-4.1</td>
<td>2.0</td>
<td>27.9</td>
</tr>
<tr>
<td>2 Rod and Bundle</td>
<td>27</td>
<td>.8-2.3</td>
<td>1.7</td>
<td>20.2</td>
</tr>
<tr>
<td>3 Rod</td>
<td>22</td>
<td>1.2-4.1</td>
<td>2.0</td>
<td>28.2</td>
</tr>
<tr>
<td>Late Bonito 2 Rod and Bundle</td>
<td>5</td>
<td>1.1-1.8</td>
<td>1.5</td>
<td>24.0</td>
</tr>
<tr>
<td>Post-Chaco 2 Rod and Bundle</td>
<td>10</td>
<td>.8-2.1</td>
<td>1.7</td>
<td>14.3</td>
</tr>
<tr>
<td>Post-Chaco 3 Rod</td>
<td>12</td>
<td>1.2-2.2</td>
<td>1.8</td>
<td>17.5</td>
</tr>
<tr>
<td><strong>Stitches per cm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>78</td>
<td>2.1-11.3</td>
<td>4.8</td>
<td>32.1</td>
</tr>
<tr>
<td>2 Rod and Bundle</td>
<td>33</td>
<td>2.4-11.3</td>
<td>5.4</td>
<td>27.1</td>
</tr>
<tr>
<td>3 Rod</td>
<td>22</td>
<td>2.2-6.4</td>
<td>4.9</td>
<td>20.0</td>
</tr>
<tr>
<td>Late Bonito 2 Rod and Bundle</td>
<td>5</td>
<td>2.4-8.1</td>
<td>5.5</td>
<td>37.9</td>
</tr>
<tr>
<td>Post-Chaco 2 Rod and Bundle</td>
<td>10</td>
<td>4.5-11.3</td>
<td>5.8</td>
<td>34.9</td>
</tr>
<tr>
<td>Post-Chaco 3 Rod</td>
<td>12</td>
<td>4.0-6.4</td>
<td>5.0</td>
<td>18.3</td>
</tr>
<tr>
<td><strong>Fineness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>77</td>
<td>3.2-44.4</td>
<td>10.6</td>
<td>56.9</td>
</tr>
<tr>
<td>2 Rod and Bundle</td>
<td>32</td>
<td>5.0-34.0</td>
<td>11.8</td>
<td>45.2</td>
</tr>
<tr>
<td>3 Rod</td>
<td>22</td>
<td>3.3-14.6</td>
<td>9.4</td>
<td>29.1</td>
</tr>
<tr>
<td>Late Bonito 2 Rod and Bundle</td>
<td>5</td>
<td>5.0-24.3</td>
<td>13.0</td>
<td>54.7</td>
</tr>
<tr>
<td>Post-Chaco 2 Rod and Bundle</td>
<td>10</td>
<td>8.5-34.0</td>
<td>13.5</td>
<td>56.3</td>
</tr>
<tr>
<td>Post-Chaco 3 Rod</td>
<td>12</td>
<td>5.8-13.4</td>
<td>9.6</td>
<td>27.5</td>
</tr>
</tbody>
</table>

* Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.
Salmon Ruins

The highly fragmented perishables from Salmon Ruins have been the focus of recent detailed study by Webster (2006a, 2008a) and my analyses revisit her important work by adding additional technical details and revising some structural identifications. Twenty-six coiled baskets were recovered from all areas of the pueblo except the southwest (Figure 7.37). Two miniature vessels that are mentioned in field notes could not be located by myself or Webster. The sample is unevenly distributed, with 10 specimens coming the northwest and 11 from the center of the site. Chronologically, the sample is skewed towards Late San Juan (A.D. 1190-1300) contexts, with 77 percent ascribable to this period and the remainder coming from mixed deposits that could date to the same timeframe or earlier.

**Raw Material.** Consistent with Webster’s identifications, all foundation rods and stitches appear to be *Rhus*, while foundation bundles are exclusively *Yucca* fiber.

**Structural Type.** Webster (2006a) allotted the 24 available specimens to three structural types and a residual category for structurally indeterminate specimens. My findings differ from hers in that I eliminate her bundle foundation type, affirm her suspicions that a two rod and bundle stacked foundation is present (Figure 7.38), and add two examples of three rod bunched foundation, noninterlocking stitch coiling (Tables 7.1, 7.13). Two rod and bundle bunched foundation coiling sewn with noninterlocking stitches (Figure 7.39) is unequivocally the dominant weave structure.
Figure 7.37. Map of Salmon Ruins, showing room locations and architectural divisions as they existed by Late San Juan period (A.D. 1190-1300) times and the site’s terminal occupation (from Reed 2006:Fig. 1.3, used with permission from Salmon Ruins Museum and Archaeology Southwest).
Figure 7.38. Concave view of a two rod and bundle stacked foundation basket sewn with noninterlocking stitches from Burial 33B001 in Room 33B at Salmon Ruins (SRM 80,016). Courtesy of the Salmon Ruins Museum.

Figure 7.39. Concave view of two rod and bundle bunched foundation, noninterlocking stitch basket from Room 62W at Salmon Ruins (SRM 80,230). Courtesy of the Salmon Ruins Museum.
and, unsurprisingly, the northwest and central portions of the pueblo that produced the largest samples also evidence the greatest structural diversity.

<table>
<thead>
<tr>
<th>Close Coiled Basketry Structural Type</th>
<th>Room (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Rod, Interlocking</td>
<td>62B-62W, 64W (2), 100W, 101W</td>
</tr>
<tr>
<td>3 Rod Bunched, Noninterlocking</td>
<td>64W (2)</td>
</tr>
<tr>
<td>2 Rod and Bundle Stacked, Noninterlocking</td>
<td>33B</td>
</tr>
<tr>
<td>Unknown</td>
<td>43W</td>
</tr>
</tbody>
</table>

**Work Surface and Direction.** Where preservation permits confident identification, only concave work surfaces and right-to-left work directions are documented.

**Starting and Finishing Methods.** The only starting methods surviving are of the normal variety. Rim treatment and termination are not preserved for any of the Salmon specimens.

**Stitch Splices.** Stitch splices were not analyzed by Webster but my scrutiny of the sample identified two specimens with preserved splices, one each from rooms 43W (SRM 80,112) and 62W (SRM 80,230). Both exhibit fag ends bound under with the direction of work and moving ends that are clipped short.

**Decoration.** Decorative embellishment has not been documented for any of the surviving coiled baskets from the site.

**Metric Variation.** A scatterplot of Salmon Ruins coiling metric data suggests general similarity throughout the pueblo in the range of variation in stich and coil
measurements (Figure 7.40). There is, however, some suggestion that specimens from
rooms in the northwest portion of the pueblo cluster more tightly and thus may be
more standardized, but this could be a product of small sample size or attributable to
chronological differences that we currently lack the resolution to hone in on. The sole
specimen from the northeast stands out because of its relative fineness for a one rod,
interlocking stitch basket (Figure 7.41). Notably, three of the clustering northwest
specimens are from burials, possibly lending support to others’ observations that the
northwest burials stand out as a unit compared to burials elsewhere in the site (Potter
1981; Webster 2006a:1010, 2008a:187). The sole specimen from the southeast is from a
burial and is clearly different from those in the northwest, but we lack data on coiled
baskets from additional mortuary contexts that could strengthen this possible contrast
with the northwest.

Antelope House

Adovasio and Gunn’s (1986) published description of the 77 coiled baskets from
Antelope House is based on detailed attribute-oriented analyses very similar to my own.
Because I could examine only a fraction of the assemblage, I sought to compare my
observations with theirs and obtain a sample for eventual comparison against other
study sites sampled. The subsample that I examined was focused on coiling of the two
most numerous structural types from Pueblo II (A.D. 900-1150) and III (A.D. 1100-1270)
contexts defined by the excavators. Also included is a previously unexamined specimen
Figure 7.40. Scatterplot of Salmon Ruins coiled basketry stitch and coil density by site spatial subdivision.

Figure 7.41. Concave view of a finely woven one rod foundation, interlocking stitch basket from Room 101W at Salmon Ruins (SRM 80,408). White coloring is possible fungus. Courtesy of the Salmon Ruins Museum.
excavated by Kidder and Morris curated at the American Museum of Natural History (29.1/8576). These facts limit the utility of my data for exploring within-site variation and so what follows are some of the most relevant observations drawn from Adovasio and Gunn’s (1986) report including new data and my own observations where appropriate.

Coiled basketry was recovered from across the site but is differentially distributed, with the majority (59.7 percent) coming from the South Room Block/South Area (Figure 7.42). The bulk of the assemblages is ascribable to the excavators’ (Morris 1986) Pueblo III period occupation, which they subdivided into Early PIII (A.D. 1100-1140), Middle PIII (A.D. 1140-1200), and Late PIII (A.D. 1200-1270).

*Raw Material.* Foundation rods and stitches are *Rhus* and *Salix*, with the former genus dominating stitches and the latter dominating rods. Fiber bundles are exclusively *Yucca*, and 3.9 percent of the assemblage employs *Yucca* for stitches. Use of *Rhus* is documented during Basketmaker III times with *Salix* added during Pueblo I, after which both genera are employed side-by-side. No clear spatial patterns in raw material use are reported.

*Structural Type.* Adovasio and Gunn (1986) allotted 77 coiled basketry fragments to 14 primary structural types in their analyses of the Antelope House material, including an incomplete Type VI (close coiling, bundle foundation, stitch type unknown). Because Type VI is represented by a single specimen, and that specimen is the initial coil of a basket start, I do not consider it a distinctive type since the first one or three coils of many ancient Pueblo baskets that I have seen frequently consist of a bundle of fiber or a
Figure 7.42. Map of Antelope House, Canyon del Muerto, Arizona, showing architecturally distinct room blocks (adapted from Adovasio and Gunn 1977). Note that open space divisions are arbitrary.
single rod with or without fiber. Similarly, my reexamination of the single Type IX (close coiling, two rod horizontal foundation, noninterlocking stitch) specimen with a 10x hand lens identified the remains of a yucca bundle, indicating that it actually belongs to their Type XVII (close coiling, two rod and bundle bunched foundation, noninterlocking stitch). I was unable to reexamine all of the Antelope House coiling due to time and NAGPRA constraints, but I suspect that Types X (close coiling, rod with lateral bundle foundation, noninterlocking stitch), XIV (close coiling, two rod and Welt bunched foundation, noninterlocking stitch), and XVIII (close coiling, five rod bunched foundation, noninterlocking stitch), each represented by small single specimens, may have been mistyped owing to their poor preservation. For example, the sole Type X specimen is probably a second example of their Type XII (whole rod and bundle stacked foundation, noninterlocking stitch) coiling, as in my experience this foundation arrangement leads to areas in the basket wall where the surmounting bundle slips to one or both sides of the rod.

Based on these observations, I conservatively recognize at least nine different structural types at Antelope House that I reference here for comparative purposes. Excluding the Type IX specimen, which I have reallocated, the remaining specimens belonging to the four types that I consider dubious are placed in the Foundation and/or Stitch Type Unknown category in Table 7.1 and omitted from further consideration. Of the nine structural types present, the assemblage is clearly dominated by two rod and bundle bunched foundation, noninterlocking stitch coiling (48 percent, Figure 7.43), and one rod foundation, interlocking stitch coiling (33.8 percent, Figure 7.44) (Table
Figure 7.43. Convex surface view of two rod and bundle bunched foundation, noninterlocking stitch basket fragments from Room 21 at Antelope House (CACH 1706). Courtesy of the National Park Service and Canyon de Chelly National Monument.

Figure 7.44. Concave surface view of a complete one rod foundation, interlocking stitch coiled basket plaque from Room 21 at Antelope House (CACH 19061). Courtesy of the National Park Service and Canyon de Chelly National Monument.
7.1). The remaining seven types are represented by two or fewer specimens. Only the most numerous type has a pan-site distribution, while most other types are principally from the South Room Block/South Area.

**Work Surface and Direction.** Both concave and convex work surfaces are present but concave predominates throughout the occupational sequence. There is a clear preference for R-L work direction, though three examples of the opposite occur.

**Starting and Finishing Methods.** Normal starts are most common but a small number of oval starts are also reported. Self rims predominate during Pueblo II and III times and the two specimens with full 2/2 false braid rims are, respectively, restricted to Early and Middle Pueblo III contexts. One Pueblo III specimen exhibits a self rim with a 1/1 interval false braid termination. A probable bifurcated burden basket from an unnumbered burial in Room 44 (FS 641/CACH ?, Table 6.5) exhibits rare rim plaiting atop its self rim similar to that seen on a cylinder basket from Pueblo Bonito (NMNH A335304, Figure 7.7). This feature was noted during the original analysis and is visible in Adovasio’s photograph of the object on file at Mercyhurst University but is not mentioned in the published report. The rim is not seen in full view so a pattern, if present, is unclear. The presence of the 2/2 rim plaiting is unequivocal, however.

**Stitch Splices.** As expected, the two principal structural types in the assemblage evidence the greatest variability in splices. Adovasio and Gunn (1986:Table 145) report minimally five different splice types for 39 baskets, of which bound under fag and moving ends is the most common variety (n=26) and cross-cuts multiple structural types. Their analysis does not make the distinction between the direction in which splice
stubs are bound under that I do, so their number of splice types is more conservative relative to my own tally. Of the 30 Antelope House coiled baskets that I examined, I recorded eight splice types from 17 examples of the two most numerous structural types (Table 7.14). The stitch splice varieties defined by Adovasio and Gunn easily subsume the types that I defined and the first three listed in Table 7.14 correspond with Adovasio and Gunn’s two most abundant splice types: fag and moving ends bound under, and fag and moving ends clipped short. Both of these splice types are long-lived at Antelope House.

Table 7.14. Distribution of Study Sample Coiled Basketry Stitch Splice Types at Antelope House by Temporal Period and Room.

<table>
<thead>
<tr>
<th>Splice Type</th>
<th>n</th>
<th>PII (A.D. 950-1100)</th>
<th>Early PIII (A.D. 1100-1140)</th>
<th>Middle PIII (A.D. 1140-1200)</th>
<th>Late PIII (A.D. 1200-1270)</th>
<th>P III (A.D. 1100-1270)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fag and moving ends clipped</td>
<td>4</td>
<td>21</td>
<td></td>
<td></td>
<td>21, Rm. ?</td>
<td></td>
</tr>
<tr>
<td>Fag and moving ends bound under with work direction</td>
<td>2</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Fag and moving ends bound under against work direction</td>
<td>2</td>
<td></td>
<td>29</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Fags bound under with work direction, movings clipped</td>
<td>3</td>
<td></td>
<td></td>
<td>22</td>
<td></td>
<td>21, 29</td>
</tr>
<tr>
<td>Fags bound under against work direction, movings clipped</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (2)</td>
</tr>
<tr>
<td>Fags clipped and bound under with work direction, movings clipped</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>32, Kiva B</td>
<td></td>
</tr>
<tr>
<td>Fags clipped, movings bound under with work direction</td>
<td>1</td>
<td></td>
<td></td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fags clipped, movings bound under against work direction and clipped</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
</tr>
</tbody>
</table>

Decoration. Adovasio and Gunn (1986) identify three decorated specimens, none of which I was able to examine. Two are indicated as having dyed stitch geometric
designs while the third exhibits quadrupeds executed in dyed stitches that were later painted over. The first specimen is a Late Pueblo III burden basket (FS 641/CACH ?, Table 6.5), possibly bifurcated, from Room 44 that from Adovasio’s file photos appears to exhibit \-slanting zig-zags and possibly also frets (cf. Adovasio and Gunn 1986:Fig. 132). Although published as being effected with dyed stitches, the original analysis form and my examination of Adovasio’s photos suggest that it is done in black (?) paint. Whether or not there is an underlying dyed stitch design is uncertain. The second specimen (CACH 53317), a fragment of a tray or bowl (see Chapter 6) from undated North Area trash, is illustrated (Adovasio and Gunn 1986:Figure 133) and suggests stepped frets in darker dyed stitches.

Before discussing the specimen with dyed and painted stitches, I should point out that my re-examination of a sample of the Antelope House coiling identified an additional two artifacts with pigment and three vessels with dyed stitch designs. The two pigmented baskets are from Late Pueblo III contexts in Room 44 and both evidence red ochre on their convex faces. Contextual and technological similarities shared among these specimens suggests that they may have come from the same basket. The three other vessels all exhibit very faded geometric dyed stitch designs that appear to include stepped frets and zig-zags. They are provenienced to undated South Room Block/South Area deposits (AMNH 29.1/8576), Pueblo II or III fill from Room 21 (CACH 1707), and Late Pueblo III contexts from Kiva B/Central Plaza Annex (CACH 19129, Figure 7.45).

The final decorated specimen is in several respects unique among known Pueblo III period basketry (CACH 2287). It is a complete and virtually pristine hourglass-shaped
tray, measuring 38.5 cm long by 20 cm wide and 8.5 cm tall, from Pueblo III (sub-period unknown) deposits in Room 88 (South Plaza). It was found wrapped in a textile and the basket’s contents included a host of items suggesting use as a receptacle for ritual paraphernalia (Adovasio and Gunn 1986:327-328; Magers 1986:284-285). The basket itself lacks any evidence of abrasive use-related wear but, significantly, the designs are moderately faded on the exterior and very faded on the interior, suggesting that it was used and exposed to daylight enough for the design to fade. Adovasio and Gunn (1986:327-328) effectively characterize the tray’s unusual decorative embellishment:
“The specimen is decorated with six “geometricized” quadrupedal animal figures. There are two figures on each of the long margins of the basket and one on each “end.” In plan, all of the figures are quite similar, with elongate torsos, compressed necks, blocked heads, stubby “erect” tails and short legs (Fig. 137, 138). Spacing is more or less uniform, but the exact dimensions of the figures vary slightly. All of the figures are oriented with their heads to the viewer’s right. The designs were originally inserted into the basket wall using the technique described above for fragments of this type. On the outer surface of the basket, however, the designs also were painted over in three colors: black, aqua and red. Bodies and heads always are red and are outlined on the dorsal surface in the opposite color. Each figure has two aqua and two black legs. Although the dorsal and ventral outlines always are a different color in the same figure, the sequence of colors is not consistent around the basket. The aqua-backed forms are found on each short wall or end of the basket, while each long wall has both a black and aqua-backed form. Whatever the color of the dorsal or ventral outline, each figure has the same sequence of leg colors. When viewed from the right, the first and third legs are aqua and the second and fourth legs are black.”

Correspondence in Adovasio’s analysis files reveal that in 1975 and 1976, subsequent to the finalizing of Adovasio and Gunn’s report but prior to publication, some compositional analyses were carried out on the three pigments used to create the painted design. The Carnegie Mellon Art Analysis Research and Technology Center conducted Mössbauer Effect spectroscopy on paint samples while Materials Consultants and Laboratories of Monroeville, Pennsylvania, performed energy-dispersive x-ray spectroscopy. Although the files appear to be incomplete with respect to the analytical results of the latter technique, preliminary findings from Mössbauer spectroscopy indicated that the black pigment consisted of a ground oxide that was applied to the basket via a mixture of cornstarch and water. Distinctive maize starch grains were visible microscopically and photographed by the analysts. The aqua or turquoise-colored pigment was identified as a ground mineral such as azurite or turquoise.
These results are from a photocopy of a handwritten letter from Ronald Carlisle, University of Pittsburgh, to Don Morris, National Park Service, dated 27 October 1975. Other letters and invoices in the files indicate that further analyses were undertaken into 1976, but only a two page draft manuscript detailing the Mossbauer analytical methods employed exists in Adovasio’s files. It refers to results “discussed below,” but the text ends there. There are indications in the correspondence that funding dried up and that the analyses were never completed. I have not searched the Antelope House archives at the Western Archaeological Center in Tucson, but additional correspondence, data, or results may exist.

The combined results of Adovasio and Gunn’s (1986) and my own analyses indicate the presence of, at minimum, seven decorated baskets. Included are four baskets with only dyed stitch designs, one or two vessels with red mineral pigment, one with a painted design, and at least one basket, an hourglass-shaped tray, with a dyed stitch and painted design. All of these decorated vessels are executed in two rod and bundle bunched foundation, noninterlocking stitch coiling.

**Metric Variation.** Employing principal components and canonical discriminant function statistical analyses, Adovasio and Gunn (1975, 1977, 1986) explored variation in stitch and coil metrics and technological stylistic choices within the samples of Pueblo III period two rod and bundle bunched foundation, noninterlocking stitch coiling, and one rod foundation, interlocking stitch coiling in order to identify spatial patterning. Change through time was not possible to assess given that the majority of the sample derives from Late Pueblo III contexts at the site. Using the three spatial divisions defined
architecturally by the site’s excavators (Figure 7.42), their statistical evaluations reveal
distinct clustering of Central Room Block specimens separate from the South Room
Block/South Area. The small sample of vessels from the North Room Block/North Area
constitute a tight cluster within the South Room Block/South Area material. Adovasio
and Gunn view these patterns as unlikely to be a product of time given the expectation
of greater variance within rather than between areas over time that would blur spatial
distinctions. Clustering of North Room Block/North Area specimens within the southern
material is suggested to reflect the production of more standardized wares that fall
within range of variation of South Room Block/South area vessels. If one assumes that a
weaver occupied a given set of rooms, the three distinct subgroups discernible within
the South Room Block/South Area possibly represent the work of three individual
weavers, an interpretation that finds support in the corresponding vessels’ provenience
data (Adovasio and Gunn 1977). Central Room Block baskets are clearly the most
distinctive and, in light of the dominance of kivas in that area, Adovasio and Gunn
speculate that they are more similar for functional reasons, proposing that they may
result from specialized production of baskets for ritual consumption.

The comparative sample examined for this study does not permit systematic re-
evaluation of Adovasio and Gunn’s findings, but a scatterplot of sampled wares by site
area reaffirms the distinctiveness of Central Room Block coiling (Figure 7.46). Only one
of these vessels, a bifurcated burden basket (FS 641/CACH ?), is almost certainly ritually
significant, while the others that I examined are of indeterminate form and function.
Central Room Block coiling does, however, include the two fragments that I identified
with red pigment applied to their convex faces and a third basket evidences a dyed stitch design (Figure 7.45). These facts do not prove or disprove a functional explanation for Central Room Block basketry’s metric distinctiveness, but instead imply that alternative interpretations should also be entertained.

**Figure 7.46. Scatterplot of a sample of Antelope House coiled basketry by stitch and coil density and site spatial subdivision.**

**Plaited Matting**

Structural variability in twill plaited matting is tabulated in Table 7.15 by study site sample. What follows is an overview of the spatial and temporal patterning observed in mat metrics and technological stylistic choices at the site-scale. Patterned variability is considered along the dimensions of structural type, selvages (edge finishes), decoration, and metric variation. Data on raw material and splicing mechanics
Table 7.15. Twill Plaited Matting Primary Structural Type Variation by Site Sample.\textsuperscript{a}

<table>
<thead>
<tr>
<th></th>
<th>Bc 51</th>
<th>Bc 53</th>
<th>Bc 59</th>
<th>Bc 288</th>
<th>Chetro Ketl</th>
<th>Kin Kletso</th>
<th>Peñasco Blanco</th>
<th>Pueblo Bonito</th>
<th>Tsin Kletsin</th>
<th>Antelope House\textsuperscript{b}</th>
<th>Aztec West</th>
<th>Aztec East</th>
<th>General Aztec</th>
<th>Salmon Ruins</th>
<th>White House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple, 1/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (100)</td>
<td>10 (3.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twill, 2/2</td>
<td>P</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1 (10)</td>
<td>13 (62)</td>
<td>1 (100)</td>
<td>41 (56.9)</td>
<td>231 (87.8)</td>
<td>101 (59.8)</td>
<td>4 (66.6)</td>
<td>4 (66.6)</td>
<td>6 (50)</td>
<td>2 (66.7)</td>
<td></td>
</tr>
<tr>
<td>Twill, 2/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twill, 3/3</td>
<td>9</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>18 (25)</td>
<td></td>
<td></td>
<td></td>
<td>21 (8)</td>
<td>42 (24.8)</td>
<td>1 (16.7)</td>
<td></td>
<td>2 (16.7)</td>
<td>1 (33.3)</td>
<td></td>
</tr>
<tr>
<td>Twill, 4/4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (0.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twill, Unkn.</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>1 (100)</td>
<td>13 (18.1)</td>
<td></td>
<td></td>
<td>26 (15.4)</td>
<td>1 (16.7)</td>
<td>2 (33.4)</td>
<td>4 (33.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample Total</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>10 (21)</td>
<td>1 (72)</td>
<td></td>
<td>263 (169)</td>
<td>6 (6)</td>
<td>6 (12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Types</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2 (4)</td>
<td>2</td>
<td>1 (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} Sample size given as n (percent of assemblage); P = present but unconfirmed/frequency unknown.

\textsuperscript{b} Data from Adovasio and Gunn (1986) revised and supplemented with my observations. For consistency with this study matting tallies are conservative counts based on Adovasio and Gunn’s estimates of the minimum number of individual mats, not number of specimens.
were recorded but the latter was only rarely preserved and minor variations encountered only infrequently. Rush culms (*Schoenoplectus* sp.) are the sole raw material source for plaited matting elements at study sample sites. When preserved, strip (or element) splices are simply laid in alongside exhausted strips, and only occasionally are a small fraction of splices in the same mat tied off with a single self-engaging overhand knot.

*Pueblo Bonito*

At Pueblo Bonito, matting is documented throughout the Bonito phase but the distribution of the 77 plaited mat fragments is uneven across the site. The largest samples derive from rooms in the northwest (n=20) and southeast (n=20) quadrants (Figure 6.1). Seventeen fragments derive from rooms in the northeast portion of the pueblo while 12 derive from the southwest quadrant, but all of these are from Room 25. The remaining specimens include an unprovenienced specimen and one small fragment each from the East and West trash mounds that were recovered during Drs. W. H. Wills and Patricia Crown’s Chaco Stratigraphy Project re-excavations of Judd’s (1954, 1964) trenches (see also Crown 2016c; Wills et al. 2016).

**Structural Type.** More than half of the plaited matting assemblage is 2/2 interval twill plaiting (Figure 7.47, Table 7.15). One quarter is 3/3 interval (Figure 7.48) and the remainder are twill plaiting with an indeterminate interval of strip interlacement. Both structural types are found in deposits dispersed across the pueblo and occur throughout
Figure 7.47. Fragment of 2/2 twill plaited matting from refuse in Room 25 at Pueblo Bonito (H/3181). Note manipulation of 2/2 body interval at left with 2/4/4/2 and 2/3/2 shifts to effect a monochromatic transverse zig-zag or quartered field design. Courtesy of the American Museum of Natural History.

Figure 7.48. Large 3/3 twill plaited mat fragment in multiple pieces found beneath disarticulated human remains in Room 330 at Pueblo Bonito (A335289). White line segments were applied by museum staff to facilitate reuniting separated fragments. Courtesy of the Smithsonian’s National Museum of Natural History.
the Bonito phase (Table 7.16; see also Table 6.1). Matting was a frequent accompaniment in mortuary contexts but only a handful of such specimens were collected (e.g., Judd 1954:325-334; Marden 2011:266; see also Chapter 6).

Chronologically, 2/2 twill predominates during the Bonito phase, possibly increasing in popularity by Late Bonito times (Figure 7.49).

Table 7.16. Pueblo Bonito Plaited Matting Structural Type Presence by Room/Site Location.

<table>
<thead>
<tr>
<th>Plaited Matting Structural Type</th>
<th>Room/Site Location (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twill Plaiting, 2/2 Interval</td>
<td>3a, 24 (5), 25 (7), 52, 53 or 56/63 (2), 62 (8), 85 (2), 105, 109, 110, 160, 168, 170,</td>
</tr>
<tr>
<td></td>
<td>246A (2), 320B, 323, 326 (2), 330, West Mound, Unknown</td>
</tr>
<tr>
<td>Twill Plaiting, 3/3 Interval</td>
<td>24, 25 (4), 53 or 56/63 (3), 62 (2), 85, 92, 97, 110, 168, 235, 300B, 330</td>
</tr>
<tr>
<td>Twill Plaiting, Interval Unknown</td>
<td>24 (2), 25, 62 (3), 168 (2), 170, 171, 246A, 320B, East Mound</td>
</tr>
</tbody>
</table>

Figure 7.49. Frequency of plaited matting structural types at Pueblo Bonito through time.
Selvage Treatment. Unlike selvage-less mat body fragments, which in the absence of decoration are rather consistent in composition and execution, selvages (finished edges) provide the weaver with a virtually limitless range of choices for treating the terminal ends of the mat’s constituent strips. Selvage treatments encompass both how the plaiting elements are terminated as well as how they may be manipulated to reinforce the structural integrity of the fabric. They can be viewed as analogous to the rim finishing treatments of coiled baskets. Without finished selvages plaited mats would disarticulate strip by strip because the elements do not engage each other but simply course over and under one another.

Fifty-six mat fragments have portions of selvages on at least one edge and three major selvage configurations are identifiable: 90 degree self selvage, double 90 degree self selvage, and intricate (or multiple) self selvage. The simplest variety, the 90 degree self selvage, simply sees plaiting strips given a 90 degree fold at the mat’s edge before being reinserted into the fabric. There are six examples of this selvage type, three each of 2/2 and 3/3 plaiting, from four rooms (53 or 56/63, 85, 160, 330) and contexts that span the Bonito phase. Double 90 degree self selvages are a variation of the former in which the two sets of interacting elements (horizontal/weft and vertical/warp strips) that comprise the fabric are treated separately to produce parallel or stacked 90 degree self selvages. This results in a doubling or thickening of the selvage. Six examples of this type are known from three rooms (25, 85, 92, 320B). Except for one that is likely of Classic or Late Bonito age, all are from Early- or Classic Bonito-age deposits, suggesting that this selvage treatment may have largely fallen into disuse during Classic Bonito
times. One specimen with a corner, however, exhibits a double 90 degree end selvage adjoining a 90 degree self side selvage (Figure 7.50), and may indicate that the two selvage styles sometimes or always co-occur.

Figure 7.50. Overview of a 3/3 twill plaited mat fragment from Room 85 at Pueblo Bonito (H/7482.5). Side selvage at left is a 90 degree self selvage while the end selvage at the bottom is a double 90 degree self selvage. Note the double thickness of the edge where the museum tag is attached. Courtesy of the American Museum of Natural History.

The third selvage type is the most elaborate and referred to as an intricate or multiple self selvage (Adovasio 2010; Adovasio and Gunn 1986) because it is characterized by the involvement of edge strips in a complicated sequence of folds and interval shifts with each other that may differ from the mat’s body weave and terminate with the truncation of the strips, rather than being reinserted into the body weave.
(Figures 7.51, 7.52). This produces a visibly wider edge border resembling a decorative braid. These selvages exhibit marked variation and considerable effort was made to record differences in such selvage manipulations because of the likelihood that decisions about which folding and plaiting sequence to use are dictated by social or cultural norms (Adovasio and Gunn 1986:349-355, 392-393). Of 44 identifiable intricate selvages, 41 are partial or complete (that is, preserving the entire fold and shift sequence) segments of intricate selvages that come from various rooms throughout Pueblo Bonito. Four mat fragments are from probable Early Bonito contexts in northern rooms (85, 109, 110, 323) and indicate that intricate selvages were likely in use by the A.D. 900s at Pueblo Bonito. The bulk of the sample, including most of the very elaborate specimens, is ascribable to Classic or Late Bonito contexts (n=28). This suggests that the style flourished during Classic and Late Bonito times.

Following Adovasio and Gunn (1986), I focused comparative study on the sequence of folds and interlacements that follow the apex fold forming the true edge of the mat because they exhibit the greatest variation. A minimum of 18 intricate selvage variants are documented, including three partial sequences for which enough is preserved to determine that the entire sequence was unique within the context of the sample (Figures 7.51, 7.52; Table 7.17). Intricate selvage variants were defined irrespective of mat body plaiting interval because multiple selvage variants employ 2/2 and 3/3 twill plaiting in their body weave. Most mats also employ a single row of weft twining for reinforcement that was woven immediately prior to the initiation of the intricate selvage, and so its presence or absence was documented as well.
Figure 7.51. Intricate selvage twill (interval unknown) mat (Variant 1) from Room 24 at Pueblo Bonito (H/3988.10). Courtesy of the American Museum of Natural History.

Figure 7.52. Overview and close-up of intricate selvage 2/2 twill mat fragment (Variant 14) from Room 3a at Pueblo Bonito (H/8932). Note yucca cordage carrying straps or bindings and probable plaiting interval shift-induced design in close-up. Courtesy of the American Museum of Natural History.
Table 7.17. Pueblo Bonito Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants.

<table>
<thead>
<tr>
<th>Variant No.</th>
<th>Post-Apex Fold Sequence&lt;sup&gt;a&lt;/sup&gt;</th>
<th>n</th>
<th>Twill Interval</th>
<th>Twining</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AF/1/2/2/1/C</td>
<td>2</td>
<td>2/2, unknown</td>
<td>1 row s-twist, absent</td>
<td>24, 53 or 56/63</td>
</tr>
<tr>
<td>2</td>
<td>AF/1/2/2/2/C</td>
<td>2</td>
<td>2/2</td>
<td>1 row s-twist, absent</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>AF/1/2/2/2/2/C</td>
<td>2</td>
<td>2/2, 3/3</td>
<td>1 row s-twist, 1 row s-twist wrapped</td>
<td>25, 110</td>
</tr>
<tr>
<td>4</td>
<td>AF/1/2/2/2/2/2/C</td>
<td>6</td>
<td>2/2 (4), 3/3 (2)</td>
<td>1 row s-twist (4), absent, unknown</td>
<td>24, 25 (2), 52, 62, 109</td>
</tr>
<tr>
<td>5</td>
<td>AF/2/2/2/2/1/C</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
<td>168</td>
</tr>
<tr>
<td>6</td>
<td>AF/1/2/2/2/1/F/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>62</td>
</tr>
<tr>
<td>7</td>
<td>AF/1/2/2/1/F/1/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>AF/2/2/2/2/2/2/F/2/C</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
<td>246A</td>
</tr>
<tr>
<td>9</td>
<td>AF/1/2/2/1/1/F/1/1/C</td>
<td>3</td>
<td>2/2 (2), unknown</td>
<td>1 row s-twist</td>
<td>62 (2), 168</td>
</tr>
<tr>
<td>10</td>
<td>AF/1/2/2/2/1/1/F/1/1/C</td>
<td>5</td>
<td>2/2 (2), 3/3 (3)</td>
<td>1 row s-twist</td>
<td>24, 62 (2), 53 or 56/63 (2)</td>
</tr>
<tr>
<td>11</td>
<td>AF/1/2/2/2/2/1/F/1/1/C</td>
<td>1</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>62</td>
</tr>
<tr>
<td>12</td>
<td>AF/1/2/2/2/2/1/F/1/2/C</td>
<td>5</td>
<td>2/2 (4), 3/3</td>
<td>1 row s-twist</td>
<td>24, 62 (2), 168, 170</td>
</tr>
<tr>
<td>13</td>
<td>AF/1/2/2/2/2/2/2/1/F/1/C</td>
<td>2</td>
<td>unknown</td>
<td>unknown</td>
<td>62</td>
</tr>
<tr>
<td>14</td>
<td>AF/1/2/2/2/2/2/2/1/1/F/1/1/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>3a</td>
</tr>
<tr>
<td>15</td>
<td>AF/1/2/2/2/2/1/F/1/1/F/1/1/C</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
<td>171</td>
</tr>
</tbody>
</table>

**Partial Sequences**

<table>
<thead>
<tr>
<th>AF/?/2/2/2/1/F/1/1/C</th>
<th>2/2</th>
<th>1 row s-twist</th>
<th>246A</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF/1/2/2/2/1/F/2/C</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>25</td>
</tr>
<tr>
<td>AF/1/2/2/2/2/2/2/1/F</td>
<td>2/2</td>
<td>absent</td>
<td>85</td>
</tr>
<tr>
<td>AF/1/2/2/2/2/2/2/2/1/F</td>
<td>2/2</td>
<td>unknown</td>
<td>24</td>
</tr>
<tr>
<td>AF/1/2/3/2</td>
<td>2/2</td>
<td>unknown</td>
<td>323</td>
</tr>
<tr>
<td>AF/2/3/2</td>
<td>2/2</td>
<td>unknown</td>
<td>326</td>
</tr>
<tr>
<td>AF/2/3/3</td>
<td>2/2</td>
<td>unknown</td>
<td>170</td>
</tr>
</tbody>
</table>

<sup>a</sup> AF=obtuse angled apex fold, F=approximately 90 degree fold, C=terminal clipping of strips

Single rows of s-twist weft twining for intricate selvage reinforcement are present on 25 specimens (57 percent) and occur across the pueblo throughout the Bonito phase. One specimen from Room 25 (AMNH H/3819) varies in employing a row of s-twist wrapped twining rather than plain twining. The absence of a row of twining
was clear in only four cases while its presence or absence is unknown for the remaining 14 specimens.

Consideration of the distribution of post-apex fold sequences in time and space does little to reveal patterns in the data given the numerous isolated occurrences of variants and skewing of the sample towards Classic to Late Bonito contexts. It does indicate, however, that intricate selvages from rooms in the southeast apparently exhibit greater variation than anywhere else. This quadrant has yielded the largest sample of matting with complete intricate selvage segments (n=16) corresponding to 11 variants, whereas the next largest samples from the northeast (n=14) and northwest (n=9) both evidence seven variants. Temporal factors could be at work if one reasonably expects greater stylistic variability in those portions of the site that were occupied the longest and presumably producing intricate selvages longer. Yet, if intricate selvages did not become widespread until Classic Bonito times as it seems, and its popularity increased evenly throughout the site, then chronology would still not entirely account for the higher stylistic variation in selvages in southeastern rooms that were constructed and used after the A.D. 1040s or 1070s (see Windes 2003:Figs. 3.5, 3.6, 3.9).

Decoration. Decorative embellishment in plaited objects is frequently accomplished through the application of pigment or paint, the introduction of structural variation that includes altering plaited element composition by dyeing strips or varying their material or width, and shifts, which involve intentionally patterned manipulation of the interval of interlacement to produce a design. In some cases a combination of these techniques may be used. At Pueblo Bonito, nine decorated mats were identified in
Bonito phase deposits from seven rooms spread across the pueblo (Table 7.18). The most common form of decoration is the systematic alternation of thin and thick strips to effect a subtle textural contrast in the body of the fabric (Figure 7.53). The use of interval shifts to create woven-in designs is apparent on four specimens but the precise character of the designs is unclear (Figure 7.52). One specimen in particular (NMNH A335289, Figures 7.48, 7.54), found beneath an unnumbered, disarticulated burial in Room 330, exhibits shifts that may have been introduced to effect a complicated pattern into the fabric or, alternatively, to shape the mat. In addition to using shifts for decorative effect they can also be used to manipulate the overall form of the mat, adding curves, angles or bends. The incompleteness of the Room 330 specimen makes it impossible to determine the intent of the shifts, but an unusual feature of this mat is the abundant and obvious strip splice ends visible on one face. I have never observed this technique before, and while it could reflect an unfinished or untrimmed mat, the sheer number of these strip ends on a rather large and, presumably, originally complete mat from a mortuary context implies that it was intentional. The two most likely explanations are that they were intentionally left untrimmed, or that their abundance signals a complicated shaping of the original fabric, for which the clipping of the loose strip ends may have weakened the fabric’s structure. The shaping of mats into recognizable forms is rare but not unknown in the prehispanic Southwest (cf. Hughes 1956), so it is conceivable, if not most plausible, that this burial-associated mat exhibited a unique design, form, or both.
Table 7.18. Decorated Twill Plaited Matting from Pueblo Bonito.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Context</th>
<th>Approx. Date</th>
<th>Structure</th>
<th>Decoration Type and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMNH H/8932</td>
<td>Room 3a</td>
<td>A.D. 850-1140</td>
<td>2/2 Twill</td>
<td>Shifts used to effect indeterminate design</td>
</tr>
<tr>
<td>AMNH H/3181</td>
<td>Room 25</td>
<td>A.D. 1040-1140</td>
<td>2/2 Twill</td>
<td>Shifts used to effect transverse zig-zag or quartered field design</td>
</tr>
<tr>
<td>AMNH H/3184</td>
<td>Room 25</td>
<td>A.D. 1040-1140</td>
<td>3/3 Twill</td>
<td>Strips alternate thick and thin</td>
</tr>
<tr>
<td>AMNH H/5892</td>
<td>Room 62</td>
<td>A.D. 850-1140</td>
<td>2/2 Twill</td>
<td>Strips alternate thick and thin</td>
</tr>
<tr>
<td>AMNH H/7157.3</td>
<td>Room 62</td>
<td>A.D. 1040-1140</td>
<td>2/2 Twill</td>
<td>Strips alternate thick and thin</td>
</tr>
<tr>
<td>AMNH H/7739.1</td>
<td>Room 92</td>
<td>A.D. 850-1300</td>
<td>3/3 Twill</td>
<td>Strips alternate dyed and undyed in both sets of elements; dyed strips often but not always thinner than undyed</td>
</tr>
<tr>
<td>AMNH H/8755</td>
<td>Room 109</td>
<td>A.D. 850-1040</td>
<td>2/2 Twill</td>
<td>Strips alternate dyed and undyed in both sets of elements</td>
</tr>
<tr>
<td>NMNH A335334</td>
<td>Room 235</td>
<td>A.D. 1040-1140</td>
<td>3/3 Twill</td>
<td>Strips alternate thick and thin</td>
</tr>
<tr>
<td>NMNH A335289</td>
<td>Room 330</td>
<td>A.D. 850-1110</td>
<td>3/3 Twill</td>
<td>Shifts used to effect indeterminate design or manipulate mat shape</td>
</tr>
</tbody>
</table>

Figure 7.53. Intricate selvage 2/2 twill mat fragment (Variant 9) from Room 62 at Pueblo Bonito (H/5892). Courtesy of the American Museum of Natural History.
Figure 7.54. Close-up views of a large 3/3 twill plaited mat fragment from mortuary contexts in Room 330 at Pueblo Bonito (A335289) showing peculiar loose strip ends and interval shifts that suggest an indeterminate woven-in design, intentional manipulation of mat shape, or both. Courtesy of the Smithsonian’s National Museum of Natural History.

Metric Variation. The principal means of exploring mat metric variation is in terms of measurements of strip dimensions and density, and intricate selvages. Twill mats of 2/2 and 3/3 interval all fall along the same continuum of variation with respect to the related variables of strip width and density, though 3/3 matting appears to tend towards finer and more densely packed strips (Figure 7.55). Mats with intricate selvages are spread across the full range of metric variability documented, indicating that they cannot be differentiated from other mat selvages based on plaiting interval or strip metrics alone. There is also neither any clear spatial patterning in metric variation, save
for mats from southwestern rooms employing on average wider strips (Figure 7.56), nor is there any difference when mat metric variation is considered through time (Figure 7.57). Few mats directly associated with burials were saved, but comparison of mats from mortuary rooms with non-mortuary mats indicates that some (though not all) of the finest mats come from burial cluster rooms (Figure 7.58).

When plotted, measurements of intricate selvage initial and apex fold angles suggest that intricate selvages from northwestern rooms tend towards more obtuse apex fold angles compared to the same from southeastern rooms. There is also some suggestion that intricate selvages from southeastern rooms tend towards more obtuse initial fold angles as compared to northwestern rooms (Figure 7.59). Unsurprisingly, selvages from northeastern rooms overlap with both the northwest and southeast specimens, suggesting that certain rooms in this arbitrary quadrant ally better with one of the former. Unfortunately, the temporal dimension cannot reliably be assessed with these same measurements owing to the extremely small sample from Early Bonito contexts.

Articulating the relationship between intricate selvage structural complexity and metric variables is complicated by a lack of any analog for interpreting the significance of minor selvage deviations. Whereas coiling foundation types are most indicative of regional geographic and cultural affinities, no comparable data exist to guide the interpretation of structurally complex mat selvages. For example, minor stylistic differences between the variants that I define, such as the addition of one or more interlacements, or the substitution of a 1/2 sequence for a 2/2 or 2/3, may have been
Figure 7.55. Scatterplot of Pueblo Bonito twill plaited matting strip width and density by structural type.

Figure 7.56. Scatterplot of Pueblo Bonito twill plaited matting strip width and density by spatial subdivision.
Figure 7.57. Scatterplot of Pueblo Bonito twill plaited matting strip width and density by aggregated temporal periods.

Figure 7.58. Scatterplot of Pueblo Bonito twill plaited matting from mortuary and non-mortuary rooms by strip width and density.
meaningless to individuals or larger social groups (e.g., compare the difference in plaiting sequence for Variants 1 and 2 in Table 7.17), and would have made little difference in terms of the time spent making the selvages. This fact aside, I calculated two values for each intricate selvage variant that I argue capture intrinsic variability, minimize differences between variants with minor plaiting sequence deviations, and serve as proxies for weave complexity, which we can define based on the number of strip interlacements and variation in interval span. In the first, one can simply count the total number of strip interlacements irrespective of the number of strips spanned by each, yielding values of 4 for Variant 1, and 13 for Variant 14. In the second, to capture variability in the number of strips spanned in each selvage interlacement, one can sum all of the interval spans to arrive at the cumulative number strips interlaced. This

Figure 7.59. Scatterplot of Pueblo Bonito twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision.
calculation results in a value of 6 strips for Variant 1, and 20 for Variant 14. The addition of average selvage border width adds a third measure to capture potential correlations between selvage variation and strip metrics. The three-dimensional scatterplot of these data by site area in Figure 7.60 suggests that while there is a degree of pan-site overlap in the range of variation seen in intricate selvage complexity, intricate selvages from rooms in the southeast and northeast tend to be more complex than examples from the northwest. By comparison, the small sample of intricate selvages from southwestern rooms are of “average” complexity, but stand apart because their wider selvages, which is likely influenced the use of wider strips (Figure 7.56).

Figure 7.60. Three-dimensional scatterplot of Pueblo Bonito twill plaited matting intricate selvage width and structural complexity proxies by spatial subdivision.
Descriptive statistics for mat measurements summarized in Table 7.19 reinforce the foregoing observations about the general similarity of mat production at the pueblo. Mat plaiting strips are rather consistent in width, which is also reflected in similar numbers of strips per cm, though 3/3 mats do employ slightly thinner strips on average. No doubt the overarching similarity in strip variation, irrespective of plaiting interval and chronology, is aided by intentional selection of rush culms for weaving and an ecologically imposed limit on the range of culm sizes available (e.g., Judd 1954:12). The angles at which strips interlace in intricate selvages appear to be rather standardized and this is probably a product of intricate selvage weaving mechanics allowing little room for deviation in order to produce the desired selvage configuration. Intricate selvage width shows the greatest range of variation relative to the other variables and there are indications that intricate selvages became wider, if not also structurally more complex, during Classic and Late Bonito times. However, the small sample of Early or Classic Bonito subphase intricate selvage matting makes this observation tentative.
Table 7.19. Descriptive Statistics for Measurements on Pueblo Bonito Twill Plaited Matting.

<table>
<thead>
<tr>
<th>Strip Width</th>
<th>n(^a)</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>72</td>
<td>3.7-8.6</td>
<td>5.7</td>
<td>21.0</td>
</tr>
<tr>
<td>2/2</td>
<td>41</td>
<td>3.7-8.6</td>
<td>5.8</td>
<td>21.0</td>
</tr>
<tr>
<td>3/3</td>
<td>18</td>
<td>4.0-7.9</td>
<td>5.4</td>
<td>23.2</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>16</td>
<td>3.7-8.6</td>
<td>5.8</td>
<td>25.4</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>42</td>
<td>4.0-8.0</td>
<td>5.8</td>
<td>19.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strips Per CM</th>
<th>n</th>
<th>Range</th>
<th>Mean</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>72</td>
<td>1.0-2.9</td>
<td>1.9</td>
<td>23.6</td>
</tr>
<tr>
<td>2/2</td>
<td>41</td>
<td>1.2-2.9</td>
<td>1.9</td>
<td>23.5</td>
</tr>
<tr>
<td>3/3</td>
<td>18</td>
<td>1.3-2.8</td>
<td>2.1</td>
<td>22.0</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>16</td>
<td>1.3-2.9</td>
<td>2.0</td>
<td>27.5</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>42</td>
<td>1.0-2.8</td>
<td>1.8</td>
<td>22.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Initial Fold Angle</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>39</td>
<td>110.0-140.0</td>
<td>129.6</td>
<td>5.0</td>
</tr>
<tr>
<td>2/2</td>
<td>21</td>
<td>120.0-140.0</td>
<td>129.5</td>
<td>4.0</td>
</tr>
<tr>
<td>3/3</td>
<td>8</td>
<td>110.0-140.0</td>
<td>130.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>4</td>
<td>110.0-140.0</td>
<td>126.3</td>
<td>10.0</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>26</td>
<td>120.0-140.0</td>
<td>130.9</td>
<td>4.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Post-Apex Fold Angle</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>39</td>
<td>85.0-135.0</td>
<td>106.6</td>
<td>11.4</td>
</tr>
<tr>
<td>2/2</td>
<td>22</td>
<td>85.0-132.5</td>
<td>109.5</td>
<td>10.4</td>
</tr>
<tr>
<td>3/3</td>
<td>7</td>
<td>90.0-112.5</td>
<td>104.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>4</td>
<td>90.0-117.5</td>
<td>106.9</td>
<td>11.0</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>25</td>
<td>85.0-135.0</td>
<td>103.7</td>
<td>11.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Strip Angle of Crossing</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>41</td>
<td>62.5-115.0</td>
<td>81.6</td>
<td>16.0</td>
</tr>
<tr>
<td>2/2</td>
<td>21</td>
<td>62.5-115.0</td>
<td>79.3</td>
<td>19.5</td>
</tr>
<tr>
<td>3/3</td>
<td>11</td>
<td>67.5-110.0</td>
<td>83.3</td>
<td>14.7</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>6</td>
<td>70.0-90.0</td>
<td>80.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>26</td>
<td>62.5-115.0</td>
<td>84.6</td>
<td>16.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Width</th>
<th>n</th>
<th>Range (cm)</th>
<th>Mean (cm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>38</td>
<td>2.1-7.4</td>
<td>4.1</td>
<td>27.9</td>
</tr>
<tr>
<td>2/2</td>
<td>20</td>
<td>2.6-7.4</td>
<td>4.3</td>
<td>30.3</td>
</tr>
<tr>
<td>3/3</td>
<td>10</td>
<td>2.1-6.0</td>
<td>3.7</td>
<td>31.9</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>5</td>
<td>2.1-4.5</td>
<td>3.5</td>
<td>26.3</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>24</td>
<td>2.6-7.4</td>
<td>4.3</td>
<td>26.9</td>
</tr>
</tbody>
</table>

\(^a\) Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.
Matting is known from contexts that span Aztec West’s occupation. Comparable samples derive from Chacoan (A.D. 1100-1130, n=64) and Post-Chacoan (A.D. 1130-1290, n=64) contexts, despite that the length of time represented by the latter period is greater by more than 100 years. Forty-one specimens lack adequate chronological information to better resolve their temporal placement. Spatially, however, the sample of 169 specimens is differentially distributed. The largest samples (n=>19) derive from rooms in the Northwest (n=57), Northeast (n=20), and East North Wing (n=30) Sectors (Figure 6.2). The remaining specimens come from the West North Wing and Southeast Sectors, or are unprovenienced. In several cases exceptional preservation of refuse deposits yielded numerous distinct mats from individual rooms. For example, Room 122-2 contained at least 20 different mats, and Room 48 at least 18. It should also be kept in mind that my counts of individual mats are conservative, as I did not analyze further those fragments from some cataloged lots that I could not confidently distinguish from, or associate with, individual mats that were otherwise separable based on body weave, strip metrics, or selvage mechanics.

**Structural Type.** Nearly 60 percent of the Aztec West twill plaited matting assemblage is 2/2 interval while an additional 25 percent is 3/3 interval (Table 7.15). Both structural types are well distributed throughout the pueblo (Table 7.20) and 2/2 twill predominates in all portions of the site. Examined by occupational period, 2/2 twill
again expresses its dominance and there is the further suggestion that 2/2 twill dramatically increased in popularity over 3/3 twill during the Post-Chaco era (Figure 7.61). Twenty individual mats were identified from five different burials (Graves 20, 25, 29, 37, 54), although this certainly underestimates the amount of matting actually present in mortuary contexts (cf. Morris 1919:9, 53, 1924:163, 168, 173, 223, 1928:379, 382, 412; see also Chapter 6; Webster 2008a:188).

Table 7.20. Aztec West Plaited Matting Structural Type Presence by Room.

<table>
<thead>
<tr>
<th>Plaited Matting Structural Type</th>
<th>Room (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twill Plaiting, 3/3 Interval</td>
<td>48 (7), 54 (3), 72 (3), 80 (2), 115 (5), 122-2 (10), 124, 134-2, 141 (2), 153-2, 193? (4), Unknown (3)</td>
</tr>
</tbody>
</table>

Figure 7.61. Frequency of plaited matting structural types at Aztec Ruin West through time.
Selvage Treatment. Selvages are present on at least one margin of 146 mats constituting a remarkable 86 percent of the matting assemblage. Included are a single example of a 90 degree self selvage and two examples of double 90 degree self selvages. One double 90 degree selvage is from Chacoan deposits while the other two examples are only dated broadly to the site’s occupational span. All three specimens are executed in 3/3 twill.

Intricate selvages are well represented and out of the 143 recovered, 140 have complete selvage plaiting and folding sequences preserved. Intricate selvages are abundant in both Chaco deposits (n=62) and Post-Chaco deposits (n=52) at Aztec West and come from only northern rooms (Sectors 3-6, see Figure 6.2). Given the shorter span of time represented by Chaco deposits, the greater number of Late Bonito-age specimens may indicate that intricate selvage matting was more popular during this period if the difference is not a product of sampling. Twenty-nine intricate selvage post-apex fold variants were identified that include eight variants previously observed at Pueblo Bonito (Figures 7.62, 7.63, 7.64; Table 7.21). For ease of comparison, these eight selvage configurations retain the variant numbers ascribed to them in the discussion of Pueblo Bonito matting. The 21 new variants from Aztec West are numbered consecutively starting with 19. Twined weft row reinforcement with an s-twist predominates throughout the assemblage, and although its absence and minor variations do occur, there is no clear spatial or temporal patterning in use of weft twining.
Figure 7.62. Twill plaited 3/3 interval mat fragment with intricate selvage (Variant 6) from Late Bonito contexts in Room 122-2 at Aztec West (AZRU 76.7). This intricate selvage configuration is attested throughout the occupation of Aztec and is also present at Pueblo Bonito. Courtesy of the National Park Service and Aztec Ruins National Monument.

Figure 7.63. Twill plaited 3/3 interval mat fragment with intricate selvage (Variant 22) from Late Bonito contexts in Room 48 at Aztec West (29.0/7708.7). Courtesy of the American Museum of Natural History.
Finding patterning in the spatial distribution of intricate selvage post-apex fold plaiting sequences is complicated by the small numbers of multiple variants, but general trends become clear when the distribution of intricate selvage variants by time and space are compared (Figures 7.65, 7.66). Of the 28 intricate selvage variants that can be ascribed to Chaco or post-Chaco contexts at Aztec, eight variants are documented from both. Of these, all but Variant 4 are represented by 7 or more specimens. Thirteen variants are restricted to Late Bonito deposits and seven to post-Chaco deposits, but every one of these is represented by only one or two examples. There is greater variation in intricate selvages during Late Bonito times at Aztec and this is likely reflective of reality in light of the lengthier post-Chaco occupation during which one
Table 7.21. Aztec West Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants.

<table>
<thead>
<tr>
<th>Variant No.</th>
<th>Post-Apex Fold Sequencea</th>
<th>n</th>
<th>Twill Interval</th>
<th>Twining</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>AF/1/2/C</td>
<td>2</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>48, unknown</td>
</tr>
<tr>
<td>20</td>
<td>AF/1/2/2/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>48</td>
</tr>
<tr>
<td>21</td>
<td>AF/1/2/1/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>141</td>
</tr>
<tr>
<td>1</td>
<td>AF/1/2/2/1/C</td>
<td>7</td>
<td>2/2 (5), 3/3, unknown</td>
<td>1 row s-twist (5), 3 rows close simple s-twist, unknown</td>
<td>73, 115 (4), 134-2, 139</td>
</tr>
<tr>
<td>2</td>
<td>AF/1/2/2/2/C</td>
<td>9</td>
<td>2/2 (7), 3/3 (2)</td>
<td>1 row s-twist (7), absent (2)</td>
<td>48 (4), 72 (2), 115, 180, unknown</td>
</tr>
<tr>
<td>22</td>
<td>AF/1/3/3/3/C</td>
<td>1</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>AF/1/2/2/2/2/C</td>
<td>2</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>48, 72</td>
</tr>
<tr>
<td>23</td>
<td>AF/1/2/2/2/2/2/C</td>
<td>1</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>48</td>
</tr>
<tr>
<td>24</td>
<td>AF/1/2/1/F/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>122-2</td>
</tr>
<tr>
<td>25</td>
<td>AF/1/2/1/1/F/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>141</td>
</tr>
<tr>
<td>26</td>
<td>AF/1/2/2/1/F/1/C</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
<td>54</td>
</tr>
<tr>
<td>27</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>11</td>
<td>2/2 (9), 3/3 (2)</td>
<td>1 row s-twist (6) 1 row s- and z-twist, 2 rows close simple s-twist, absent, unknown (2)</td>
<td>48, 62-2, 78, 111 (2), 122-2 (2), 126, 139 (2), 141</td>
</tr>
<tr>
<td>6</td>
<td>AF/1/2/2/2/1/F/1/C</td>
<td>38</td>
<td>2/2 (21), 3/3 (13), unknown (4)</td>
<td>1 row s-twist (32), 1 row z-twist, absent, unknown (4)</td>
<td>48, 54 (2), 62-2, 72, 78, 80 (5), 115 (2), 122-2 (13), 136-2 (3), 139 (3), 153-2 (2), 189, 193? (2), 225</td>
</tr>
<tr>
<td>28</td>
<td>AF/2/2/2/1/F/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>134-2</td>
</tr>
<tr>
<td>29</td>
<td>AF/1/2/2/2/1/F/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>139</td>
</tr>
<tr>
<td>7</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>95</td>
</tr>
<tr>
<td>9</td>
<td>AF/1/2/2/1/1/F/1/1/C</td>
<td>12</td>
<td>2/2 (8), 3/3, unknown (3)</td>
<td>1 row s-twist (9), 1 row z-twist, 2 rows close simple s-twist, unknown</td>
<td>54, 80, 111, 122-2, 139 (3), 141 (3), 225</td>
</tr>
<tr>
<td>30</td>
<td>AF/1/2/2/1/2/1/F/1/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>115</td>
</tr>
<tr>
<td>31</td>
<td>AF/1/2/2/1/1/1/F/1/C</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
<td>180</td>
</tr>
<tr>
<td>10</td>
<td>AF/1/2/2/2/1/F/1/1/C</td>
<td>21</td>
<td>2/2 (12), 3/3 (3), unknown (6)</td>
<td>1 row s-twist (17), unknown (4)</td>
<td>48, 49, 72, 78, 62-2, 95, 111 (2), 115, 122-2 (4), 135-2 (3), 139, 153-2, 193? (2), unknown</td>
</tr>
<tr>
<td>12</td>
<td>AF/1/2/2/2/1/F/1/2/C</td>
<td>16</td>
<td>2/2 (7), 3/3 (7), unknown (2)</td>
<td>1 row s-twist (13), 1 row z-twist, unknown (2)</td>
<td>48 (3), 54, 71, 72, 115 (5), 134-2, 139, 193?, 224, unknown</td>
</tr>
<tr>
<td>32</td>
<td>AF/1/2/2/2/2/1/F/1/C</td>
<td>1</td>
<td>unknown</td>
<td>1 row s-twist</td>
<td>122-2</td>
</tr>
<tr>
<td>33</td>
<td>AF/1/2/2/2/2/1/F/1/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row z-twist</td>
<td>48</td>
</tr>
<tr>
<td>34</td>
<td>AF/1/2/2/2/2/1/F/1/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>48</td>
</tr>
<tr>
<td>35</td>
<td>AF/1/2/2/2/2/2/1/F/1/2/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>111</td>
</tr>
<tr>
<td>36</td>
<td>AF/1/2/2/2/2/2/1/F/1/2/C</td>
<td>1</td>
<td>unknown</td>
<td>1 row s-twist</td>
<td>115</td>
</tr>
<tr>
<td>37</td>
<td>AF/1/2/1/F/2/1/F/2/1/C</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
<td>54</td>
</tr>
<tr>
<td>38</td>
<td>AF/1/2/1/F/2/1/F/1/2/C</td>
<td>2</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>115</td>
</tr>
<tr>
<td>39</td>
<td>AF/1/2/2/F/2/1/F/1/2/C</td>
<td>2</td>
<td>2/2, 3/3</td>
<td>1 row s-twist, absent</td>
<td>72, 193?</td>
</tr>
</tbody>
</table>

a AF=obtuse angled apex fold, F=approximately 90 degree fold, C=terminal clipping of strips
Figure 7.65. Aztec Ruin West twill plaited matting intricate selvage variants by temporal period. Note that variant numbers correspond to those in Table 7.20 and are in no particular order.

Figure 7.66. Aztec Ruin West twill plaited matting intricate selvage variants by site area. Note that variant numbers correspond to those in Table 7.20 and are in no particular order.
would expect, all things being equal, greater variation through time, even though the post-Chaco sample is smaller relative to the occupational timespan sampled. Where intricate selvage variants apparently span the entire occupation of Aztec, four variants (1, 2, 6, 12) are more abundant during Late Bonito times while three (9, 10, 27) assume greater prominence during the post-Chaco occupation. Although preservation and sampling issues cloud the picture, these data may be indicating a possible shift in intricate selvage variant preferences after A.D. 1130, as well as an overall decline in mat production and use that may most parsimoniously be linked to the demographic downturn at the site indicated by other lines of evidence (Brown et al. 2008).

Examined by architectural subdivision, intricate selvage variants are most diverse in the Northeast Sector (see Figure 6.2). Seven variants, all with samples greater than or equal to seven, are found in at least three of the four northern sectors at Aztec. Strong correspondence between the variants restricted to Late Bonito deposits and the northeast sector suggests that we may be picking up on Late Bonito subphase occupational intensity in this portion of the site. Similarly, the five variants restricted to the northwest are also ascribable to solely post-Chaco contexts. Evaluating the significance of the eight variants that cross-cut the Late Bonito and post-Chaco occupations is more difficult. Seven of these have actual or near pan-site distributions but they are also the most abundant types in the sample. This could indicate that poorly represented minority variants are simply underrepresented and may have been more widely distributed spatially as well. However, I would submit that this is less likely given that the most abundant variants are disproportionately represented and thus more
reflective of the population's general preferences. Chronology is an important
dimension for understanding selvage variation in that it indicates fluctuations in
minority variants with arguable links to shifts in the construction and use of the pueblo
while also attesting to the longevity of the seven most popular variants across the site.

Decoration. Favorable preservation at Aztec West facilitated identification of
multiple decorated mats. Thirty-two specimens were identified from 15 rooms spread
across the site and spanning its occupation. Although the decorated mat sample only
represents about 19 percent of Aztec’s mat assemblage, it almost certainly
underestimates the frequency of decoration. Once faded or damaged, dyed strips can
be difficult to identify and if very little of the body weave is preserved it can be difficult
to say with confidence whether there are shift-induced designs. For these reasons it is
best to consider the 32 decorated mats as a sample of the decorative techniques
available and their relative proportions at Aztec. Table 7.22 summarizes these
specimens by type of decorative embellishment.

Use of shifts and dark brown or black dyed elements (Figure 7.67), in one case in
the same mat, are the most common decorative techniques employed. An additional
common decorative manipulation involves alteration of the width of strips in one or
both sets of interacting elements. When involving dyed strips, they are frequently
thinner relative to the undyed strips (Figure 7.68). These most abundant decorative
styles cross-cut weave structure and occupational periods, and examples are known
from most portions of the site.
### Table 7.22. Summary of Decorated Twill Plaited Matting from Aztec West.

<table>
<thead>
<tr>
<th>Decoration Type</th>
<th>n</th>
<th>Context Age</th>
<th>Approx. Age</th>
<th>Structure</th>
<th>Catalog No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyed strips</td>
<td>10</td>
<td>72 (2), 95 (2), 111, 134-2, 139 (2), 141 (2)</td>
<td>post-Chaco (9), unresolved</td>
<td>2/2 (6), 3/3 (3), Unknown</td>
<td>AMNH 29.0/8464.2, 29.0/8464.3, 29.0/8788.2, 29.0/8955, 29.0/8956, 29.0/9466.4, 29.0/9466.11, 29.0/9662.6, 29.0/9662.7, 29.0/9927.1</td>
<td>dyed strips alternate in both warp and weft sets except in 3 examples where only 1 strip set is dyed</td>
</tr>
<tr>
<td>Strips alternate thick/thin</td>
<td>3</td>
<td>48 (2), 115</td>
<td>Late Bonito</td>
<td>2/2, 3/3 (2)</td>
<td>AMNH 29.0/7708.10, 29.0/7708.12, 29.0/8851.13</td>
<td>strips thinner in only 1 strip set in 2 cases, third has both warp/weft strips sets alternate</td>
</tr>
<tr>
<td>Dyed strips and alternating thick/thin strips</td>
<td>6</td>
<td>48 (3), 54, 72, 193?</td>
<td>Late Bonito (4), post-Chaco, unresolved</td>
<td>2/2 (3), 3/3 (3)</td>
<td>AMNH 29.0/7371.1, 29.0/7708.5, 29.0/7708.13, 29.0/7708.19, 29.0/8464.5, AZRU 2915.3</td>
<td>dark brown/black dyed strips always thinner</td>
</tr>
<tr>
<td>Monochromatic shifts</td>
<td>11</td>
<td>48, 54, 72, 78, 80, 115 (2), 122-2 (2), 193?, Kiva D</td>
<td>Late Bonito (6), post-Chaco (3), unresolved (2)</td>
<td>2/2 (4), 3/3 (7)</td>
<td>AMNH 29.0/6792, 29.0/7371.3, 29.0/7708.1, 29.0/8386.1, 29.0/8620.2, 29.0/8851.1, 29.0/8851.3, 29.0/5301.1, 29.0/5301.13, 29.0/8464.1, AZRU 2915.7</td>
<td>design elements include portions of straight and diagonal lines as portions of possible zig-zags, diamonds, squares, chevrons or bands</td>
</tr>
<tr>
<td>Shifts and alternating thin dyed strips</td>
<td>1</td>
<td>122-2</td>
<td>Late Bonito</td>
<td>3/3</td>
<td>AMNH 29.0/5301.3</td>
<td>Indeterminate shift-induced design</td>
</tr>
<tr>
<td>Painted</td>
<td>1</td>
<td>62-2</td>
<td>unresolved</td>
<td>2/2</td>
<td>AMNH 29.0/7413.1</td>
<td>from &quot;rat nest&quot; in SW corner; geometric-looking design with interlocking elements in red, black, and white on one face, apparently only black on reverse face</td>
</tr>
</tbody>
</table>
Figure 7.67. Plan and close-up views of virtually complete 2/2 twill plaited mat with intricate selvages (Variant 10) found associated with Grave 20 in Room 95 at Aztec West (29.0/8955). Close-up image shows how dyed and undyed strips alternate to effect subtle overall design. A painted cotton textile fragment adheres to the mat at its center. Courtesy of the American Museum of Natural History.
One decorated specimen stands out for its uniqueness. Three fragments from the same mat found in Room 62-2, adjacent to Kiva F in the Northeast Sector, exhibit painted decoration (Figure 7.69). On the obverse face an indeterminate geometric-looking design was applied and employs possible interlocking elements in red, black, and white. The reverse face apparently exhibits only black paint of uncertain patterning.
One of the scraps is a selvage and shows that the painted design extended to the mat’s edge. The fragments were mixed among others that, by Morris’ (1928:317) account, came from a rat’s nest, but which, based on his description, sounds equally like a refuse deposit. Notably, they lack adhering feces or urine stains. The specimen is only dated generally to Aztec West’s occupation but could well be of Late Bonito age given the wealth of Chacoan artifacts from refuse in adjacent rooms.

Figure 7.69. One of two fragments of a 2/2 twill plaited mat with intricate selvage (Variant 27, not shown) from Room 62-2 at Aztec West exhibiting painted decoration in black, red, and white (29.0/7413.1). Courtesy of the American Museum of Natural History.

Metric Variation. Regardless of interval of interlacement, mat strip width and density exhibit similar ranges of variation through time, but 3/3 mats do tend to be finer
and more consistent in the width of strips used (Figure 7.70). When strip width and
density are plotted by spatial subdivision there is considerable overlap among mats
from all areas of the site (Figure 7.71). Yet, the possibility of greater similarity among
Northeast and East North Wing mats is discernible when only mats from Late Bonito
contexts are examined, although there are unfortunately no mats assigned to Late
Bonito contexts from northwestern rooms (Figure 7.72). After about A.D. 1130, mat
data suggest a trend towards pan-site homogeneity and that if any strip width or density
differences persist between the matting from opposite sides of the pueblo, they are
minor (Figure 7.73).

Mats were collected from only five burials post-dating A.D. 1130. In several cases
multiple different mats are reported as associated with the burials. Comparison of
mortuary and non-mortuary mat strip width and density shows considerable variation,
even among individual burials (Figure 7.74). The data indicate no preference for the
interment of finer mats with the deceased, but may indicate that either multiple whole
or fragmentary mats were used as offerings, or that some of the putatively burial-
associated mats were incorrectly attributed and may reflect refuse that was mixed with
the burials and went unrecognized as such during excavation. The finest mat in the
Aztec West assemblage, from Grave 25 in Room 111, is a clear outlier in Figure 7.74.
That it is one of at least eight mats found covering the burial of two adults shows that,
at least in some cases, multiple mats were used in burials.

Examination of variation in selvage initial and apex fold angles reveals stronger
spatial patterning. Although there is overlap, intricate selvage mats from rooms in the

Figure 7.70. Scatterplot of Aztec Ruin West twill plaited matting strip width and density by structural type and temporal period.

Figure 7.71. Scatterplot of Aztec Ruin West twill plaited matting strip width and density by spatial subdivision.
Figure 7.72. Scatterplot of Aztec Ruin West Late Bonito phase (A.D. 1100-1130) twill plaited matting strip width and density by spatial subdivision. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.73. Scatterplot of Aztec Ruin West post-Chaco (A.D. 1130-1290) twill plaited matting strip width and density by spatial subdivision. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
Northeast Sector consistently employ more obtuse initial fold angles as compared to like mats from rooms in the Northwest Sector (Figure 7.75). The smaller sample of intricate selvage mats from the East North Wing Sector appears more consistent with mats from northwestern rooms. Additionally, in contrast to Northwest selvages that show a tendency for initial fold angles to increase in line with apex fold angles, Northeast and East North Wing selvages tend to evidence initial fold angles that decrease as apex fold angles increase.

When intricate selvage initial and apex fold angles are examined by time, the clearest pattern is greater on average initial fold angles among Late Bonito intricate selvages (Figures 7.76, 7.77). Late Bonito selvage apex folds also appear to be more acute than those dated to post-Chaco times. Late Bonito-age matting is only known
from rooms in the Northeast and East North Wing Sectors, and even then the sample from the latter area is too small to infer differences between these sectors. On the other hand, while securely dated post-Chaco intricate selvages are comparatively few, they suggest the persistence through time of the negative correlation between initial and apex folds from the Northeast and East North Wing (Figure 7.77). Post-Chaco intricate selvages from the Northwest exhibit a positive correlation between initial and apex fold angles.

Data on intricate selvage width and proxies for intricate selvage structural complexity show some differences through time across the site (Figures 7.78 and 7.79). Late Bonito selvages from the Northeast have generally wider and structurally more

![Figure 7.75. Scatterplot of Aztec Ruin West twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.](image)

Aztec West Spatial Subdivision
- ○ Northeast
- × East North Wing
- + West North Wing
- Δ Northwest
Figure 7.76. Scatterplot of Late Bonito phase (A.D. 1100-1130) Aztec Ruin West twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision.

Figure 7.77. Scatterplot of post-Chaco (A.D. 1130-1290) Aztec Ruin West twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
Figure 7.78. Scatterplot of Late Bonito phase (A.D. 1100-1130) Aztec Ruin West twill plaited matting intricate selvage width and structural complexity proxy by spatial subdivision. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.79. Scatterplot of post-Chaco (A.D. 1130-1290) Aztec Ruin West twill plaited matting intricate selvage width and structural complexity proxy by spatial subdivision. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
complex selvages, and show the highest degree of internal variation. After A.D. 1130, Northeast selvages still exhibit greater variation but overlap better with mats from other portions of the site. There also exists evidence that mats from post-Chaco deposits are overall more similar in terms of selvage complexity and width.

Descriptive statistics for Aztec West matting provided in Table 7.23 illustrate the general consistency of most assemblage metric variables but notably obscure some of the more subtle differences noted above when variation is considered along the dimensions of chronology and space. Twill matting with a 3/3 interval exhibits on average finer strips than 2/2 mats and this lends to their having slightly higher numbers of strips per cm. There is further suggestion of greater standardization among 3/3 matting strip widths, but this is not mirrored in strip density. Selvage interlacing and folding angles exhibit the highest degrees of standardization in the assemblage as suggested by percent CV and this is likely a byproduct of intricate selvage mechanics placing constraints on the range of angles permissible to effect such a selvage configuration.
Table 7.23. Descriptive Statistics for Measurements on Aztec West Twill Plaited Matting.

<table>
<thead>
<tr>
<th>Strip Width</th>
<th>n²</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>169</td>
<td>1.9-10.4</td>
<td>5.8</td>
<td>25.2</td>
</tr>
<tr>
<td>2/2</td>
<td>101</td>
<td>1.9-10.4</td>
<td>6.0</td>
<td>25.1</td>
</tr>
<tr>
<td>3/3</td>
<td>42</td>
<td>2.9-6.2</td>
<td>4.9</td>
<td>15.8</td>
</tr>
<tr>
<td>Late Bonito (A.D. 1100-1130)</td>
<td>64</td>
<td>2.9-10.4</td>
<td>5.8</td>
<td>24.8</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1130-1290)</td>
<td>64</td>
<td>1.9-10.1</td>
<td>6.0</td>
<td>26.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strips Per CM</th>
<th>n</th>
<th>Range</th>
<th>Mean</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>168</td>
<td>1.0-5.3</td>
<td>2.0</td>
<td>30.1</td>
</tr>
<tr>
<td>2/2</td>
<td>101</td>
<td>1.0-5.3</td>
<td>1.9</td>
<td>29.5</td>
</tr>
<tr>
<td>3/3</td>
<td>42</td>
<td>1.6-4.5</td>
<td>2.4</td>
<td>23.5</td>
</tr>
<tr>
<td>Late Bonito (A.D. 1100-1130)</td>
<td>64</td>
<td>1.0-4.5</td>
<td>2.0</td>
<td>30.6</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1130-1290)</td>
<td>64</td>
<td>1.0-5.3</td>
<td>1.9</td>
<td>33.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Initial Fold Angle</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>78</td>
<td>115.0-155.0</td>
<td>131.8</td>
<td>6.0</td>
</tr>
<tr>
<td>2/2</td>
<td>45</td>
<td>117.5-155.0</td>
<td>132.6</td>
<td>5.7</td>
</tr>
<tr>
<td>3/3</td>
<td>20</td>
<td>120.0-147.5</td>
<td>132.4</td>
<td>6.6</td>
</tr>
<tr>
<td>Late Bonito (A.D. 1100-1130)</td>
<td>27</td>
<td>120.0-155.0</td>
<td>135.7</td>
<td>5.8</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1130-1290)</td>
<td>29</td>
<td>117.5-150.0</td>
<td>130.3</td>
<td>6.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Post-Apex Fold Angle</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>8</td>
<td>85.0-145.0</td>
<td>109.8</td>
<td>10.7</td>
</tr>
<tr>
<td>2/2</td>
<td>48</td>
<td>85.0-145.0</td>
<td>110.3</td>
<td>12.8</td>
</tr>
<tr>
<td>3/3</td>
<td>20</td>
<td>95.0-125.0</td>
<td>107.3</td>
<td>7.0</td>
</tr>
<tr>
<td>Late Bonito (A.D. 1100-1130)</td>
<td>27</td>
<td>85.0-125.0</td>
<td>107.1</td>
<td>8.6</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1130-1290)</td>
<td>30</td>
<td>85.0-145.0</td>
<td>112.5</td>
<td>13.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Strip Angle of Crossing</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>139</td>
<td>55.0-115.0</td>
<td>79.1</td>
<td>13.2</td>
</tr>
<tr>
<td>2/2</td>
<td>83</td>
<td>55.0-112.5</td>
<td>78.6</td>
<td>12.4</td>
</tr>
<tr>
<td>3/3</td>
<td>35</td>
<td>67.5-115.0</td>
<td>79.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Late Bonito (A.D. 1100-1130)</td>
<td>61</td>
<td>55.0-115.0</td>
<td>80.4</td>
<td>14.1</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1130-1290)</td>
<td>52</td>
<td>65.0-90.0</td>
<td>77.5</td>
<td>9.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Width</th>
<th>n</th>
<th>Range (cm)</th>
<th>Mean (cm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>152</td>
<td>1.0-6.6</td>
<td>3.7</td>
<td>27.5</td>
</tr>
<tr>
<td>2/2</td>
<td>84</td>
<td>1.0-6.6</td>
<td>3.8</td>
<td>27.6</td>
</tr>
<tr>
<td>3/3</td>
<td>36</td>
<td>1.4-5.9</td>
<td>3.4</td>
<td>27.2</td>
</tr>
<tr>
<td>Late Bonito (A.D. 1100-1130)</td>
<td>63</td>
<td>1.4-6.6</td>
<td>3.8</td>
<td>28.8</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1130-1290)</td>
<td>52</td>
<td>1.0-5.9</td>
<td>3.8</td>
<td>26.5</td>
</tr>
</tbody>
</table>

² Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.
Salmon Ruins

At least 60 twill plaited mats were identified from 24 rooms distributed across the pueblo. However, a full third of this sample was not saved, could not be located, or was too poorly preserved to yield much information during Webster’s (2006a:950) analysis. Nearly 60 percent of the matting comes from mortuary contexts that likely facilitated their recovery and identification. Webster’s (2006a) report provides key data and so my analysis focused on reexamination of objects identified as mats with actual or possible intricate selvages in order to collect additional metric and stylistic data. Twelve intricate selvage mats were analyzed in detail and supplemented with strip width and density data for another 24 selvage-less mats for a total sample of 36 specimens (Table 7.15; see also Webster 2006a:Table 46.31).

Structural Type. Both 2/2 and 3/3 twill interval mats are present in the Salmon assemblage. The former structural type predominates throughout the occupation, comprising 85 percent of the structurally identifiable mats. Although the data suggest that 3/3 twill mats are a post-A.D. 1190 introduction at the site, this could be a product of sampling, a likely interpretation in my view.

Selvage Treatment. Webster (2006a:953) notes four 90 degree self selvages and 13 intricate selvages, of which one intricate selvage is missing or was not collected. Although I did not reexamine the four 90 degree self selvages, if they are fragmentary and the initial fold is not preserved, the possibility exists that they could have also been
incomplete intricate selvages as an isolated mat edge with an intact apex fold could easily be misidentified as such. Out of 12 surviving intricate selvages both 2/2 and 3/3 twill plaiting are represented and only eight are preserved enough to determine their complete selvage configuration (Table 7.24). These specimens are restricted to rooms in the northwest portion of the pueblo (Figure 7.37). Use of a single row of s-twist weft twining for reinforcement is present on seven specimens but indeterminate for the eighth. I identified seven intricate selvage variants in the assemblage, three of which were not previously documented at Pueblo Bonito or Aztec West. Intricate selvage mats appear to have been present throughout the occupation of Salmon Ruins (Figure 7.80).

<table>
<thead>
<tr>
<th>Variant No.</th>
<th>Post-Apex Fold Sequence</th>
<th>n</th>
<th>Twill Interval</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>AF/1/2/2/2/2/1/C</td>
<td>1</td>
<td>unknown</td>
<td>62W</td>
</tr>
<tr>
<td>27</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>2</td>
<td>2/2</td>
<td>43W</td>
</tr>
<tr>
<td>7</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>2</td>
<td>2/2</td>
<td>unknown</td>
</tr>
<tr>
<td>9</td>
<td>AF/1/2/2/1/1/F/1/1/C</td>
<td>1</td>
<td>2/2, unknown</td>
<td>43W, 64W</td>
</tr>
<tr>
<td>10</td>
<td>AF/1/2/2/1/1/F/1/1/C</td>
<td>1</td>
<td>unknown</td>
<td>33W</td>
</tr>
<tr>
<td>41</td>
<td>AF/1/2/2/2/1/1/F/1/C</td>
<td>1</td>
<td>3/3</td>
<td>43W</td>
</tr>
<tr>
<td>42</td>
<td>AF/2/2/1/F/1/2/F/2/1/C</td>
<td>1</td>
<td>unknown</td>
<td>62W</td>
</tr>
</tbody>
</table>

* AF=obtuse angled apex fold, F=approximately 90 degree fold, C=terminal clipping of strips

**Decoration.** Although no mats were sufficiently preserved to allow characterization of overall design, Webster (2006a) does note the presence of shift-induced patterning and alternation of thick and thin strips in one specimen.

**Metric Variation.** Webster (2006a:953) noted that 3/3 twill mats tended to be finer than 2/2 mats, but I found no clear patterns in strip width or density by structural type, space or time, and this is likely owing the to the small sample size (e.g., Figure
There is some suggestion that intricate selvages from centrally-located rooms near Room 64 (kiva) employ more acute apex fold angles as compared to those from northwestern rooms but, again, the sample is small (Figure 7.82) and chronology does not appear to account for this. A scatterplot of intricate selvage complexity proxies reveals little save that intricate selvages from centrally-located rooms may be wider on average as compared to those from northwestern rooms (Figure 7.83). Descriptive statistics for measurable twill plaited matting (Table 7.25) are difficult to make generalizations about due to small sample size.

Figure 7.80. Fragment of a 2/2 twill plaited mat with intricate selvage (Variant 27) from adult female burial 43W057 in Room 43W at Salmon Ruins (SRM 80,485.1). Courtesy of the Salmon Ruins Museum.
Figure 7.81. Scatterplot of Salmon Ruins twill plaited matting strip width and density by spatial subdivision.

Figure 7.82. Scatterplot of Salmon Ruins twill plaited matting intricate selvage initial fold and apex fold angles by spatial subdivision.
Figure 7.83. Scatterplot of Salmon Ruins twill plaited matting intricate selvage width and structural complexity proxy by spatial subdivision.
Table 7.25. Descriptive Statistics for Measurements on Salmon Ruins Twill Plaited Matting.

<table>
<thead>
<tr>
<th>Strip Width</th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>32</td>
<td>2.0-8.3</td>
<td>4.6</td>
<td>34.1</td>
</tr>
<tr>
<td>2/2</td>
<td>22</td>
<td>2.0-7.5</td>
<td>4.1</td>
<td>34.2</td>
</tr>
<tr>
<td>3/3</td>
<td>2</td>
<td>4.1</td>
<td>4.1</td>
<td>-</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>3</td>
<td>3.0-4.8</td>
<td>3.6</td>
<td>29.2</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>22</td>
<td>2.0-7.5</td>
<td>4.4</td>
<td>32.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strips Per CM</th>
<th>n</th>
<th>Range</th>
<th>Mean</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>34</td>
<td>1.1-4.0</td>
<td>2.3</td>
<td>33.2</td>
</tr>
<tr>
<td>2/2</td>
<td>23</td>
<td>1.3-4.0</td>
<td>2.5</td>
<td>31.1</td>
</tr>
<tr>
<td>3/3</td>
<td>2</td>
<td>2.5-2.8</td>
<td>2.7</td>
<td>-</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>3</td>
<td>2.0-3.3</td>
<td>2.8</td>
<td>23.2</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>23</td>
<td>1.3-4.0</td>
<td>2.4</td>
<td>33.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Initial Fold Angle</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>11</td>
<td>122.5-135.0</td>
<td>128.0</td>
<td>2.8</td>
</tr>
<tr>
<td>2/2</td>
<td>5</td>
<td>125.0-130.0</td>
<td>129.0</td>
<td>1.7</td>
</tr>
<tr>
<td>3/3</td>
<td>2</td>
<td>122.5-124.3</td>
<td>123.4</td>
<td>-</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>1</td>
<td>126.7</td>
<td>126.7</td>
<td>-</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>7</td>
<td>122.5-135.0</td>
<td>128.1</td>
<td>3.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Post-Apex Fold Angle</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>10</td>
<td>90.0-120.0</td>
<td>112.0</td>
<td>8.2</td>
</tr>
<tr>
<td>2/2</td>
<td>4</td>
<td>110.0-117.5</td>
<td>113.8</td>
<td>2.8</td>
</tr>
<tr>
<td>3/3</td>
<td>2</td>
<td>120.0</td>
<td>120.0</td>
<td>-</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>1</td>
<td>107.5</td>
<td>107.5</td>
<td>-</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>6</td>
<td>110.0-120.0</td>
<td>116.7</td>
<td>3.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Strip Angle of Crossing</th>
<th>n</th>
<th>Range (°)</th>
<th>Mean (°)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>12</td>
<td>60.0-85.0</td>
<td>69.1</td>
<td>11.7</td>
</tr>
<tr>
<td>2/2</td>
<td>6</td>
<td>60.0-70.0</td>
<td>64.6</td>
<td>7.1</td>
</tr>
<tr>
<td>3/3</td>
<td>2</td>
<td>65.0-69.3</td>
<td>67.1</td>
<td>-</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>1</td>
<td>78.3</td>
<td>78.3</td>
<td>-</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>8</td>
<td>60.0-70.0</td>
<td>64.6</td>
<td>5.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intricate Selvage Width</th>
<th>n</th>
<th>Range (cm)</th>
<th>Mean (cm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>10</td>
<td>2.0-5.8</td>
<td>3.4</td>
<td>31.7</td>
</tr>
<tr>
<td>2/2</td>
<td>4</td>
<td>2.0-3.4</td>
<td>2.7</td>
<td>26.7</td>
</tr>
<tr>
<td>3/3</td>
<td>2</td>
<td>3.0</td>
<td>3.0</td>
<td>-</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>1</td>
<td>3.3</td>
<td>3.3</td>
<td>-</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>6</td>
<td>2.0-3.7</td>
<td>2.9</td>
<td>22.7</td>
</tr>
</tbody>
</table>

*a Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.
Antelope House

The matting assemblage from Antelope House has been thoroughly analyzed and reported by Adovasio and Gunn (1975, 1976, 1986), and includes mats dating from Basketmaker III to historic times. Twill plaited mats, however, are not clearly attested to until Pueblo I times. Adovasio and Gunn’s (1986) Table 138, which lists the distribution of all plaited objects by structural type, raw material, and provenience, includes one mat from Basketmaker III contexts and, perhaps, four from Pueblo I contexts. Given the likelihood of stratigraphic mixing, because nearly all of Antelope House’s architectural units were built over earlier structures, I am dubious about the assignment of so early a date to one twill plaited intricate selvage mat, and view it as more likely post-dating the Basketmaker III occupation. Direct radiocarbon dating could of course resolve this. Later discussion of plaited artifacts’ internal chronology (Adovasio and Gunn 1986:391) also asserts the persistence of twill plaited intricate selvage matting up through the Navajo occupation, but Table 138 lists only three specimens that could be rush mats. I think more parsimonious explanations are that these are not Navajo, or are the result of stratigraphic disturbance, given what we know about prehispanic twill plaited matting’s spatio-temporal distribution elsewhere in the northern Southwest, and the scant evidence for Navajo twill plaited mat production (see Gifford 1940; Kluckhohn et al. 1971:181-183, 332-333).
The 263 twill plaited mats recovered from the site reveal an increase in abundance and presumably importance with time during the Pueblo era, peaking during the Late Pueblo III period. As with the coiled basketry, the twill plaited matting sample has a pan-site distribution, but is differentially distributed within the site, with more than half of the sample coming from the South Area/Room Block (Figure 7.42). Time and collection access issues did not permit an examination of a comparative sample of mats from Antelope House, but I was able to study a single complete mat (AMNH 29.1/8525) undoubtedly affiliated with the Antelope House occupation that Morris (1948) recovered from the so-called “Tomb of the Weaver.” Select observations from Adovasio and Gunn (1986) are summarized below because of the assemblage’s size and importance for later comparisons, but some data are not readily available due to the space limitations of the 1986 site report. For example, stylistic variation in matting is not treated separately but as part of the broader discussion of variability within the entire plaited artifact sample that includes ring baskets, pot rests, tump bands, and other manufactures.

**Structural Type.** Plaited mats are documented in 1/1 simple plaited, and 2/2, 3/3, and 4/4 twill plaited varieties (Table 7.15). Twill plaiting with 2/2 interval interlacement is the preferred structural type across the site and through time, comprising 87.8 percent of the mat assemblage, while the other three types are present in small numbers. Simple plaiting and 2/2 twill plaiting have pan-site distributions while 3/3 twill is absent from the North Area/Room Block and the sole example of a 4/4 twill mat derives from the northern portion of the site.
Selvage Treatment. Mat selvages include small quantities of 90 degree self selvages but are overwhelmingly intricate selvages. The sole example of 4/4 twill matting exhibits a 90 degree self side selvage and a double 90 degree self end selvage. There are 185 intricate selvages, plus the complete burial mat from the Tomb of the Weaver, and 175 of these have intact post-apex fold plaiting sequences. Intricate selvages are known from all areas of the site and most popular after A.D. 1100, but may occur as early as the A.D. 900s or 1000s. I suspect that the single unprovenienced s-twist weft twined mat with a 2/2 twill plaited selvage (Adovasio and Gunn 1986:Fig.116) is of Basketmaker III or Pueblo I age and, if so, would visually anticipate later intricate selvage mats.

Adovasio and Gunn (1986:349-350) define 36 different post-apex fold variants subsumed by six selvage subtypes based on variation in post-apex fold sequence, the presence or absence of twining, and whether the first post-apex fold strip interlacement initiates under or over the intersecting strip. However, aside from primary variation in post-apex fold sequence, I did not find the other variables meaningful in light of preservation factors and the variation that I observed elsewhere, so I collapsed Adovasio and Gunn’s variants into 30 configurations to facilitate comparison. These include 12 variants that I documented at Pueblo Bonito, Aztec, and Salmon (Table 7.26). Note that the thirteenth century A.D. Tomb of the Weaver mat is included in this tabulation and exhibits intricate selvage Variant 27. Four variants (Jolie Variants 6, 9, 27, 29) clearly dominate the intricate selvage assemblage. Where observable, reinforcing rows of twining on intricate selvages are almost entirely s-twist wefts (98.3 percent),
with only 5.3 percent of the sample exhibiting z-twist wefts. One specimen employs yucca cordage twining wefts rather than the standard rush culms.

Table 7.26. Antelope House Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants.

<table>
<thead>
<tr>
<th>Jolie Variant</th>
<th>Adovasio and Gunn Variant</th>
<th>Post-Apex Fold Sequence(^a)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>AF/2/2/C</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>12, 35</td>
<td>AF/1/2/2/1/1/C</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>1, 9, 31</td>
<td>AF/1/2/2/2/C</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>AF/1/2/2/2/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>18, 21</td>
<td>AF/1/2/1/1/F/1/C</td>
<td>2</td>
</tr>
<tr>
<td>26</td>
<td>3</td>
<td>AF/1/2/2/1/F/1/C</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>AF/2/2/2/1/F/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>AF/1/1/2/1/1/F/1/C</td>
<td>1</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>58</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>AF/1/2/2/1/F/1/C</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>AF/2/2/1/1/1/F/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>AF/1/2/2/2/1/F/1/2/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>33, 34</td>
<td>AF/1/2/2/2/3/F/1/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>17, 30</td>
<td>AF/2/2/2/1/1/F/1/1/C</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>AF/1/2/1/2/1/1/F/1/C</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>5</td>
<td>AF/1/2/2/2/1/1/F/1/C</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>AF/1/2/2/2/2/1/F/1/C</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>AF/1/2/2/1/1/1/F/1/1/C</td>
<td>18</td>
</tr>
<tr>
<td>11</td>
<td>24</td>
<td>AF/1/2/2/2/2/1/F/1/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>AF/2/2/2/1/1/1/F/1/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>AF/2/2/2/2/2/1/F/1/1/C</td>
<td>1</td>
</tr>
<tr>
<td>41</td>
<td>26</td>
<td>AF/1/2/2/2/2/1/F/1/C</td>
<td>2</td>
</tr>
<tr>
<td>32</td>
<td>15</td>
<td>AF/1/2/2/2/2/2/1/F/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>AF/1/2/2/2/1/1/1/F/1/1/C</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>AF/1/2/2/2/1/2/1/F/1/2/1/C</td>
<td>1</td>
</tr>
<tr>
<td>34</td>
<td>28</td>
<td>AF/1/2/2/2/2/2/1/1/F/1/1/C</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>AF/1/2/2/2/2/2/1/F/1/2/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>AF/1/2/2/1/1/F/1/1/F/1/1/C</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>36</td>
<td>AF/1/2/2/2/1/F/1/1/F/1/1/C</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>AF/1/2/2/2/1/F/1/1/F/1/2/C</td>
<td>1</td>
</tr>
</tbody>
</table>

\(^a\) AF=obtuse angled apex fold, F=approximately 90 degree fold, C=terminal clipping of strips. Data are adapted from Adovasio and Gunn (1986:351-367, Tables 140-143) and include the single mat from the “Tomb of the Weaver” (Morris 1948).
Decoration. Adovasio and Gunn (1986:352) report only one 2/2 twill specimen that exhibits alternating dyed and undyed strips to effect simple linear designs. Thus, the number of mats exhibiting decorative embellishment appears to be quite small at Antelope House, but factors of preservation more than likely clouded analysts’ ability to recognize decoration.

Metric Variation. Strip width and density measurement averages by subtype do not permit calculations like those performed for the previously discussed assemblages, but are sufficient to note that the range of variation reported for Antelope House twill plaited matting is comparable with study sample sites. To examine the possibility that two or more groups of matweavers were operating simultaneously at Antelope House, Adovasio and Gunn (1986:392) performed factor analysis on 185 mats with intricate selvages. Their results indicate that mats from the northern portion of the site employ consistently greater angles of selvage element interlacement than the central or southern portions. They interpret these data as supporting the presence of at least two matweaving groups occupying spatially separated areas of the site.

Fine Twill Plaited Sandals

Twill plaited sandals were the dominant form of footwear from Pueblo I times until the late A.D. 1300s on the Colorado Plateau (see Chapter 5; Salwen 1960). Smaller quantities of the next most popular style, finely woven twined sandals, as well as simple 1/1 plaited sandals and hide moccasins were also produced, but they represent
markedly smaller fractions of footwear assemblages during this timeframe. Whereas
simple 1/1 plaited sandals are generally made from seven to ten whole broadleaf yucca
leaves and are correspondingly coarse in weave texture, twill plaited sandals tend to be
made from 20 to 30 whole narrow yucca leaves or longitudinally cut strips of wider
leaves to produce a markedly finer weave texture. Intermediate textures do occur, but
they are readily distinguishable from the abundant fine twill plaited sandals. Little
structural variability is evident as the overwhelming majority are 2/2 interval twill,
though a handful of 3/3 interval twill are documented.

Complete and fragmentary fine twill plaited sandals were identified in study
sample assemblages through available documentation and systematic survey of
museum collections. In many cases fragments of sandals were identified among mixed
artifact lots. Even when diagnostic structural features such as selvages or ties are
missing, identification of a fragment as a sandal is generally straightforward when raw
material is identifiable and a portion of the weave is preserved. The only comparable
perishable artifacts employing such narrow yucca strips in 2/2 interval twill, which in a
fragmentary state could be confused with fine twill sandals, are distinctive truncated
cone- or donut-shaped pot rests. However, fragments of pot rests are easily
recognizable because their strips interlace at consistently more acute angles to
accommodate the object’s characteristic form, and they also typically exhibit vertical
strip compression from the heavy ceramic pots that they supported, which distorted
their fabrics’ appearance.
The sections that follow consider patterned variability in only fine twill plaited yucca sandals along the lines of raw material, starting and finishing methods (that is, toe and heel selvages), side selvage treatment, strip splices, decoration, and metric variation. Time did not permit detailed study of toe-jog construction techniques, but it is sufficient to note that they are typically created by adding one to three strips and/or altering the position (transposing, cf. Emery 1995:188) of existing strips (Osborne 2004:143-144, Fig. 118).

**Pueblo Bonito**

A total of 45 complete and fragmentary fine twill plaited sandals were identified in Pueblo Bonito collections. All are executed in 2/2 twill, and examples derive from all areas of the pueblo and represent the duration of the Bonito phase. The largest samples come from rooms in the northwest (n=21) and southeast (n=13) quadrants of the pueblo (Figure 6.1, Table 7.27). Twenty-three specimens are assignable to Early to Classic Bonito (A.D. 850-1110) deposits, 13 Classic to Late Bonito (A.D. 1040-1140) deposits, and the remainder only broadly to the site’s occupational span.

**Raw Material.** All specimens are woven from yucca (*Yucca* sp.), except for three specimens from Room 32 (Figures 6.30, 6.31) that are made from whole, thin rush (*Schoenoplectus* sp.) culms. One (or more) species of narrowleaf yucca dominates the assemblage (n=30), while the remaining 12 sandals are composed of longitudinally cut...
strips of broadleaf yucca leaves, probably banana leaf yucca (*Yucca baccata*) (Figure 6.26), and a single example of yucca cordage strips (Figure 7.84).

Table 7.27. Fine 2/2 Twill Plaited Sandals from Pueblo Bonito by Spatial Subdivision and Room.

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>n</th>
<th>Room (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwest</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Northwest</td>
<td>21</td>
<td>2 (10), 32 (3), 53 or 56/63 (3), 111 (2), 326 (2), 330</td>
</tr>
<tr>
<td>Northeast</td>
<td>6</td>
<td>62 (2), 85 (4)</td>
</tr>
<tr>
<td>Southeast</td>
<td>13</td>
<td>24/229 (5), 168, 169, 170, 171 (2), 226, 246A, 255</td>
</tr>
<tr>
<td>Unknown</td>
<td>4</td>
<td>possibly 62? (4)</td>
</tr>
</tbody>
</table>

Figure 7.84. Heel-end sole of an incomplete 2/2 twill sandal made from two ply, s-spun, final z-twist yucca cordage strips from Early Bonito (A.D. 850-1040) contexts in Room 111 at Pueblo Bonito (H-9184). Note pseudo-embroidered raised zig-zag design. Courtesy of the American Museum of Natural History.
Raw material variability is most pronounced in rooms in the northwest quadrant that yielded similar quantities of narrow and broadleaf yucca sandals, the three rush specimens, and the sole example utilizing yucca cordage strips. Rooms in the southeast represent the only other area in the pueblo where broad and narrowleaf yucca sandals were recovered. A single sandal from the southwest is broadleaf yucca.

Chronologically, specimens from northwestern rooms ascribed to Early Bonito subphase contexts show the most variation insofar as this area is the source of the cordage strip and rush specimens. Examining the distribution of broad and narrowleaf sandals through time we find that broadleaf yucca was most prevalent during Early to Classic Bonito times in rooms in the western half of the pueblo (Figure 7.85). Only two broadleaf specimens are known from Classic to Late Bonito contexts in the southeast portion of the pueblo.

![Bar chart showing sandal strip raw material count by Pueblo Bonito spatial subdivision](image)

**Figure 7.85. Use of broadleaf and narrowleaf yucca strips for fine twill plaited sandals through time and across space at Pueblo Bonito.**
Starting and Finishing Methods. The interlacing of twill plaited sandals almost always began at the toes, as indicated by unfinished specimens and other features of sandal construction. Starting and finishing methods are thus generally equivalent to toe and heel selvages that record, respectively, how the initial plaiting elements are secured and how the ends of terminal strips are secured. Toe and heel selvages are visible exclusively on the soles of the sandals and are inset 2 to 5 cm from sandals’ toe- and heel-edge margins (Figure 7.86, top). Whereas toe selvages generally reflect the point at which the initial strips became exhausted and new strips were added, heel selvages mark the treatment of strip ends after they were reinserted into the fabric at the heel to produce the continuous edge (side selvage) of the fabric. Unfortunately, toe and heel selvages’ restriction to sandal soles has meant that they frequently wore away with use.

The Pueblo Bonito sandal assemblage includes only three specimens that are preserved well enough to characterize toe selvage construction and 12 for which the heel selvage could be documented. Two toe selvage configurations are represented. In the first, the free ends of the initial strips were tied off on immediately adjacent strips in overhand knots (Figure 7.86, middle). In the second, strips were secured by looping them around immediately adjacent strips. Five heel selvage varieties exist, including two that replicate documented toe selvage manipulations (Figure 7.86, bottom). The other three heel selvage configurations include double 90 degree self selvages, 180 degree self selvages, and one specimen in which the heel strips were apparently left free as stubs after interlacing to form the heel. Table 7.28 summarizes the spatial and temporal distributions of these stylistic choices.
Figure 7.86. Top, sole view of 2/2 twill plaited sandal with 90 degree self side selvage from Room 24/229 at Pueblo Bonito (H-3960). Middle show close-up view of an overhand knotted toe selvage and, bottom, heel selvage with strips looped around adjacent strips. Courtesy of the American Museum of Natural History.
Despite the small sample, the data suggest some chronological patterning inasmuch as 180 and 90 degree self selvages appear limited to Early Bonito contexts, while several new toe and heel selvage configurations may have been introduced during the Classic and Late Bonito subphases. Because those rooms yielding the earliest selvage varieties are all from northwest rooms that are among the earliest constructed, it seems likely that any spatial patterning is more likely a product of chronology, but this cannot be proven with the available data.

**Side Selvage Treatment.** Side selvages on twill plaited sandals refer to the manipulation of strips to create a continuous margin around the sandal fabric. Generally, the technique is employed consistently throughout the specimen, and so side selvage technique is identifiable as long as a segment of at least one sandal margin is preserved. In the Pueblo Bonito assemblage the majority (n=40) of fine twill plaited sandals exhibit 90 degree self selvages wherein strips reaching the sandal edge were simply folded at a 90 degree angle to the left or right and thereafter reinserted into the
body of the sandal where they were interlaced to create the fabric. Within this subset of selvages, there is some variation in interval of interlacement prior to and immediately after the fold. While most (n=28) side selvages proceed 2/F/2 (Figures 6.25, 7.86, top), thereby continuing the 2/2 interlacement of the body, nine differ in proceeding 3/F/3 (Figure 6.26), and three proceed 2/1/F/1/2 (Figure 6.30). Each variation, though minor, effects subtle visual differences. For example, 3/F/3 selvages give the appearance of tightly rolled, cordage-like sandal edges. The remaining two specimens with identifiable side selvages each reflect a unique configuration. Summary data on side selvage treatments through time and across space are presented in Table 7.29.

Table 7.29. Pueblo Bonito Fine Twill Plaited Sandal Side Selvage Treatments.

<table>
<thead>
<tr>
<th>Side Selvage</th>
<th>n</th>
<th>Room</th>
<th>Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>90° self selvage, 2/F/2</td>
<td>28</td>
<td>2 (4), 24/229 (5), 25, 53 or 56/63, 62 (2), 85 (2), 111, 168, 169, 170, 171, 226, 246A, 255, 330, unknown (4)</td>
<td>Early Bonito (7), Early-Classic Bonito, Classic-Late Bonito (8), Late Bonito (5), Bonito phase (7)</td>
</tr>
<tr>
<td>90° self selvage, 3/F/3</td>
<td>9</td>
<td>2 (6), 53 or 56/63 (2), 85</td>
<td>Early Bonito (7), Bonito phase (2)</td>
</tr>
<tr>
<td>90° self selvage, 2/1/F/1/2 (see Osborne 2004:Fig. 102c)</td>
<td>3</td>
<td>32</td>
<td>Early Bonito</td>
</tr>
<tr>
<td>Full twist 90° self selvage (see Osborne 1980:Fig.399)</td>
<td>1</td>
<td>85</td>
<td>Early Bonito</td>
</tr>
<tr>
<td>Double 90° self selvage</td>
<td>1</td>
<td>111</td>
<td>Early Bonito</td>
</tr>
</tbody>
</table>

Akin to the spatiotemporal distribution of toe and heel selvage variants discussed above, rooms in the northwest yielded the earliest and most variable side selvage configurations. In this case it appears that Early Bonito subphase variation in side selvages gave way to greater uniformity in 90 degree self selvages by Classic Bonito times.
Strip Splices. The technique of adding in new strips was discernible in 17 specimens and is always located on the sole. In all but one case, new strips were laid in adjacent to existing strips at strip crossings, frequently leaving short strip stubs on the sole. Laying in new elements in this fashion is exceedingly common in plaited objects made just about anywhere and at any time, so it is likely that most sandals bore these types of splices, in the absence of evidence suggesting otherwise. A single unfinished specimen from Room 53 or 56/63, undated but perhaps of Early Bonito subphase age given its provenience, exhibits laid-in splices as well as two strips tied in self-engaging overhand knots.

Decoration. Twenty-seven sandals exhibit structural manipulations used to create textural contrasts on the upper and lower surfaces. By far the most frequent decorative technique, observed in 22 sandals, is the creation of from one to five raised ridges, each ridge about the width of one strip, parallel to the sandal’s long axis (Figure 6.26). Effected by applying differential tensioning (pulling one strip into an adjacent row), these occur as spaced and tightly packed lines, more often than not paralleling one or both side selvages, where they give the appearance of a border along the length of the sandal. In textile terminology, such manipulations where one or more elements diverge from their position diagonally for a space, while continuing to interlace, are described as transposed elements (Emery 1995:188-189), and they produce a textural contrast that is visible on both surfaces of the fabric (cf. Rogers 1983; Whiteford and Rogers 1994). In one case (NMNH A335335.1), the ridges appear to have been made by intentionally and systematically splicing new strips in laterally, rather than relying on
tension applied to extant strips. Notably, five such specimens with tension-induced raised ridges also utilize patterned strip tensioning to create more complex designs in the body of the sandal. In at least three of these specimens, all from Room 32, the strips under tension create zig-zags that run parallel to the sandal’s long axis (Figures 6.30, 6.31). Use of tensioned or transposed strips for decorative effect spans the Bonito phase, and examples are known from all areas of the pueblo except for the southwestern rooms where the sample is small.

Six specimens, three of which also evidence tensioned raised ridges, employ supplemental strips to effect raised patterns on the soles in a manipulation that Osborne (2004:156, Figs. 136-138) describes as “embroidery” (Figures 7.84, 7.87). Osborne’s use of the term “embroidery” is technically inappropriate, however, as true embroidery entails the use of needle-worked accessory stitches that may or may not pierce the constituent elements of the fabric (Emery 1995:233, 246-247). These supplemental strips were added during manufacture, with no evidence that any needle was used, nor that any yucca strips were sewn. Labeling the technique "eccentric supplemental strip patterning" might be more accurate and structurally descriptive (cf. Emery 1995:83, 140-141), but for ease of comparison with Osborne’s published sandal descriptions, I modify it with “pseudo-” to acknowledge the method’s superficial resemblance to embroidery. In all cases where a sufficient portion of the fabric survives, the pseudo-embroidered motifs are zig-zags oriented several degrees shy of parallel to the sandal’s long axis. Use of pseudo-embroidery is documented in sandals from contexts spanning the Bonito phase. Judd (1954:73) views this “ground gripper”
modification, as he calls it, as intending added traction. Although his contention cannot be disproven, in my view the primary function was decorative.

Figure 7.87. Overview and close-up of the sole of fine twill plaited sandal with pseudo-embroidered zig-zag design from Room 246A in Pueblo Bonito (A335335.1). Courtesy of the Smithsonian’s National Museum of Natural History.

*Metric Variation.* From the available sample there is no evidence to suggest change through time in strip width or density (Figure 7.88, Table 7.30). Spatially, the northwest and southeast quadrants show the greatest range of variation in strip width and density, with some suggestion that sandals from southeastern rooms are slightly more internally consistent (Figure 7.89). Sandals from the northeast, however, fall within the range of other areas of the site but tend to be on the coarser side and form a
tighter cluster unto themselves. Since northeast and southeast rooms yielded the largest samples, it may be best to view these results cautiously.

![Figure 7.88. Scatterplot of temporal variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density.](image)

Table 7.30. Descriptive Statistics for Measurements on Pueblo Bonito Fine Twill Plaited Sandals.

<table>
<thead>
<tr>
<th>Strip Width</th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>45</td>
<td>1.5-4.2</td>
<td>2.7</td>
<td>19.9</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>23</td>
<td>1.5-3.5</td>
<td>2.6</td>
<td>19.9</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>13</td>
<td>1.9-3.2</td>
<td>2.6</td>
<td>13.9</td>
</tr>
<tr>
<td>Strips Per CM n</td>
<td>Range</td>
<td>Mean</td>
<td>CV (%)</td>
<td></td>
</tr>
<tr>
<td>Assemblage</td>
<td>45</td>
<td>2.6-6.1</td>
<td>4.0</td>
<td>18.1</td>
</tr>
<tr>
<td>Early-Classic (A.D. 850-1110)</td>
<td>23</td>
<td>3.0-6.1</td>
<td>4.1</td>
<td>19.3</td>
</tr>
<tr>
<td>Classic-Late (A.D. 1040-1140)</td>
<td>13</td>
<td>3.3-5.3</td>
<td>4.1</td>
<td>13.4</td>
</tr>
</tbody>
</table>

* Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.

Although no twill plaited sandals were documented with specific burials during excavation, I identified one specimen in a mixed lot associated with Burial 8/9 recovered from Room 326. When sandals from burial cluster rooms are plotted, it appears that
examples from Judd’s western burial cluster rooms are among the finest recovered from the pueblo (Figure 7.90). Sandals from Pepper’s northern burial cluster rooms fall within the range of non-mortuary room sandals and may be coarser as compared to western burial cluster room sandals if the small sample sizes reflect reality and not sampling bias. Additionally, neither the presence nor absence of toe jogs or decoration seem related to sandal fabric texture, as those with and without jogs or decoration exhibit similar ranges of strip widths and densities (Figures 7.91, 7.92).

Figure 7.89. Scatterplot of spatial variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density.
Figure 7.90. Scatterplot of Pueblo Bonito fine 2/2 twill plaited sandal strip width and density by mortuary and non-mortuary contexts.

Figure 7.91. Scatterplot of variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density by presence/absence of toe jog.
Figure 7.92. Scatterplot of variation in Pueblo Bonito fine 2/2 twill plaited sandal strip width and density by presence/absence of decorative embellishment.

Aztec West Ruin

Seventy-six fine 2/2 twill plaited sandals come from deposits representing the duration of occupation at Aztec Ruin West. This sample derives only from northern rooms at the pueblo, with the Northeast and Northwest sectors yielding the largest samples (Figure 6.2, Table 7.31). In the Northeast Sector, more than 80 percent of the sandals are from just two rooms. Twenty-nine of the latter are assigned to the Late Bonito subphase Chaco occupation and 25 to the post-Chaco occupation.

Raw Material. Yucca leaves are the exclusive raw material used in sandal construction at Aztec West, with 39 composed of one or more narrowleaf species and 34 of broadleaf yucca (Figure 6.25). At least one Late Bonito subphase specimen from
Table 7.31. Fine 2/2 Twill Plaited Sandals from Aztec West by Spatial Subdivision and Room.

<table>
<thead>
<tr>
<th>Sector</th>
<th>n</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>37</td>
<td>46, 48 (16), 54, 59, 62-2, 72 (15), 76, 78</td>
</tr>
<tr>
<td>East North Wing</td>
<td>8</td>
<td>95 (2), 122-2 (6)</td>
</tr>
<tr>
<td>West North Wing</td>
<td>3</td>
<td>115</td>
</tr>
<tr>
<td>Unknown</td>
<td>7</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Room 48 (AMNH 29.0/7659) employs both whole narrowleaf and longitudinally cut broadleaf yucca strips. Numerically, narrowleaf yucca sandals are slightly more abundant than broadleaf sandals in the assemblage, and when examined by provenience, narrowleaf predominates in all sectors except those rooms in the Northeast Sector. The temporal distribution of sandal raw materials indicates that narrowleaf yucca is the preferred strip fiber source for Late Bonito sandals but is ultimately usurped by broadleaf yucca, which assumes dominance after A.D. 1130. To better explore the relationship between raw material choice, time, and space, Figure 7.93 charts sandal abundance by time, space, and raw material. Here, narrowleaf yucca is seen to be the raw material of choice for Late Bonito sandals. However, sandals from post-Chaco deposits tend to be broadleaf yucca in northeastern rooms and narrowleaf yucca in northwestern rooms. Three of four undated sandals from the Northeast are broadleaf and so would likely have a negligible impact on the observed trends even if they could be assigned to the Chacoan or later occupations. Interpreting raw material preferences in the Northwest is more difficult as nine sandals are undated, five of which are narrowleaf and four broadleaf. Chronological refinement of these specimens could show that post-Chaco sandals in the northwest employed similar quantities of broad
and narrowleaf yucca, or that narrowleaf yucca is preferred throughout the occupation, in contrast to the pattern seen in northeastern rooms. In either case, and assuming that current sandal temporal assignments are correct, the data suggest the possibility of a post-A.D. 1130 contrast in raw material choice between the occupants of northeastern versus northwestern rooms.

![Bar chart showing sandal strip raw material distribution by Aztec West Spatial Subdivision.](chart.png)

**Figure 7.93.** Fine twill plaited sandals from Aztec Ruin West by space, time, and raw material.

*Starting and Finishing Methods.* Four different toe selvage and four different heel selvage configurations exist in the sandal assemblage (Table 7.32). Use of overhand knots to secure strip stubs is the preferred starting and finishing method and is attested to across the pueblo throughout its occupation. The limited sample does not reveal any clear spatial patterning, but one rare selvage treatment not recorded at Pueblo Bonito consists of terminal strips alternately folded 90 degrees to the left or right and then
sewn so as to pierce the adjacent strip (Figure 7.94). This produces the distinctive visual appearance of a chain of split strips that resemble stacked chevrons.

Table 7.32. Aztec West Fine Twill Plaited Sandal Starting and Finishing Methods.

<table>
<thead>
<tr>
<th>Toe Selvage</th>
<th>n</th>
<th>Room</th>
<th>Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strips overhand knotted with adjacent strips</td>
<td>10</td>
<td>48 (2), 54, 72 (3), 76, 122-2, unknown (2)</td>
<td>Late Bonito (4), post-Chaco (3), A.D. 1100-1290 (3)</td>
</tr>
<tr>
<td>Strips looped around adjacent strips</td>
<td>6</td>
<td>48, 72 (4), 193</td>
<td>Late Bonito, post-Chaco (4), A.D. 1100-1290</td>
</tr>
<tr>
<td>Strip stubs left free</td>
<td>5</td>
<td>122-2, 135-2, 139 (2), 180</td>
<td>Late Bonito, post-Chaco (3), A.D. 1100-1290</td>
</tr>
<tr>
<td>Strips folded and sewn through adjacent strip</td>
<td>2</td>
<td>46, 189</td>
<td>Late Bonito</td>
</tr>
<tr>
<td><strong>Heel selvage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strips overhand knotted with adjacent strips</td>
<td>23</td>
<td>46, 48 (3), 62-2, 72 (4), 95, 115, 122-2 (3), 135-2 (2), 136-2, 139, 153-2, 178, 180, 189, unknown</td>
<td>Late Bonito (8), post-Chaco (8), A.D. 1100-1290 (7)</td>
</tr>
<tr>
<td>Strips looped around adjacent strips</td>
<td>15</td>
<td>48 (3), 54, 72 (6), 122-2 (2), 189, 193, unknown</td>
<td>Late Bonito (7), post-Chaco (6), A.D. 1100-1290 (2)</td>
</tr>
<tr>
<td>Double 90° self selvage</td>
<td>1</td>
<td>139</td>
<td>post-Chaco</td>
</tr>
<tr>
<td>Strips folded and sewn through adjacent strip</td>
<td>1</td>
<td>48</td>
<td>Late Bonito</td>
</tr>
</tbody>
</table>

Side Selvage Treatment. The side selvages preserved on 73 sandals come in two versions of 90 degree self selvages (Table 7.33). In the most numerous variety, selvages continue the 2/2 interval of the fabric body (Figure 7.94), whereas the rest switch from 2/2 to 3/3 at the selvage (Figure 7.95). Both varieties are distributed across the pueblo, and while 2/2 interval selvages span the site’s occupation, examples of 3/3 are only securely dated to Late Bonito times.

Strip Splices. Strip splicing technique is identifiable in 62 specimens, of which 60 exhibit strips that are simply laid in. One specimen evidences laid-in splices as well as some strip ends tied off in self-engaging overhand knots, while another appears to
Figure 7.94. Sole view of fine 2/2 twill plaited narrow leaf yucca sandal from Room 46 at Aztec West (29.0/7656). Close-up of toe selvage shows strips folded and sewn through an adjacent strip. Note laid in strip splices indicated by leaf stubs. Courtesy of the American Museum of Natural History.
exhibit primarily (if not exclusively) overhand knotted splices (Figure 7.96). The former comes from Late Bonito contexts in Room 189, and the latter undated specimen is from Room 153-2.

Table 7.33. Aztec West Fine Twill Plaited Sandal Side Selvage Treatments.

<table>
<thead>
<tr>
<th>Side Selvage</th>
<th>n</th>
<th>Room</th>
<th>Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>90° self selvage, 2/F/2</td>
<td>62</td>
<td>46, 48 (16), 54, 59, 62-2, 72 (15), 76, 78, 95 (2), 115 (3), 122-2 (6), 135-2, 138, 189 (2), 193 (2), 224, 225, unknown (6)</td>
<td>Late Bonito (29), post-Chaco (17), A.D. 1100-1290 (16)</td>
</tr>
</tbody>
</table>

Figure 7.95. Upper surface of fine twill plaited sandal with 3/3 interval 90 degree self selvage from Room 153-2 at Aztec West (AZRU 2821). Courtesy of the National Park Service and Aztec Ruins National Monument.
Decoration. Seventeen sandals bear evidence of decorative embellishment.

Creation of raised ridges that parallel the sandals’ margins, either through strip tensioning (n=6) or systematic lateral splicing (n=7), constitutes the most common type of decoration and is known throughout northern rooms from Late Bonito and post-Chaco occupations (Figure 7.97). Two such sandals also employ a variant of pseudo-embroidery to create textured designs on the sole only. The precise pseudo-embroidery technique differs from that described by Osborne (2004:156, Figs. 136-138) and what I documented at Pueblo Bonito. Rather than employing supplemental strips, the pseudo-embroidery used existing strips that were twisted as they floated over (or span) several strips (Figure 7.98, cf. Figure 7.87). The end result is visually similar to the previously
Figure 7.97. Upper (left) and lower (right) views of fine twill plaited sandal from Room 115 at Aztec West with decorative border ridges effected by tensioned lateral splices and raised zig-zag design on sole created by pseudo-embroidery technique where strips are given a twist as they interlace (29.0/8855). Courtesy of the American Museum of Natural History.

Figure 7.98. Close-up views of upper and lower surfaces of the toe of a fine twill plaited sandal from Room 115 at Aztec West with decorative border ridges and raised zig-zag design on sole (29.0/8855). Courtesy of the American Museum of Natural History.
discussed pseudo-embroidery technique, but produced ridges on the sole that are noticeably thinner and resemble less the texture of cordage. This variant of pseudo-embroidery was used to effect three equally spaced lines down the center of one sandal (AMNH 29.0/8460.1), and a zig-zag in the second specimen (Figures 7.97, 7.98). The former post-dates A.D. 1130, and the latter dates to the Late Bonito subphase. Another specimen (AMNH 29.0/9984), this one from post-Chaco contexts and lacking the lateral splice-induced raised ridges that the others share, does utilize Osborne’s pseudo-embroidery technique to effect a zig-zag design most similar in overall appearance to the specimens from Room 32 in Pueblo Bonito (Figures 6.30, 6.31). However, instead of supplemental yucca leaf strips this sandal utilizes lengths of two ply, s-spun, final z-twist yucca cordage.

The final decorative technique observed in Aztec West sandals consists of supplemental strips that are sewn intermittently to effect subtle textural patterns on the upper surfaces of three specimens (Figure 7.99). Designs, if they existed, are unclear, and the textural patterns best resemble dotted or dashed lines. Peculiar to this technique is that each “dash” was sewn individually as a strip of limited length that usually spans only two or four strips before it was abruptly clipped short at its points of initiation and termination on the sole. Stated another way, each individual element was sewn for a short span and then clipped at both ends without any other interlacement in the fabric. Two of these sandals derive from northwestern rooms while the third is unprovenienced. One sandal is attributable to post-Chaco occupation of Aztec while the other two are undated.
Figure 7.99. Upper (left) and lower (right) surfaces of fine twill plaited sandal with sewn strip decoration from Room 139 at Aztec West (AZRU 115). Decoration is most visible on upper surface along the contoured toe and heel. Courtesy of the National Park Service and Aztec Ruins National Monument.

*Metric Variation.* Strip width and density show similar ranges of variation through time and across the site, although there is a tendency for Late Bonito occupation sandals to be finer than those from post-Chaco contexts (Figure 7.100, Table 7.34). Sandals from northwestern rooms are on average coarser than those from northeastern rooms (Figure 7.101), and while chronology may account for some of this, since most sandals from the Northwest Sector are assignable to post-Chaco contexts, the pattern does persist through time. A complete lack of sandals from mortuary contexts prevents assessment of spatial patterning by burial, and the presence or
absence of toe jogs and decorative embellishment appear uncorrelated with sandal fineness (Figures 7.102, 7.103).

Figure 7.100. Scatterplot of temporal variation in Aztec Ruin West fine 2/2 twill plaited sandal strip width and density.

Table 7.34. Descriptive Statistics for Measurements on Aztec West Fine Twill Plaited Sandals.

<table>
<thead>
<tr>
<th>Strips Per CM</th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>74</td>
<td>2.2-5.7</td>
<td>3.7</td>
<td>20.2</td>
</tr>
<tr>
<td>Late Bonito (A.D. 1100-1130)</td>
<td>29</td>
<td>2.5-5.7</td>
<td>4.0</td>
<td>21.5</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1130-1290)</td>
<td>24</td>
<td>2.4-5.1</td>
<td>3.7</td>
<td>17.4</td>
</tr>
</tbody>
</table>

*Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.*
Figure 7.101. Scatterplot of spatial variation in Aztec Ruin West fine 2/2 twill plaited sandal strip width and density.

Figure 7.102. Scatterplot of variation in Aztec Ruin West fine 2/2 twill plaited sandal strip width and density by presence/absence of toe jog.
Webster’s (2006a) analysis identified 21 probable fine plaited twill sandals, including one serving as the sole of a looped turkey feather cordage sock. My analysis focused on 17 specimens that I am confident are sandals, and also includes one specimen Webster identified as a possible mat or sandal (SRM 80,409) that I believe to be a sandal. Excluded are one specimen that could not be located and four others that are likely items other than sandals (e.g., pot rests) or which are extremely poorly preserved (SRM 80,073.2, 80,126, 80,152, 80,212.2). The sandal assemblage is small, and the largest samples (n=8) derive from temporally mixed deposits in central Room 62W (Figure 7.37) and four rooms in the northwest portion (n=5) of the pueblo.
Chronologically, much of the sample is poorly dated or post-dates the Chacoan occupation of Salmon.

Raw Material. Webster (2006a:997) observes that all but one of the sandals are made from narrowleaf yucca and implies that the exception may be broadleaf yucca. Eleven of the sandals for which I was confident identifying raw material employ narrowleaf yucca exclusively, supporting Webster’s findings.

Starting and Finishing Methods. Zero toe selvages and two heel selvages were identified in the sample. Both heel selvages are varieties not previously seen in the study sample. A heel selvage from Late San Juan (A.D. 1190-1300) deposits in Room 43W has strips folded 180 degrees at the heel and then the strip ends are looped around adjacent strips (SRM 80,147). The second heel selvage, from mixed deposits in Room 62W, evidences strip ends that, after looping around one set of adjacent strips, then immediately loop around a second set of strips immediately above the first set engaged by loops (SRM 80,200).

Side Selvage Treatment. Sixteen sandals have portions of preserved side selvages and all are of the 90 degree self selvage (2/F/2) variety.

Strip Splices. Five sandals exhibit news strips simply laid in at strip crossings on their soles. The remaining sandals have indeterminate strip splices.

Decoration. Webster (2006a:997-1000) reports two sandals from Room 62W that are stained red, one sandal with transposed elements used to create a decorative border, and another with intentional strip interval shifts producing a diagonal design. I do not believe that the red pigmented sandals are dyed or stained but instead exhibit a
reddish- to purple-colored fungus that I have frequently encountered on partially rotted organic artifacts from archaeological sites in the desert west (cf. Blanchette et al. 2004). The isolation of iron via portable X-ray fluorescence (XRF) that is cited as supporting the pigment identification is unsurprising given the high iron content of local sediments and the inability of the XRF to distinguish matrix adhering to the surface of the sandal from any potential pigment. Further, the fineness and orientation of strips in SRM 80,152 suggest to me that it is more than likely a decorated pot rest, which are not uncommon (e.g., Adovasio and Gunn: Fig. 159), as opposed to a sandal with a strip shift-induced design, which are unknown to me and not reported in the published literature as far as I am aware.

I did, however, identify four sandals in which tensioned strips are used to create raised ridges parallel to sandal side selvages. Two of these use existing strips, while the other two utilize systematic lateral splices. One of the latter is Webster’s sandal with transposed elements, but the crossed elements are a product of splicing and manipulation of tension rather than strips that have simply been crossed (Figure 7.104). Lamentably, three of these four sandals are from Room 62W and undated, while the latter is assigned to the Late San Juan occupation of Room 100W.

**Metric Variation.** A scatterplot of sandal strip width and density by room location tentatively suggests that sandals from centrally located Room 62W are finer as compared to sandals from northeastern and northwestern rooms (Figure 7.105). Unfortunately, the chronological dimension of this pattern is difficult to assess because all of the Room 62W sandals are undated. That said, most sandals not from Room 62W
Figure 7.104. Upper (left) and lower (right) surface views of best-preserved fine twill plaited sandal from Room 62W at Salmon Ruins (SRM 80,200). Note subtle toe jog and decorative border effected by systematic lateral strip splices on sole. Courtesy of the Salmon Ruins Museum.

Figure 7.105. Scatterplot of Salmon Ruins fine twill plaited sandal strip widths and densities by site room location.
tend to cluster together and are specimens that principally post-date A.D. 1125, suggesting that chronology could be a factor (Figure 7.106). No sandals were reported from burials and there is apparently no correlation between the presence or absence of toe jogs or decoration and sandal fabric fineness. Descriptive statistics presented in Table 7.35 reveal the possibility that sandals from the Chacoan occupation may, on average, be finer than those post-dating A.D. 1125.

![Figure 7.106. Scatterplot of Salmon Ruins fine twill plaited sandal strip widths and densities by chronological assignment.](image)

Table 7.35. Descriptive Statistics for Measurements on Salmon Ruins Fine Twill Plaited Sandals.

<table>
<thead>
<tr>
<th>Strip Width</th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>15</td>
<td>2.0-3.5</td>
<td>2.9</td>
<td>17.8</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>3</td>
<td>2.0-2.5</td>
<td>2.2</td>
<td>13.3</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>6</td>
<td>3.2-3.5</td>
<td>3.4</td>
<td>3.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strips Per CM</th>
<th>n</th>
<th>Range</th>
<th>Mean</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>15</td>
<td>2.8-4.0</td>
<td>3.5</td>
<td>10.8</td>
</tr>
<tr>
<td>Chacoan (A.D. 1060-1125)</td>
<td>3</td>
<td>3.5-4.0</td>
<td>3.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Post-Chaco (A.D. 1125-1300)</td>
<td>6</td>
<td>2.8-3.8</td>
<td>3.2</td>
<td>11.0</td>
</tr>
</tbody>
</table>

*Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.*
The entire sandal assemblage was analyzed by Magers (1986a), and her report synthesizes structural and morphological variability through time and across space rather than metric and technological stylistic variation. Of the 406 sandals recovered, 172 are specimens described as fine plaited. Structurally, she notes that 91 percent are 2/2 interval twill plaiting, 7 percent 1/1 simple plaiting, and three specimens exhibit irregular or inconsistent intervals (Magers 1986a:255). Focusing on the fine 2/2 interval twill plaited specimens, I reexamined a sample of 74 sandals. An additional eight sandals, from Morris and Kidder’s unpublished excavations from Antelope House curated at the American Museum of Natural History, are included, bringing the total sample to 82 (Figure 7.107). Although this number represents about 45 percent of the total number of fine twill plaited sandals from the site, I am confident that any robust spatiotemporal trends will only be strengthened with additional data. Because of the differing emphases of our analyses, and Magers’ treatment of variation in both twined and plaited sandals irrespective of weave structure, there are few observations that Magers makes about fine twill plaited sandals that my study can reevaluate, but this is not problematic insofar as the present study provides new data that refines and complements her important work.

As is typical for Antelope House fiber artifacts in general, the bulk of my sample derives from rooms in the South Room Block/Area, with small samples coming from the
North and Central Room Blocks/Areas (Figure 7.42; Table 7.36). The sandal assemblage is also unevenly distributed in time, and my sub-sample reflects this, with 78 percent (n=64) ascribable to Pueblo III contexts. The rest consist of undated specimens and small numbers from Pueblo I or II contexts.

Figure 7.107. Upper (left) and lower (right) surfaces of an unprovenienced fine 2/2 twill plaited sandal with yucca cordage pseudo-embroidered design on sole from Antelope House (29.1/1850). Note 3/3 interval 90 degree self selvage that creates rolled or twisted effect at edge. Courtesy of the American Museum of Natural History.
Table 7.36. Fine 2/2 Twill Plaited Sandal Study Sample from Antelope House by Spatial Subdivision and Room.

<table>
<thead>
<tr>
<th>Spatial Subdivision</th>
<th>n</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Room Block/South Area</td>
<td>53</td>
<td>1 (3), 21 (18), 22, 23/kiva (3), 29 (8), 30 (9), 77 (2), 83, unknown (8)</td>
</tr>
<tr>
<td>Central Room Block/Central Plaza</td>
<td>12</td>
<td>27, 36, 40, 42/kiva (4), 44, 57, Kiva B/Central Plaza (3)</td>
</tr>
<tr>
<td>North Room Block/North Plaza</td>
<td>11</td>
<td>18/kiva, 19 (2), 35, 43 (2), 46 (2), 47/kiva, unknown (2)</td>
</tr>
<tr>
<td>Unprovenienced</td>
<td>6</td>
<td>unknown</td>
</tr>
</tbody>
</table>

Raw Material. Magers (1986a:255) reports that all fine plaited sandals are made from *Yucca angustissima* (narrowleaf yucca) except for two specimens with two ply, z-spun, final s-twist yucca cordage strips, and one of rush culms. My findings differ somewhat from hers in that I did identify eight fine twill plaited sandals that employ longitudinally cut broadleaf yucca leaves (cf. *Yucca baccata*). These specimens all derive from the South Room Block/Area and variously date to Pueblo II and III contexts. One specimen in my study sample is one of her two yucca cordage specimens, but I did not locate the rush specimen. Collectively, these data suggest that one or more narrowleaf yucca species were consistently preferred for fine twill plaited sandal production, but also indicate that broadleaf yucca was used occasionally.

Starting and Finishing Methods. Four toe and five heel selvage variants are present in the study sample (Table 7.37). The preferred treatment for both selvages was to tie terminal strips off on adjacent strips in overhand knots. This configuration is attested to throughout the Pueblo era and from all areas of the site. Minority selvage varieties tend to come from the South Room Block/Area, which also yielded the largest sample (Figure 7.108).
Figure 7.108. Upper surface of a fine 2/2 twill plaited sandal (top) from Room 29 at Antelope House (CACH 18525) with toe selvage in which terminal strips are looped around adjacent strips (middle) and a double 90 degree heel self selvage (bottom). Courtesy of the National Park Service and Canyon de Chelly National Monument.
Table 7.37. Antelope House Fine Twill Plaited Sandal Starting and Finishing Method Sample.

<table>
<thead>
<tr>
<th>Toe Selvage</th>
<th>n</th>
<th>Room/Context</th>
<th>Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strips overhand knotted with adjacent strips</td>
<td>18</td>
<td>1, 21 (4), 22, 29, 30 (4), 42/kiva, 46, Kiva B, SoRB/A (3), NoRB/A</td>
<td>PI, PII (2), PIII (3), EPIII, MPIII (4), LPIII (6), unknown (1)</td>
</tr>
<tr>
<td>Strips looped around adjacent strips</td>
<td>4</td>
<td>29</td>
<td>EPIII</td>
</tr>
<tr>
<td>Double 90° self selvage</td>
<td>1</td>
<td>19</td>
<td>LPIII</td>
</tr>
<tr>
<td>Strips folded 90° under strip then clipped</td>
<td>1</td>
<td>South Plaza</td>
<td>LPIII</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heel Selvage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strips overhand knotted with adjacent strips</td>
</tr>
<tr>
<td>Double 90° self selvage</td>
</tr>
<tr>
<td>Strips looped around adjacent strips</td>
</tr>
<tr>
<td>Strips folded 180° at heel and left free</td>
</tr>
<tr>
<td>Strips left free</td>
</tr>
</tbody>
</table>

*Side Selvage Treatment.* The study sample of fine twill plaited sandal selvages is dominated by the typical 90 degree self selvage that maintains the 2/2 interval of the sandal fabric (Table 7.38, Figure 7.108). This variety is found across the site and throughout the Pueblo era. Other configurations exist (e.g., Figure 7.107), and contextual data suggest that these may be Late Pueblo III (A.D. 1200-1270) introductions at the site.

*Strip Splices.* Sixty-five sandals evidenced strip splices, and of these the overwhelming majority (n=62) is simply laid in on the sole. Two sandals exhibit laid-in splices as well as some strips that are tied off on themselves in overhand knots. A sandal with yucca cordage strips has splices that appear to be exclusively tied off in overhand knots.
Table 7.38. Antelope House Fine Twill Plaited Sandal Side Selvage Treatment Sample.

<table>
<thead>
<tr>
<th>Side Selvage</th>
<th>n</th>
<th>Room/Context</th>
<th>Chronology</th>
</tr>
</thead>
<tbody>
<tr>
<td>90° self selvage, 2/F/2</td>
<td>71</td>
<td>1 (3), 18/kiva, 19 (2), 21 (18), 23/kiva (3), 27, 29 (8), 30 (9), 35, 36, 42/kiva (2), 43 (2), 46 (2), 47/kiva, 57, 77, 83, Kiva B/Central Plaza (2), SoRB/A (6), NoRB/A (2), unknown (4)</td>
<td>PI, PII (5), PII/III (3), PII (9), EPIII (9), MPIII (14), LPIII (24), unknown (6)</td>
</tr>
<tr>
<td>90° self selvage, 3/F/3</td>
<td>6</td>
<td>40, 42/kiva, Kiva B/Central Plaza, SoRB/A (2), unknown</td>
<td>PII, LPIII (4), unknown</td>
</tr>
<tr>
<td>90° self selvage, 2/1/F/1/2 (see Osborne 2004:Fig. 102c)</td>
<td>2</td>
<td>42/kiva, 77</td>
<td>PII/III, LPIII</td>
</tr>
<tr>
<td>Half twist 90° selvage (see Osborne 2004:Fig.134)</td>
<td>2</td>
<td>22, 44</td>
<td>LPIII</td>
</tr>
<tr>
<td>Combination 90° self selvage, 2/F/2, and half twist 90°</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
</tr>
</tbody>
</table>

Decoration. Magers (1986a:257) notes that decoration of fine plaited sandals is rare, reporting one sandal with a design effected using dyed strips and others with stitching that could have been for either structural reinforcement (mends) or decoration. Those that I observed with such stitching appear to be likely mends or for reinforcement. Magers (1986a:256) also comments on the presence of edge borders, but does not state their frequency. Based on her description, such borders seem to subsume both 3/3 interval side selvages that give the appearance of rolled or twisted edges as well as inset ridges or borders created through strip tensioning. One manipulation does not structurally require the other, however, and I have observed examples with both operate in concert and others separately.

Twenty-five sandals in the study sample evidence decoration. The most frequent type, seen on 16 specimens, entails the use of systematic lateral splices and tensioning to create ridges or borders that run parallel to the sandal’s long axis (Figure 7.109). An additional four specimens exhibit similar textural variation, but rely solely on tension
applied to existing strips (Figure 7.110). Both varieties are known from the South and North Room Blocks/Areas, but none are provenienced to Central Room Block/Plaza rooms. Chronologically, one specimen each is dated to Pueblo II and Early Pueblo III (A.D. 1100-1140) times, but 11 are assigned to Late Pueblo III (A.D. 1200-1270).

Figure 7.109. Fine 2/2 twill plaited sandal from Room 30 at Antelope House. Upper surface (left) shows border decoration effected by systematic lateral splicing and sole (right) shows pseudo-embroidered zig-zag (CACH 18380). Courtesy of the National Park Service and Canyon de Chelly National Monument.

Five sandals utilize pseudo-embroidery with supplementary strips to create raised designs on their soles, one of which also exhibits a splice-induced border decoration. One design is clearly a zig-zag paralleling the sandal’s long axis (Figure 7.109), whereas three other fragmentary specimens evidence diagonal lines that are
more than likely also portions of zig-zags. In one sandal (Figure 7.107), the pseudo-embroidery is done with two ply, s-spun, final z-twist cordage to effect diagonal lines and interlocking frets. Provenience data are lacking for one specimen, but the others derive from the South Room Block and date to Middle and Late Pueblo III times at the site.

Figure 7.110. Upper (left) and lower (right) surfaces of fine 2/2 twill plaited sandal with border decoration created by with strip tensioning from Room 35 at Antelope House (CACH 18426). Courtesy of the National Park Service and Canyon de Chelly National Monument.

A final decorated sandal employs some strips that have been dyed dark brown (Figure 7.111). They are introduced in such a way that the sole yields a lattice- or
diamond-like pattern. This sandal, from Room 19 in the northern part of the site, is assigned to Late Pueblo III deposits.

Figure 7.111. Upper (left) and lower (right) surface views of a fine 2/2 twill plaited sandal from Room 19 at Antelope House with dyed strip design effecting a lattice or diamonds (CACH 18442). Courtesy of the National Park Service and Canyon de Chelly National Monument.

*Metric Variation.* As noted earlier, Magers’ (1986a) exploration of sandal spatiotemporal variability focuses on primary structural type and attributes of form, with little reference to stylistic choices except some bearing on toe, heel, and tie system configuration. Although most of the variables she considers are inconclusive with respect to within-site spatial differences, this in part may be due to her lumping of data
from different structural types together as opposed to examining variation within a single structural type, such as simple plaited or 2/2 twill plaited sandals. Although her analyses show the extent to which weave structure can influence other technical choices, they do suggest North-South room block differences in coarse plaited sandal heel shapes and sandal tie system preferences. Left unaddressed are questions of whether sandal metric variability sorts in any meaningful way.

Generally speaking, sandals in my sample from the South Room Block/Area tend to be consistently finer in terms of fabric texture than the North and Central Room Blocks/Areas but still overlap in terms of their full range of variation (Figure 7.112). Chronologically, sandals from across the site tend to become progressively coarser and expand the range of variation in fabric texture produced over time (Table 7.39, Figure 7.113). Only the South Room Block/Area yielded sandals that span the Pueblo II and III occupations of the site, however, and while sandals falling toward the finer end of the range of variation are produced in quantity throughout this period, there is a clear trend towards increased production of coarser-textured sandals with time (Figure 7.114). When only Late Pueblo III sandals from all areas of the site are considered, we find that those from the North and Central Room Blocks tend to be coarse as well (Figure 7.115). Yet, unlike in the south, the vast majority of Late Pueblo III sandals from the North and Central Room Blocks/Areas provide little evidence for contemporaneous production of sandals that fall along the finer end of that range of variation. If not a function of sampling, which seems unlikely, this suggests that Southern Room Block occupants maintained a tradition of producing a wider range of variation in sandal textures for
over three centuries or, alternatively, were correspondingly less standardized in their sandal production than occupants of more northerly portions of the site during Late Pueblo III times.

![Scatterplot of Antelope House fine twill plaited sandal sample strip widths and densities by site spatial subdivision.]

**Figure 7.112. Scatterplot of Antelope House fine twill plaited sandal sample strip widths and densities by site spatial subdivision.**

**Table 7.39. Descriptive Statistics for Measurements on the Antelope House Fine Twill Plaited Sandal Sample.**

<table>
<thead>
<tr>
<th>Strip Width</th>
<th>n</th>
<th>Range (mm)</th>
<th>Mean (mm)</th>
<th>CV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assemblage</td>
<td>82</td>
<td>2.1-5.0</td>
<td>3.3</td>
<td>17.9</td>
</tr>
<tr>
<td>Pueblo II (ca. A.D. 900-1100)</td>
<td>5</td>
<td>2.4-3.4</td>
<td>2.9</td>
<td>12.9</td>
</tr>
<tr>
<td>Early Pueblo III (A.D. 1100-1140)</td>
<td>9</td>
<td>2.4-3.6</td>
<td>2.9</td>
<td>10.8</td>
</tr>
<tr>
<td>Middle Pueblo III (A.D. 1140-1200)</td>
<td>14</td>
<td>2.1-4.4</td>
<td>3.1</td>
<td>16.9</td>
</tr>
<tr>
<td>Late Pueblo III (A.D. 1200-1270)</td>
<td>31</td>
<td>2.6-5.0</td>
<td>3.6</td>
<td>15.9</td>
</tr>
<tr>
<td>Strips Per CM</td>
<td>n</td>
<td>Range</td>
<td>Mean</td>
<td>CV (%)</td>
</tr>
<tr>
<td>Assemblage</td>
<td>82</td>
<td>2.1-5.0</td>
<td>3.3</td>
<td>17.8</td>
</tr>
<tr>
<td>Pueblo II (ca. A.D. 900-1100)</td>
<td>5</td>
<td>3.1-3.8</td>
<td>3.5</td>
<td>7.7</td>
</tr>
<tr>
<td>Early Pueblo III (A.D. 1100-1140)</td>
<td>9</td>
<td>3.4-4.4</td>
<td>3.9</td>
<td>8.1</td>
</tr>
<tr>
<td>Middle Pueblo III (A.D. 1140-1200)</td>
<td>14</td>
<td>2.4-5.0</td>
<td>3.4</td>
<td>18.2</td>
</tr>
<tr>
<td>Late Pueblo III (A.D. 1200-1270)</td>
<td>31</td>
<td>2.1-4.1</td>
<td>3.0</td>
<td>17.2</td>
</tr>
</tbody>
</table>

* Specimens missing data are omitted from temporal groupings and assemblage counts include undated artifacts.
Figure 7.113. Scatterplot of Antelope House fine twill plaited sandal sample strip widths and densities by chronology.

Figure 7.114. Scatterplot of fine twill plaited sandals from the South Room Block/Area of Antelope House through time.
Figure 7.115. Scatterplot of strip widths and densities for only Late Pueblo III (A.D. 1200-1270) period fine twill plaited sandals from Antelope House by site spatial subdivision.

Interpreting Site-Scale Stylistic Patterning

The preceding analyses focused on the identification of spatial and temporal patterns in basket, mat, and sandal technological style that could be argued to reflect past learning networks with implications for understanding socio-cultural diversity at the scale of individual sites within Chaco Canyon and across the regional system. Imperfect preservation and poor chronological control posed the biggest challenges to this endeavor, but in several instances the data suggest patterns not easily attributed to the accumulation of random stylistic variation with the passage of time. Below I
summarize the evidence for patterned variation within the Pueblo Bonito, Aztec West Ruin, Salmon Ruins, and Antelope House assemblages and offer a working interpretation of these patterns in the context of prior research that can inform future work and provide additional context for the assessment of social and cultural diversity at larger spatial scales.

Pueblo Bonito

Coiled basketry technological stylistic features observed in the Pueblo Bonito assemblage reflect broad consistency in choices regarding structural type, work direction, and starting and finishing methods that are mirrored by wider prehispanic production standards in the northern Southwest (e.g., Mitchell 1960; Morris and Burgh 1941; Weltfish 1932b), which makes interpreting the spatial and chronological significance of minor deviations among them difficult. However, since variation in coiled basketry structural type (primarily foundation type and arrangement) tends to sort along the lines of wider geographic and cultural affinities, it is possible to propose some plausible implications for the presence of the minority structural variants among an assemblage dominated by the typical two rod and bundle and one rod foundation types. Of the seven documented structural types at Pueblo Bonito, three of the five minority types are exclusive to, or best represented in, rooms in or near the western burial cluster (Table 7.2). The spatial concentration of these minor types, and the evidence for greater structural type diversity in cylinder baskets and oval/hourglass trays, implies
that these vessel forms most clearly include the products of several weavers belonging to different learning networks. Given the lack of unambiguous use-related wear and the likelihood that their atypical form indicates special use(s), a parsimonious explanation is that they reflect wares specially made for their intended use and/or deposition.

As noted earlier, stitch splice data are limited, but splices tend to be more idiosyncratic and arguably reflect finer scale socio-cultural differences. Although poorly preserved at Pueblo Bonito, three different splice configurations were observed among both bowl and cylinder vessel forms. In the case of bowls, a widely shared and morphologically variable form, this is not surprising as one might reasonably expect them to evidence multiple producers at such a large site. Splice variability among cylinder vessels, on the other hand, complements evidence from structural type variation to further indicate that cylinder baskets had multiple fabricators who belonged to different learning networks. Additionally, in the only instance where a splice configuration appears twice in the same room (Room 320A), it is seen in a cylinder basket and bifurcated basket, both of which were found very close to each other in the southeastern quadrant of that room. This suggests that one weaver (or two weavers related through kinship or a smaller craft learning network) produced these vessels, and that their spatial proximity to one another speaks to the role of that weaver (or weavers) in the activities culminating in their deposition in that room.

Variation in coiled basket wall fineness or texture, a product of stitch and coil width and density, is apparent within Pueblo Bonito and correlates to varying degrees with the arbitrary spatial subdivisions that I employ and which map generally onto the
site’s architectural growth over time (Figure 6.1). These data suggest basket wall
textural differences between vessels from rooms in the northwest and northeast but
also indicate that baskets deriving from the southeastern portion of the pueblo sort
differently from northern specimens that are more similar to each other. Among
northern rooms, the apparent east vs. west difference hinges on wall texture, with
northeastern wares being coarser on average than northwestern wares. A decrease in
basket wall fineness over time may account for this, since many northeastern rooms
were added later than those in the northwest, but behavioral differences cannot be
excluded because contemporaneity remains a possibility for at least some wares.

Demonstrable contrast between Classic through Late Bonito subphase (A.D.
1040-1140) coiling from the southeastern rooms at Pueblo Bonito and coiling from Early
to Classic Bonito subphase (A.D. 850-1110) contexts from northern rooms is of a
different kind, however. Coiled baskets from northern rooms show a positive
relationship between stitch and coil density whereas specimens from southeastern
rooms indicate a trend towards greater stitch density at the expense of fatter coils and,
thus, lower coil density. Chronology is clearly a factor here but it is initially unclear
whether the difference may be attributable to a progressive shift over time in
basketweavers' preferences for wall texture appearance or a later influx of coiled wares
produced by weavers belonging to a different learning network, one in which
consistency in stitch density was given priority over coil density. The data from Pueblo
Bonito are also equivocal in terms of support for Watson’s (2012:357) suggestion of a
possible intensification of coiled basketry production during Early and Classic Bonito
times based on bone awl standardization. While there are more baskets ascribable to Early to Classic Bonito contexts, Classic to Late Bonito specimens appear more standardized compared to earlier wares when considering overall weave fineness (Table 7.6).

Given the small sample (n=12) of coiled baskets more securely assignable to Classic to Late Bonito subphase contexts, what is known about the conservative nature of coiled basketry production, and findings from studies that consider basketry technological change over time (e.g., Adovasio 1986b, 2003; Adovasio and Gunn 1986; Adovasio and Pedler 1994; Polanich 1994; Thulman 2014), it seems highly unlikely that the observed shift in the relationship between stitch and coil density would occur randomly within a span of roughly 100 years when the preceding two or more centuries demonstrate relative consistency in the same attributes. I submit, then, that the most parsimonious explanation is the introduction of coiled wares woven by individuals who belonged to an overlapping but historically distinct learning network conveying different ideas about “appropriate” stitch and coil density as it relates to wall texture. The A.D. 1040s to 1070s construction dates for the majority of the rooms in Pueblo Bonito's southeast quadrant (Lekson 1986; Windes 2003) provide a terminus post quem for this potential demographic development that is not inconsistent with arguments for an influx of non-local people(s) around or after about A.D. 1100 (Wills 2009). Space syntax analysis of Pueblo Bonito indicates that the southeastern and southwestern room blocks are distinctly different from earlier room blocks in the north, evidencing decreased spatial accessibility and fewer residential features that are viewed as indicative of
occupation by one or more corporate groups as opposed to the households thought to comprise the earliest construction in northern rooms (Bustard 1996, 2003; Cooper 1995). Furthermore, such a demographic development perceived from coiled basketry is also potentially correlated with the post-A.D. 1085 construction of the north-south-oriented wall that bisects Pueblo Bonito to create two plazas and which separates two great kivas (Judd 1964:198, 207; Lekson 1986:141-42). This and other synchronous architectural changes have been cited as evidence of an emergent dualism linked to the development of moieties at Pueblo Bonito (Fritz 1978; Heitman and Plog 2005; Hudson 1972; Vivian 1970, 1989, 1990).

Analyses of Pueblo Bonito’s twill plaited mats and sandals generally complement the foregoing observations. Data on twill plaited matting intricate selvages indicate the possibility of greater technological stylistic variation in southeastern rooms relative to other portions of the pueblo, while intricate selvage folding angles and width differ between northwestern rooms and southeastern rooms. Chronological control is poor, but the data suggest that intricate selvages became wider and structurally more complex during Classic and Late Bonito times. While speculative, this could indicate that wider and more complex mat selvages reflected (and signaled) greater time investment and increased symbolic significance given the unlikelihood that these modifications enhanced mat structural integrity appreciably. Variation in mat strip width and fabric density reveal no clear spatiotemporal patterns, save for the 12 mats from Room 25 in the southwest that employ wider strips relative to the rest of the assemblage. Situated immediately south of Rooms 367 and 396, Room 25 appears to have been added in the
early A.D. 1070s and so the mats, which come from a thick refuse deposit, post-date this period. Their metric distinctiveness may thus reflect change through time, subsequent use of the room for trash by weavers who preferred wider strips relative to others in the pueblo’s occupational history, or both. Setting aside the Room 25 mats, the lack of metric evidence in matting for strong learning network variability may simply indicate that the natural range of variation in rush culm dimensions obscures any such patterns in the relatively small sample available.

Fine twill plaited sandals from Pueblo Bonito best reveal stylistic variation through time. Early Bonito subphase sandals exhibit greater raw material and side selvage variability compared to later sandals. During Classic and Late Bonito subphase, times narrowleaf yucca becomes the preferred raw material and side selvages become more standardized in execution. Such a chronological pattern is mirrored metrically in an apparent reduction in the overall range of variation in sandal strip width and density from Early to Late Bonito times. Yet, since the largest sandal samples derive from northwestern and southeastern rooms, this may reflect a spatial pattern that, although imperceptible in other stylistic attributes, indicates that Classic to Late Bonito subphase sandals from southeast rooms are more internally consistent as compared to earlier sandals from northwestern rooms.

In sum, the observed differences in basketry artifacts from Pueblo Bonito are clearest in production attributes such as stitch and coil density that reflect repetitive motor skills conditioned by the learning process. Absent is evidence for stronger stylistic contrasts that would indicate pronounced learning network boundaries at Pueblo
Bonito. I therefore view these data as inconsistent with a dramatic demographic shift or large population influx. I suggest that when the chronological dimension is considered the observed patterns in technical choices and corollary metric variation accord best with an interpretive model that sees probable low-level in situ growth in conjunction with the incorporation of a stream of small groups of people throughout the Bonito phase that included weavers belonging to distinct yet overlapping learning networks. Some import of non-local wares cannot be ruled out, and the technological variation among the cylinder baskets suggests that perhaps several may have been non-local products. However, the internal coherence of baskets from southeastern rooms relative to their dissimilarity from northern wares, when combined with the evidence for on-site coiled basketry and sandal production at Pueblo Bonito (see Chapter 5), implies that exchange is unlikely to entirely account for such a pattern by itself.

The difficulty in perceiving any such newcomers is in part a product of the coarseness of the available perishable artifact data. However, the lack of any marked stylistic dissimilarity arguably reflects correspondingly greater learning network overlap at a wider geographic scale. This would suggest that the newcomers' origins might be found, spatially, among relatively close populations. Available archaeological data do not permit me to suggest specific geographic locales as sources, but the wide sharing of multiple technological features across the three basketry crafts implies social interaction on the order of what we would expect from groups living close enough to each other that the pools of learners and teachers would overlap and interact with some frequency. This could obviously mean the incorporation of small groups from
settlements within the canyon as well as outside the canyon, but how far outside is hard to say. If I were to speculate, I would not think it likely that the sources of post-A.D. 900 demographic contributions went much beyond the central San Juan basin, at least up until the mid-eleventh century A.D. However, because the wares recovered from rooms in the southeastern portion of the pueblo post-date ca. A.D. 1040/1070, exhibit a degree of internal coherence, and differ the most from those produced in rooms in the northeast and northwest, it seems reasonable to infer that they reflect the products of later arrivals who belonged to one or more learning networks that shared less of their craft learning histories with the pueblo's earlier occupants. One implication of this may be that the post-A.D. 1040/1070 newcomers’ geographic origins were further removed from Chaco Canyon than prior arrivals. This assessment holds, I argue, regardless of whether one elects to see the stylistic differences as a product of newly arrived weavers producing their wares on-site or bringing their goods with them.

Identification of the precise type or types of social groups represented by these spatiotemporal patterns is complicated to say the least. The blurring of the data that results from factors of preservation, sampling, and my arbitrary spatial subdivisions makes such a task problematic, but some light may be shed on this question in light of prior observations about coiled basket formal and functional variation. In Chapter 6, I suggested that the timing of introduction and spatial patterning in the deposition of unique coiled vessel forms, including bifurcated baskets, cylinder baskets, and clay coated baskets, implies the intersection of distinct but overlapping ritual beliefs and practices at Pueblo Bonito during the Early and Classic Bonito subphases. Following from
Pueblo ethnography (e.g., Blinman and Ware 2000; Eggan 1950; Parsons 1939; Ware 2001, 2014), it is likely that these different classes of ritual baskets reflect paraphernalia associated with at least two if not three different ritual sodalities and the households linked to them. In this view, and based on qualitative assessment of the scale and nature of stylistic difference, an estimate of as many as 30 to 40 newcomers (representing several households) seems plausible. Such a group size would not contradict research finding relatively low momentary population sizes throughout the Bonito phase at Pueblo Bonito (Benson et al. 2006a; Bernardini 1999; Windes 1984) nor challenge historic accounts of small group migration, of which several documented migrations notably coincide with the introduction of new ritual sodalities (see Chapter 2). The number and frequency of any such demographic contributions is subject to debate as current chronological resolution does not allow evaluation of whether these proposed events were periodic or episodic. Regardless, I find the available evidence to be broadly consistent with previously proposed models of prehispanic serial migration and plurality (e.g., Duff 1998; Schillaci 2003; Wills 2009; see also Bernardini 2005a, 2005b). This interpretation may also provide some social context for understanding the timing of the development of moieties at Pueblo Bonito, as some have suggested (Fritz 1978; Vivian 1970, 1989, 1990). In concert with ritual sodalities that cross-cut kinship groups, moieties may have added another organizational option for promoting community cohesion and facilitating consensual decision-making (Fowles 2005; Lowell 1996; Ware 2014) during a period of dramatic cultural change.
As with the Pueblo Bonito coiling assemblage, Aztec West fits comfortably within contemporaneous regional stylistic trends regarding preferred structural types, work direction, work surface, and starts and finishes, and not unexpectedly demonstrates homogeneity in these features. No clear spatial patterns emerge when any of these features are considered singly, nor do the 11 splice types identified sort in any suggestive way. Despite a lack of spatial patterning in the identified structural types, three do appear to post-date the A.D. 1100 to 1130 Chacoan occupation (Table 7.9). Noteworthy among them is the addition of three rod bunched foundation coiling that attains parity with two rod and bundle foundation coiling.

Most of the Late Bonito Chacoan specimens derive from the northeastern portion of the pueblo and are demonstrably finer in overall weave texture. As noted previously, this could indicate a social distinctiveness to this portion of the pueblo as compared to rooms in the northwest, but it could also index the intensity of Chacoan use of these rooms relative to other areas that yielded few specimens confidently assigned to Late Bonito contexts. Relative to two rod and bundle coiling, post-Chaco three rod bunched coiling is more standardized metrically.

Abundant matting from Aztec West affords comparable sample sizes for the Late Bonito Chacoan and post-Chaco occupations. Intricate selvages are technologically more variable during Late Bonito times, especially in the Northeast Sector, and variants exist that are exclusive to Late Bonito northeastern and post-Chaco northwestern rooms that
could indicate social differences between these areas of the pueblo. General
equivalence in the range of variation in matting strip width and density, both across the
site and over time, likely reflects a combination of ecological constraints on rush culm
dimensions (e.g., Judd 1954:12) and broad similarity in harvesting practices. While the
data provide some evidence for greater similarity between Late Bonito specimens from
the Northeast and East North Wing as compared to those from the West North Wing,
those differences, if real, are absent after A.D. 1130. Late Bonito intricate selvages from
the Northeast Sector tend to be wider and more complex structurally but fall more in
line with mats from elsewhere in the pueblo after A.D. 1130. The strongest spatial
patterning is evident in the difference in intricate selvage folding angles between rooms
in the Northwest as compared to those of the Northeast and East North Wing. This
difference hinges on the relationship between intricate selvage initial and apex folding
angles, a feature almost certainly governed by repetitive motor habits and indicative of
learning network differences. Intricate selvages from Northeast and East North Wing
rooms show a negative relationship between initial and apex folds while a positive
relationship exists for the same attributes among intricate selvages from rooms in the
Northwest. Revealingly, this difference persists through time despite that after A.D.
1130 mats from northeastern rooms are more consistent with other mats in terms of
selvage complexity and width.

Sandals demonstrate the most pronounced spatiotemporal variation at Aztec in
terms of raw material and weave fineness. Thin narrowleaf yucca strips were preferred
during Late Bonito times but after A.D. 1130 are overshadowed by longitudinally cut
broadleaf yucca strips, except in the Northwest where sandals of narrowleaf persist or were produced in comparable quantities of narrowleaf and broadleaf yucca. Late Bonito sandals tend to be finer than post-Chaco sandals, and spatially the difference in fineness is most pronounced between the Northeast and Northwest sectors where sandals from the east are on average finer than those of the west.

Taken as a unit, the coiled basketry, matting, and sandal data from Aztec West best point to technological stylistic patterns reflecting learning network differences between northeastern (Northeast and East North Wing Sectors) and northwestern (Northwest Sector) rooms. However, chronology is important for interpreting the sociocultural character of these differences. Owing to the uneven spatial distribution of basketry artifacts ascribable to the Late Bonito Chacoan and post-Chaco occupations, it is tempting to explain away the differences as purely chronological, with northeastern rooms being biased towards Late Bonito material and northwestern rooms biased towards post-Chaco artifacts. The northeastern rooms were among the first large portion of Aztec West constructed (Brown et al. 2008) and so it is not surprising that the majority of Late Bonito basketry artifacts derive therein. Be this as it may, the persistence of technological stylistic patterns from Late Bonito times through the post-Chaco occupation in northeastern rooms that contrast with post-Chaco styles of the northwest strongly implicates a role for sociocultural factors, too.

Relative to post-Chaco specimens, Late Bonito coiled baskets and sandals are on average finer and intricate mat selvages more complex structurally. After A.D. 1130, while certain Late Bonito stylistic trends prevail in northeastern rooms, as seen in
intricate mat selvage folding angles and sandal fineness, what is most telling is that the contrast between the northeast and northwest becomes salient but with a veneer of greater pan-site similarity in certain technological features. Post-Chaco coiled basketry sees the incorporation of the three rod bunched foundation, and there exists a trend towards increased standardization in coiled basket wall texture as well as reduced variation in intricate mat selvages. The persistence through time of finer sandals in northeastern rooms despite a shift in raw material source and preparation is difficult to account for and seems contrary to the trends seen in coiled baskets and mats. Several things could explain this, but it may simply speak to the conservative nature of sandal production given that, of the three basketry crafts, they were arguably learned, produced, and consumed at the smallest social scale (see Chapter 5) and are perhaps more resistant to external influence when it comes to weave fineness.

I interpret the foregoing as indicating the co-existence of at least two overlapping but distinctive basketry craft learning networks at Aztec West that operated from rooms centered in the opposing northeastern and northwestern rooms of the pueblo. During the Late Bonito subphase, I suspect that this spatial distinctiveness was present even if it is difficult to demonstrate unequivocally with the basketry artifact data at hand. After about A.D. 1130, certain stylistic contrasts between the two areas appear more pronounced even as the general character of the coiled basketry, matting, and sandal assemblages suggests a trend towards increased homogeneity in other attributes. A plausible scenario accounting for these technological stylistic similarities and differences through time sees the observed patterns as a product of spatially
separated pools of learners experiencing a blending of learning networks through social interaction by A.D. 1130 and the decline of the Chacoan occupation that continued in succeeding decades.

Previous research at Aztec Ruins has generated considerable evidence from architecture, ceramics, select perishable ritual objects, and human remains to suggest close ties to Chaco Canyon, arguably in the form of colonists who founded Aztec Ruin West and worked closely with local peoples during its initial construction (Brown and Paddock 2011; Brown et al. 2008, 2013; Durand et al. 2010; Reed 2008, 2011; Schillaci et al. 2002b; Washburn and Reed 2011; Webster 2011b). I argue that the coiled basketry, matting, and sandal data lend support to this hypothesis and would add that the importation of practices associated with clay coated and painted ritual basketry is also indicated by this technology’s existence at Aztec and apparent temporal restriction to the Late Bonito occupation. Although evidence of at least two ceramic cylinder vessels from Aztec has recently been brought to light (Washburn and Reed 2011:188), clay coated baskets represent a second artifact type with very strong connections to Pueblo Bonito that complement suggestive links seen in other perishable ritual artifacts (Webster 2011b). Clay coated and painted baskets may thus indicate the movement of several individuals or households with members belonging to the sodality responsible for the proper use and care of these important objects. A further implication is that the basketry craft learning network centered on Aztec West’s northeastern rooms may have its origins in Chaco Canyon and that decades of co-residence with local groups, perhaps represented by the learning network centered on northwestern rooms, led to increased
interaction and stylistic blending. Intriguingly, the cessation of activities requiring cylinder vessels and clay coated baskets around A.D. 1130 appears not to have provided sufficient cause for the occupants of Aztec West go their separate ways.

Salmon Ruins

The small, poorly preserved basketry artifact assemblage from Salmon, much of it ascribable to the post-Chaco, Late San Juan (A.D. 1190-1300) occupation of the site, did not yield data sufficient to allow the delineation of any strong spatial or temporal patterns. For these reasons the suggestive patterns I observed should be treated very cautiously in light of the small samples. That said, coiled basketry from northwestern rooms tends to cluster more tightly together in terms of stitch and coil density. Included in this sample are three specimens from burials and so these data may lend support to other scholars’ observations that northwest burials stand out as compared with other burials at Salmon (Potter 1981; P. Reed 2006; Webster 2006a:1010, 2008a:187). Data from matting suggests the possibility that centrally located rooms near Room 64 (the tower kiva) evidence wider intricate selvages and employ more acute apex fold angles as compared to data on mats from northwestern rooms. Undated sandals from centrally located Room 62W may on average be finer than those from elsewhere in the pueblo and do cluster more tightly together.

Minimally, these observations provide a foundation for future research by suggesting potential technological stylistic differences between basketry artifacts from
rooms in the northwest and central portions of the pueblo. The paucity of data from other areas of the site, however, makes it impossible to evaluate propositions of an east-west residential duality (Irwin-Williams 2006).

Antelope House

At Antelope House, Adovasio and Gunn (1977, 1986) demonstrated technological stylistic patterning in coiled basketry and twill plaited matting that supported the excavators’ architecturally informed partitioning of the site into three separate room blocks. Coiled basketry showed strongest contrasts between the Southern and Central Room Blocks while baskets from the North formed a tight cluster within the range of variation evidence by specimens from the South. Matting intricate selvages indicated clearest spatial differences between North Room Block specimens and Central or South specimens. Other studies of utility ceramics and maize corroborate the distinctiveness of the three room blocks, suggesting to the excavators that they reflect residential spaces associated with discrete social units (Hall and Dennis 1986; Morris 1986:542-546; Thorton 1986).

My comparative samples did not permit a complete reevaluation of Adovasio and Gunn’s findings, but do reaffirm the metric distinctiveness of Central Room Block coiling as compared to specimens from the North and South Room Blocks. Building off of Magers’ (1986a) preliminary study of Antelope House sandals, analysis of a sample of fine twill plaited sandals further illustrates a clear chronological trend toward decreasing
fabric fineness over time at the site, with indications that Late Pueblo III sandals from the Central and North Room Blocks exhibit greater standardization in weave fineness when compared to contemporaneous examples from the South Room Block. From the perspective of these multiple datasets, then, the southern and northern areas of the site tend to be separable, but the Central Room Block/Area eludes tidy interpretation, and no doubt this is a product of its intermediate location. Depending on the technological stylistic feature examined, closer ties to both the North and South Room Blocks can be argued for basketry artifacts from the Central Room Block/Area.

While Adovasio and Gunn (1977, 1986) favor a functional interpretation for the clustering of Central Room Block coiling that links them to specialized production for ceremonial activities, the absence of unequivocal evidence for an exclusively ritual function for the small sample from the Central Room Block urges caution. However, nearly all construction in the central area post-dates about A.D. 1200, including the large Kiva B (Central Plaza) structure that may be a Great Kiva. This activity overlaps with continued construction of upper story rooms in the South Room Block and architectural expansion in the North Room Block, developments that were initiated after A.D. 1140 (Morris 1986). Recognizing that the Middle to Late Pueblo III periods at Antelope House are ones of population increase, it is tempting to view these architectural developments as a response to not only in situ growth but also population influx, perhaps, as Morris (1986) speculates, as a product of plateau site occupants moving to Antelope House on the canyon floor. The distinctiveness and temporal circumscription of Central Room Block coiling, if not attributable to functional choices, may alternatively reflect the
incorporation of a small group of people that included basketweavers belonging to a separate learning network. By extension, proximity to the massive pilastered Kiva B in the central plaza could indicate such a group’s involvement in the activities undertaken in that space.

Summary

Knowledge gained from previous archaeological research at Pueblo Bonito, Aztec West, Salmon Ruins, and Antelope House has indicated the possibility of site-scale sociocultural diversity in some form at each of these sites. The findings summarized above, in cases where sufficient data exist, provide additional evidence to support previous researchers’ contentions. The data generally imply at least site-wide dual divisions at Pueblo Bonito, Aztec West, Antelope House, and perhaps also some internal division within Salmon Ruins. Pueblo Bonito is an exception in that evidence suggests the possibility of three discernable learning networks whose material contributions may plausibly be linked to architectural and demographic developments at the pueblo over time, adding new wrinkles to our understanding of the social fabric of Pueblo Bonito throughout its occupation. In the next section I expand the spatial and, by extension, presumed social scales of investigation to evaluate evidence for multiple or overlapping learning networks suggested by basketry artifacts from within Chaco Canyon.
Community-Scale Stylistic Patterning

With the exception of Pueblo Bonito, the very small assemblages from other Chaco Canyon sites only allow for tentative comparisons and observations. For the majority of sites, poor preservation prevented acquisition of data on most stylistic features and many metric measurements. In general, where technological stylistic features are preserved they replicate widely observed variants (e.g., R-L work direction, normal starts, self and false braid rim finishes), so only noteworthy deviations are considered here. Despite these limitations, exploration of within-canyon variability is still worthwhile given long-standing scholarly interest in relationships among canyon sites over time. Given the constraints imposed by available site samples, technological stylistic variation is best explored through a comparison of primary structural type variability and metric data. Site-specific sample size data are available in Table 5.1, while Tables 7.1 and 7.15 provide structural type frequencies by site for coiled baskets and twill plaited matting, respectively. To the extent possible, emphasis is placed on insights gleaned from this analysis that may be relevant to comparing small site and great house assemblages, and Bonito phase and McElmo phase materials. The results of comparisons within each subclass of basketry artifact are presented below.

Coiled Basketry
After Pueblo Bonito, Chetro Ketl provides the next largest sample (n=14) of coiled baskets available for comparison. These specimens are, unfortunately, poorly provenienced and only generally dated to the Classic and Late Bonito subphases that are coincident with Chetro Ketl’s construction and primary use. Three structural types are represented and include the two rod and bundle and one rod varieties most abundant at neighboring Pueblo Bonito (Figure 7.116). The third type, a variation of two rod and bundle coiling in which the foundation elements are stacked as opposed to bunched, is also attested at Pueblo Bonito. A single two rod and bundle bunched foundation fragment (MMA 63.50.177.m) evidences traces of a reddish brown dyed stitch design suggestive of a partial triangle or zig-zag. Available samples from the Peñasco Blanco, Pueblo del Arroyo, and Kin Kletso great houses similarly attest to the presence of the common two rod and bundle and one rod foundation structural types in evidence at Pueblo Bonito. The Kin Kletso basket (Figure 7.117), likely the highly fragmented remains of a bifurcated burden basket, is finely woven and constitutes the only other decorated basket that I identified that is not from Pueblo Bonito or Chetro Ketl. A polychrome design of dyed black, red, and natural tan stitches appears to have included stepped and fret-like elements effected in thin lines, perhaps recalling designs on one of the Pueblo Bonito bifurcated baskets (see Figures 6.4-6.6). Interestingly, a previously unpublished ceramic bifurcated burden basket effigy was also identified in the Kin Kletso collection, bringing the canyon total for such effigies to 13 when the Pueblo Bonito, Pueblo del Arroyo, and unprovenienced specimens are considered (Figure 7.118; see also Figure 6.8 and Chapter 8).
Figure 7.116. Unprovenienced fragment of a steep-sided, two rod and bundle bunched foundation vessel from Chetro Ketl (MIAC 27371/11). Courtesy of the Museum of Indian Arts and Culture.

Figure 7.117. Fragmentary remains of a probable bifurcated burden basket with polychrome design from unknown contexts at Kin Kletso (CHCU 1007.a). Note that two twined fabric fragments (CHCU 1007.b) and unidentified carbonized organic material are mixed with the basketry. Courtesy of the National Park Service and Chaco Culture National Historical Park.
Figure 7.118. Ceramic bifurcated burden basket effigies from an unknown context at Kin Kletso (left, CHCU 1018) and Pueblo del Arroyo Room 27 (center, A334638; right, A334637). Courtesy of the National Park Service and Chaco Culture National Historical Park (left), and the Smithsonian’s National Museum of Natural History (center and right).
Small site coiled basketry consists of a meager six specimens from four sites: Bc 51, Bc 59, Bc 288 (Gallo Cliff Dwelling) and Leyit Kin. Four structural types are represented but little more can be said other than to note their presence. At Bc 51, fragments of two vessels of indeterminate form are close coiled with one rod foundations but differ in that one employs interlocking stitches and the other noninterlocking stitches. Two rod and bundle bunched foundation coiling is attested by individual specimens from Bc 59 and Leyit Kin. The McElmo phase Bc 288 assemblage includes one three rod bunched foundation, noninterlocking stitch specimen (Figure 7.119).

Comparison of basket weave texture or fineness between canyon sites is subject to previously stated caveats about the data, but minimally suggests that a similar range of variation is reflected by Chetro Ketl and Pueblo Bonito coiled basketry (Figures 7.120, 7.121). The limited small site coiling falls towards the coarser end of the observed range, perhaps due to larger coils relative to other baskets in the sample, but does not appear unusually coarse. Restricting comparisons to only two rod and bundle bunched foundation coiling sewn with noninterlocking stitches from Pueblo Bonito and Chetro Ketl clarifies some of the differences and similarities between these two sites. In terms of stitch and coil dimensions, when Chetro Ketl is plotted alongside Pueblo Bonito, the former’s coiling overlaps best with specimens from Pueblo Bonito’s northern rooms (Figure 7.122). Chetro Ketl coiled basketry also compares most favorably with rooms in Pueblo Bonito’s northern two quadrants in terms of overall weave texture or fineness (Figure 7.123). Architectural construction and use dates from Chetro Ketl (Lekson 1983,
Figure 7.119. McElmo phase three rod bunched foundation coiled basket fragment from Room 3-4 at Bc 288 (CHCU 18511). Courtesy of the National Park Service and Chaco Culture National Historical Park.

Figure 7.120. Scatterplot of stitch and coil dimension data for coiled baskets from sampled sites in Chaco Canyon.
Figure 7.121. Scatterplot of stitch and coil density data for coiled baskets from sampled sites in Chaco Canyon.

Figure 7.122. Scatterplot of stitch and coil dimension data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
Figure 7.123. Scatterplot of stitch and coil density data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

1986; Lekson et al. 2007) imply that the available basketry can reasonably be ascribed to the Classic and Late Bonito subphases, making it more or less contemporaneous with the corresponding chronological sample from Pueblo Bonito. Comparison of two rod and bundle, noninterlocking stitch coiling from both sites through time indicates that while there are some differences, the Chetro Ketl sample is more similar in terms of weave texture to coiled basketry from Early to Classic Bonito subphase deposits at Pueblo Bonito, as opposed to Classic to Late Bonito subphase baskets (Figures 7.124, 7.125).
Figure 7.124. Scatterplot of stitch and coil dimension data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl by temporal period. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.125. Scatterplot of stitch and coil density data for only two rod and bundle bunched foundation, noninterlocking stitch coiled baskets from Pueblo Bonito and Chetro Ketl by temporal period. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
Plaited Matting

The largest matting samples from the canyon available for comparison derive from Pueblo Bonito, Chetro Ketl, Bc 51, and Bc 288 (Gallo Cliff Dwelling); all other study sample sites yielding four or fewer specimens (Table 7.15). Speaking generally, it is significant that several excavators remarked on the abundance of twill matting at their sites, particularly its frequent occurrence in burials (e.g., Hibben 1937; Tschopik 1939), even if little tangible evidence survives today. Published reports for Pueblo Alto (Ingbar 1987) and several small sites, including Leyit Kin (Dutton 1937: 58, 66, 68, 162, 1938:73-75), Bc 50 (Hibben 1937), Bc 236 (Bradley 1971:50), 29SJ627 (Truell 1992:46, 49, 62-63, 181), and 29SJ1360 (McKenna 1984:309, 357-358), further attest to the presence of twill plaited mats (as well as baskets and sandals), often in the form of impressions in adobe or matrix, but most of these appear to have either not been collected or do not survive in existing museum collections. Additionally, such published identifications of twill basketry artifact form (mat, basket, sandal, etc.) should be viewed cautiously because poorly preserved and fragmentary objects are frequently confused with one another. As but one example, reexamination of the purported mat fragment from Room 229 at Pueblo Alto (Windes 1987:307) revealed that it is actually the remains of a 3/3 twill plaited ring basket (CHCU 47063).

Based on data collected for this study, 2/2 interval twill plaiting predominates at most Chaco Canyon sites (Figure 7.126), with the notable exceptions of Bc 51 and Bc 288 where 3/3 twill may be more popular (Table 7.15). Small site material is poorly
understood chronologically but dates principally to the Bonito phase, with Bc 288 providing the only McElmo phase small site data. From Bc 51, 10 poorly preserved twill plaited mats, all lacking selvages, were recovered from three burials in Room 2 and two burials in Room 5. Except for one fragment for which the interval could not be determined, all are interlaced in 3/3 interval. However, Tschopik's (1939) earlier analysis did report one fragment of 2/2 matting that I did not see and so it may be missing or misidentified. Ceramics are directly associated with matting from two of the burials in Room 2. Fragments of Burial 9's matting partially lie in a bowl that appears to be Chaco-McElmo black-on-white and which Thomas C. Windes (pers. comm. 1/13/13) thinks likely dates between the late A.D. 1000s and early 1100s. Matting was also found
partially lying in a bowl with Burial 18 that appears to be Puerco black-on-white which would date to the A.D. 1000s (Windes, pers. comm. 1/13/13).

Intriguing is the apparently isolated example of 1/1 interval matting from the Tsin Kletsin great house (Figure 7.127), along with published reports of the same structural type from a burial at Bc 50 (Hibben 1937) and two separate burials at 29SJ1360 (McKenna 1984). Assuming that the objects from the latter two sites are in fact mats (as seems likely), they would indicate the use of a plaiting interval that is not attested in the larger and better preserved assemblages from Pueblo Bonito and Chetro Ketl. For this reason the use of 1/1 simple plaiting might, tentatively, reflect a real difference in mat construction between these and other sites, in spite of the small samples.

Figure 7.127. Fragment of a 1/1 simple plaited mat with an intricate selvage (Variant 45) from Room 39 or 40 at Tsin Kletsin (CHCU 33019.a). Note that the fragment is folded and that in one set of elements two thinner strips are paired and act as one unit. Courtesy of the National Park Service and Chaco Culture National Historic Park.
Decorated matting was clearly present at sites beyond Pueblo Bonito even if little can be said of the frequencies of specific decorative styles. Incomplete monochromatic designs created with systematic shifts appear on two Chetro Ketl specimens (MIAC 19067 and 21727A; see Figure 7.126) and possibly one fragment from Bc 53 (CHCU 92450.a). A single mat from Bc 288 (CHCU 33467.d) evidences a two-tone and textural effect created by alternating thinner black-brown dyed strips with thicker undyed strips.

Two mats from Chetro Ketl exhibit double 90 degree self selvages and one from Bc 288 exhibits a 90 degree self selvage. Single examples of intricate self selvages were documented among the assemblages from Bc 57, Bc 59, Kin Kletso, Penasco Blanco, and Tsin Kletsin (Figure 7.127), while Bc 288 (n=7) and Chetro Ketl (n=15) yielded multiple examples (Figures 7.126, 7.128). Intricate selvage plaiting sequences were not identifiable for all fragments, but those with substantive or complete post-apex fold sequences are tabulated by site and variant in Table 7.40.

Comparison of intricate selvage post-apex fold variants from Pueblo Bonito with those documented at other canyon sites is hampered by small samples, but a few comments are warranted. Chetro Ketl’s intricate selvages are most comparable, with six of its seven variants replicating varieties observed at nearby Pueblo Bonito (cf. Table 7.17). By comparison, while Bc 288 shares only two variants with Pueblo Bonito, the three most common variants at Pueblo Bonito (variants 4, 10, and 12) are all attested at Chetro Ketl while none of these are seen at Bc 288. What is notable, given the small samples, is that the McElmo phase matting from Bc 288 includes two previously
unidentified intricate selvage variants, one of which deviates from most others I have seen in employing 3/3 interlacements (cf. Tables. 7.20, 7.23, 7.25). Another mat utilizes four rows of weft twining for reinforcement, rather than one which appears to be standard.

Figure 7.128. Fragment of a 3/3 twill plaited mat with an intricate selvage (Variant 44) from the trash area outside of the east wall of Room 5 at Bc 288 (CHCU 33467.b). Courtesy of the National Park Service and Chaco Culture National Historic Park.

Tsin Kletsin, a small great house situated atop South Mesa about 3 km south of Pueblo Bonito, has yielded only one mat fragment, but this specimen is 1/1 simple plaiting with a previously undocumented intricate selvage variant. It also employs two thin rush culms that act together as a single strip for one of its sets of elements (Figure 7.127). The site is unexcavated but generally considered transitional because of its D-
shaped plan and McElmo masonry style veneer (Lekson 1986). Tree-ring dates suggest it was built in the early A.D. 1100s and so the mat should date to the Late Bonito subphase or the McElmo phase. The appearance of several new selvage variants and stylistic peculiarities in the small assemblages from Bc 288 and Tsin Kletsin together imply that chronology could partly explain these stylistic differences.

Table 7.40. Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants from Bc 288, Chetro Ketl, Peñasco Blanco, and Tsin Kletsin.

<table>
<thead>
<tr>
<th>Variant No.</th>
<th>Post-Apex Fold Sequence</th>
<th>n</th>
<th>Twill Interval</th>
<th>Twining</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bc 288 (Gallo Cliff Dwelling)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AF/1/2/2/2/C</td>
<td>1</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>trash area outside east wall</td>
</tr>
<tr>
<td>6</td>
<td>AF/1/2/2/1/F/1/C</td>
<td>2</td>
<td>unknown</td>
<td>1 row s-twist, 4 rows close simple s-twist</td>
<td>trash area outside east wall</td>
</tr>
<tr>
<td>43</td>
<td>AF/1/3/3/2/2/1/F/1/2/2/C</td>
<td>1</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>trash area outside east wall</td>
</tr>
<tr>
<td>44</td>
<td>AF/2/2/2/2/2/2/C</td>
<td>2</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>trash area outside east wall</td>
</tr>
<tr>
<td>Chetro Ketl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AF/1/2/2/2/C</td>
<td>2</td>
<td>3/3, unknown</td>
<td>1 row s-twist, unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>3</td>
<td>AF/1/2/2/2/2/C</td>
<td>3</td>
<td>2/2</td>
<td>1 row s-twist (2), unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>40</td>
<td>AF/1/2/2/2/1/C</td>
<td>2</td>
<td>2/2</td>
<td>1 row s-twist, unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>4</td>
<td>AF/1/2/2/2/2/2/C</td>
<td>2</td>
<td>2/2, unknown</td>
<td>1 row s-twist, unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>6</td>
<td>AF/1/2/2/1/F/1/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>unknown</td>
</tr>
<tr>
<td>10</td>
<td>AF/1/2/2/1/1/F/1/1/C</td>
<td>2</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>12</td>
<td>AF/1/2/2/2/1/F/1/2/C</td>
<td>1</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>unknown</td>
</tr>
<tr>
<td></td>
<td>AF/1/2/2/2/2/*/</td>
<td>1</td>
<td>2/2</td>
<td>unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>Peñasco Blanco</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AF/1/2/2/2/*/</td>
<td>1</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>Tsin Kletsin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>AF/2/2/1/2/F/2/C</td>
<td>1</td>
<td>1/1</td>
<td>absent</td>
<td>39 or 40</td>
</tr>
</tbody>
</table>

*AF=obtuse angled apex fold, F=approximately 90 degree fold, C=terminal clipping of strips

The scatterplot of plaited mat strip width and density by site in Figure 7.129 shows that mat weave textures from study sites all fall within roughly the same range of
variation revealed by the larger sample of mats from Pueblo Bonito. However, mats from Bc 51 form a relatively tight cluster at the finer end of the spectrum. This is likely in part because they are predominately 3/3 interval twill, which tends to employ finer strips (cf. Figures 7.55, 7.70), but could also be a consequence of their having come from burials in two rooms close to each other in the central portion of the site, if it is fair to assume that the deceased (or the matweavers providing the mortuary offerings) were related in some way. In comparison, Bc 288 mats form a similarly recognizable cluster but are coarser than the Bc 51 examples. A plot of mat intricate selvage complexity proxies provides little to augment this picture except to show that Chetro Ketl overlaps well with Pueblo Bonito and that, while there exists considerable range of variation, Bc 288 mat selvages tend to be wider than those observed at other sites (Figure 7.130).

Although the majority of Chaco Canyon mat specimens beyond Pueblo Bonito are difficult to resolve in terms of Bonito phase subphases, the lack of clear spatiotemporal trends in matting strip width and density at Pueblo Bonito suggests that, even if better provenience and chronometric data existed for specimens from other sites, little new information might be gained. Again, this may indicate that *Schoenoplectus* morphology and ecology constrains the range of culm widths available to weavers at any given time. However, the relatively distinct clustering of the Bc 51 and Bc 288 mats by site suggests the possibility that if a mat assemblage can be assumed to date to a relatively restricted span of time then between-site comparison may be more fruitful for discerning differences between sites.
Figure 7.129. Scatterplot of Chaco Canyon plaited matting strip width and density by site. For clarity one Chetro Ketl outlier (MIAC 19300.1) is omitted because it employs very wide strips for both sets of elements that are made by pairing thick and thin rush culms together to act as one unit.

Figure 7.130. Scatterplot of Chaco Canyon twill plaited matting intricate selvage width and structural complexity proxy by site.
Fine Twill Plaited Sandals

Fine twill plaited sandals were ubiquitous during the Pueblo era in the northern Southwest but appreciable data from Chaco Canyon are limited to Pueblo Bonito (n=45) and, even then, many are highly fragmented. Chetro Ketl (n=13) and Bc 288 (n=8) yielded small samples but most other sites have produced four or fewer specimens (see Table 5.1). The lack of comparative data means that canyon-wide comparisons should be treated tentatively, but several observations bear on understanding within-canyon stylistic variability.

The primary structural technique is 2/2 twill plaiting for all but one specimen from Bc 288 that is tightly packed 3/3 twill (Figure 7.131). As noted earlier, at Pueblo Bonito longitudinally split broadleaf yucca strips were more common during Early to Classic Bonito times but were eventually succeeded in dominance by narrowleaf yucca strips. Elsewhere in the canyon narrowleaf yucca strips appear to prevail (Figure 6.36), but split broadleaf yucca strips are known in small quantities from Bc 52, Bc 288, Chetro Ketl (n=3), Kin Kletso, and Peñasco Blanco.

Starts and finishes (toe and heel selvages) are poorly represented outside of Pueblo Bonito, but one specimen from Peñasco Blanco evidences a toe selvage with strips overhand knotted with adjacent strips, and another from Chetro Ketl exhibited strips that were left free after the toe was constructed. Heel selvages tend to preserve better, perhaps due to their tightness relative to other portions of the woven structure,
and specimens from Bc 288 (n=2), Chetro Ketl (n=2), Kin Kletso, and Pueblo del Arroyo all exhibit heel selvages with strips overhand knotted with adjacent strips. A single specimen from Chetro Ketl bears an 180 degree self selvage, which is the best represented style at Pueblo Bonito (Table 7.28). Side selvage treatments show the greatest stylistic diversity during the Early Bonito subphase at Pueblo Bonito (Table 7.29) and, as at that site, Classic and Late Bonito subphase material from other sites in the canyon share a preference for 2/2 interval 90 degree self selvages. This selvage treatment thus persists throughout the Bonito phase and into McElmo times, as indicated by Bc 288 footwear. The only side selvage variation observed in the canyon derives from Bc 288 where two sandals exhibit 3/3 interval 90 degree self selvages, a variant also seen in small quantities at Pueblo Bonito (Table 7.29).

Figure 7.131. Upper surface view of fine 3/3 twill plaited narrowleaf yucca sandal from Bc 288 (CHCU 33292). Courtesy of the National Park Service and Chaco Culture National Historic Park.
Strip splices in sandals from canyon sites, where preserved, are exclusively laid in at adjacent strip crossings and so mirror the dominant splicing method at Pueblo Bonito. Exclusive of Pueblo Bonito, decorated sandals are represented by four sandals from Chetro Ketl that evidence subtle raised ridges affected by differential tensioning applied to the strips (Figure 7.132). The character of these ridges is consistent with that seen in Pueblo Bonito sandals where it is the most frequent decorative technique.

As observed in the earlier discussion of metric variation in Pueblo Bonito sandals, there is no clear evidence for change in strip width and density through time. Similarly, no convincing patterns emerge when sandal fineness is compared across Chaco Canyon sites in the study sample (Figure 7.133). In spite of small samples, most canyon sites indicate a range of variation in strip width and density that compares favorably with the range indicated by the more substantive Pueblo Bonito sandal assemblage.

Figure 7.132. Upper surface view of fine 2/2 twill plaited broadleaf yucca sandal from Chetro Ketl (MIAC 21719A) with subtle decorative edge ridges created by strip tensioning. Courtesy of the Museum of Indian Arts and Culture.
Summary

Consideration of community-scale stylistic variation in basketry artifacts from Chaco Canyon is severely limited by factors of preservation, but the data do yield some suggestions of spatial and temporal affinities that can be explored in future research. Chaco Canyon basketry artifacts exhibit a relatively high degree of homogeneity in terms of preferences for raw material and primary technological stylistic features such as 2/2 twill plaiting, coiled basket foundation type and arrangement, work direction, and starting and finishing methods. However, the fine scale technical choices most likely to reflect differences between smaller scale learning networks are not well preserved.
Unsurprisingly given their close proximity, Pueblo Bonito and Chetro Ketl’s coiled baskets appear most similar to each other in terms of weave texture and these sites also share the same primary technique for decorating sandals. The further possibility exists for greater affinity between Chetro Ketl's coiled wares and those from Pueblo Bonito's northern rooms that date principally to Early and Classic Bonito subphase times. If this stylistic similarity reflects overlapping learning networks, as seems plausible, then it may indicate that some fraction of the individuals responsible for Chetro Ketl's coiled basketry shared stronger ties to, and interacted more directly with, the tenth through mid-eleventh century A.D. occupants of Pueblo Bonito responsible for the wares from Bonito’s northern rooms. One implication of this would then be that Chetro Ketl coiled baskets, here assumed to date between about A.D. 1040 and 1140 (Lekson 1983, 1986), bear little similarity to Pueblo Bonito’s stylistically distinctive wares from southeastern rooms that I earlier proposed may be linked to newcomers arriving sometime after A.D. 1040/1070 based on construction dates assigned to those room blocks. Of course, it is important to remember that insufficient provenience and chronometric data for the small Chetro Ketl sample prevents further evaluation of this idea. This potential spatiotemporal dimension to Chetro Ketl’s coiled basketry’s stylistic similarity with Pueblo Bonito could indicate that Chetro Ketl's occupants interacted more with the occupants of Pueblo Bonito's northern rooms, or that a portion of Chetro Ketl's founders were, perhaps, derived from them. Were the latter scenario to be supported with other lines of evidence it might imply a role for group fissioning in determining the demographic composition of nearby Chetro Ketl.
Whereas coiled basketry reveals little about within-canyon stylistic variability bearing on questions of small site and great house cultural and temporal differences, comparative data on twill plaited matting and sandals afford some preliminary observations. Small site matting indicates the possibility of differences in preferred twill plaiting interval both among small sites and, perhaps, between the Pueblo Bonito and Chetro Ketl great houses. Lacking detailed chronological information it is unclear if the observed differences in mat plaiting interval are explainable as a product of sampling, temporal or sociocultural differences, or some combination of all three. Although representing admittedly minor structural deviations inferred from small samples, I argue that the presence of these technological stylistic differences, by virtue of their being evident in such small samples, is suggestive enough to allow that they may be indexing participation in discrete learning networks and thus worthy of additional future study.

A similar interpretation may obtain to the small McElmo phase mat assemblage from Bc 288 (Gallo Cliff Dwelling), insofar as relative to sample size the number of technological stylistic divergences from Bonito phase matting seems notable. Intricate selvages on mats from Bc 288 appear to on average be wider than examples from other canyon sites and two unique intricate selvage variants are documented, including one with multiple rows of twining for reinforcement. Combined with the atypical 1/1 plaited mat with a unique intricate selvage variant of Late Bonito or McElmo age from Tsin Kletsin, and the unusual 3/3 twill construction of one sandal from Bc 288, I offer that the McElmo phase data suggest a stylistic departure from Bonito phase products consistent with more marked learning network differences as opposed to in situ stylistic evolution.
Chronology is clearly a factor, and in spite of the meager samples, construction attributes of the basketry artifacts differ sufficiently from Bonito phase products that I view them as plausibly providing support for proposals that the twelfth century A.D. in Chaco Canyon witnessed an extra-canyon demographic influx (Wills 2009), as opposed to reflecting structural variation accumulated over time. While the technical choices stand out when compared to other Chaco Canyon assemblages there is as yet no single attribute or set of attributes that points to a more specific geographic or cultural source for them.

Regional-Scale Stylistic Patterning

Analyses of patterning in basketry artifact technological stylistic choices at site- and community-scales yielded findings consistent with the existence of basketry craft learning network variation at those scales within the Chaco regional system. Making the reasonable assumption that this variation is a product of the histories of learning and teaching the crafts, and recognizing that social learning processes variously correspond with social, cultural and/or linguistic identities, it follows that some degree of sociocultural diversity must also have been present at larger spatial scales. Larger scale learning networks and attendant sociocultural diversity should then be reflected by discernable regional trends in basketry artifact technological style. Given their
geographic extent, these spatially expansive learning networks can be understood to be products of deeper or older shared histories of learning and teaching the crafts. Questions that arise from this line of thinking inevitably turn on our ability to identify and characterize wider technological stylistic patterning for the relevance it may have for the social and cultural developments associated with Bonito phase Chaco Canyon.

I investigate these issues below by examining basketry artifact technological patterning across the Chaco regional system in order to (1) characterize regional trends in basketry artifact style that may provide a geographic and chronological context for the finer scale stylistic patterns documented earlier and (2) explore the possible geographic and cultural affinities of the Chacoan assemblages analyzed. Available data do not afford even coverage of the Chaco regional system in space or through time, but adequate samples of coiled basketry, plaited matting, and fine twill plaited sandals from sites in Chaco Canyon, the Middle San Juan region, the Mesa Verde region, and Canyon de Chelly National Monument do exist, and these can be supplemented by published data to permit preliminary investigation of the foregoing.

**Coiled Basketry**

Ethnographic and archaeological observations on the social and spatial scales at which specific coiled basketry technological stylistic features sort (see Chapter 4) suggest that regional affinities may profitably be explored by examining the distribution and proportion of primary structural types, in addition to individual attributes that
reveal themselves to be geographically or culturally diagnostic. Data on the relative proportions of coiled basketry structural types by site (see Table 7.1), when combined to make larger regional samples (Table 7.41), seemingly suggest that Chaco Canyon actually exhibits fewer structural types than the other regions sampled and thus could imply relatively less regional stylistic variation. However, I dismiss this observation in light of the fact that the Pueblo Bonito assemblage, which constitutes the bulk of the canyon sample, is far less well preserved than the material from Aztec Ruin, de Chelly, or Mesa Verde. When taking differential preservation into account, the numbers of structural types identified for each region are actually quite comparable, especially when considering that individual site assemblages dominate all but the Mesa Verde region sample.

What is clear from this coarse, but broad, view of coiled basketry structural variation is that two rod and bundle bunched foundation coiling sewn with noninterlocking stitches, and one rod foundation coiling sewn with interlocking stitches, are the two primary structural techniques employed across the northern Southwest during the Bonito phase. Unsurprisingly, this finding is consistent with earlier synthetic research that demonstrates the ubiquity of both of these techniques, as well as their longevity in the northern Southwest (Morris and Burgh 1941; Tschopick 1939; Weltfish 1932). The former technique routinely constitutes more than 40 percent of sizeable basketry assemblages while the latter ranges between about 10 and 35 percent of the same assemblages. The appearance of three rod bunched foundation coiling sewn with noninterlocking stitches by the A.D. 1100s reflects a new structural technique in the
northern Southwest that, for reasons that are unclear, becomes more prominent in subsequent centuries (e.g., Morris and Burgh 1941; Tanner 1983; Whiteford 1988), as attested by the Aztec West assemblage (Figure 6.18). Significantly, this type also comes to dominate thirteenth century A.D. assemblages from the Mesa Verde region (Figures 6.22, 6.23, and 6.34; Table 7.41).

All other observed coiled basketry structural types are present in very small quantities that most likely reflect occasional on-site production, imports that arrived with visitors and migrants, or wares acquired through exchange. With such meager and imperfectly preserved examples of these minor types it is difficult to address the question of trade versus population movement, but knowledge of each technique’s wider spatial and temporal distribution can provide circumstantial support for non-local sources for certain structural types. Whereas some techniques distinguished by minor alterations to foundation type and arrangement or stitch type (e.g., two rod and bundle bunched foundation, interlocking stitch, or one rod foundation, noninterlocking stitch) are not infrequently encountered in low frequencies in large Southwestern assemblages and likely reflect local, intentional deviations for any number of reasons, others occur in greater abundance in, or are more restricted to, certain geographic areas of the Southwest.

Single rod (halved or whole) and bundle stacked foundations, for example, date as early as the Early Archaic on the Colorado Plateau and persist as dominant structural types in Ancient Pueblo assemblages from north of the San Juan River in Colorado and Utah until they are largely replaced by two rod and bundle bunched foundation coiling
Table 7.41. Coiled Basketry Primary Structural Types Aggregated by Study Region.

<table>
<thead>
<tr>
<th>Primary Structural Typeb</th>
<th>Chaco Canyon</th>
<th>Middle San Juan</th>
<th>Canyon de Chelly</th>
<th>Mesa Verde</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close Coiling, Half Rod, Interlocking Stitch</td>
<td>1 (0.9)</td>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Interlocking Stitch</td>
<td>14 (12.1)</td>
<td>17 (16.2)</td>
<td>26 (32.5)</td>
<td>6 (10.3)</td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Noninterlocking Stitch</td>
<td>5 (4.3)</td>
<td>2 (2.5)</td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Intentionally Split on Both Surfaces</td>
<td>1 (1.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Interlocking Stitch and Wrap</td>
<td>2 (1.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod, Noninterlocking Stitch and Wrap</td>
<td>2 (1.9)</td>
<td>2 (2.5)</td>
<td>2 (3.5)</td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 1 Rod and Bundle Stacked, Noninterlocking Stitch</td>
<td>1 (0.9)</td>
<td>1 (1.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 2 Rod and Bundle Stacked, Noninterlocking Stitch</td>
<td>3 (2.6)</td>
<td>2 (1.9)</td>
<td>1 (1.3)</td>
<td>P</td>
</tr>
<tr>
<td>Close Coiling, 2 Rod and Bundle Bunched, Interlocking Stitch</td>
<td>1 (0.9)</td>
<td>2 (2.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 2 Rod and Bundle Bunched, Noninterlocking Stitch</td>
<td>82 (70.6)</td>
<td>49 (46.7)</td>
<td>37 (46.3)</td>
<td>19 (32.7)</td>
</tr>
<tr>
<td>Close Coiling, 3 Rod Stacked, Noninterlocking Stitch</td>
<td></td>
<td></td>
<td>P</td>
<td></td>
</tr>
<tr>
<td>Close Coiling, 3 Rod Bunched, Noninterlocking Stitch</td>
<td>5 (4.3)</td>
<td>24 (22.9)</td>
<td>4 (5.0)</td>
<td>25 (43.1)</td>
</tr>
<tr>
<td>Close Coiling, 3 Rod Bunched, Interlocking Stitch and Wrap</td>
<td></td>
<td></td>
<td>2 (3.5)</td>
<td></td>
</tr>
<tr>
<td>Open Coiling, 1 Rod, Intricate Interlocking Stitch</td>
<td></td>
<td></td>
<td>1 (1.3)</td>
<td></td>
</tr>
<tr>
<td>Open Coiling, 1 Rod, Intricate Interlocking Stitch and Wrap</td>
<td>2 (1.9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Coiling, 2 Rod Stacked, Intricate Interlocking Stitch and Wrap</td>
<td></td>
<td></td>
<td>1 (0.9)</td>
<td></td>
</tr>
<tr>
<td>Untyped (Close Coiling, Foundation and/or Stitch Type Unknown)</td>
<td>5 (4.3)</td>
<td>3 (2.9)</td>
<td>4 (5.0)</td>
<td>1 (1.7)</td>
</tr>
<tr>
<td>Sample Total</td>
<td>116</td>
<td>105</td>
<td>80</td>
<td>58</td>
</tr>
</tbody>
</table>

a n (percent of sample)

b Structural types not examined for this study but identified as present (P) in small quantities by Osborne (2004) are noted for Mesa Verde but not included in tabulations. The probable Navajo coiled basket is omitted from the Chaco Canyon sample (see Table 7.1).

during Late Basketmaker II times (Adovasio et al. 2002; Geib and Jolie 2008; Jolie and Geib 2010; Webster and Jolie 2011; see also Table 5.3). Based on current evidence, single rod and bundle stacked foundations were in use at Atlatl Cave in Chaco Canyon during by Late Archaic/Basketmaker II times (see Table 5.3), but were in competition
with, or already replaced by, two rod and bundle bunched foundations by the A.D. 700s (Jolie, unpublished data; Judd 1924, 1954:15). Documentation of the rod and bundle staked foundation type at Aztec West (Figure 7.134), and its persistence into the A.D. 1200s in the Mesa Verde region (Table 6.1, see also Morris and Burgh 1941; Osborne 2004), albeit in much reduced quantities by this time, implies a probable technological link between Aztec and points further north.

Stitch-and-wrap, a stitch type variant often employed for decorative effect or to create open spaces between coils, is a second uncommon technique found at Aztec West in post-A.D. 1130 contexts (Figure 7.19). Basketmaker II/III (ca. A.D. 50 to 750) examples are known from several caves in the Prayer Rock District of northeastern Arizona (Morris 1980) but all later (ca. A.D. 1000 to 1300) known specimens derive from the Mogollon (Cosgrove 1947; Hough 1914) and Mesa Verde regions (Morris and Burgh 1941; Osborne 2004). Beyond the Aztec specimens, my research also isolated one undated example sewn with yucca leaf stitches from Kiva 3 at Kin Bineola (Figure 7.135). Kin Bineola is a Chacoan outlier located about 19 km (12 mi) southwest of Pueblo Bonito thought to have been built during the mid-A.D. 900s, with construction continuing into the first decades of the A.D. 1100s (Dungan 2009). If not reflecting continued limited production of this technique since Basketmaker times, stitch-and-wrap’s presence at Aztec after A.D. 1130 may signal a connection to Mesa Verde in light of chronology and geographic proximity.

Techniques of decorative embellishment and decorative style provide additional lines of evidence for inferring geographic and cultural affinities, but unevenly preserved
design motifs and layouts limit design comparisons. Designs effected with dyed stitches and/or paint are known from all of the regions considered here but some regional affinities are suggested. Pueblo Bonito’s decorated coiling (Table 7.5) stands out for its prevalence of dyed stitch geometric patterns that cover the majority of the basket wall.

Figure 7.134. Nearly complete half rod and bundle stacked foundation, noninterlocking stitch coiled bowl (29.0/9694) from Burial 32, a young adult (female?), in Room 138 at Aztec West Ruin. This basket is directly dated to A.D. 1155 to 1285. Courtesy of the American Museum of Natural History.
design field, and liberal use of paint as compared to other assemblages. Yet, as discussed in Chapter 6, many of these vessels likely have non-utilitarian functions and include forms such as cylinder and bifurcated burden baskets that are known exclusively or predominately from this site. Turquoise and shell mosaic-covered baskets are also restricted to Pueblo Bonito. Although decorated coiled baskets from Canyon de Chelly National Monument sites are numerically few, Antelope House specimens that include examples of bifurcated burden baskets exhibit geometric designs that compare best to those from Chaco Canyon. Use of most of the basket’s wall as the design field, and the
incorporation of zig-zag and stepped fret elements, mark the strongest parallels in decorative style. The painted quadrupeds on the hourglass-shaped tray from Antelope House are unusual as zoomorphic elements are quite rare in prehispanic Southwestern basketry (Morris and Burgh 1941).

Decorated Middle San Juan wares, attested solely by the Aztec West assemblage (Table 7.11), show the strongest link to Chaco Canyon with clay coated and painted vessels from Late Bonito subphase deposits that are largely identical in technical execution and their use of turquoise, white, black, and yellow paint to create zig-zag and linear elements set against the red clay background. A departure from Bonito phase vessels’ decorative style is identifiable in post-A.D. 1130 specimens. Such later baskets at Aztec are noteworthy for an absence of clay coated and painted vessels and an apparent shift to preferred design layouts in which isolated geometric motifs not observed in Chaco are repeated with even spacing across the vessel wall (Figures 6.38, 7.21, 7.23). The result is geometric decoration that makes less use of negative space than it does empty space and sees smaller motifs more sparsely, if evenly, distributed across the basket surface. Additionally, one post-Chaco plaque from Aztec West utilizes dark brown turkey feather quill for its decorative stitches (Figure 7.23). These post-Chaco specimens exhibit decoration much more akin to that which I document for Mesa Verde region sites.

Of the Mesa Verde region comparative sample, 23 baskets exhibit decoration. A common embellishment, observed on 10 specimens, is the application of red mineral pigment that survives as uneven red staining on the interior or exterior of the vessel. No
patterns are identifiable and the unevenness of the red staining implies unsystematic application. The number of baskets and different bowl forms evidencing staining make it implausible that all of them were used as red pigment preparation or application vessels. Two additional specimens have more systematic paint or pigment applications. These include the Cliff Palace shield (Figure 6.23; see Chapter 6), with a faded design of uncertain character in red and white pigment, and one of a pair of very similar polychrome steep-sided bowls with large stepped fret motifs (Figure 6.21). Fourteen vessels, including three that also bear red pigment, have woven geometric designs. Of these, half employ dyed stitches while the others utilize longitudinally split bird feather quills (presumably turkey) that are a glossy dark brown to black in color (Figure 6.22). Design elements in the sample include stepped frets, checkered motifs, stepped lines, and two vessels with nested broad-pointed stars.

Metric data for construction features of coiled basketry afford an additional means of exploring regional technological stylistic patterning, and in the present study this amounts to measurements of coil and stitch dimensions and density that reflect weave texture and fineness. Comparison of these data for only two rod and bundle bunched, noninterlocking stitch, and three rod bunched, noninterlocking stitch specimens (Figures 7.136 and 7.137) underscores that while individual assemblages can exhibit a considerable range of variation, at wider geographic scales such variation remains relatively constrained between assemblages. This is most likely a consequence of constraints imposed by the coiled basketweaving process and similar or identical raw material sources. That over 275 prehispanic coiled baskets from the northern Southwest
Figure 7.136. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil dimension data by regional basketry sample. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.137. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil density data by regional basketry sample. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
plotted in the above figures exhibit stitches between about 0.5 and 2.5 mm wide, and coils between about 3.0 and 7.0 mm tall, illustrates how narrow the range of variation truly is, as well as how this variation results in considerable overlap between assemblages at larger geographic scales. Yet, despite this overlap in attributes of basket wall construction, the data do seem to indicate some regional trends. It is instructive that Chaco Canyon coiling, dominated by the Pueblo Bonito sample, is consistently finer than wares from the Canyon de Chelly, Middle San Juan, and Mesa Verde regions. Chaco Canyon coiling typically exhibits narrower stitches and smaller coils as compared to the other regions sampled. While the three other regions are all coarser by comparison, Middle San Juan region baskets, represented primarily by the Aztec West sample, are generally intermediate between Chaco and Mesa Verde baskets. The de Chelly regional sample is quite varied, but in general terms compares somewhat better with Chaco and Middle San Juan material than Mesa Verde. A sample of 47 Basketmaker (ca. A.D. 50 to 750) baskets from northeastern Arizona (de Chelly region and Prayer Rock District) and Grand Gulch in southern Utah that are included for comparison show no strong affinity to any region, although the Prayer Rock and de Chelly area Basketmaker baskets are quite similar to each other (Figures 7.138 and 7.139). Notably, the Basketmaker sample includes exclusively two rod and bundle bunched foundation specimens, so it is clear that it is not foundation type that contributes to their relative coarseness but consistent use of wider stitching thread. These data could be interpreted as showing that Ancient Pueblo coiling became finer through time since Chaco Canyon baskets are on average finer relative to other samples, but this seems unlikely since later wares from the Middle
Figure 7.138. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil dimension data by regional basketry sample with Basketmaker period samples. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.139. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil density data by regional basketry sample with Basketmaker period samples. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
San Juan and Mesa Verde regions do not continue such a trend towards increasing fineness.

In some respects, comparison of the Pueblo Bonito and Aztec West two rod and bundle and three rod assemblage data against the same structures in the Mesa Verde sample enhances the clarity of regional relationships through time (Figures 7.140 and 7.141). Pueblo Bonito coiling is more easily separable from thirteenth century A.D. Mesa Verde wares based on wall texture and stitch and coil dimensions. Although the sample is small, Late Bonito subphase Chaco material from Aztec appears more similar to Pueblo Bonito's Early to Classic Bonito phase coiling, particularly as regards stitch and coil dimensions (Figure 7.140). In contrast, post-A.D. 1130 coiling from Aztec, which plots in the space intermediate between Pueblo Bonito and Mesa Verde wares, clearly demonstrates greater similarity in wall texture, and stitch and coil dimensions, to Mesa Verde baskets.
Figure 7.140. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil dimension data for Pueblo Bonito, Aztec Ruin West, and Mesa Verde sites. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.141. Scatterplot of two rod and bundle bunched foundation, noninterlocking stitch coiling, and three rod bunched foundation, noninterlocking stitch coiling stitch and coil density data for Pueblo Bonito, Aztec Ruin West, and Mesa Verde sites. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
**Plaited Matting**

Regional structural variation in plaited matting obviates two facts (Table 7.42). First, it is clear that plaited matting was produced and used in very limited quantities at Mesa Verde sites as compared to the Middle San Juan, Chaco Canyon, and Canyon de Chelly National Monument regions. Second, 2/2 interval twill plaiting was the preferred manner of interlacing across the northern Southwest. This was apparently the case during the Pueblo I period (Webster 2009a, 2012a) and remained so through (and likely beyond) the A.D. 1200s based on data collected for this study. At the vast majority of individual sites (Table 7.15), and when considered regionally, 2/2 twill plaiting constitutes 50 percent or more of the matting recovered. Although limited quantities of other plaiting intervals are documented, all but 3/3 twill are uncommon. Even so, 3/3 twill plaited matting only appears to have attained some popularity in Chaco Canyon and the Middle San Juan region where it makes up about a quarter of all matting.

Table 7.42. Plaited Matting Primary Structural Types Aggregated by Study Region.

<table>
<thead>
<tr>
<th>Primary Structural Type</th>
<th>Region²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chaco Canyon</td>
</tr>
<tr>
<td>Simple Plaiting, 1/1 Interval</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Twill Plaiting, 2/2 Interval</td>
<td>61 (49.6)</td>
</tr>
<tr>
<td>Twill Plaiting, 2/3 Interval</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Twill Plaiting, 3/3 Interval</td>
<td>36 (29.3)</td>
</tr>
<tr>
<td>Twill Plaiting, 4/4 Interval</td>
<td></td>
</tr>
<tr>
<td>Untyped (Twill Plaiting, Interval Unknown)</td>
<td>24 (19.5)</td>
</tr>
<tr>
<td>Sample Total</td>
<td>123</td>
</tr>
<tr>
<td><strong>Number of Structural Types</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

² n (percent of sample)
Data on matting intricate selvage post-apex fold variants enumerated above (Tables 7.17, 7.20, 7.23, 7.25, 7.39) reveal that, despite considerable variation, a subset of selvage configurations do recur within and across the regions sampled. To these data may be added the comparative material from Mesa Verde. Of the 25 Mesa Verde twill plaited mats analyzed all but three exhibit selvages, and those with selvages are exclusively intricate selvages that employ one of five different post-apex fold sequence variants (Table 7.43). Only Variant 46 is not documented elsewhere.

Inclusion of the Mesa Verde data shows that a minimum total of 64 different post-apex fold variants were used to varying degrees at the sites sampled. The number of variants by site includes 18 from Pueblo Bonito, 29 from Aztec West Ruin, 7 from Salmon Ruins, 30 from Antelope House, 3 from White House, and 5 from at least four Mesa Verde sites. These numbers certainly underestimate the full range of variation that existed, but the larger and better preserved samples from Aztec West and Antelope House do suggest that select variants were more popular and probably reflect real preferences among those populations. Aztec West and Antelope House exhibit the highest number of shared selvage variants, followed by Pueblo Bonito and Aztec West (Table 7.44). The 12 selvage variants documented for other Chaco Canyon sites (Table 7.40) include three unique examples and one (Variant 40) shared with Salmon Ruins. The remainder reflect selvage configurations seen at Pueblo Bonito and among other assemblages. The three mat fragments from White House, all with intricate selvages, include two examples of Variant 27 and one of Variant 6.
Table 7.43. Mesa Verde Region Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants.

<table>
<thead>
<tr>
<th>Variant No.</th>
<th>Post-Apex Fold Sequence</th>
<th>n</th>
<th>Twill Interval</th>
<th>Twining</th>
<th>Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>2</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>Oak Tree House, unknown</td>
</tr>
<tr>
<td>6</td>
<td>AF/1/2/2/2/1/F/1/C</td>
<td>13</td>
<td>2/2 (12), 3/3</td>
<td>1 row s-twist (7), 2 rows close simple s-twist, 1 row z-twist (5)</td>
<td>Cliff Palace, unknown (12)</td>
</tr>
<tr>
<td>10</td>
<td>AF/1/2/2/1/1/F/1/1/C</td>
<td>4</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>Painted Kiva House, unknown (3)</td>
</tr>
<tr>
<td>12</td>
<td>AF/1/2/2/2/1/F/1/2/C</td>
<td>2</td>
<td>2/2</td>
<td>1 row s-twist</td>
<td>unknown</td>
</tr>
<tr>
<td>46</td>
<td>AF/1/3/2/1/1/F/1/1/C</td>
<td>1</td>
<td>3/3</td>
<td>1 row s-twist</td>
<td>Cliff Palace</td>
</tr>
</tbody>
</table>

* AF=obtuse angled apex fold, F=approximately 90 degree fold, C=terminal clipping of strips

Comparison of intricate selvage variants for which five or more examples are documented in an assemblage yields nine variants that occur most frequently both within and among the sample assemblages (Table 7.45). Variant 6 is noteworthy because it is present in all but the Salmon Ruins assemblage, is the dominant selvage configuration at Aztec West, and also occurs most frequently in the Mesa Verde sample. Different variants prevail at Pueblo Bonito and Antelope House, although Variant 6 is attested at these sites as well.

Table 7.44. Counts of Shared Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants by Assemblage.

<table>
<thead>
<tr>
<th></th>
<th>Pueblo Bonito</th>
<th>Aztec Ruin West</th>
<th>Salmon Ruins</th>
<th>Antelope House</th>
<th>Mesa Verde</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo Bonito</td>
<td>18</td>
<td>8</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Aztec West Ruin</td>
<td>29</td>
<td></td>
<td>4</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Salmon Ruins</td>
<td></td>
<td>7</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Antelope House</td>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Mesa Verde</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>
Table 7.45. Comparison of Twill Plaited Matting Intricate Selvage Post-Apex Fold Variants Represented by ≥5 Specimens by Assemblage.\(^a\)

<table>
<thead>
<tr>
<th>Variant No.</th>
<th>Post-Apex Fold Sequence(^b)</th>
<th>Pueblo Bonito</th>
<th>Aztec West</th>
<th>Antelope House</th>
<th>Mesa Verde Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AF/1/2/2/1/C</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AF/1/2/2/2/C</td>
<td>2</td>
<td>9</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>AF/1/2/2/2/2/2/C</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>AF/1/2/2/2/2/1/F/1/C</td>
<td>1</td>
<td>38</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td>AF/1/2/2/1/1/F/1/1/C</td>
<td>3</td>
<td>12</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>AF/1/2/2/2/1/F/1/1/C</td>
<td>5</td>
<td>21</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>AF/1/2/2/2/2/1/F/1/2/C</td>
<td>12</td>
<td>16</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>11</td>
<td>58</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>AF/1/2/2/1/1/F/1/C</td>
<td>1</td>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Bold identifies the most abundant selvage variant in each assemblage. Salmon Ruins is excluded because no variant included five or more examples.

\(^b\) AF=obtuse angled apex fold, F=approximately 90 degree fold, C=terminal clipping of strips

Based on study data, mat decoration does not appear to be particularly well suited to delineating geographic patterning, perhaps due to use wear and uneven preservation. As observed earlier in the context of site-specific analyses, the use of dyed strips, shift manipulations, and alterations to strip composition (e.g., strip width) are common decorative techniques and occur in all assemblages in comparable frequencies. The apparently shaped mat from Pueblo Bonito and the painted mat from Aztec West are unique items. Notably, decorated mats are rare at Antelope House (Adovasio and Gunn 1986:352), consisting of just one specimen with alternating dyed/undyed strips, which is surprising given the assemblage’s size. If accurate, and not reflective of faded dyed strip designs that went unrecognized during analysis, this represents a rather dramatic difference from Chaco Canyon, Middle San Juan, and Mesa Verde matting. In contrast, 18 of the 25 mat fragments from Mesa Verde sites evidence some form of decoration. This high proportion of embellished mats may be owing to excellent preservation that facilitates identification of faded or otherwise subtle designs.
Fourteen mats have alterations to their strip composition wherein strips alternate from thicker to thinner, and of these half also exhibit two-tone patterns where one set of elements is dyed black. Only three mats show monochromatic strip manipulations to effect probable diamond or zig-zag elements, while a fourth mat employs alternating dark and lighter strips along with a bicolor shift manipulation to create a pair of bands that contain zig-zags (Figure 7.142).

Overlap is great between regional assemblages in terms of mat strip width and density (Figure 7.143). Despite this overlap there is the suggestion that Chaco Canyon matting is marginally finer than Middle San Juan and Mesa Verde matting. The Mesa Verde matting sample tends to be coarser than other regions and reveals a more restricted range of variation that, if not a product of small sample size, may index greater internal consistency relative to Chaco Canyon and the Middle San Juan regions. For Pueblo Bonito and Aztec West Ruin, specifically, the range of variation in matting strip width and density overlaps well, with Aztec's suggestion of a greater range of variation arguably due to larger sample size (Figure 7.144). There is no discernable change in matting strip width and density over time (Figure 7.145). Similarly, no clear regional preferences exist for intricate selvage initial or apex folding angles; all three regions exhibit very similar ranges of variation (Figure 7.146). Data on intricate selvage structural complexity and width demonstrate that Chaco Canyon selvages are generally more complex and wider than mats from the Middle San Juan and Mesa Verde regions (Figure 7.147).
Figure 7.142. Left, nearly complete 2/2 twill plaited mat with intricate selvage (Variant 27) from a burial at an unknown Mesa Verde site (O.1506.1). Right, detail of faded two-tone pattern and bicolor shift manipulation to produce a band containing zig-zags. Photo courtesy of the History Colorado Center.

Figure 7.143. Scatterplot of twill plaited matting strip width and density data by aggregated regional sample. Outliers are omitted for clarity and confidence ellipses (95 percent) for centroids are shown to accentuate trends.
Figure 7.144. Scatterplot of twill plaited matting strip width and density data for Pueblo Bonito, Aztec Ruin West, and Mesa Verde. Outliers are omitted for clarity and confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.145. Scatterplot of twill plaited matting strip width and density data for Pueblo Bonito, Aztec Ruin West, and Mesa Verde by temporal period. Outliers are omitted for clarity and confidence ellipses (95 percent) for centroids are shown to accentuate trends.
Figure 7.146. Scatterplot of twill plaited matting intricate selvage initial fold and apex fold angles by aggregated regional sample. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.

Figure 7.147. Scatterplot of twill plaited matting intricate selvage width and structural complexity proxy data by aggregated regional sample. Confidence ellipses (95 percent) for centroids are shown to accentuate trends.
**Fine Twill Plaited Sandals**

Prior discussion of sandal data for individual sites revealed considerable regional homogeneity in many major technological attributes. Namely there exists a widespread preference for 2/2 interval interlacing, narrowleaf yucca strips, and a limited number of starting and finishing techniques (toe and heel selvages) and side selvage manipulations (Tables 7.27, 7.28, 7.31, 7.32, 7.36, 7.37). Toe and heel selvages are typically overhand knotted with, or looped around, adjacent strips, while side selvages are predominately of the 2/2 interval 90 degree self variety.

The 143 Mesa Verde sandals (Table 5.1; Figure 7.148) examined are all 2/2 twill of yucca, with 74.8 percent (n=107) made from longitudinally cut strips of broadleaf yucca and another 23.8 percent (n=34) consisting of thin, whole leaves from a narrowleaf yucca species. One sandal employs an unknown variety of yucca and another’s strips are two ply, s-spun, final z-twist yucca cordage. Because data on preferred Mesa Verde toe, heel, and side selvage variants are comparable to those documented in other assemblages, Mesa Verde region sandals appear to amplify the appearance of general homogeneity in prehispanic fine twill plaited sandal construction features (Table 7.46). On a wider geographic scale this suggests that there was, in a sense, a widely known template for their construction in which a limited number of options were preferred for effecting selvages at the toe, heel, and along the sides.

Whereas strip splices isolable on the bottoms of sandals from Chaco Canyon, the Middle San Juan, and de Chelly regions are almost exclusively accomplished by laying in the butt of the new strip beneath adjacent strip interlacements, strip splicing mechanics
on Mesa Verde sandals have turned out to be one of the more diagnostic features of the region's perishable industries that I have observed. Some 32.9 percent (n=47) exhibit strip splices created by tying off the loose ends of strips in overhand knots (Figure 7.148). An additional 16.8 percent (n=24) of sandals appear to have both overhand knotted and laid in strip splices. However, because knotted splices result in greater relief on the sole, they suffered accelerated wear. I strongly suspect that many (if not all) sandals with mixed knotted and laid in splices may simply be well used sandals in which the knots have worn off to leave a stub that resembles the stub of a laid in strip splice.
Twenty-eight percent (n=40) of the Mesa Verde sample evidences only laid in splices but, again, there is no way to determine how many of these may have formerly had knotted strip splices. While laid in strip splices abound in Chaco Canyon, the Middle San Juan, and de Chelly regions, only five sandals evidence knotted strip splices reminiscent of the Mesa Verde technique. Two of these derive from Aztec West and three are from Antelope House.

Table 7.46. Fine Twill Plaited Sandal Starting and Finishing Methods and Side Selvage Treatments from Mesa Verde Sites.

<table>
<thead>
<tr>
<th>Toe Selvage</th>
<th>n</th>
<th>Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strips overhand knotted with adjacent strips</td>
<td>14</td>
<td>Unknown</td>
</tr>
<tr>
<td>Strip stubs left free</td>
<td>3</td>
<td>Cliff Palace, Unknown (2)</td>
</tr>
<tr>
<td>Strips individually knotted</td>
<td>2</td>
<td>Long House, Unknown</td>
</tr>
<tr>
<td>Strips reinserted into plaiting then left free</td>
<td>2</td>
<td>Unknown</td>
</tr>
<tr>
<td>Strips looped around adjacent strips</td>
<td>1</td>
<td>Long House</td>
</tr>
<tr>
<td>Strips folded and sewn through adjacent strip</td>
<td>1</td>
<td>Cliff Palace</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heel Selvage</th>
<th>n</th>
<th>Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strips overhand knotted with adjacent strips</td>
<td>44</td>
<td>Cliff Palace (2), Long House, Oak Tree House, Spruce Tree House (2), Unknown (38)</td>
</tr>
<tr>
<td>Strips individually knotted</td>
<td>4</td>
<td>Cliff Palace, Long House, Unknown (2)</td>
</tr>
<tr>
<td>Strip folded 180° at heel and knotted or left free</td>
<td>4</td>
<td>Unknown</td>
</tr>
<tr>
<td>Strips looped around adjacent strips</td>
<td>3</td>
<td>Long House (2), Unknown</td>
</tr>
<tr>
<td>Strip stubs left free</td>
<td>1</td>
<td>Cliff Palace</td>
</tr>
<tr>
<td>Strips reinserted into plaiting then left free</td>
<td>1</td>
<td>Unknown</td>
</tr>
<tr>
<td>Strips folded and sewn through adjacent strip</td>
<td></td>
<td>Unknown</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Side Selvage</th>
<th>n</th>
<th>Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>90° self selvage, 2/F/2</td>
<td>90</td>
<td>Cliff Palace (5), Long House (7), Oak Tree House (4), Spruce Tree House (4); Unknown (70)</td>
</tr>
<tr>
<td>90° self selvage, 3/F/3</td>
<td>42</td>
<td>Cliff Palace (4), Long House (5), Spruce Tree House (7), Unknown (26)</td>
</tr>
<tr>
<td>Full twist 90° self selvage (see Osborne 1980:Fig. 399)</td>
<td>4</td>
<td>Long House, Unknown (3)</td>
</tr>
<tr>
<td>90° self selvage, 2/1/F/1/2 (see Osborne 2004:Fig. 102c)</td>
<td>3</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
In terms of sandal decoration, in regional perspective the decorative style manifest by fine twill plaited sandals is rather consistent even if the techniques for creating that decorative style are less so. Raised ridges/edge borders visible on the sandal’s upper surface are seen in a fraction of all of the site-specific assemblages examined (Figures 6.26, 6.30, 6.31, 6.36, 7.104, 7.110). They are also present on 23 of the 24 decorated sandals from Mesa Verde that I studied (Figure 7.149). At Pueblo Bonito and Chetro Ketl in Chaco Canyon, raised ridges/edge borders are primarily accomplished by applying tension to existing strips, whereas at Aztec West this is done through both tensioned strips and systematic lateral strip splicing. Laterally located strip splicing is the preferred technique for effecting edge borders and ridges in the Antelope House sandals (Figure 7.109). Mesa Verde sandals rely exclusively on tensioned strips to produce their raised ridges/edge borders. Only at Pueblo Bonito are tensioned strips used to effect designs other than selvage borders, and there they consist of zig-zags (Figures 6.30, 6.31). Pseudo-embroidered zig-zag designs on sandal soles are effected using supplemental strips only at Pueblo Bonito and Antelope House (Figures 7.84, 7.87, 7.107, 7.109), but a slightly different technique not requiring the addition of new strips is used to accomplish what amounts to nearly identical-looking raised sole designs on the examples from Aztec West (Figures 7.97, 7.98). Analogous techniques of pseudo-embroidery are entirely absent from Mesa Verde sites and, indeed, no Mesa Verde fine twill plaited sandals exhibit raised designs on their soles. Finally, the use of dyed strips to produce a design is only seen in one specimen at Antelope House (Figure 7.111), and
another solitary specimen from Mesa Verde that yielded six brown diagonal lines or bars (HCC O.1137.1).

Figure 7.149. Upper (left) and lower (right) surfaces of a fine twill plaited sandal (O.7418.11) from an unidentified Mesa Verde site. Note edge border adjacent to the side selvage created by applying tension to the strips. Photo courtesy of the History Colorado Center.

Data on fine twill plaited sandal strip width and density compared by region indicate that Chaco Canyon sandals tend to be the finest but do share a similar range of variation with Middle San Juan sandals (Figure 7.150). Mesa Verde sandals are clearly
coarser, on average, relative to the other regions sampled, and de Chelly region sandals fall in between Mesa Verde and Chaco/Middle San Juan in terms of fineness. Sandals from Mesa Verde sites also appear to form a tighter cluster unto themselves that may reflect greater regional internal consistency in weave texture.

![Figure 7.150. Scatterplot of fine twill plaited sandal strip width and density data by aggregated regional sample. Outliers are omitted for clarity and confidence ellipses (95 percent) for centroids are shown to accentuate trends.](image)

**Figure 7.150. Scatterplot of fine twill plaited sandal strip width and density data by aggregated regional sample. Outliers are omitted for clarity and confidence ellipses (95 percent) for centroids are shown to accentuate trends.**

**Summary**

Had I in this chapter presented evidence from the technological style of basketry artifacts to support the inference that a high degree of sociocultural homogeneity existed across the Chaco regional system, such an observation would certainly be more
surprising than evidence for a degree of heterogeneity in light of what we know about the region’s ancient and more recent past. The accumulated knowledge of over a century’s worth of archaeology in the northern Southwest, coupled with ethnographic and historic accounts of population movement (see Chapters 2, 3), provide compelling data to support the contention that some forms of sociocultural diversity must have been present at a regional scale in the northern Southwest, insofar as its existence yields a requisite cultural and historical context for the emergence and maintenance of the sorts of smaller scale sociocultural diversity seen among historic groups. The evidence I presented in earlier sections of this chapter complements previous scholarship by providing support for the inference of socioculturally distinct coresident populations at the scale of several individual sites and Chaco Canyon itself. What the foregoing investigation of regional-scale stylistic patterning does is provide wider geographic and cultural context for evaluating whether or not, and to what degree, the social or cultural differences that I (and other researchers) have proposed at site- and community-scales may be useful for identifying plausible cultural and geographic affinities among and between the diverse populations thought to have participated in the Chaco regional system.

Thus, while the existence of site- and community-scale sociocultural diversity necessarily implies the existence of some degree of regional-scale heterogeneity, questions remain about the precise character of such diversity and its trajectory through time. To this end, the regional data that I collected and analyzed are informative, if far more opaque than one might wish. A general lack of Pueblo I period perishable artifacts
from throughout the area ultimately encompassed by the Chaco regional system, and poor preservation and chronological controls for those that have survived, makes it impossible at present to evaluate proposals about the geographic affinities of the groups who founded the earliest great houses in Chaco Canyon. Whether they demonstrate affinities with groups of the Little Colorado River area of Arizona and the northern San Juan River region as hypothesized by the co-traditions model of Chacoan sociocultural diversity (Vivian 1970, 1989, 1990, 1997) awaits recovery of additional perishable artifact assemblages. The small sample of Basketmaker period coiled baskets, included for comparative purposes, are found to be more similar to each other than any later assemblage. I do not view this as meaning that Basketmaker coiled basketry is not related to, or cannot be used to explore affinities with, later populations, but rather that we require a better handle on spatiotemporal variation in Basketmaker basketry in order to make stronger arguments about geographic and cultural relationships.

Documented coiled basketry, twill plaited matting, and twill plaited sandal primary structural types indicate pan-regional consistency within and beyond the Chaco regional system that speaks to a shared history of these technologies among prehispanic Pueblo peoples. This makes isolating finer areal distinctions difficult solely on the basis of structural types, but coiled basketry (the earlier of the three crafts) may be most useful in these regard as select techniques appear to have more temporally or geographically restricted distributions. For example, small quantities of rod and bundle stacked foundations, as well stitch-and-wrap coiling techniques at Aztec Ruins and Mesa Verde suggest a link between these areas. Late Bonito subphase coiling from Aztec West
exhibits parallels to coiling from Pueblo Bonito, particularly in the construction and
decorative style of clay coated and painted vessels, and also coil and stitch dimension
and density data. After about A.D. 1130 the strength of that connection to Chaco
Canyon is reduced and there exist strong linkages to Mesa Verde wares in terms of
weave texture, preference for three rod bunched foundations, the production of coiled
plaques, and a sparser design layout.

For whatever reason(s), twill plaited matting appears never to have attained the
importance or popularity in the Mesa Verde region that it did in other areas in the
northern Southwest. Mesa Verde mats also tend to be the coarsest relative to other
regions sampled. Because 2/2 interval twill plaiting was overwhelmingly the preferred
structural type across the Chaco regional system, and mat metric data demonstrate
considerable overlap between assemblages, mat intricate selvage configurations
provide the best clues to areal patterning. In this case it seems that while each site
included a number of intricate selvage variants, a small number tended to be more
popular at any given site. That the most popular variants are not the same at every site
implies that site-specific population preferences and learning networks likely
determined what variants were deemed appropriate. By logical extension, similarity and
dissimilarity in site-specific intricate selvage variants and their abundance may offer a
means of proposing cultural or geographic affinities and interaction.

A measure of support for this view comes from Table 7.44, which shows that
geographically closer sites tend to exhibit greater numbers of intricate selvage variants
in common. Although mat intricate selvage configurations are almost never reported in
the published literature, Kidder and Guernsey (1919:111-112, Plate 44) do illustrate the two most common intricate selvage varieties that they found in Pueblo II/III period material they excavated from Marsh Pass cliff houses in northeastern Arizona. One (Kidder and Guernsey 1919:111, Fig. 41) conforms to my Variant 40, which is only known from one example each from Chetro Ketl and Salmon Ruins. Their second common selvage type (Kidder and Guernsey 1919:111, Fig. 42) is my Variant 27, and this occurs in small numbers at Aztec West and Mesa Verde, but is the most common type at Antelope House, which is closer than any other study site to Marsh Pass area.

Recurrence of nine selvage variants in different quantities among the sites examined (Table 7.44) hints that they may be pan-regionally distributed and that the variants not seen at other sites are local deviations or inventions. If we assume that that the Pueblo Bonito mat specimens predate the other samples, as seems likely, it may be instructive that seven of the nine most widely distributed selvage variants are known from that site. Whether this means that Pueblo Bonito was the ultimate source for those seven variants, or that those variants simply reflect an earlier range of variability, is unclear, but the former possibility would be intriguing.

As with the matting, the fine twill plaited sandals examined for this study reflect broad consistency across the northern Southwest in many primary construction attributes. Where regional differences emerge they are largely in terms of raw material, weave texture and, in the case of Mesa Verde, strip splicing mechanics. Pueblo Bonito's sandals tend to be the finest and Mesa Verde's are decidedly the coarsest. Mesa Verde sandals also demonstrate a strong preference for broadleaf yucca as a raw material, in
contrast to other regions that, while using broadleaf yucca, consistently prefer narrowleaf species. Overhand knotted strip splices are clearly diagnostic of Mesa Verde region sandals and were they employed with any frequency in other regions it assuredly would have been documented by this study. The presence of sandals with knotted strip splices at Aztec West and Antelope House thus could indicate the presence of individuals from the Mesa Verde region or persons familiar with Mesa Verde sandal production.

In contrast to the elaborate decoration of Basketmaker footwear (e.g., Hays-Gilpin et al. 1998; Teague and Washburn 2013), twill plaited sandal decoration is quite restrained, being confined to the addition of edge borders through two methods of strip manipulation, and limited use of pseudo-embroidery to effect zig-zag designs on soles. What is potentially informative about sandal decoration is the variability in edge border and zig-zag sole design construction techniques. Application of tension to existing strips to create edge borders is preferred in Chaco Canyon and Mesa Verde, but a similar effect is achieved with systematic lateral splicing in some of the sandals from Aztec West and the majority of sandals from Antelope House. Pseudo-embroidery that relies on the incorporation of supplemental strips is seen only at Pueblo Bonito and Antelope House, whereas a variation that produces the same effect without the addition of strips is restricted to Aztec West; Mesa Verde sandals offer no evidence for pseudo-embroidered designs. Given that the outward appearance of edge borders and zig-zag sole designs are virtually identical regardless of the techniques used to produce them, I submit that a plausible explanation for the technical variation in their execution lies in
attempts to replicate or emulate the design and appearance of others' sandals. Stated another way, lacking experience producing sandals with tension-induced edge borders or pseudo-embroidery that uses supplemental strips, sandalmakers found technological solutions that allowed them to reproduce the same designs but in alternative ways.

Assigning temporal priority to the Pueblo Bonito sandals could mean that those specimens served as the models that others sought to emulate. Identification of pseudo-embroidery using supplemental strips at Antelope House, as at Pueblo Bonito, could be problematic for this interpretation but it may correlate with shifting social ties between the Canyon de Chelly region and Chaco Canyon following the regional system's decline as I speculated in regards to fluctuations in sandal toe jog popularity at Antelope House (see Chapter 6).

In broad overview, then, the clearest distinction in regional basketry craft learning networks is between Mesa Verde and all of the other areas sampled. Recalling that this study's Mesa Verde coiling sample is an aggregate of baskets from no fewer than six sites (see Table 5.1; Osborne 2004), it is interesting that the range of metric variation in stitches and coils revealed by the aggregated Mesa Verde sample is comparable to the range evinced by the Pueblo Bonito and Aztec West assemblages individually (Figures 7.140 and 7.141). This may suggest greater internal consistency to Mesa Verde region coiled basketry production relative to other regions sampled or, alternatively, that the variation apparent in the Pueblo Bonito and Aztec West assemblages is atypical (cf. Figure 7.136). However, since the de Chelly regional sample, consisting primarily of Antelope House specimens, appears so variable, it may support
the contention that Mesa Verde coiling produced in the A.D. 1200s is more internally consistent relative to the other regions sampled.

That such a proposal for technological stylistic consistency within Mesa Verde coiling may be generalizable to other perishable manufactures is buttressed by several other observations made here. Namely that there is an evident unity in coiled basketry decorative style (including distinctive bird quill decorative stitches), an abundance of plaques and (complete?) absence of burden baskets, diagnostic overhand knotted strip splices on sandals, a decided preference for broadleaf yucca strips in sandals, and a dearth of twill plaited matting. On the whole, these observations accord well with previous archaeological research indicating the existence of a permeable social boundary, most visibly detected in architecture and ceramics, between the Mesa Verde region and Pueblo occupations to its south.

The distinctiveness of Mesa Verde perishables also facilitates recognition of a strong stylistic affinity with the post-A.D. 1130 perishable material culture from Aztec Ruins. Stylistic similarity exists principally in terms of preferred coiled basketry structural technique (three rod bunched foundation, noninterlocking stitch), wall texture and fineness, decorative style, shared mat intricate selvage variants, and a shift in preference to broadleaf yucca as a raw material source for sandals. In my view, the character of these post-Chaco similarities between Aztec and Mesa Verde is not of a magnitude to indicate the movement of people south to Aztec from Mesa Verde, but rather a shift towards greater intensity of interaction between Aztec’s occupants and populations to the north, which may or may not have included people occupying the
Mesa Verde core, and increasing overlap in basketry craft learning networks between the two regions.

By comparison, securely dated Late Bonito subphase coiling from Aztec (A.D. 1100–1130) bears some stylistic similarity to Chaco Canyon coiling (Figures 7.140, 7.141), but the sample is small. The strongest link to Chaco comes in the form of clay coated and painted vessels, of which remarkably similar examples are known from Pueblo Bonito, and the relatively high number of shared mat intricate selvage variants. These observations, combined with my interpretation of site-scale sociocultural diversity at Aztec, contributes additional support for the findings of recent research that implicate colonists from Chaco Canyon working alongside local groups in the founding of Aztec Ruins (Brown and Paddock 2011; Brown et al. 2008, 2013; Reed 2008, 2011; Washburn and Reed 2011; Webster 2011b).

Having thus far discussed at length the evidence, as I interpret it, for the existence of sociocultural diversity at different spatial scales across the Chaco regional system, and the plausible geographic and cultural affinities of Chacoan peoples, it is both useful and instructive to now return to some of the observations made in Chapter 6 about formal and functional variation in Chacoan baskets, mats, and sandals. The final chapter that follows more fully integrates the observations made in Chapters 6 and 7 with current archaeological understanding of Pueblo Bonito and the Chaco regional system. Doing so permits me to posit additional cultural and geographic affinities through basketry craft learning networks, and develop a revised model of Chacoan
sociocultural diversity that has implications for understanding Chacoan social identities and their connections to Chacoan ritual practice.
Archaeological investigation of past sociocultural diversity holds great potential for contributing to contemporary discussions about the roles of human diversity in structuring social interaction, cooperation, and conflict. Despite the multiple meanings and uses of “diversity” in public and academic discourse, its current social relevance and utility should not be underestimated, nor should the concept be uncritically accepted as too nebulous to be of any analytical value. The ubiquity of diversity and its links to current social events and issues, ranging from immigration to economics and politics, underscore the concept’s importance and invites scholarship seeking to untangle diversity’s meanings, uses, and abuses. Such research stands to improve collective understanding of human diversity’s roles in social life, much in the same way that historical debates surrounding "culture" and "race" have enhanced critical understanding of these concepts and their deployment. Diversity, in all its forms, resonates with today’s increasingly globalized society and merits greater attention from archaeologists.

Invoking sociocultural diversity, which I defined as the heterogeneity observed at multiple scales resulting from groups of people from different backgrounds coming together, enhances archaeological approaches examining variability and interaction in larger scale cultural patterns and smaller scale social institutions (see Chapter 1). In this
study, I have operated from the position that one of the ways that archaeology can contribute to current discussions is by identifying and examining case studies of past multiscalar human diversity that provide a deeper historical perspective on humans societies' engagement with sociocultural diversity, its sources, its maintenance, and its consequences. Insights derived from the U.S. Southwest's rich archaeological and ethnographic records speak to the long term continuity between today's vibrant Native American communities and those of the past, while underscoring the roles that sociocultural diversity and attendant processes played in shaping social and cultural realities (see Chapter 2). Research surveyed in Chapter 3 identified substantive evidence suggesting that the archaeology of prehispanic cultural developments within Chaco Canyon and across the wider Chaco regional system between ca. A.D 850 and 1140 afford a case study and opportunity to evaluate the evidence for, and implications of, cultural and social variability at multiple scales.

In the sections that follow, I synthesize the results of this study’s attribute-oriented analyses of over 1,100 coiled baskets, twill plaited mats, and sandals with previous research to offer a new perspective on Chacoan sociocultural diversity to guide future research. After first reviewing my theoretical and methodological approach, I then consider the limitations inherent to the present study. I next summarize this project’s major findings in light of three working models of Chacoan sociocultural diversity (at site, community, and regional scales) and incorporate observations about past social group’s geographic affinities when possible or appropriate. The final sections consider some of the plausible consequences of Chacoan learning network variability
and inferred sociocultural diversity for reconstructing social interaction and identities within Chaco Canyon and across the regional system.

**Technological Style and Learning Networks within and Beyond Chaco Canyon**

Social learning, denoting learning in a social context, draws attention to how the contingencies of social life influence behavioral and cognitive outcomes. Residential proximity, and the frequency and intensity of interaction among teachers and learners that it yields, provides cautious rationale for interpreting stylistic patterns that implicate spatially bounded pools of learners, or learning networks, as reflecting small scale social entities such as descent groups, lineages, and clans. Myriad other factors, however, including personal and family history, population movement, shifting consumer demands, and power relations, contribute to social learning and material outcomes in ways that vary by time and place.

Research on twentieth century Pomo basketweavers of California has shown that the greatest stylistic similarity is seen in the baskets of mothers and daughters, but close interaction with weavers across tribal and linguistic boundaries produces a blurring of technological stylistic boundaries (Pryor and Carr 1995). An analysis of Hopi and Hopi-Tewa ceramic learning networks showed that while clan membership and matrilocality exerted strong influence over learning, teaching also crossed clan,
tribal, and village lines, and this appears to have been this case prior to intense interaction with traders and the establishment of the reservation in the nineteenth century (Stanislawski and Stanislawski 1978). Inferences about what exactly ancient learning network variability means, then, are context dependent and arguably have the most bearing on understanding social interaction and identities when combined with other datasets, rather than delineating a specific type of social entity.

Research on human social leaning and its material consequences has thus become increasingly influential in archaeological research examining the relationships between material culture variability, social interaction, and identities. This body of scholarship, reviewed in Chapters 3 and 4, illustrates how the concept of technological style (Lechtman 1977; Lemonnier 1986, 1992, 1993), identifies information about the learning process as being reflected in an individual artifact's design in the form of visible production decisions. Differing technological styles are manifested materially as collections of technological choices representative of the enculturative traditions in which they were produced. Consequently, technological stylistic traditions are reproduced through social learning processes ingrained at the level of the individual, and individuals, as members of larger social groups, interact with one another to produce stylistic traditions perpetuated through pools of interacting learners that I have labeled learning networks. These learning networks constitute bounded entities of interaction with internal coherence determined by historically linked teacher-student relationships and reflect cultural standards that are consciously and unconsciously embedded with information about social interaction and identities. Since craft learning
networks overlap and intersect with larger social networks governed by gender, kinship and descent group, ritual and linguistic affiliation, as well as economic and political relationships (Bowser 2000; Crown 2016c; DeBoer 1990; DeBoer and Moore 1982; Dietler and Herbich 1998; Gosselain 2000), it is possible to observe manufacturing techniques change or be reproduced across space and through time in ways that mirror dramatic demographic and cultural changes, such as population movement, and new economic and political developments.

Assuming that the distribution of material culture learning networks revealed by patterned technological styles at multiple scales can yield information about social boundaries, interaction and identities, this project set out to identify basketry craft learning networks through detailed technological stylistic analyses of three separate but technologically related woven products: coiled basketry, twill plaited mats, and twill plaited sandals. In documenting such craft learning networks I have also assumed that between-group social interaction produces learning traditions that overlap, while continuity across a suite of technological variables reflects a shared history of learning. Accepting that learning networks may overlap to varying degrees with other socially learned norms and values, examination of spatiotemporal variability in learning networks within Chaco Canyon and across the regional system provides one avenue for investigating ancient cultural and social diversity, and, ultimately, consideration of its impacts.

In Chapter 5, I offered three working models of Chacoan sociocultural diversity operating at different spatial scales (site, community, and region) that were informed by
prior studies and which yield expectations of multiple discrete or overlapping learning networks reflected in basketry artifact technological stylistic variation. Limitations inherent in this study’s dataset meant that it was neither possible nor appropriate to evaluate every prior researcher’s proposal. Rather, a primary focus of this study has been examining what the selected perishable artifact data might reveal about Chacoan sociocultural diversity as a demographic condition, and whether or not the perishable artifact evidence corroborate patterns observed in other data previously interpreted as indicating such diversity. Since my identification and interpretation of learning networks defined by patterns in attribute-oriented technological data is necessarily post-hoc, limitations imposed by sampling and data availability warrant discussion first.

**Sampling and Interpretive Constraints**

A reality of working with perishable artifacts, for which good preservation is the exception and not the rule, is that the data are very unevenly distributed in time and space. Variable artifact preservation means that in some cases only select data can be collected, and that the observation(s) recorded may vary from artifact to artifact, even among material from the same depositional context. As an example, for one coiled basket fragment, it may have been possible to record primary structural attributes such as work direction and foundation type, while for another these attributes may have
been indeterminate, but it was still possible to record data on coil or stitch density. This fact can limit the comparability of individual artifacts within and between assemblages, and so assemblage-level comparisons require grouped samples that artificially compress some variability that may be due to factors of space and/or time. Further complicating matters are the limitations imposed by a dearth of substantive comparative data from excavated great houses and small sites. The broad chronological boundaries and spatially combined samples that I used to investigate patterning in technological style within and between study sites are thus a product of sampling considerations in conjunction with contextual information of varying quality, limited direct radiometric age determinations, and different artifact discard pathways.

To develop a more complete reconstruction of perishable artifact manufacture and use at study sample sites it would have also been desirable to have detailed data on the full range of worked fiber artifacts preserved. Perishable items such as loom woven cloth fragments, twined and simple plaited sandals, twisted and braided cordage, twill plaited ring baskets, twill plaited pouches or “pillows,” and twill plaited pot rests, to name just a few, are known from many study sites, but small sample sizes and time meant that including them in the present study was not practical. However, textiles (in the narrow sense), twined sandals, and worked wood from several study sites have been a focus of Dr. Laurie D. Webster’s complementary research program (Webster 2006a, 2007c, 2007d, 2008a, 2009b, 2010, 2011b; Webster et al. 2014) and her observations have been incorporated here.
As discussed in Chapter 5, by focusing on coiled baskets, twill plaited mats, and twill plaited sandals, I was able to maximize study sample sizes and obtain a cross-sectional view of the organization of Chacoan basketry craft production by exploring three mechanically independent, but technologically intersecting, woven industries. Relative to most other surviving textile or basketry crafts, these three artifact classes exhibit a higher number of production choices in the finished product, and so this targeted approach improved my likelihood of success in discriminating spatiotemporal patterning based on technological style. However, of the perishable manufactures not included in this study, future detailed analysis of the textiles and non-twill plaited sandals may provide the best evidence for correspondences with, or deviations from, the patterns in technological style that I have observed.

The above issues obtain to all of the sites sampled for this study, but they are particularly well illustrated by the circumstances surrounding the analysis and interpretation of the Pueblo Bonito sample, in which individual artifacts vary considerably in their condition, and room contents may have been subjected to a range of natural and cultural disturbances. Architectural partitioning of Pueblo Bonito into four arbitrary quadrants was necessary for spatial analyses, while combined Bonito subphase samples (e.g., Early, Early-Classic, Classic) aided my examination of stylistic variation through time. Differential discard patterns and archaeological recovery meant that burial rooms in the northwest quadrant of Pueblo Bonito yielded more evidence of unique vessels forms, contrasting with the artifacts from the southeastern rooms that lack burial associations, reflect more typical forms, and which largely appear to reflect
accumulations of refuse. Of course, spatiotemporal differences in artifact discard might alternatively reflect the reality of contrasting patterns of site use and refuse disposal behaviors due to sociocultural differences.

In sum, to the extent that sampling and interpretive issues could be mitigated by close attention to data quality, the documentary record, and new radiometric assays, I have tried to do so. I adopted a conservative approach to identifying and interpreting the spatiotemporal patterning reported in Chapters 6 and 7, and offered alternative interpretations when plausible. Given the uneven data quality of my samples, it is a certainty that I must have chronologically mis-assigned some individual artifacts, and that persuasive arguments could be made for alternative architectural subdivisions. Nevertheless, areal and chronological patterns do appear in the data that I collected and classified. The visibility of some of the most pronounced spatiotemporal patterns, in spite of the aforementioned limitations, suggests that they are the most deserving of more detailed scrutiny and attempts to clarify spatiotemporal boundaries. Additional research refining site construction histories and targeted direct dating of individual artifacts will only enhance the resolution of the patterns I have identified. Future work incorporating detailed attribute-oriented data on other durable and perishable artifacts, particularly textiles and non-twill plaited sandals, will undoubtedly contribute to reconstructions of variability in technological style and learning networks within and between sites, as well.
Model 1: Site-Scale Diversity

Previous research identified architectural, ceramic, and bioarchaeological evidence indicating possible sociocultural and biological diversity at Pueblo Bonito in Chaco Canyon, as well as several outliers. These studies suggest that the identification of two or more spatially discrete craft learning networks within a single site may reflect the co-residence of cultural or social groups from different culture-historical or ethnolinguistic backgrounds. The best case for site-scale sociocultural diversity in this study comes from Pueblo Bonito, where metric variation in coiled basketry suggests the existence of two, or perhaps three, overlapping learning networks centered on different areas of the pueblo. Stitch and coil measurement data from Early to Classic Bonito subphase coiling from rooms in the northern half of the site contrast with Classic to Late Bonito subphase coiling from southeastern rooms in a way that is unlikely to be a product of variation accumulated over time through learning errors, but, instead, dissimilarity between basketry learning networks. Twill plaited mat intricate selvages from southeastern rooms also differ from northern rooms in terms of structural complexity, folding angle, and width. These differences in coiled baskets and mats follow or correspond to a period of major architectural growth beginning about A.D. 1070 (Lekson’s Stages VI and VII), during which time the majority of rooms in the southeast quadrant were constructed (Lekson 1986; Windes 2003). I interpret this evidence for spatially patterned learning network variability as indicating that coiled
wares and matting from southeastern rooms were produced by weavers deriving from a technological stylistic tradition demonstrably distinct from that (or those) reflected in the northern rooms that may be linked to newcomers using these later architectural additions. Exchange networks are unlikely to account for the observed stylistic patterns because the internal coherence of the coiled basketry weave texture data from southeastern rooms would imply that the majority of the analyzed specimens would have had to be imported from a single source. Wholesale importation of baskets into the southeastern rooms cannot be ruled out, but this seems improbable given the evidence for on-site basketry artifact manufacture and historic data on Puebloan basketry production and exchange (see Chapter 5).

Subtler differences in coiled basket wall fineness between northwestern and northeastern rooms may further indicate the existence of two discrete learning networks during the Early and Classic Bonito subphases that overlapped to a greater extent than any of the wares from northern rooms do with those recovered from the southeast quadrant of Pueblo Bonito. These possible learning network differences are more tentative, however, as the observed technological stylistic variation is not linked to marked dissimilarity in the relationship between coil and stitch variables. Although chronological changes in producer and consumer preferences over time are one explanation, given the conservative nature of basketry craft learning, it is more plausible that this textural difference reflects technological stylistic divergence due to time and/or a separation of weavers that moderately reduced the close interaction expected for learning network homogeneity.
Additional circumstantial support for an east-west social difference in northern rooms is found in the contrasting distributions of bifurcated baskets and clay coated and painted vessels (see Chapter 6). The former cluster in northern rooms associated with Judd’s western burial cluster, while the latter cluster in some of the pueblo’s oldest rooms in the northeast. Their spatial separation, combined with the suggestive metric data, may reflect distinct social groups whose members included weavers and ritual practitioners responsible for those vessel forms and associated practices. The lack of evidence for equivalent distinctive and circumscribed woven ritual paraphernalia from Pueblo Bonito’s southeastern rooms does not prove that any later arrivals did not contribute ritually, only that if they did there are as yet no recognized basketry correlates.

Compared to bifurcated baskets and clay coated and painted vessels, cylinder baskets have a wider distribution within Pueblo Bonito and evidence greater structural variability in terms of stylistic features such as foundation type and splicing mechanics, implying that the work of multiple weavers and learning networks is represented. It is difficult to quantify the number of weavers or learning networks reflected by these vessels, but an estimate of three or more seems plausible based purely on foundation type variation, a feature which tends to sort at the broadest sociocultural and geographic scales (see Chapter 4). These observations may mean that some cylinder baskets were trade items or offerings produced beyond the canyon.

Variability in cylinder basket form and production appears to parallel that observed for the ceramic cylinder vessels (Toll 1980). Although the bulk of Pueblo
Bonito’s ceramic cylinder vessels come from Room 28, the provenience of other specimens reveals a wider distribution throughout the site similar to the cylinder baskets (Crown 2018). One implication of this is that cylinder baskets and pots were employed in communal ritual activity tied to cacao beverage preparation and consumption (Crown 2013, 2018; Crown and Hurst 2009; Crown et al. 2015) that was structured and executed quite differently from, and at social scale not mirrored by, bifurcated basket or clay coated and painted vessel ritual practices.

In retrospect, Judd’s (1954, 1964) proposition that, after about A.D. 1020, Pueblo Bonito simultaneously housed similar but contrasting Old Bonitian and Late Bonitian peoples is hard to reconcile with this study’s findings, or those of other studies. In large part this is because Judd (1954:18-38) assigns sociocultural distinctiveness to groups of ceramic types and masonry styles best understood today as reflecting temporal variation. Relying heavily on a dichotomous distinction between aggregated earlier and later ceramic types to guide his determination of whether room deposits are of an Old Bonitian or Late Bonitian affiliation, Judd employs circular logic in using criteria asserted to distinguish different populations as evidence of their existence. He ultimately concludes that the eleventh century Late Bonitian migrants are almost singularly responsible for the dramatic cultural developments associated with the Bonito Phase. Judd was definitely an experienced and very observant archaeologist, so it seems likely that while he perceived evidence for sociocultural heterogeneity during his work at Pueblo Bonito, he lacked the means to effectively relate it to temporal differences in material culture and architecture.
Subsequent studies have made enough progress to suggest that the core of Judd’s proposal for sociocultural diversity by the A.D. 1000s has merit, even if the timing and details are subject to revision. Analyses of mortuary data provide tantalizing evidence that two distinct biological populations are attested by Pepper’s northern and Judd’s western burial clusters, with each representing multigenerational family burial plots in use as early as the A.D. 800s and continuing into the 1100s (Akins 1986, 2003; Marden 2011; Mulhern et al. 2006; Plog and Heitman 2010; Price et al. 2017; Schillaci and Stojanowski 2002a, 2003). The results of recent ancient DNA analyses of burials from Room 33 in the northern burial cluster further suggests the persistence of a single matriline linked to higher status over 300 years (Kennett et al. 2017). The western burial rooms, built slightly later, were also used for multigenerational residential interment, and isotopic differences from northern burials suggests they may reflect an offshoot of the northern matriline (Price et al. 2017). Unfortunately, available technological stylistic data provide no insight into the relationship between the northern and western burials, except that similarities in the stitch splicing mechanics observed on a cylinder basket and a bifurcated basket from Room 320B in the western cluster indicate that one weaver, or two weavers belonging to the same smaller scale learning network, were likely responsible.

Although burial location need not be precisely equivalent to residence location, evidence from ritual basketry’s distribution and coiling metric variation suggesting east-west social differences in Pueblo Bonito’s northern arc of early rooms can be taken as complementary to the above evidence for distinct burial crypts. The tentative learning
network variability and inferred social differences generally correspond to the two
discrete room arcs in the north dated to the late A.D. 800s that merged during the mid-
900s to form the curved back wall of Pueblo Bonito (Judd 1954, 1964; Lekson 1986;
Windes 2003). From this perspective, the greater degree of learning network overlap
may reflect blending brought about by ongoing close personal interaction among
weavers over time.

In Chapters 6 and 7, I suggested that bifurcated burden baskets and clay coated
and painted vessels represent ritual accoutrements controlled by separate social
entities, arguably sodalities, and the households linked to them. Recovered from some
of the earliest architectural units in the northern portion of the pueblo, the possibility
exists that these ritual basketry complexes were closely tied to founding descent groups.
The basketry and ceramic cylinder vessels could reflect a third ritual association but, as
previously noted, their stylistic variability and within-pueblo distribution imply that even
if this were the case the accompanying ritual was qualitatively different in social scale
and impact (Crown and Hurst 2009; Crown et al. 2015) as compared to bifurcated and
clay coated and painted objects.

The recovery contexts and novelty of these ritual baskets in the Southwest
during the Bonito phase at Pueblo Bonito implies that they conferred prestige and social
power on the individuals that wielded them by virtue of the esoteric knowledge
associated with their production and use. Chacoan bifurcated burden baskets, clay
coated and painted vessels, and cylinder baskets are local products and not
Mesoamerican imports, but the latter minimally implicate the influence of distant
connections. Resolving the timing of the different ritual basketry complexes’
development would clarify whether their appearance more likely signals certain
individuals’ increased access to the esoteric knowledge and ritual practices of peoples
geographically removed from the canyon, or reflects the contributions of small groups
of new arrivals who administered desired rituals. The latter scenario is appealing
because of the evidence for population increase in excess of in situ growth during the
eleventh century, and the likelihood that the contribution of powerful new rituals would
facilitate newcomers’ integration while enhancing others’ perception of Pueblo Bonito
and Chaco Canyon.

The chronometric imprecision that complicates determining when and in what
order the ritual basketry complexes emerged at Pueblo Bonito by the A.D. 1000s also
hampers our ability to understand any fluctuations in their use and significance. It is
unrealistic to assume that the rituals that these baskets were a part of remained
unchanged over the one to three centuries that the baskets might have been in use. The
late ninth century A.D. turquoise mosaic cylinder basket from Room 33, for example,
could be viewed as an initial manifestation of ritual that evolved into something grander
during succeeding decades against a backdrop of dynamic local politics and intensified
interregional interaction. Contextual evidence and an absence of bifurcated and clay
coated and painted vessels from southeastern rooms makes it plausible that the
demographic influx that I associate with those units based on learning network
variability followed the earlier introduction of the ritual baskets during the Early to
Classic Bonito subphases. The nature of the stylistic difference distinguishing baskets
and mats from Pueblo Bonito’s southeastern rooms, and the recognition that they must largely post-date A.D. 1070 on architectural grounds, means that these items might relate to a proposed canyon-wide cultural disjuncture associated with the arrival of northern-influenced McElmo style, perhaps following an occupational hiatus (Wills 2009; Windes 1987). However, the evidence for the persistence of bifurcated burden basket-related ritual at the McElmo style Kin Kletso great house (and beyond the San Juan Basin in the A.D. 1200s) signifies some continuity in aspects of ritual practice, if not also offering the possibility of cultural mixing between existing canyon occupants and newcomers bearing McElmo style ceramics and architecture.

After about A.D. 1050 at Pueblo Bonito, several researchers have noted differences in measurement systems and a shift towards greater within-structure variability corresponding to an east-west architectural division (Bustard 1996, 2003; Cooper 1995; Fritz 1978; Hudson 1972). The most striking empirical evidence for such a division with social consequences comes from the construction of a north-south wall, sometime after A.D. 1085, that bisects Pueblo Bonito to create two plazas and separate great kivas (Judd 1964:198, 207; Lekson 1986:141-42). The extent to which these architectural changes can be temporally linked to the appearance of McElmo style, however, is unclear. A connection between architectural manifestations of dualism coincident with the demographic influx suggested by coiled basketry and matting is certainly possible, but such dualism does not require migration. Some Chaco scholars see this architectural shift as signifying the emergence of some form of dual social organization, possibly moieties, or simply a physical representation of the dualism so

In Ware’s (2001, 2014) reconstruction of social history at Chaco Canyon, he suggests that these architectural changes correspond to the development of Eastern Pueblo-style moieties (dual tribal sodalities) that are divested of kinship restrictions. By the Early Bonito subphase, Ware envisions Chacoans organized by kin-based leadership and sodalities that cross-cut kinship ties. Leaders derived their power from descent group ranking (based on order of arrival) validated by ritual. Following about A.D. 1040 and the onset of the Classic Bonito subphase, existing sodalities became detached from kinship and the governing priests assumed control over resources and ritual with the power of individual sodalities moderated through shared governance. The stimulus for this organizational transition is unclear, but Ware (2014:70-71; see also Fowles 2005) points out that cross-cultural data implicate either an internal division stemming from factionalism, or the coming together of two formerly independent social groups as the most parsimonious explanations. Ware personally favors the view that a unitary tribal sodality housed in great kivas split to yield the dual model. In either case, the existence of sociocultural heterogeneity at Pueblo Bonito would have provided incentive for the adoption of sodality recruitment mechanisms that facilitated detaching sodalities from kinship-based control (Ware 2014:127). To this end, the mounting evidence for sociocultural diversity at Pueblo Bonito by the A.D. 1000s lends support to an interpretation that sees a form of dual social organization emerge in response to site-
scale heterogeneity. Of course, as Ware (2014:128) acknowledges, archaeological data proving this continue to be elusive.

Around A.D. 1100, the shift of the regional system’s center from Chaco Canyon north to the Aztec West Ruin outlier is thought by some scholars to be a consequence of Chacoan migrants establishing the site and residing alongside local groups (Brown et al. 2008, 2013; Lekson 2015; Reed 2008, 2011; Webster 2011b). Previous research has not specified any site-scale spatial patterns thought to reflect such co-residence, but I interpret the basketry artifact data as indicating the existence of at least two distinct but overlapping learning networks at Aztec West operating in rooms centered in the opposing northeastern (Northeast and East North Wing Sectors) and northwestern (Northwest Sector) rooms of the pueblo. Following the end of the Chacoan occupation ca. A.D. 1130, the persistence of some spatially patterned stylistic differences along with increasing homogeneity in others suggests to me that a blending of learning networks that began earlier continued throughout subsequent decades of close interaction. In this case, the evidence is consistent with the co-residence of two populations that, while retaining some technological stylistic distinctiveness into the A.D. 1200s, became increasingly amalgamated with time.

**Model 2: Community-Scale Diversity**
Evidence for sociocultural diversity at the scale of the Chaco Canyon community builds on the site-scale evidence and incorporates observations about canyon-wide mortuary patterning, the biological affinities of skeletal remains, and ceramic and architectural variability that specifically includes the site size dichotomy observed between great houses and small sites. Basketry learning networks that correlate with sites of similar size within the canyon may indicate cultural or social diversity at the community scale consistent with Vivian’s (1970, 1989, 1990) co-traditions model and others that propose the union of two or more cultural traditions during the Bonito phase. Serial reoccupation of Chaco Canyon after about A.D. 1090, as suggested by the introduction of McElmo style ceramics and architecture (Vivian and Mathews 1965; Wills 2009), might also be inferred from a demonstrable increase in the number of basketry learning networks after that time.

The data acquired for this study are limited by the small sample sizes available from sites other than Pueblo Bonito, but do yield clues to sociocultural diversity within the Chaco Canyon community that may inform future work. Overall, Chaco Canyon's Bonito phase basketry artifacts exhibit a relatively high degree of homogeneity in terms of preferences for raw material and primary technological stylistic features such as twill plaiting interval, coiled basket foundation type and arrangement, work direction, and starting and finishing methods. Coiled baskets from Pueblo Bonito's northern rooms potentially exhibit an affinity with the poorly provenienced sample from Chetro Ketl, and so might indicate a degree of learning network overlap consistent with strong social ties between the two nearby sites. Variability in preferred twill plaiting interval at small
sites, as well as between small sites and great houses, is suggestive of learning network differences. While it is possible that this variation is influenced by sample size, chronology, sociocultural difference, or some combination of all three, I argue that the character of the matting stylistic difference is suggestive enough to allow that discrete learning networks may have been operating at individual small sites, and that these contrast with those of sampled great houses. Such dissimilarity in the relative proportion of twill plaited mat intervals between sites is a pattern consistent with stylistic variation corresponding to tribal-scale differences and suggests the possibility that distinct social groups occupying small sites were not engaged in sufficiently regular or close contact with their neighbors in other small sites or great houses to influence craft learning beyond general conformity with wider areal patterns in technological style (see Chapter 4).

Pursuing this line of thinking, the matting data could lend credence to hypotheses based on architectural and ceramic variation that the small site and great house site size dichotomy reflects sociocultural heterogeneity (Bustard 1996; Hawley 1937; Judge and Cordell 2006; Kluckhohn 1939; Lekson et al. 2006; Sebastian 2006; Vivian 1970, 1989, 1990). Yet, this is not to mean that the matting data suggest unity among all small sites to the extent that an equivalent sociocultural dichotomy existed for all small sites and great houses. Although conclusions from such small samples should be treated as tentative, the matting data imply that at least some individual small sites may reflect distinctive learning networks corresponding to sociocultural groups for which a single cultural or geographic source would be implausible. Notably,
National Park Service excavations of small sites since 1970 have documented previously unappreciated architectural variation that challenges assumptions of a homogeneous small site cultural pattern (Lekson et al. 2006; McKenna and Truell 1986). If small sites each housed a discrete sociocultural group this would not necessarily challenge the basic premise of the co-traditions model wherein the site size dichotomy is due to co-residence and parallel development of two cultural traditions, but instead require greater recognition of the likelihood that sociocultural diversity was a factor at play within the tradition posited as being responsible for the small site pattern.

By comparison, still smaller samples of basketry artifacts from McElmo Phase sites have yielded a noteworthy handful of departures from Bonito phase technological stylistic trends. The atypical weave structures reflected by examples of matting from Bc 288 (Gallo Cliff Dwelling) and Tsin Kletsin, as well as a sandal from Bc 288, raise the possibility of increased learning network variability in Chaco Canyon during the A.D. 1100s. The character of these stylistic deviations is in my view more consistent with population differences than changes over time, and they are not clearly related to the material from Pueblo Bonito’s southeastern rooms, which may indicate the existence of greater learning network variability throughout the canyon after about A.D. 1140. Were these meager specimens to be corroborated by additional data they would provide better support for arguments envisioning serial reoccupation of the canyon (Vivian and Mathews 1965; Wills 2009) by groups distinct from those represented by learning the network variability observed at Pueblo Bonito during the Bonito phase. Assessment of
the significance of these objects, however, must be tempered by an appreciation of sample size.

Model 3: Regional-Scale Diversity

Arguments for the existence of cultural and social diversity through time and across space in the northern Southwest relies on evidence of population increase in excess of local growth, and variation in architecture, settlement layout, and ceramics, although the precise geographic or cultural affinities of sites are not always clear. Basketry learning networks corresponding to multiple site clusters distributed across the northern Southwest should reflect cultural diversity, and likely attendant social diversity, at this scale. Accepting the evidence for site- and community-scale sociocultural diversity, the question becomes less one of whether such diversity existed at larger spatial scales, but where and at to what extent it is discernable through time in the archaeological record. A corollary question asks what can be said about the cultural or geographic affinities of larger scale learning networks inferred from technological stylistic patterning.

The perishable artifact database from the northern Southwest is too uneven, and this study’s sample still too small, to evaluate specific source areas for Chacoan populations, such as those hypothesized by the co-traditions model (Vivian 1990), which
would require more and better preserved data suited to tracking fine scale subregional affinities among learning networks. Concerns with scale and resolution aside, comparison of aggregated samples from Chaco Canyon, the Middle San Juan, Mesa Verde, and Canyon de Chelly National Monument regions has yielded evidence of several stylistic patterns bearing on learning network variability within and beyond the Chaco regional system. At the broadest scale, and allowing for differential preservation, the magnitude of basketry artifact typological diversity across the northern Southwest appears to have been quite similar between the archaeological regions examined. Pan-regional consistency in many technological stylistic features of basketry artifacts thus demonstrates a deep shared history of teaching and learning many of these technologies that is in line with previous research (e.g., Adovasio and Gunn 1986; Mitchell 1960; Morris and Burgh 1941; Tschopik 1939; Weltfish 1932b; Whiteford 1988, 1989). Most assemblages have yielded evidence for on-site production, so evidence for trade in coiled baskets, mats, and sandals is equivocal, but likely did not approach the levels documented during the historic period that are at least in part a product of contact with Europeans (see Chapter 5). Minor coiled basketry foundation types might provide the best evidence of imports, possibly including a few of the cylinder baskets from Pueblo Bonito, but they just as well could have been made on-site by non-local weavers.

Coiled basketry from Chaco Canyon stands out for its finer weave texture relative to all other regions. Mesa Verde wares tend to be the coarsest, and specimens from the Middle San Juan and de Chelly regions tend to fall between Chaco and Mesa
Verde. The small sample of Late Bonito subphase coiling from Aztec West is finer compared to later baskets and overlaps well with Early to Classic Bonito subphase specimens from Chaco. Of the regions sampled, thirteenth century A.D. Mesa Verde coiled basketry is the most distinctive based on its relative coarseness of weave texture, preference for three rod bunched foundations, distinctive decorative style, use of plaque forms, and the absence of burden baskets as well as distinctive ritual basketry forms. Mesa Verde fine twill plaited sandals reveal a decided preference for broadleaf yucca strips and diagnostic overhand knotted strip splices. These stylistic contrasts complement a large corpus of research indicating that a cultural boundary, though permeable, existed between Mesa Verde peoples and those of neighboring regions. The distinctiveness of available Basketmaker period coiling from the Mesa Verde region implies that the region’s learning networks and the resultant technological stylistic traditions might also have considerable time depth (Webster and Jolie 2011).

Coiled basketry vessel forms are generally consistent across the northern Southwest. However, while they represent products unequivocally local to the northern Southwest, aspects of form and specific technological attributes of Chacoan ritual baskets illustrate a connection to later examples from areas to the west and south. The only known cylinder basket not from Pueblo Bonito was among the elaborate accompaniments interred with the so-called “Magician’s Burial” from Ridge Ruin near Flagstaff (Figure 8.1) and is dated between A.D. 1150 and 1175 (Gruner 2015; McGregor 1941, 1943; Neitzel 2012; O’Hara 2008).
Burden baskets with bifurcated bases, and clay coated and painted baskets, are two uncommon and enigmatic coiled basketry forms that apparently first emerged at Pueblo Bonito in Chaco Canyon by the A.D. 1000s. Bifurcated burden baskets are known from Pueblo Bonito, as well as a handful of sites in the Kayenta, Canyon de Chelly National Monument, and, perhaps, Central Mesa Verde regions (Table 8.1; Figure 8.2; see also Chapter 6). Judd (1954) and Morris and Burgh (1941) thought them to reflect the existence of an ancient women’s ritual society celebrating fertility and abundance.
<table>
<thead>
<tr>
<th>Site</th>
<th>Cat. No.</th>
<th>Approx. Date</th>
<th>Context</th>
<th>Technology</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaco Canyon, New Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pueblo Bonito (n=5)</td>
<td>see Table 6.2</td>
<td>A.D. 850-1110</td>
<td>Judd’s Western Burial Cluster, see Table 6.2</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>dimensions vary; hourglass-shaped orifices present; some exhibit dyed stitch and/or painted decoration but none evidence tumpline attachments or obvious use-related wear, see Tables 6.2, 7.5</td>
</tr>
<tr>
<td>Kin Kletso</td>
<td>CM CHCU 1007.a</td>
<td>A.D. 1140-1200</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>fine weave texture; dyed black, red, and natural tan stitches effect thin line geometric design that includes stepped lines and fret-like elements; no obvious wear or tumpline attachments; not recognized by excavators (cf. Vivian and Mathews 1965:102), form inferred from curvature of surviving fragments (Figure 7.117)</td>
</tr>
<tr>
<td>Canyon de Chelly National Monument, Arizona</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antelope House (n=3)</td>
<td>see Table 6.5</td>
<td>A.D. 1140-1270</td>
<td>mortuary and non-mortuary, see Table 6.5</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>one bears worn/faded painted decoration over dyed stitch design that may resemble common polychrome design on other bifurcates; at least one has humped appearance to final coils of front and back faces; one is associated with 4 prayer sticks, see Table 6.5; all evidence moderate-heavy abrasive use-related wear with at least one being heavily mended; at least one bears tumpline attachments (see Adovasio and Gunn 1986)</td>
</tr>
<tr>
<td>Canyon del Muerto</td>
<td>SHM 86.158.1</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>unfinished base with shallow bifurcation and only the lowest framing line of design complete; Morris and Burgh’s (1941:Figs. 21, 28a, b) “McSparron’s basket”</td>
</tr>
<tr>
<td>Canyon de Chelly</td>
<td>NMNH A324678.a</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>partial lobe fragment only; cataloged lot also contains ring basket fragment (A324678.b)</td>
</tr>
</tbody>
</table>
### Northeastern Arizona and Southeastern Utah Area

<table>
<thead>
<tr>
<th>Site Description</th>
<th>Site Code</th>
<th>Date Range</th>
<th>Burial Details</th>
<th>Basket Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cave 1, Tsegi Canyon</td>
<td>PMAE 20-5-10/A5065</td>
<td>A.D. 850-1000s</td>
<td>Grave 1 in talus, inverted over Burial 2 of approx. 18 year old female</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch mostly complete bifurcated burden basket with complex polychrome geometric design (Guernsey 1931:8-9, 95, Plates 7, 13, Fig. 28; Webster 2012a:160); lobes missing but extant coils confirm manipulation to effect bifurcation; holes for missing tumpline, mends, and heavy abrasive use-related wear evident; most similar to complete Pueblo Bonito specimen except for far less exaggerated hourglass-shaped orifice (cf. Figures 6.4-6.6); see Figure 8.2</td>
</tr>
<tr>
<td>Segihatsosi Canyon, AZ</td>
<td>ASM 21970</td>
<td>A.D. 1000-1300?</td>
<td>found in pot hole in side gulch</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch mostly complete, 55 cm L x 23 cm W x 15.5 cm T; common polychrome dyed stitch design is present on both faces but lacks diagonally opposing stepped fret elements; blue feathers protrude from beneath rim termination; humped appearance to final coils on front and back faces; cotton thread pierces wall in at least one place; tumpline attachments present; heavily worn with multiple mends (Cummings 1910:4, 34; Judd 1954:307-309); see Figure 8.4</td>
</tr>
<tr>
<td>Scaffold House, AZ</td>
<td>ASM 2913</td>
<td>AD 1200-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch partial lobe fragment, 13 cm L x 11 cm W; shows heavy abrasive wear and damage to exterior</td>
</tr>
<tr>
<td>Navajo Canyon, AZ</td>
<td>MNA 2414/A5346</td>
<td>A.D. 1000-1300?</td>
<td>cave in Cow Springs area</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch mostly complete, 53.9 cm L x 21 cm W x 13.8 cm T; common polychrome dyed stitch design is present on both faces but lacks diagonally opposing stepped fret elements; humped appearance to final coils of front and back faces; multiple cotton threads pierced coils below rim; tumpline attachments present; heavily worn with multiple mends (see Ambler 1977: back cover; Tanner 1976:43, Fig. 2.36)</td>
</tr>
<tr>
<td>Location</td>
<td>Museum/Code</td>
<td>Period</td>
<td>Age</td>
<td>Weave Type</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------</td>
<td>-----------------</td>
<td>--------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Batwoman House, AZ</td>
<td>NHMU AR4351/2199</td>
<td>A.D. 1250-1300</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td>Cradle House, AZ</td>
<td>NMNH A277770</td>
<td>A.D. 1200s</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td>Oljato area, AZ-UT, cliff dwelling</td>
<td>CM AZRU 3353</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
<tr>
<td>Pottery Pueblo, UT</td>
<td>MNA NA7713.B9-2.2183</td>
<td>A.D. 1260-1280</td>
<td>covered head and chest of Burial 9, young adult female</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
</tbody>
</table>
Table 8.1. Continued.

<table>
<thead>
<tr>
<th>Region</th>
<th>Museum Code</th>
<th>Period</th>
<th>Shape Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moqui Canyon, UT, cliff dwelling</td>
<td>UPMAA NA4925</td>
<td>A.D. 1150-1300</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch complete with tumpline attachments and moderate wear to lobes, 57.2 cm L; common polychrome dyed stitch design is present on both faces in black, red, lavender, and natural colors; lavender hue may be product of overpainting; pronounced hump to final coils on front and back faces (see Farabee 1920:202; Fewkes 1911b:30; Judd 1954:308; Morris and Burgh 1941:55, Fig. 18f; Plog 1979:Fig. 11, top; Weltfish 1932b:7); see Figure 8.5</td>
</tr>
<tr>
<td>southern UT?</td>
<td>PC</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch unfinished lower half of apparently squat basket with geometric dyed-stitch design and very obtuse-angled bifurcated base resembling some effigies from Waterfall Ruin (Byers and Morss 1957:Fig. 1h), Antelope House (Popelish 1986:Fig. 229b), Tseahatso Cave, and Crosspatch Ruins</td>
</tr>
</tbody>
</table>

**Central Mesa Verde Region of Utah and Colorado**

<table>
<thead>
<tr>
<th>Region</th>
<th>Museum Code</th>
<th>Period</th>
<th>Shape Type</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen Canyon, UT</td>
<td>BYUMPC</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch unfinished, partial lobes only (Allen and Baker 2000:144; Farabee 1920; Judd 1954:308-309)</td>
</tr>
<tr>
<td>Allen Canyon, UT</td>
<td>BYUMPC or</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch unfinished (Farabee 1920; Judd 1954:308-309)</td>
</tr>
<tr>
<td></td>
<td>CHM?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“southern Colorado cliff dwelling”</td>
<td>NMAI 169765</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 1 rod, intentionally split stitches on both surfaces complete with shallow bifurcation, 28 cm L x 26 cm W x 14.5 cm T; atypical structural technique and L-R work direction; undecorated and no obvious tumpline attachments; aberrant form suggests local copy of Chaco-style bifurcated burden basket or, less likely, conjoined cylinder baskets (Figure 6.24)</td>
</tr>
<tr>
<td>Unprovenienced</td>
<td>NHMU 23213.10</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
</tr>
</tbody>
</table>

*BYUMPC=Brigham Young University Museum of Peoples and Cultures, Provo, Utah, CHM=LDS Church History Museum, Salt Lake City, Utah, MNA=Museum of Northern Arizona, Flagstaff, Arizona, NHMU=Natural History Museum of Utah, Salt Lake City, Utah, PC=private collection item for which additional information may be obtained from the author, SHM=Sharlot Hall Museum, Prescott, Arizona, UPMAA=University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia, Pennsylvania; all other institutional abbreviations follow Table 5.1.
Diminutive ceramic versions of these baskets occur in a slightly wider distribution and probably had multiple uses as offerings, votives, and altar paraphernalia (Table 8.2). Diversity in both the shape and decoration on bifurcated baskets and effigies suggests that certain forms were preferred in different places at different times. So standardized are the distinctively shaped bifurcated baskets of the A.D. 1200s, I suggest that they may have been produced by a small number of weavers (Figures 8.3-8.5), but this remains a proposal to evaluate.

Coiled baskets covered with thin coats of red clay provided a canvas for dynamic painted geometric designs (Figure 8.6; see also Chapter 6). Current data suggest that
Table 8.2. Pueblo Era Burden Basket Models or Effigies from the Prehispanic Southwest.

<table>
<thead>
<tr>
<th>Site</th>
<th>Cat. No.</th>
<th>Approx. Date</th>
<th>Context</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaco Canyon, New Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>NMNH A336061</td>
<td>A.D. 850-1110</td>
<td>Room 329</td>
<td>complete bifurcated burden basket B/W effigy with miniature olla sitting atop double loop handles; from among disarticulated skeletons in middle north half of room (Judd 1954:316, Plates 88a, 97 lower); hourglass-shaped orifice and tumpline attachments represented; 15.2 cm L x 6.5 cm W x 5.6 cm T (Figure 6.8)</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>NMNH A336063</td>
<td>A.D. 850-1110</td>
<td>Room 330</td>
<td>bifurcated burden basket B/W effigy (Judd 1954:Fig. 100a); hourglass-shaped orifice and tumpline attachments represented; loop handle(s) broken if ever present; 9.2 cm L x 7 cm W x 3.6 cm T (Figure 6.8)</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>NMNH A336064</td>
<td>A.D. 850-1110</td>
<td>Room 347, subfloor</td>
<td>base fragment of a bifurcated burden basket unslipped ceramic effigy (Judd 1954:Fig. 100c); 3.6 cm L x 1.9 cm W x 1.3 cm T</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>NMNH A336062</td>
<td>A.D. 850-1110</td>
<td>Room 350</td>
<td>bifurcated burden basket B/W effigy with missing double loop handles (Judd 1954:Fig. 100b); hourglass-shaped orifice but tumpline attachments absent; 9.5 cm L x 7.2 cm W x 3.2 cm T (Figure 6.8)</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>NMNH A336065.1</td>
<td>A.D. 850-1140</td>
<td>East Trash Mound</td>
<td>lower half of bifurcated burden basket B/W effigy from general digging (Judd 1954:Fig. 100d, 1959:163); 6.7 cm L x 3.6 cm W x 2.2 cm T</td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>NMNH A336065.2</td>
<td>A.D. 850-1140</td>
<td>East Trash Mound</td>
<td>possible loop handle fragment of bifurcated burden basket B/W effigy from general digging; 4.9 cm L x 3.3 cm W x 1.5 cm T</td>
</tr>
<tr>
<td>Pueblo del Arroyo</td>
<td>NMNH A334637</td>
<td>A.D. 1060s-1200</td>
<td>Room 27</td>
<td>complete bifurcated burden basket B/W ceramic effigy with loop handle and lugs representing tumpline attachments, “Hachure B” decoration; hourglass-shaped orifice; found couple feet above floor in 2nd story debris (Judd 1954:Plate 88b, Judd 1959:23, 162-163, Plate 35; see also Figure 7.118); 23.5 cm L x 9.8 cm W x 4.6 cm T</td>
</tr>
<tr>
<td>Pueblo del Arroyo</td>
<td>NMNH A334638</td>
<td>A.D. 1060s-1200</td>
<td>Room 27</td>
<td>complete bifurcated burden basket B/W ceramic effigy with loop handle and lugs representing tumpline attachments; hourglass-shaped orifice; found couple feet above floor in 2nd story debris (Judd 1954:Plate 88c, Judd 1959:23, 162-163, Plate 35; see also Figure 7.118); 21 cm L x 7.6 cm W x 3.5 cm T</td>
</tr>
<tr>
<td>Pueblo del Arroyo</td>
<td>NMNH A334682</td>
<td>A.D. 1060s-1200</td>
<td>Room 44A</td>
<td>fragment of possible bifurcated burden basket effigy of unfired clay</td>
</tr>
</tbody>
</table>
Table 8.2. Continued.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Museum Code</th>
<th>Date</th>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo del Arroyo NMNH A334677</td>
<td>A.D. 1060s-1200</td>
<td>Kiva D</td>
<td>fragment of possible bifurcated burden basket B/W ceramic effigy with double loop handle; “from late rubbish at the east end of the Kiva “d” enclosure” (Judd 1959:163)</td>
<td></td>
</tr>
<tr>
<td>Kin Kletso CM CHCU 1018</td>
<td>A.D. 1125-1200</td>
<td>unknown</td>
<td>incomplete bifurcated burden basket Chaco B/W ceramic effigy reconstructed from 16 sherds; hourglass-shaped orifice; 16.5 cm L x 9.5 cm W x 4.5 cm T (Figure 7.118); base of one lobe bears plainweave textile negative impression; not reported in Vivian and Mathews (1965)</td>
<td></td>
</tr>
<tr>
<td>Marcia’s Rincon-Road Site (29SJ626 East) CM CHCU 48786</td>
<td>A.D. 700-900s</td>
<td>Pit Structure 2, Grid 4, Floor 1 Fill, Layer 3</td>
<td>nearly complete unfired clay burden basket model (toy?), 6.9 cm L x 4.1 cm W x 2.1 cm T; specimen lacks bifurcation and tumpline attachments but exhibits hourglass-shaped opening in planview</td>
<td></td>
</tr>
<tr>
<td>Chaco Canyon NMAI 052632</td>
<td>A.D. 850-1200?</td>
<td>unknown</td>
<td>complete unbifurcated burden basket B/W effigy with miniature olla sitting in its opening (Judd 1954:317); tumpline attachments represented</td>
<td></td>
</tr>
<tr>
<td>Chaco Canyon UOMNH 2-2822</td>
<td>A.D. 1050-1200?</td>
<td>unknown</td>
<td>complete Wingate B/R pitcher with bifurcated burden basket effigy handle (Scheans 1957)</td>
<td></td>
</tr>
<tr>
<td>Arizona, Colorado, Utah and Unprovened</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duckbutt Site, AZ NNAD PN970</td>
<td>A.D. 1090-1140</td>
<td>Structure 8, Pit 11</td>
<td>complete small bifurcated basket B/W effigy, 4 cm L x 3.5 cm W x 1.4 cm T; hourglass-shaped orifice and tumpline attachments represented; Pit 11 is a niche beneath northeast wall that yielded the inverted small Black Mesa B/W seed jar containing the effigy; a pollen wash of the seed jar indicated a pinch of maize pollen had been added; jar apparently placed in pit when house was built or remodeled and is interpreted as an offering (Spurr 2004)</td>
<td></td>
</tr>
<tr>
<td>Inscription House area, AZ ASM 2013-391-1352</td>
<td>A.D. 1050-1200</td>
<td>unknown</td>
<td>nearly complete bifurcated burden basket effigy with broken loop handle and perforation above bifurcation; Tusayan Black-on-red</td>
<td></td>
</tr>
<tr>
<td>Waterfall Ruin, AZ (n=3) PMAA?</td>
<td>A.D. 750-1150</td>
<td>fill and roof fall</td>
<td>at least 3 crudely made, fragmentary unfired clay bifurcated basket models, 1 with 2 sticks protruding from it (Byers and Morss 1957:82)</td>
<td></td>
</tr>
<tr>
<td>Antelope House, AZ (n=4) WACC?</td>
<td>A.D. 800-1270</td>
<td>not reported</td>
<td>at least 4 incomplete unfired clay bifurcated burden basket models, 1 stratigraphically associated with human figurine (Schafer 1986:422-423)</td>
<td></td>
</tr>
<tr>
<td>Tseahatso Cave, AZ UCMNH 02669.1</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>complete bifurcated burden basket effigy, squat form with incised decoration and obtuse-angled bifurcation (Quirolo 1987)</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Location Code</td>
<td>Date</td>
<td>Unknown</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------</td>
<td>--------------</td>
<td>-----------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Houck, AZ, vicinity</td>
<td>DMNS A434.1</td>
<td>A.D. 1000-1100</td>
<td>unknown</td>
<td>complete bifurcated burden basket Escavada B/W effigy with double loop handles and lugs representing tumpline attachments, miniature olla rests atop handles; 17.4 cm L x 5.4 cm T; apparently same specimen in sketch mentioned by Judd (1954:317) and depicted by Chapman (1966:Fig. B)</td>
</tr>
<tr>
<td>Houck, AZ, vicinity</td>
<td>SDMM 5177</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>complete (?) bifurcated burden basket ceramic effigy with miniature olla sitting in its opening (Judd 1954:316)</td>
</tr>
<tr>
<td>Snowflake, AZ, vicinity</td>
<td>PC</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>complete small B/W painted bifurcated basket effigy with perforation above bifurcated base; pendant?</td>
</tr>
<tr>
<td>Showlow Ruin, AZ</td>
<td>ASM GP6788</td>
<td>A.D. 1270-1320</td>
<td>unknown</td>
<td>complete unbifurcated burden basket Pinedale B/W effigy in which three miniature ollas sit in the opening of the basket, 18.9 cm L x 9.8 cm W x 5.9 cm T (Chapman 1966:Fig. C; Lyons 2010); tumpline is represented; form suggests possible use as a hand-held effigy or wand</td>
</tr>
<tr>
<td>Globe, AZ, vicinity</td>
<td>PC</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>crudely made undecorated bifurcated burden basket effigy with broken/missing double loop handles; fired?</td>
</tr>
<tr>
<td>Arizona?</td>
<td>SWMAI 268.G.105</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>complete (?) bifurcated burden basket B/W (?) ceramic effigy with miniature olla sitting on 4 legs emanating from its opening (Judd 1954:316); 12.7 cm H x 5.8 cm W</td>
</tr>
<tr>
<td>Crosspatch Ruins, CO (n=8)</td>
<td>PC</td>
<td>A.D. 900-1150?</td>
<td>east middens</td>
<td>fired bifurcated burden basket effigies, most squat in form; one with Mancos B/W painted design; two contained two unmarked clay balls; most may have been portions of ladle or vessel handles (cf. Scheans 1957)</td>
</tr>
<tr>
<td>Haynie Site, CO</td>
<td>CCAC PD 390, SU ARB 171</td>
<td>A.D. 900-1300</td>
<td>west of west ruin</td>
<td>nearly complete B/W bifurcated burden basket effigy, 2.9 cm H X 2.5 cm W (K. Schleher, pers. comm. 7/2018); possibly from vessel handle</td>
</tr>
<tr>
<td>Ida Jean Site, CO</td>
<td>CAVCM 78.27.5MT 4126.1403</td>
<td>A.D. 900-1300</td>
<td>NW corner exterior of pueblo</td>
<td>nearly complete B/W bifurcated burden basket effigy with painted design, 3.8 cm H x 2.4 cm W (K. Schleher, pers. comm. 7/2018); possibly from vessel handle</td>
</tr>
<tr>
<td>Wallace Ruin, CO (n=3)</td>
<td>PC</td>
<td>AD 1040-1300</td>
<td>Rooms 1, 3, 7</td>
<td>fired bifurcated burden basket effigies; two with Mancos B/W style decoration, all apparently from distal ends of ladles (in possession of B. Bradley, see also B. Bradley 2010, C. Bradley 2017)</td>
</tr>
<tr>
<td>Grand Gulch, UT, cave</td>
<td>NMAI 051790</td>
<td>A.D. 1000-1300?</td>
<td>unknown</td>
<td>complete miniature bi-lobed 2/2 twill plaited ring basket, possibly reminiscent of coiled bifurcated basket; 9.5 cm L x 10 cm W</td>
</tr>
</tbody>
</table>
Table 8.2. Continued.

<table>
<thead>
<tr>
<th>Unknown</th>
<th>DAM?</th>
<th>A.D. 1000-1300?</th>
<th>unknown</th>
<th>burden basket B/W ceramic effigy (?) with broken loop handle; specimen lacks bifurcation and tumpline attachments but does exhibit hourglass-shaped opening in planview (Chapman 1966:Fig. A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>PC</td>
<td>A.D. 875-1040</td>
<td>unknown</td>
<td>unique Red Mesa B/W pitcher wherein the body consists of the broad form of 3 bifurcated burden basket effigies arranged in a cloverleaf-like pattern, 15.25 cm H x 15.8 cm W</td>
</tr>
<tr>
<td>PC</td>
<td>A.D. 1030-1200</td>
<td>unknown</td>
<td>Puerco B/W pitcher with unbifurcated burden basket effigy handle, ca. 10.2 cm H x 10.2 cm W</td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td>A.D. 1175-1300</td>
<td>unknown</td>
<td>Tularosa B/W pitcher with unbifurcated burden basket effigy handle, ca. 17.8 cm H x 17.2 cm W; effigy handle opening appears to contain 2 snugly fitting clay beads</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) CAVCM= Canyon of the Ancients Visitors Center and Museum, CCAC=Crown Canyon Archaeological Center, Cortez, Colorado, DAM=Denver Art Museum, Denver, Colorado, DMNS=Denver Museum of Nature and Science, Denver, Colorado, NNAD=Navajo Nation Archaeology Department, Window Rock, Arizona, PC=private collection items for which additional information may be obtained from the author, SDMM=San Diego Museum of Man, San Diego, California, SWMAI=Southwest Museum of the American Indian, Los Angeles, California, UOMNH=University of Oregon Museum of Natural History, Eugene, Oregon; all other institutional abbreviations follow Table 5.1. ^b Lacking better chronological data, where the effigy ceramic types have been identified the date range reflects estimated production spans (e.g., Toll and McKenna 1997:Appendix 2A).
Figure 8.3. Front (left) and back (right) views of the bifurcated burden basket from Cradle House, Arizona (A277770). Courtesy of the Smithsonian’s National Museum of Natural History.
Figure 8.4. Back (left) and profile (right) views of the bifurcated burden basket from Segihatsosi Canyon, Arizona (ASM 21970). Front face (not shown) is very faded. Courtesy of the Arizona State Museum.
Figure 8.5. Bifurcated burden basket from Moqui Canyon, Utah, cliff dwelling with polychrome dyed stitch design and possible blue-green overpainting on reddish brown stitches (NA4925). Courtesy of the Penn Museum, Image #150615.
such baskets occurred outside of Chaco Canyon only in the Chacoan rooms of Aztec’s West Ruin, and during the Late Bonito phase at Wallace Ruin in southwest Colorado, but by the mid- to late-1100s they were used near contemporary Acoma, Flagstaff, and in the Tonto and Phoenix basins into the 1300s (Table 8.3). Variations in the technological style (e.g., base coatings) and designs of these later examples suggest an elaboration of the Chacoan design repertoire and color palette (Jolie, unpublished data). The precise uses of these baskets are murky, but work by Odegaard and Hays-Gilpin (2002) underscores the considerable mastery of pigment preparation and application required to produce and maintain them. Their unique technology and associated ritual practices
<table>
<thead>
<tr>
<th>Site</th>
<th>Cat. No.</th>
<th>Approx. Date</th>
<th>Context</th>
<th>Technology</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chaco Canyon and Aztec Ruins, New Mexico</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pueblo Bonito (n=4)</td>
<td>see Table 6.2</td>
<td>A.D. 850-1160</td>
<td>see Table 6.2</td>
<td>Close coiling, varied</td>
<td>see Table 6.2; forms represented include bowls, a burden basket</td>
</tr>
<tr>
<td>Aztec West  (n=6)</td>
<td>see Table 6.3</td>
<td>A.D. 1100-1130</td>
<td>see Table 6.3</td>
<td>Close coiling, varied</td>
<td>see Table 6.3; forms represented include bowls, a ladle</td>
</tr>
<tr>
<td><strong>Southwest Colorado</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wallace Ruin W-14-106</td>
<td></td>
<td>A.D. 1040-1100</td>
<td>Room 14, Stratum 13, burned clay level</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>small red clay basecoat spalls, no obvious paint observed (in possession of B. Bradley, see also B. Bradley 2010, C. Bradley 2017)</td>
</tr>
<tr>
<td>Wallace Ruin W-25-35</td>
<td></td>
<td>A.D. 1040-1300</td>
<td>Room 25, mixed fill</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>small red clay basecoat spalls, no obvious paint observed (in possession of B. Bradley, see also B. Bradley 2010, C. Bradley 2017)</td>
</tr>
<tr>
<td><strong>Acoma, New Mexico, vicinity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veteado area ASUCAS</td>
<td></td>
<td>A.D. 1200s?</td>
<td>unknown</td>
<td>Close coiling</td>
<td>recovered by A. Dittert (Matt Peeples, pers. comm. 5/2014); red clay with blue paint basecoat and fine line green painted geometric design</td>
</tr>
<tr>
<td><strong>Flagstaff, Arizona, vicinity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ridge Ruin Repatriated/ MNA NA 1785.B16.591</td>
<td></td>
<td>A.D. 1150-1175</td>
<td>Room 13, subfloor Burial 16 (adult male “Magician’s Burial”)</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>small bowl; black basecoat a mixture of possible charcoal and ash with pitch binder; painted design of rectilinear serrated hooks in blue-green and red; evidence exists that the coating was not the first or only coating applied (Jolie, unpublished data; McGregor 1941, 1943:275; Neitzel 2012; O’Hara 2008)</td>
</tr>
</tbody>
</table>
Table 8.3. Continued.

<table>
<thead>
<tr>
<th>Site</th>
<th>Repatriated/ MNA</th>
<th>A.D.</th>
<th>Location</th>
<th>Vessel Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridge Ruin</td>
<td>Repatriated/ MNA</td>
<td>1150-1175</td>
<td>Room 13, subfloor</td>
<td>Burial 16 (adult male “Magician’s Burial”) possible yucca sandal or fine mat fragments; thin pitch-like basecoat was covered with pink-red background and beige zig-zags (Jolie, unpublished data; McGregor 1941, 1943:275)</td>
</tr>
<tr>
<td>Ridge Ruin</td>
<td>Repatriated/ MNA</td>
<td>1150-1175</td>
<td>Room 13, subfloor</td>
<td>Burial 16 (adult male “Magician’s Burial”) Twill plaiting, 3/3 interval possible sandal or fine mat fragments of non-rush fiber that received multiple thin layers of a gray ash-like coating to which black and red mineral pigment rather than paint appears to have been applied; flecks of white and blue-green pigment also seen; 4 black stone (jet?) beads embedded in one piece, possibly intentionally; small bits adhere to a fragment of NA 1785.B16.595.b (Jolie, unpublished data; see also McGregor 1941, 1943)</td>
</tr>
<tr>
<td>Ridge Ruin</td>
<td>Repatriated/ MNA</td>
<td>1150-1175</td>
<td>Room 13, subfloor</td>
<td>Burial 16 (adult male “Magician’s Burial”) Close coiling, 2 rod stacked, noninterlocking stitch probable steep-sided bowl; black (ash, charcoal and pitch?) basecoat overlain by white gypsum-like pigment with discontinuous applications of blue-green and red paint (Jolie, unpublished data; see also McGregor 1941, 1943)</td>
</tr>
<tr>
<td>Wupatki Pueblo</td>
<td>MNA ECC.AM3.9/ WUPA 9601</td>
<td>1130-1250</td>
<td>Room 56b, Burial 16, with Walnut B/W bowl</td>
<td>Close coiling, 3 rod bunched, interlocking stitch? pink-red clay basecoat with green paint in Flagstaff ceramic style (Odegaard and Hays-Gilpin 2002; Stanislawski 1963:413, Fig. 55e, h-i, k)</td>
</tr>
<tr>
<td>Wupatki Pueblo</td>
<td>MNA ECC.AM3.9/ WUPA 9601</td>
<td>1130-1250</td>
<td>Room 30b, Burial 29</td>
<td>Close coiling, 3 rod bunched? pink-red clay basecoat with stepped motif in yellow with black outlining (Odegaard and Hays-Gilpin 2002; Stanislawski 1963:413)</td>
</tr>
<tr>
<td>Turkey Hill Ruin</td>
<td>ASM 5691x-1</td>
<td>1200s</td>
<td>burial</td>
<td>Close coiling, 1 rod and bundle stacked? shallow bowl with rotated interlocking keys in blue and light green on red clay background (Odegaard and Hays-Gilpin 2002; Whittaker and Kamp 1992)</td>
</tr>
<tr>
<td>Site</td>
<td>Accession No.</td>
<td>Date</td>
<td>Type</td>
<td>Details</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Turkey Hill Ruin</td>
<td>ASM 5691x-2</td>
<td>A.D. 1200s</td>
<td>burial</td>
<td>Close coiling, 1 rod and bundle stacked? shallow bowl with linear design in blue, yellow, and red on white calcium carbonate background; from burial distinct from other basket (Odegaard and Hays-Gilpin 2002; Whittaker and Kamp 1992)</td>
</tr>
<tr>
<td>Metzger Ruin</td>
<td>UCMNH 19538</td>
<td>A.D. 1150-1300?</td>
<td>in undecorated black smudged/polished bowl from burial</td>
<td>Close coiling, 3 rod or 2 rod and bundle bunched? bowl with serrated zig-zags painted in dark blue and light turquoise set against thin red clay basecoat (S. Lekson, pers. comm. 1/2015)</td>
</tr>
<tr>
<td>New Caves Acropolis</td>
<td>ASM 5692</td>
<td>A.D. 1150-1250</td>
<td>burial</td>
<td>Close coiling inverted over individual's face (Odegaard and Hays-Gilpin 2002; Odegaard and Pool 2003)</td>
</tr>
<tr>
<td>Winona area</td>
<td>MNA NA 1785.B16.57</td>
<td>A.D. 1150-1300?</td>
<td>unknown, possibly burial</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch tray or shallow bowl; original basket had black painted design over-coated with red clay bearing painted zig-zag and key motifs in blue-green, dark blue, yellow, and red; from Babbitt collection (Jolie, unpublished data; McGregor 1943:275)</td>
</tr>
<tr>
<td>Winona area</td>
<td>MNA NA 1785.B16.590/A1596</td>
<td>A.D. 1150-1300?</td>
<td>unknown</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch steep-sided bowl with gray clay basecoat to which blue-green paint is uniformly applied to concave surface while convex bears interlocking hooks in blue, red, and yellow; design is similar to Sosi or Flagstaff ceramic style; from Babbitt collection (Jolie, unpublished data; McGregor 1943:275, Fig. 5; Odegaard and Pool 2003), misattributed to Ridge Ruin in Odegaard and Hays-Gilpin (2002)</td>
</tr>
<tr>
<td>Winona area</td>
<td>MNA A1597/1337</td>
<td>A.D. 1150-1300?</td>
<td>in Sunset Red bowl, possibly burial</td>
<td>Close coiling, 1 rod? bowl with red clay basecoat and radiating lines and hooks in blue-green and yellow against red background (Brody 1991:Plate 2; Odegaard and Hays-Gilpin 2002; Odegaard and Pool 2003)</td>
</tr>
</tbody>
</table>
Table 8.3. Continued.

<table>
<thead>
<tr>
<th>Site Location</th>
<th>Repatriated/ Repository</th>
<th>Period</th>
<th>Burial Details</th>
<th>Vessel Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuvakwewtaqa (Chavez Pass)</td>
<td>Repatriated/ ASUCAS 1981.004.178</td>
<td>A.D. 1200s-1300s</td>
<td>Burial 13, elderly female, in Level 14 of Chavez Heights Pueblo 1, with 4 ceramic vessels</td>
<td>Close coiling small bowl with unidentified black basecoat painted with zig-zag and linear elements in blue, red, gold, white, and turquoise (Brown 1982:26, 74, 78; Ruiz y Costello and Striker 2015)</td>
</tr>
<tr>
<td>Tuzigoot, AZ</td>
<td>Not recovered?</td>
<td>A.D. 1300s</td>
<td>burial, near feet</td>
<td>Close coiling bowl or tray with green and blue paint basecoat bearing painted red center from which thin lines in red and yellow radiated (Caywood and Spicer 1935:90; see also Webster 2013)</td>
</tr>
<tr>
<td>Oak Creek/Verde Junction</td>
<td>Repatriated/ MNA A47</td>
<td>A.D. 1300s</td>
<td>burial with prayer sticks, B/Y and redware bowls</td>
<td>Close coiling green and blue paint basecoat with serrated lines in green, red and yellow paint (Odegaard and Hays-Gilpin 2002)</td>
</tr>
<tr>
<td>Sycamore Canyon</td>
<td>ASM</td>
<td>no data</td>
<td>no data</td>
<td>no data</td>
</tr>
<tr>
<td>Oak Creek/Verde Junction</td>
<td>Repatriated/ MNA A47</td>
<td>A.D. 1300s</td>
<td>burial with prayer sticks, B/Y and redware bowls</td>
<td>Close coiling green and blue paint basecoat with serrated lines in green, red and yellow paint (Odegaard and Hays-Gilpin 2002)</td>
</tr>
<tr>
<td>Sycamore Canyon</td>
<td>ASM</td>
<td>no data</td>
<td>no data</td>
<td>no data</td>
</tr>
<tr>
<td>Sycamore Canyon</td>
<td>ASM</td>
<td>no data</td>
<td>no data</td>
<td>no data</td>
</tr>
<tr>
<td><strong>Tonto Basin, Arizona, and vicinity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Las Tortugas Locus 1</td>
<td>Repatriated/ field no. 8420.18</td>
<td>A.D. 1300s</td>
<td>Burial 411, adult female, with 2 other examples near head</td>
<td>Close coiling, 1 rod and welt/bundle stacked? bowl with red clay basecoat bearing diagonal bands in green, blue, and yellow paint; contained 2 bone hairpins, 2 bird-shaped shell pendants, multiple turquoise and other stone beads, 1 flake (Odegaard and Crawford 2001)</td>
</tr>
<tr>
<td>Las Tortugas Locus 1</td>
<td>Repatriated/ field no. 8420.20</td>
<td>A.D. 1300s</td>
<td>Burial 411, adult female, with 2 other examples near head</td>
<td>Close coiling, 1 rod and welt/bundle stacked? bowl with red clay basecoat bearing interlocking triangles with hooks in green and blue paint; possibly contained a perishable vessel originally (Odegaard and Crawford 2001)</td>
</tr>
<tr>
<td>Las Tortugas Locus 1</td>
<td>Repatriated/ field no. 8420.90</td>
<td>A.D. 1300s</td>
<td>Burial 411, adult female, with 2 other examples near head</td>
<td>Close coiling, 1 rod and welt/bundle stacked? bowl with red clay basecoat bearing painted bands in green, blue, and yellow(Odegaard and Crawford 2001)</td>
</tr>
</tbody>
</table>
Table 8.3. Continued.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Site Code</th>
<th>Date Range</th>
<th>Artifacts Found</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gila Pueblo</td>
<td>ASM GP12601</td>
<td>A.D. 1300s</td>
<td>burial, found in San Carlos R/B bowl</td>
<td>Close coiling, 1 rod, interlocking stitch, bowl with red clay basecoat and painted diamonds around red enter in blue and green (Haury 1945a:171; Odegaard and Crawford 2001)</td>
</tr>
<tr>
<td>Rye Creek Ruin</td>
<td>ASM GP46711</td>
<td>A.D. 1200s-1300s</td>
<td>unknown</td>
<td>Close coiling, 1 rod and welt/bundle?, bowl with green paint basecoat and painted lines in red and green radiating from red center (Odegaard and Pool 2003)</td>
</tr>
<tr>
<td>Murray Wash Site</td>
<td>Repatriated</td>
<td>A.D. 1275-1325</td>
<td>inverted in Salado Red corrugated bowl with adult male burial</td>
<td>Close coiling, 1 rod, intentionally split stitches, small bowl or arm band?; green parallel lines and chevrons on blue coating over red clay basecoat (Odegaard and Hays-Gilpin 2002; Odegaard and Pool 2003)</td>
</tr>
<tr>
<td>JR Site</td>
<td>Repatriated</td>
<td>A.D. 1300s</td>
<td>adult burial, sex unknown</td>
<td>Close coiling, blue and green chevron pattern on red clay basecoat (Odegaard and Pool 2003)</td>
</tr>
<tr>
<td>Phoenix Basin, Arizona</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Las Acequias</td>
<td>Not recovered</td>
<td>A.D. 1150-1450?</td>
<td>unknown</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch?, plaque or tray with red clay basecoat (Haury 1945a:170-171)</td>
</tr>
<tr>
<td>La Ciudad</td>
<td>ASUCAS 73/2123</td>
<td>A.D. 1150-1450?</td>
<td>from skullcap on skeleton near Compound B</td>
<td>Close coiling, 2 rod and bundle bunched?, paint spalls with gray clay basecoat; unknown design in red, light blue-green, and dark blue with white outlining (see Wilcox 1987:128)</td>
</tr>
<tr>
<td>La Ciudad</td>
<td>ASUCAS?</td>
<td>A.D. 1150-1450?</td>
<td>“hood found over skull” at Compound B, northeast corner</td>
<td>Close coiling, unknown, but could be clay coated with blue, green, red and yellow painted design (Wilcox 1987:128; cf. Haury 1945a:171)</td>
</tr>
</tbody>
</table>
Table 8.3. Continued.

<table>
<thead>
<tr>
<th>Site</th>
<th>Field Spec.</th>
<th>Date</th>
<th>Locus</th>
<th>Close Coiling</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gila Crossing Site (GR-522)</td>
<td>field spec. 8154</td>
<td>A.D. 1150-1300</td>
<td>Locus A/Pear Road 1, adult male inhumation HRD 2005.308</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>ring-shaped top to wand/staff; blue and red paint applied in manner similar to others but lacks clay basecoat (Webster 2008b)</td>
</tr>
<tr>
<td>Gila Bend area</td>
<td>ASM 98-215-371</td>
<td>unknown</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch?</td>
<td>blue-green basecoat with design in yellow and red; collected by Norton Allen (see Schwartzlose and Ferg 2010)</td>
</tr>
<tr>
<td>Unprovenienced</td>
<td>AMAW 3068.G.4</td>
<td>unknown</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>design of interlocking black and yellow serrated lines against red clay basecoat; NAA compositional data (Chapter 6) suggest affinity with Four Corners region; clay application and design is most similar to Pueblo Bonito examples; see Figure 8.6</td>
</tr>
</tbody>
</table>

*AMA=Autry Museum of the American West, Los Angeles, California; ASUCAS=Arizona State University Center for Archaeology and Society, Tempe, Arizona; all other institutional abbreviations follow Table 5.1.
were probably carried beyond the canyon by a limited few who commanded the requisite esoteric knowledge to make and use them.

Oval, figure-eight-, and hourglass-shaped trays are additional unique vessels documented in Chacoan assemblages that appear to have a wider distribution from Late Bonito subphase times onward (Table 8.4). Recovery contexts and basket contents indicate functions as women’s work baskets and receptacles for sacred materials (Figure 8.7). Analogous basket forms executed in twill plaiting that share similar functions are documented historically among O’odham, Raramuri, Huichol, and Aztec peoples, and are known archaeologically from throughout Mexico south into Peru over at least the last 2,000 years (e.g., Dransart 1993; Heyden 1983; Price et al. 2015; Zingg 1940). By comparison, basketry shields, the final atypical form to occur in the study sample, are presently unknown from Bonito phase contexts but appear shortly thereafter in parallel with increased visibility of shield imagery and symbolism (LeBlanc 1999; Schaafsma 2000). Data from previously known examples, as well as new specimens identified during this study, demonstrate that at least some were functional in defense (Figure 8.8), while others may have also conveyed symbolic meanings or roles held (Table 8.5).

Comparison of the decorative style of coiled baskets in this study’s sample is hampered by factors of preservation but suggests the greatest affinity exists between Chaco Canyon and post-Bonito phase Canyon del Muerto material, though Late Bonito subphase specimens from Aztec West resemble Early to Classic Bonito subphase Chaco examples. Taken with their similarly fine weave textures, and the occurrence of clay coated and painted baskets resembling Pueblo Bonito’s examples, Late Bonito subphase
Table 8.4. Oval, Figure-eight-, or Hourglass-Shaped Trays from the Prehispanic Southwest.

<table>
<thead>
<tr>
<th>Site</th>
<th>Cat. No.²</th>
<th>Approx. Date</th>
<th>Context</th>
<th>Technology</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pueblo Bonito, NM (n=6)</td>
<td>see Table 6.2</td>
<td>A.D. 850-1140</td>
<td>see Table 6.2</td>
<td>Close coiling, varied</td>
<td>see Tables 6.2, 7.5; various contents include bone “scrapers,” a pair of twined sandals, ceramic pot, red mineral pigment, and worked sticks (Judd 1954; Pepper 1920)</td>
</tr>
<tr>
<td>Aztec West, NM</td>
<td>AMNH 29.0/6871</td>
<td>A.D. 1130-1290</td>
<td>Room 33, Grave 9 (adult female)</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>see Tables 6.3, 6.4; likely contained 3 bone &quot;scrapers,&quot; roll of cotton cord, and bundled yucca leaves (Morris 1924:147, Fig. 1, 1928:293)</td>
</tr>
<tr>
<td>Antelope House, AZ</td>
<td>CACH 2287</td>
<td>A.D. 1100-1270</td>
<td>Room 88 (South Plaza)</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch</td>
<td>hourglass shape; 28.5 cm L x 20 cm W x 8.5 cm T; painted quadruped design; wrapped in cotton cloth and containing hide and cotton bags, squash seeds, herb roots, an ear of corn, turquoise fragments, mineral pigments, yucca fiber bundles, 1 sinew bundle, 1 prayer feather holder, a shell whistle, and a bone awl, among other items (Adovasio and Gunn 1986:327-328; Magers 1986b:284-285); see Figure 8.7</td>
</tr>
<tr>
<td>Ridge Ruin, AZ</td>
<td>MNA NA1785.B16.596 (repatriated)</td>
<td>A.D. 1150-1175</td>
<td>Room 13, subfloor Burial 16 (adult male “Magician’s Burial”)</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>incomplete hourglass-shaped tray at least 20 cm L x 8-10 cm W x ca. 8 cm T; contained at least one worked stick painted with blue-green and salmon pink mineral pigment (Jolie, unpublished data; see also McGregor 1941, 1943; Neitzel 2012; O’Hara 2008)</td>
</tr>
<tr>
<td>Battle Canyon, UT</td>
<td>FMNH 165274</td>
<td>A.D. 1150-1300</td>
<td>unknown</td>
<td>Close coiling, 3 rod stacked, noninterlocking stitch</td>
<td>hourglass shape; 29.6 cm L x 17.8 cm W x 9.3 cm T; selected contents include squash seeds, buckskin and cotton cloth bundle containing: herb root, mineral pigments, 6 yucca yarn balls, 1 yellow cotton yarn ball, 3 bone &quot;spoons,&quot; a bone needle/awl, rock salt, human hair knotted net, 2 stone knives (Plog 1979:Fig. 11, bottom; Weltfish 1932b:15)</td>
</tr>
<tr>
<td>Site Location</td>
<td>Institution and Abbr.</td>
<td>Date Range</td>
<td>Burial Type</td>
<td>Basket Weave Style</td>
<td>Basket Description</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------</td>
<td>-------------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Grand Gulch, UT</td>
<td>HCC O.8139.1</td>
<td>A.D. 1150-1300</td>
<td>adult female</td>
<td>Twill plaiting, 3/3 interval</td>
<td>hourglass-shaped ring basket with monochromatic strip shift-induced design; 39 cm L x 16 cm W x 9.5 cm T; formerly contained yucca cordage, leather thong bits, cotton cloth, a bone awl, and a malachite nodule, but contents are missing (McMechen 1944; Osborne 2004:345-346; Pullen and Krakel 1952)</td>
</tr>
<tr>
<td>Horse Rock Ruin, UT</td>
<td>ECPR 56</td>
<td>A.D. 1150-1300</td>
<td>unknown</td>
<td>Close coiling, 1 rod, interlocking stitch</td>
<td>hourglass shape; 34 cm L x 16 cm W x 8 cm T; undecorated, contained animal skins, plant roots, cotton cloth, prayer sticks, prayer feather holders, ornaments, minerals, human hair, yucca cordage, and other items (Adovasio and Andrews 1990)</td>
</tr>
<tr>
<td>Horse Rock Ruin, UT</td>
<td>ECPR 55</td>
<td>A.D. 1150-1300</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle stacked, noninterlocking stitch</td>
<td>hourglass shape, 35.5 cm L x 20 cm W x 11 cm T; red and black dyed stitch interlocking key design on wall and black crosses on base; black elements later rejuvenated with black paint; recovered inverted over ECPR 56 and possibly serving as a lid; foundation originally incorrectly identified as 2 rod stacked (Adovasio and Andrews 1990; Jolie, unpublished data)</td>
</tr>
<tr>
<td>Mesa Verde, CO</td>
<td>MEVE 1005</td>
<td>A.D. 1150-1300</td>
<td>unknown</td>
<td>Close coiling, 3 rod bunched, interlocking stitch</td>
<td>oval/rectangular shape; 29 cm L x 16 cm W x 8 cm T; atypical L-R work direction and dyed stitch design; on display at Mesa Verde National Park (Morris and Burgh 1941:Fig.31a)</td>
</tr>
<tr>
<td>Mesa Verde, CO</td>
<td>UPMAA 29-43-428</td>
<td>A.D. 1150-1300</td>
<td>unknown</td>
<td>Close coiling, 1 rod, noninterlocking stitch</td>
<td>slight hourglass shape; 8.7 cm L x 5.8 cm W x 4.4 cm T (Osborne 2004:Fig. 212, left)</td>
</tr>
</tbody>
</table>

Figure 8.7. Profile (top) and plan (bottom) views of the hourglass-shaped tray that served as part of a medicine bundle from Antelope House, Arizona (Adovasio and Gunn 1986:Figs. 136, 137).
Figure 8.8. Convex view of painted shield from White House, Canyon de Chelly National Monument, Arizona (top), and close-up of wall (bottom) showing tip of a wooden projectile piercing the fabric (AMNH 29.1/7590). Courtesy of the American Museum of Natural History.
Table 8.5. Basketry Shields from the Prehispanic Southwest.

<table>
<thead>
<tr>
<th>Site</th>
<th>Cat. No.</th>
<th>Approx. Date</th>
<th>Context</th>
<th>Technology</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aztec West, NM</td>
<td>AZRU 777</td>
<td>A.D. 1130-1290</td>
<td>Room 178, Grave 83</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>mostly complete and slightly concave, 88 cm L x 75 cm W; from &quot;Warrior's Grave,&quot; found above mat and feather blanket wrappings covering from mid-thigh to forehead, long axis parallel body (Morris 1924:193, 1928:387); convex outermost coils thinly pitched (?) and sprinkled with selenite while all other coils thinly coated with mix of blue-green pigment; additional red pigment described by Morris is most likely fungal staining; wood handle missing; see also Table 6.4</td>
</tr>
<tr>
<td>Aztec West, NM</td>
<td>AMNH 29.0/8937.1</td>
<td>A.D. 1130-1290</td>
<td>Room 95, (Grave 20?)</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>highly fragmented probable shield, slightly concave, with 45 cm min. diameter based on coil curvature; from surface of refuse &quot;in front of&quot; infant Grave 20 in northeast corner of room (Morris 1924:161; 1928:347); convex decorated with red pigment on center coils and in splotches on wall, white pigment seen sporadically may have been vertical bands or stacked triangles emanating from center; sewn hide thong near center suggests possibility of pendant objects; additional fragments of basket likely represented by AMNH NAA/256, NAA/261, NAA/278</td>
</tr>
<tr>
<td>White House, AZ</td>
<td>AMNH 29.1/7590</td>
<td>A.D. 1225, AMS 14C median</td>
<td>NPS Room 10</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>mostly complete, slightly concave, ca. 74 cm diameter; convex exhibits mineral pigment design in black/red checkerboard band 20-25 cm wide that divides the basket in half; tips of 2 wooden projectiles remain embedded in convex; multiple holes, some with hide thongs, suggest former pendant items and/or projectile damage; see Figure 8.8, Table 6.1</td>
</tr>
<tr>
<td>Mummy Cave, AZ</td>
<td>NMNH A231776</td>
<td>A.D. 1200-1300</td>
<td>unknown</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch</td>
<td>mostly complete, slightly concave, ca. 82 cm diameter; mineral pigment design on convex consists of central splayed frog (?) figure with red disc body and black appendages set against white background, outermost coils of top half of basket above figure consist of paired solid yellow and then black pigmented coils in semi-circular arcs that are in reverse order below figure on bottom half; multiple holes, one with hide thong, suggest former pendant items and/or projectile damage (Morris and Burgh 1941:51)</td>
</tr>
</tbody>
</table>
Table 8.5. Continued.

<table>
<thead>
<tr>
<th>Site Location</th>
<th>Museum Code</th>
<th>Date</th>
<th>Context</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batwoman House, AZ</td>
<td>NHMU 2244</td>
<td>A.D. 1250-1300</td>
<td>unknown</td>
<td>Close coiling, 2 rod and bundle bunched, noninterlocking stitch? mostly complete, 54.6 cm diameter; feather cordage of unknown function pierces wall in several places (Anderson 1969:135, Fig. 69 top)</td>
</tr>
<tr>
<td>Cliff Palace, CO</td>
<td>HCC O.574</td>
<td>A.D. 1200-1300</td>
<td>Room 6</td>
<td>Close coiling, 3 rod bunched, noninterlocking stitch mostly complete, slightly concave, ca. 50 cm diameter; convex exhibits unclear design that appears to be alternating concentric bands and/or interlocking arcs of solid red and white mineral pigment-coated coils; multiple holes, some with hide thongs, suggest former pendant items and/or projectile damage; remains of hide sewn around now missing center may have been patch or part of handle (Figure 6.23; Morris and Burgh 1941; Osborne 2004:327-328)</td>
</tr>
</tbody>
</table>

a NHMU=National History Museum of Utah, Salt Lake City, Utah; all other institutional abbreviations follow Table 5.1.
coiling from Aztec West provides support for overlapping learning networks with Chaco Canyon, perhaps due to colonization as some have argued (Brown et al. 2008, 2013; Lekson 2015; Reed 2008, 2011; Webster 2011b). For Aztec West’s coiled basketry post-dating A.D. 1130, clay coated and painted vessels appear to have no longer been made, and the technological and decorative stylistic relationships with Chaco are much diminished or absent, underscoring the important differences between Chacoan and post-Chacoan perishable technologies at this site. A strong affinity between Aztec West’s post-Chacoan assemblage and Mesa Verde basketry artifacts is demonstrated by greater overlap in decorative style, weave texture variation, a preference for three rod bunched foundations, a shift to predominately broadleaf yucca strips in sandals, and the appearance of coiled plaque forms. In the absence of strong stylistic evidence for population movement from the core of the Mesa Verde region (e.g., knotted splices in sandals), I interpret this evidence for increased learning network overlap between the Middle San Juan and Mesa Verde regions as a product of markedly intensified close interaction with peoples to the north.

Apart from the Middle San Juan region’s Chacoan outliers of Aztec and Salmon Ruins, which exhibit stronger ties to developments in Chaco Canyon (Reed 2008), Antelope House and White House in Canyon de Chelly National Monument serve as important points of comparison because they fall within the spatiotemporal boundaries of the regional system. Antelope House affords the largest and best preserved assemblage from the area west of Chaco for the Bonito phase and after but, unlike White House, is not universally accepted as an outlier (Kantner 2003b). Basketry artifact
data from the Canyon de Chelly National Monument reveal no overt connections to Chaco Canyon or other regional learning networks save for the younger examples of bifurcated burden baskets that most resemble specimens from the Kayenta area. A decline in the abundance of sandals with toe jogs initiated during the late A.D. 1100s might correspond with waning regional interaction following the decline of the Chaco regional system. These particular data, then, best speak to consistency across the northern Southwest in many basketry artifact stylistic features and suggest that at least Antelope House’s participation in the Chaco regional system was attenuated.

That twill plaited matting appears to have been of minor importance in the Mesa Verde region contrasts with its proliferation in the Middle San Juan, Chaco Canyon, and Canyon de Chelly regions. Mats from Chaco Canyon are slightly finer than in other regions and their intricate selvages are, on average, more structurally complex and wider. Mesa Verde mats tend to be coarser than those from other areas sampled, but there is no additional spatiotemporal patterning discernible from the metric data. Yet, variation in the configuration of mat intricate selvages suggests that geographic propinquity and, thus, social interaction, may have influenced learning network preferences for particular selvage constructions in the northern Southwest. Observations on the distribution of intricate selvage variants also raise the possibility that Chaco Canyon could have been the ultimate source for some of the most common mat intricate selvage variants documented.

Taken as a whole, regional learning network variability in the northern Southwest reveals strongest contrast between Mesa Verde and other regions, but no
unequivocal evidence for strong connections between Chaco Canyon and outliers beyond the Middle San Juan region, except for the wider distributions of bifurcated and clay coated and painted baskets that post-date the Late Bonito subphase (see Tables 8.1, 8.3). Acknowledging that the outliers sampled for this study are hardly representative of the more than 200 identified, future excavations may yet produce perishable artifact data altering this picture. Considering previous research on outlier ceramics, architecture, and settlement layout, the current study contributes nothing to challenge interpretations that some outliers were more connected to Chaco Canyon than others, and that these relationships fluctuated over time (Kantner 2003a; Kantner and Kintigh 2006; Mahoney and Kantner 2000; Meyer 1999; Mills 2002; Van Dyke 1999, 2003, 2007b; Windes 2007).

If the consensus emerging from this body of work is that it was ideas and not always people that best explain similarities among outliers and between outliers and Chaco is accurate, then the present study implicates technological stylistic details such as intricate mat selvages and sandal toe-jogs as possible components of the package of ideas and symbols that may have spread from Chaco Canyon and contributed, through the daily activities in which these industries were employed, to a measure of integration in a regional system that some describe as a “disconnected heterogeneity” (Kantner and Kintigh 2006:175). Mats with intricate selvages and twill plaited sandals (as well as twined sandals) appear to have been ubiquitous throughout the regional system during and after the Bonito phase, and so perhaps functioned as day-to-day reminders of
participation in a shared Chacoan identity that was not always, nor solely, reliant on visible architecture and communal ritual.

Conversely, the well-dated bifurcated burden basket effigy from the Duckbutt Site in Arizona suggests the diffusion of ideas about bifurcated baskets deep into the Kayenta region by the Late Bonito subphase (see Table 8.2), whereas bifurcated, clay coated and painted, and cylinder baskets otherwise did not attain any prominence west of Chaco until the regional system’s dissolution was well underway or complete. If the concentrated distribution of these ritual baskets in Chaco Canyon during the Bonito phase reflects reality and not sample bias, it is plausible that their spread was permissible only after they had been decoupled from the specific social, political, and religious constraints kept them largely confined to Chaco up until the early A.D. 1100s. Similarity between clay coated baskets from Pueblo Bonito’s northern rooms and those from throughout Aztec West dating between about A.D. 1100 and 1130 might indicate that the former was a source for Aztec’s proposed Chacoan colonists. In this light, the post-Chacoan production of bifurcated burden baskets and clay coated and painted vessels outside of Chaco, perhaps also including the cylinder basket from Ridge Ruin, signal how formerly tightly controlled ritual technologies and practices were adopted (or revitalized) by other groups in the wake of the Chaco system’s decline and a reconfiguration of a Chacoan meta-identity.

Sociocultural Diversity and Chacoan Identities
The findings reported here, when combined with data from over a century of research on the archaeology of Chaco Canyon, yield ample evidence to justify the inference that sociocultural diversity was a characteristic of the Bonito phase, even if understanding what that means for Chacoan cultural developments is very difficult. In contributing to archaeological understanding of sociocultural heterogeneity as a demographic condition within Chaco Canyon and across the regional system, this study has drawn attention to the underappreciated impacts that it may have had as a feature of social life influencing individual, and group, social interaction and integration.

Consideration of the practical impacts of sociocultural diversity for archaeological reconstructions, however, entails speculation informed and constrained by the available data. In what follows I consider the issues of population movement, ritual practice, and social organization and interaction in light of Southwest ethnographic patterns and insights provided by cross-cultural studies of interethnic relations and population movement. I accept that this endeavor does not produce firm answers to questions about the impacts of sociocultural diversity on Chacoan society, but argue that there is value in attempting to articulate plausible consequences for social life that can inform future models of society and polity and generate new studies that seek to evaluate them.

Sociocultural Diversity and Chacoan Society
Southwestern ethnographic data discussed in Chapter 2 provide insight into some of the social consequences of groups from different cultural backgrounds co-residing at one site or within a community. Though rarely an explicit research focus, these observations reveal the importance of newcomer’s ritual contributions to successful social integration and underscore the role that order of arrival plays in influencing settlement growth, with later arrivals often relegated to settlement margins and less desirable lands. Within the span of a few generations, most material clues to sociocultural differences are eliminated or greatly blurred and, when distinctive social and cultural identities persist (e.g., the Hopi-Tewa), they tend to do so within the domains of language, social organization, and ceremonialism that are difficult to track archaeologically under the best of circumstances. Varying degrees of social separation can be detected from settlement layout, but even this feature can be masked after decades or centuries of site use and renovation. Between-group tensions commonly hinge on economic factors, including strains on land resources and craft production (e.g., Crown 2016b), and can be exacerbated by antagonism and stereotyping resulting from particular social and historical circumstances surrounding coresidence.

Considerable similarity in cultural form across the northern Southwest owing to centuries of interaction complicates archaeological detection of group differences except at larger spatial scales or in unique circumstances where cultural contrasts are accentuated. The nature of observed artifactual, architectural, and biological variation, as well as the lack of clear site-unit intrusions, indicates that demographic growth
contributing to sociocultural diversity throughout the Bonito phase in Chaco Canyon is most likely a product of the addition of small groups of people from outlying settlements (Judge and Cordell 2006; Schillaci 2003; Vivian 1990). Perhaps consisting of at most several households at any given time, newcomers were likely drawn to the canyon by its economic productivity tied to powerful ritual knowledge wielded by a small number of ceremonial practitioners who ensured rain and agricultural success.

The character and general synchrony of pulses in population growth with changes in settlement patterning and architecture during the Bonito phase further suggest that order of arrival was an important social variable, as it was historically. Order of arrival likely impacted settlement location decisions, access to the most productive farmland and, over the long term, provided a source of tension among canyon residents that stimulated factionalism and, ultimately, group fissioning leading to new settlements (Cameron 2013; Vivian 1990; Ware 2014; Whiteley 2008, 2015). At the same time, newcomers' ritual contributions and innovations resulting from population admixture would have afforded peaceful social and structural solutions to conflict. Basketry evidence from Pueblo Bonito, specifically, indicates that ritual involving bifurcated burden baskets, clay coated and painted baskets, and cylinder vessels figured prominently, but these were almost certainly not the only foci of Chacoan ceremonialism. Widespread symbolism attached to Gallup-Dogoszhi ceramic style, great house architectural conventions, and possibly twill plaited matting and sandal toe jogs, further cultivated a shared identity and belief system promoting regional cooperation.
Southwestern ethnographic analogy shows its limitations most clearly at this juncture precisely because so little attention has been paid to sociocultural diversity as a source for internal cultural change. However, additional implications can be derived from contemporary research on migration and multiethnic or multicultural communities. While much current research on these topics focuses on urban settings in nation states that are imperfect analogs for Southwestern societies, it is reasonable that certain of the cross-cultural trends observed regarding migrant’s experiences and diversity’s impacts have merit for, minimally, modeling the potential implications of sociocultural heterogeneity.

Organizational and Ritual Diversity

Contemporary research on sociocultural diversity in psychology and other social sciences is instructive in this context because it suggests cross-cultural patterns in intergroup relations where population movement, and migration specifically, is a factor (Berry and Sam 2014; Berry and Ward 2016; Deaux and Verkuyten 2014; Novoa and Moghaddam 2014). Such generalizations must be invoked cautiously when dealing with ancient societies, but this research shows that an important aspect of how human sociocultural diversity impacts social life is how it manifests as ideology. Individuals and groups hold views about diversity that, when manifested through social learning and institutions, impact wider understanding about the acceptability and promotion of diversity (Ashmore et al. 2001; Deaux and Verkuyten 2014; Hong et al. 2016). The most
pertinent lesson for archaeology is that social learning during childhood is when cultural views first become established and positive views of diversity should be supported. Multiple lines of evidence suggest that strong religious or ethnic divisions are not insurmountable if they operate against the backdrop of support for diversity in which dual identities are celebrated for how they strengthen national and meta-identities (Deaux and Verkuyten 2014; Novoa and Moghaddam 2014).

Research on contemporary migration suggests that, in general, exclusion, distance, and isolation may be more common experiences for new immigrants than either conflict with established residents or instances of frequent interaction and integration (Lamphere 1992). One finding from scholarship on modern migrations is identification of the important role that small-scale mediating institutions play in negotiating migrant-resident interaction and facilitating the channeling of larger political and economic forces into situations that impact individuals’ lives. Mediating institutions are sites of interaction, formal hierarchically organized outfits that are institutionalized insofar as they have a structure that coheres and extends beyond the lifespans of individuals involved in them (Lamphere 1992). Such public and private institutions are increasingly recognized today for their role in combating the fragmentation of socially diverse neighborhoods in contemporary urban settings (Sanders 2002; Talen 2010). Although few if any indigenous Southwestern sociopolitical structures satisfy the definition of contemporary mediating institutions, sodalities have and continue to serve similar roles (e.g., R. Anderson 1971), albeit with hierarchy among them often determined by seniority and order of arrival (Brandt 1994; Ortiz 1969; Parsons 1939;
Ware 2001, 2014; Ware and Blinman 2000; Whiteley 1998, 2008). Recent research shows that interaction among diverse constituencies and social groups often has consequences for the mediating structures themselves, in some cases forcing a restructuring of the mediating institutions and the expression of social identities (Sanders 2002; Talen 2010). These observations drive home the idea that social diversity, understood here in a narrower sense to refer to variability in social roles, relationships, and organizational structures, is as important to consider at smaller social and spatial scales as cultural diversity is at larger scales.

The importance of the existence of sodalities within Chaco Canyon and across the regional system for structuring social, political, economic, and ritual activities has not been lost on Chaco scholars, of course. Much prior work in this area has rightly emphasized the functions of sodalities relative to the aforementioned domains and their probable role in the inferred organizational transition linked to emergent social inequality during the Bonito Phase, with particular stress placed on sodalities’ integrative qualities (e.g., Judge and Cordell 2006; Vivian 1990; Ware 2001, 2014). As recounted in Chapter 1, diversity as a social condition typically has positive connotations owing to the assumption that it cultivates tolerance and stability, and promotes equitable distribution of resources – what some contemporary social scientists have collectively termed a "geography of opportunity" (Briggs 2005).

I do not argue that this is misplaced concern, but instead note that it can overshadow the fact that that diversity is also recognized as being problematic in some cases. One popular hypothesis in urban planning research considering sociocultural
diversity suggests that economies with little social diversity are better able to evolve mechanisms that allocate resources efficiently. If there are too many competing “preferences and endowments,” diversity can interfere with the efficiency of the economy (Talen 2006). In highly diverse areas, there are special challenges to forming a unified vision of what a community should be and how it should grow. In the absence of a collective vision, residents in a diverse community may be particularly prone to fragmentation, individualism, and social isolation that erodes community diversity and success. Importantly, cross-cultural data indicate that economics are a recurrent motive for accommodating immigrants and social diversity, and there are, again, good historical reasons for this. Many diverse places in the urban landscapes of today functioned historically as immigrant ports of entry and this openness usually translated into forms of economic and social diversity (Talen 2010). Comparative study of ethnically heterogeneous urban environments has found that most pre-industrial societies with sociopolitical hierarchy were concerned less with the identity (ethnicity) of subordinate minority populations than their ability to manage tribute, taxes and labor (Grillo 2000). In the context of Chacoan archaeology, it would not be surprising if the apparently peaceful nature of the regional system during the Classic Bonito subphase was maintained not just by integrative ritual but by a shared meta-identity and an ideology of tolerance and openness that facilitated experimentation in leadership, ritual and economics, among other things. Leaders working with diverse followers are forced to resolve novel unique problems and work with different expectations about leadership. Current cross-cultural research on the qualities of leaders effective in uniting culturally
diverse followers suggests that tolerance, resilience, good interpersonal skills, and
cognitive complexity -- the motivation and ability to comprehend and integrate multiple
perspectives -- are key to moderating conflict and tension in diverse communities
(Hanges et al. 2016), which not surprisingly underlines the positive integrative potential
of sodalities and communal ritual (e.g., Whitehouse and Lanman 2014).

Sodalities, then, may not have only been important for social integration but also
sources of ritual, economic, and sociopolitical fragmentation. For example, one
implication of elevated sociocultural heterogeneity during the Late Bonito subphase and
McElmo phase in Chaco Canyon relative to earlier periods might have been increased
spatial distance that reduced rates of contact between individuals occupying different
positions along the socio-economic continuum. This would have modified perceptions
held by established residents of great houses and small sites about available options for
social action. A shift in demography and identity around or after A.D. 1100 thus may
have had the potential to intensify status differences between canyon residents and
contribute to heightened levels of social tension during a period when the regional
system was in decline.

At a still smaller social scale, the potential for gendered variation in status and
power at Chaco also warrants further scrutiny. Prominent ritual basketry at Pueblo
Bonito, arguably produced by women, raises questions about the roles and status of
women in Chacoan society, particularly those who were closely associated with ritual
authority by virtue of kinship or being charged with the production of special basket
forms. Ritually significant basket forms, such as bifurcated and cylinder baskets in
particular, afforded opportunities for women to gain power, status, and prestige by virtue of these practices' connection to work groups, likely sodality associations, the production of socially valued goods, and ritual activity (Hays-Gilpin 2000; Lamphere 2000:390-391; Spielmann 1998, 2000, 2002; see also Heitman 2016, 2017, Ware 2017). In contexts where we see evidence for increasing emphasis on lineage, as suggested by the two burial clusters and genetic evidence for a persistent matriline at Pueblo Bonito (Kennett et al. 2017; Plog and Heitman 2010), we should not be surprised to see women playing a greater role in ceremonial affairs. Furthermore, contemporary research on migration points to the roles of women as the primary actors making efforts to cross cultural and ethnic boundaries and cultivate connections between new and established residents (e.g., Deaux and Verkuyten 2014; Lamphere 1992:28). In this light, female participation in ritual during the Bonito phase may have been as much about women’s social agency in the context of heightened sociocultural diversity as it was the significance of their productive and reproductive labors for lineage and community success.

Religions and ritual practices are also widely recognized for their ability to bring disparate peoples together to pursue a common goal or set of goals. That all of the unique coiled basket forms appear to have strong ritual connotations is revealing of the role of ritual in the development of Pueblo Bonito and Chacoan society more broadly. This observation in and of itself is nothing new, as ritual is widely recognized as a central dimension for understanding Chaco. What the basketry data contribute in this area is the opening up of a new avenue of inquiry into the spatiotemporal dimension of ritual
at Pueblo Bonito and outliers. This generally poor understanding of how ritual may have worked at Chaco is a serious lacunae in research that has been lamented by some scholars (Crown and Wills 2003; Mills 2002; Plog 2010). Observations about the existence of ritual basketry, then, do not directly bear as much on questions of cultural and social diversity as they do enhance our understanding of the role that diversity in ritual practice may have played in dividing or uniting the inhabitants of Pueblo Bonito and, perhaps, the regional system.

What I propose is that, minimally, the patterned distribution of Bonito phase bifurcated burden baskets and clay coated and painted vessels reflects distinctive ritual associations, and that their particular histories are likely tied to the social entities who maintained them at Pueblo Bonito and, later Aztec West. The overlapping suggested by Chacoan ritual basketry seem to revolve around an interest in promoting community health and well-being, rain, fertility, agricultural abundance, and ensuring the renewal of the world. These are, of course, ritual foci that have been suggested by other Chaco studies (e.g., Crown and Wills 2003; Plog 2003, 2011; Vivian et al. 1978) and that persist among contemporary Pueblo peoples (e.g., Parsons 1939; Young 1987). Importantly, however, the basketry artifact data show that peoples sharing a Chacoan meta-identity, or expressing varied aspects of a shared belief system, were anything but passive recipients of ideas and technologies. While direct radiocarbon determinations now suggest that lineage commemoration and maintenance was established very early at Pueblo Bonito, and persisted into the 1100s (Kennett et al. 2017; Plog and Heitman 2010), other components of ritual do not appear to be that early, such as the bifurcated
basket and clay coated and painted vessel complexes, and, perhaps the ritual(s) associated with cylinder vessels (Crown 2018). What is clear, however, is that by the A.D. 1000s we see an elaboration of ritual practices in the canyon that promotes a broader ideology that appears flexible enough to incorporate local variation at nearby small sites and great houses.

The reality of a some form of shared Chacoan social identity has long been suggested by material signs in the form of architecture and ceramic decorative styles that many scholars believe express membership in such a group identity, but which also exhibit a range of variation owing to geography and chronology as those variables bear on the groups living and performing the identity. Any set of beliefs with attendant social practices, whether expressing a shared world view, religion, or both, is potentially subject to different interpretations. The sources of difference and processes that create such differences are myriad and we should be mindful that there need not have been hard and fast rules to follow to express "Chaconess" but instead, to draw from Chenoweth's (2009:325) cogent analysis of the archaeology of Quaker religious identity, merely "practices united by explicit intentions, which nonetheless occurred in specific times, places, and cultural contexts." Although archaeologists must grapple with the fluidity of identity and find coherence in material variation, Chenoweth (2009) makes the important observation that variation in material traits can still point to a stable social reality.

A problem faced by archaeological research on Chaco is specifying the nature of the relationship between outwardly visible social practices and inwardly embodied
social and religious ideals. In the case of Chacoan ritual practice, with the absence of archaeological evidence for coercion and the enforcing of a strict doctrine across the regional system, it seems logical that the most intensive expressions of a Chacoan identity would be found closest to their place of origin and be subject to more variable interpretation and material expression as one moved beyond the canyon. Indeed, this general pattern is what scholars have observed about the nature of the unity observable across the regional system (e.g., Mills 2002; Plog 2003; Toll et al. 1992).

The apparent flexibility and inclusiveness of Chacoan ideas and beliefs, as implied by variation in material culture recognized as Chaco-style and observed across the geographic space synonymous with the regional system, is inconsistent with what we would expect of an overt shared identity, such as ethnic identity, in which the belief in shared background and group affinity is requisite to the maintenance of the identity formation. Were we to see strong evidence for the signaling of a distinct and consistently executed Chacoan social identity we would not expect the tolerance for local or regional variation in ceramics and architecture that has been documented in the archaeological record. This is instructive insofar as overt identity claims are frequently invoked within the context of conflicts over power and authority (e.g., Jenkins 2008b; Lamont and Molnár 2002; Sen 2006; Tilly 2005), and in this vein accepted material hallmarks of Chacoan influence suggest that the ideas they referenced played different roles in sociopolitical processes across the regional system as compared to internally within the canyon proper. Chaco as an articulated identity formation, if such a thing existed, arguably held greatest sway in the area that archaeologists have defined as the
Chaco core or halo, and as one moves beyond that focus "things Chaco" become less of an identity marker and more about the "big idea" of Chaco and ideas that sprung from it. We cannot, of course, completely divorce any belief system or identity formation from one another, or from attendant relationships of power and authority, but archaeological evidence for unequal access to power and resources is clearest within the canyon and at Pueblo Bonito, specifically. In Chaco Canyon, if beliefs were most closely tied to a Chacoan group identity formation it was precisely because of their utility in legitimizing power, authority and, by extension, inequality. For these reasons, at the scale of the regional system the concept of social identity may be less appropriate than that of a meta-identity which yields material correlates in the form of new and hybrid decorative styles on highly visible media that crosscut different enculturative groups (Clark and Reed 2011; Clark et al. 2013). Gallup-Dogoszhi ceramic style and Chacoan architectural conventions may be the most identifiable, non-perishable examples, with intricate selvage twilled matting and sandal toe jogs constituting additions that I propose.

Linguistic Diversity?

Archaeology is incapable of determining whether or not linguistic diversity was a feature of Bonito phase Chacoan society. Yet, ethnographic data indicate that multiple languages and varying degrees of mutual intelligibility should have been present in prehispanic times (Foster 1996; Hale and Harris 1979; Hill 2017b; Upham et al. 1994).
Some Chaco scholars have specifically suggested linguistic diversity and others have implied it by describing Chacoan society as “multiethnic” (Cordell and Judge 2001; Ford et al. 1972; Hays-Gilpin and Ware 2015; Judd 1954; Judge and Cordell 2006; Kluckhon 1939; Lekson 2006b, 2009, 2015; Lekson et al. 2006; Meyer 1999; Schillaci 2003; Sebastian 2006; Toll 2006; Van Dyke 2007b; Vivian 1990; Vivian and Mathews 1965; Ware 2014). At best, however, archaeologists can only infer contrasting social identities that are likely to have overlapped with linguistic identities if the corresponding social learning contexts can be assumed, or there are strong linkages between migrant source and destination locations where cultural contrasts are evident (e.g., a site-unit intrusion). Enculturation typically entails the acquisition of language(s) and craft production knowledge, although this does not always have to be the case. Convergence of multiple lines of evidence suggesting shared histories of teaching and learning strengthens the inference that a linguistic identity was also shared, but does not guarantee it.

Aware of these interpretive issues, I cautiously suggest that there are at least three instances where the available data are most suggestive of the existence of linguistic diversity. Each case has been discussed previously (see Chapter 7) and is based on architectural and material culture differences enhanced by basketry technological stylistic contrasts consistent with tribe/band-level differences among historic populations (see Table 4.1). They include, 1) Classic Bonito subphase differences between small site and great house settlements (Lekson et al. 2006; Vivian 1990) combined with suggestive contrasts in basketry learning network differences between
these sites, 2) architectural history and learning network variability in Pueblo Bonito’s southeastern rooms after about A.D. 1070 that contrasts with the rest of the sites, and 3) the proposed shift in cultural identity linked to McElmo style (Vivian and Mathews 1965; Wills 2009) that finds some support in basketry variability from sites such as Tsin Kletsin and Bc 288 (Gallo Cliff Dwelling). In these cases I have interpreted the available technological data and basketry learning network variability to be of a character consistent with what would be expected of social differences that could reasonably encompass linguistic differences.

Although linguistic diversity cannot (and should not) be assumed in these or any other cases, as empirical evidence suggesting sociocultural diversity accumulates for the canyon and across the regional system, the likelihood that linguistic diversity was a social reality increases, and with it the necessity of contemplating its consequences for social formations and inequalities given the link between language acquisition and social identities. Since archaeologists cannot identify the language or languages spoken, consideration of linguistic diversity’s impacts relies on research on the ethnography of speaking to contextualize language contact situations and the bilingualism and multilingualism that result.

In indigenous North America, degree of multilingualism is strongly correlated with regions of high linguistic diversity, such as in California, the Northwest Coast, the Southeast, and Southwest. Among small scale and middle-range societies, research suggests that kinship and interaction networks were most responsible for multilingual practices, in contrast to the more prominent role militaristic and highly asymmetrical
political formulations played in Andean multilingualism, for example (Emlen 2017).

Ethnographic documentation shows that marriage alliances, ritual cooperation, and economic exchange are the primary drivers of multilingualism in native North America but, depending on the setting, it was language function that dictated whether it was individual or societal multilingualism (Miller 1996:239-240; see also Philips 2011; Silverstein 1996; Tosi 1999). Individual multilingualism is influenced by the individuals involved and their personal history, whereas in societal multilingualism different languages perform particular functions in particular contexts, such as in diplomatic or other political settings. Since multilingualism is a primary means by which languages borrow and receive loan words, and such linguistic interaction is well attested in many Pueblo languages, it is certain to have played a role in past social interaction along the ritual and economic lines for which such linguistic interaction is most demonstrable in the Southwest (Bereznak 1995; Hill 2007, 2017a, 2017b; Mithun 1999; Ortman 2012; Shaul 2014; White 1944). Available evidence suggests that historical interactions, cultural attitudes, and ethnocentrism limited multilingualism beyond the individual in the Southwest (Fox 1968; Miller 1996:240; Ortman 2012:148-150), as was the case historically among the Hopi-Tewa interpreters at Hano (Dozier 1954; Kroskrity 1993, 1998, 2000). Inter-Pueblo contacts between ceremonial leaders and population movement resulting in coresidence facilitated bilingualism, but the existence of official interpreters at a few historic villages has been taken to indicate that bilingualism was not especially common in the Puebloan Southwest (Miller 1996:225). Although bilingualism and multilingualism may have been more common in prehispanic times
when English or Spanish were unavailable as lingua franca, it is not possible to know if recent Pueblo peoples’ tendency towards linguistic conservatism has ancient roots or has waxed and waned over time.

Kohler's (2013) consideration of the origins of a Pueblo "sprachbund," or area of linguistic convergence, suggests that bilingualism and multilingualism on the Colorado Plateau may have been an increasingly important feature of the social landscape after A.D. 600, with the linguistic conservatism documented during historic times being established after A.D. 1100. Kohler’s proposal raises the possibility that social and cultural developments tied to the rise of Chaco Canyon as a regional center during the late A.D. 800s may have been both facilitated by, and contributed to, greater multilingualism, and that, correspondingly, the regional system's decline may have contributed to the proliferation of the linguistic ideology of purism documented historically (Kroskrity 1993, 1998, 2000; Sherzer 1976). Hill (2007:35, 2017b) posits a similar reconstruction, but instead suggests that linguistic purism may be linked to post-A.D. 1200 ritual elaboration as ritual practices spread. Stated another way, during and after the disintegration of the Chaco regional system, widespread perception of failing ritual systems and shifting exchange relationships in the context of climate change and, perhaps, small numbers of people with disproportionate wealth and power, could have promoted linguistic conservatism concurrent with social and demographic contraction.

Shauls's (2014) regional analysis of Southwest U.S. languages, utilizing historical linguistic methods, and ceremonial vocabularies in particular, led him to propose that at least Hopi, Zuni, Keresan, and Tanoan speech communities were encompassed by the
Chaco regional system. Of the archaeological evidence for social inequality in Chaco Canyon, Shaul (2014:142) remarks that "the presence of an elite means the presence of an elite way of talking, a prestige code, which was used in rituals and by the elite in general, and by others communicating with the elite." Based on his findings that much ceremonial language among western Pueblos can be traced to Keresan languages, he posits that a Keresan language was the prestige code of the Chaco regional system (Shaul 2014:141-147; see also Ortman 2012:149, 166).

Shaul’s conjecture is open to debate, but it and the foregoing research suggest that even if bilingualism and multilingualism were not common features of the wider social landscape in the northern Southwest, the situation in Chaco Canyon was probably conducive to increased bilingualism among at least some ceremonial leaders and at localities where newcomers resided near locals. Correspondingly, great kivas and great houses, for which architecture and assemblages of ritual paraphernalia indicate large scale integrative ritual activity, emerge as plausible settings where bilingualism and multilingualism operated. The inter-group ceremonial and economic exchange made possible by such multilingualism would also have foregrounded social identities and their roles in local power relations at these places, while heightening the contrast with populations occupying small sites if they spoke languages of differing status.

Ethnographic accounts imply that language pluralism could have been relatively common in the prehispanic southwest (e.g., Dozier 1954; Leap 1982; Ortiz 1979), supporting the notion that some degree of linguistic diversity was present within Chaco, and certainly across the great expanse of the regional system. As a byproduct,
multilingualism would have provided opportunities for greater partitioning or excluding
of important ritual (and other) knowledge, particularly across different generations who
experienced different levels and degrees (or forms) of multilingualism (Kroskrity 2009;
Roberts 1961, 1964; Ware 2001:84). The relative statuses of the languages in a
community also influences the extent of multilingualism and, depending on the
community, there may be many (or few) restrictions on the situations in which more
than one language is used (Dozier 1954; Fox 1968; Kroskrity 1993, 2009; Leap 1982).
Cross-cultural research in linguistics suggests that bilingualism tends to be common at
the individual level, but less so at the community level, and that the mother's language
frequently plays a dominant role in childhood language acquisition (Muysken 2012).
Genetic evidence for the persistence over three centuries of a single matriline linked to
higher status burials at Pueblo Bonito (Kennett et al. 2017; Plog and Heitman 2010) thus
increases the likelihood of linguistic homogeneity among those individuals while also
suggesting that the spoken language differed in status from others that may have been
spoken at the site or elsewhere in the canyon.

This speculation on the plausible impacts of linguistic diversity serves as a critical
reminder that, on the one hand, incorporation of sociocultural diversity and its
implications into interpretations of Chacoan archaeology must be tempered by the
recognition that the consequences may apply to limited periods of time, or even fleeting
moments, at the interface of interaction between “newcomers” and “established”
residents. Historical cases from across the world show that a society's attitude towards
sociocultural diversity can persist for long periods or vacillate between positive and
negative over a span of decades (e.g., Grillo 1998, 2007; Stoczkowski 2009). Intragroup and interpersonal relationships within a community change and evolve with time, with the most salient of these social exchanges and negotiations taking place early on when newcomers first join existing residents and access to power and resources are most unequal. On the other hand, recent research on multiethnic communities emphasizes the historical rootedness of sociocultural diversity. Diverse places tend to be older and demonstrate lengthier occupations than non-diverse places (Talen 2006; York et al. 2011). Time, then, recurs as that variable that most confounds archaeological reconstruction of lived experience during the Bonito phase, even with the enhanced cultural chronologies provided by high resolution dates from tree-rings, radiocarbon assays, and ceramics.

Conclusions

The premise that two or more socially and culturally distinct groups were responsible for variability observed among contemporaneous Chaco Canyon sites, and between Chaco sites and outlying settlements, is a venerable one. Initially offered to account for architectural differences, it later became the foundation for a hypothesis that distinct but parallel organizational trajectories converged to dramatic effect during the Classic Bonito subphase in Chaco Canyon. Through an examination of basketry
artifact data, a class of material culture too often neglected in Chaco research in favor of less perishable technologies, the present study has sought to renew interest in reconstructions of Chacoan sociocultural diversity. To accomplish this I collected detailed attribute-oriented data on coiled baskets, plaited mats, and plaited sandals that contributes to our understanding of sociocultural diversity as a demographic condition at site-, community- and regional-scales. The theoretical literature on social learning and the concept of technological style, employed together in this study to develop the concept of learning networks, hold value for how they specify linkages between patterned variation in material culture and less tangible aspects of human social life. Attentive to other lines of archaeological evidence for population heterogeneity, I synthesized study findings to offer a revised model of sociocultural diversity that invites new questions about the implications of such diversity and the nature of a Chacoan social identity.

I submit that, taken as a whole, the available evidence suggests the importance of tolerance of sociocultural diversity as integral to the successful maintenance of a heterogeneous Chacoan society. As Judge and Cordell (2006) note, the absence of data suggesting endemic violence, coupled with the evidence for widespread exchange and cooperation in the form of massive building and waterworks projects, implies that the roles of coercive force and violence were negligible during the Bonito phase. The archaeological record further suggests a lack of evidence for population movement precipitated by dramatic social or environmental upheaval, as is required by the model of coalescent communities invoked to explain thirteenth and fourteenth century A.D.
migrations in the Southwest that resulted in heterogeneous communities (cf. Clark and Reed 2011). The data instead support the view that Chaco Canyon, and by extension the regional system, was a predominately cooperative endeavor grounded in cyclic communal ritual participation and mobilization of labor in tandem (Judge and Cordell 2006; Wills 2000, 2017; Wills and Dorshow 2012). The high degree of inter-site variation seen in the Bonito phase archaeological record, well expressed by architectural diversity and the organization of craft production (Lekson et al. 2006; Toll 2006), as well as the lack of clear site-unit intrusions throughout the Classic Bonito subphase, suggests the reasonable inference that new arrivals to the canyon were likely in small groups no larger than a few families. The general similarity in their material culture further suggests that their geographic origins (primarily) lie within the boundaries of the regional system. However, during certain periods (e.g., Early Bonito subphase) and times of the year the sum total of such small groups joining the canyon population must have been substantial, perhaps characterized by an ebb and flow that has made their movement even more challenging to detect. It is also murky to what extent the unprecedented labor investment involved in Classic Bonito subphase construction employed imported labor. Seasonal periodicity underpinning wood acquisition lends support to the possibility of seasonal demographic influxes from beyond the canyon (Wills 2000; Windes and McKenna 2001; see also Windes et al. 2000). In light of the distant sources relied upon for perhaps some architectural timbers, as well as lithics and ceramics, the Chuska Valley is a prime demographic source area for future research to examine. Certainly, the evidence for co-resident populations at several of the outlier
communities further suggests the possibility of as yet unrecognized diversity within the larger regional system.

A contrast, then, can be drawn with the Late Bonito subphase economic and demographic recovery in the canyon that has been linked to the appearance of McElmo architecture and ceramics (Wills 2009). In my view, the extent of this twelfth century A.D. cultural shift within the canyon is one to suggest a demographic incursion by multiple small groups with greater internal similarity than not (perhaps also implying a shared geographic origin) and operating at a larger spatial scale than any prior population influxes to the canyon. Although the precise nature and extent of the hypothesized McElmo migration remains obscure, the scope of changes observed within the canyon and beyond after A.D. 1100 imply population movement of sufficiently numerous social units to contribute to a transformative new identity, as well as likely other social formations.

Ultimately, the role of sociocultural heterogeneity and identity in the dissolution of the apparently peaceful and cooperative Chaco regional system is opaque. Social science research suggests that the social impacts of sociocultural diversity tend to be heavily influenced by status and socioeconomic differences between groups, and the spatial distribution of diversity as it relates to the nature and intensity of social interaction (Lamont and Molnár 2002; Portes and Vickstrom 2011; Salamone and Swanson 1979; Sturgis et al. 2014; van der Meer and Tolsma 2014). While evidence for past sociocultural diversity increases the probability that interaction took place, it is important to bear in mind that just because opportunities for interaction existed does
not mean that meaningful interaction occurred. It is frequent contact that tends to promote social cohesion, which is generally taken to be a positive outcome of sociocultural diversity, thought it need not always be positive.

Archaeological models of cultural change emphasizing factors such as population movement, environmental change, and socioeconomic transformation unavoidably compress time, and, by doing so, risk underestimating the importance of the routines of everyday life in normalizing social relations (Forrest and Kearns 2001). The average individual's social relations and experiences are generally restricted to a smaller segment of society, and so daily life may remain rather stable amidst changes viewed by the archaeologist as dramatic transformations or shifts. Attempts to understand social interaction at the smaller scale of villages and communities are thus necessary to provide the context critical for understanding how individuals and social groups may have experienced and responded to wider cultural changes that are more visible to archaeologists.

Little comparative archaeological or ethnographic research exists that demonstrates precisely how and why sociocultural diversity contributed to societal reorganization or collapse (but see Bray 2005; Manzanilla 2015a). Emerson and Hedman (2016:166) assert that at Cahokia near modern day St. Louis, Missouri, the urban center's decline resulted from "the fraying of the tenuous networks of social, political, and religious bonds that had been so carefully created by its eleventh- to twelfth-century leaders. Under stress, the diversity of Cahokia proved to be its primary weakness." At the city of Teotihuacan in central Mexico, economic competition
between, and social discord among, distinct social identity groups (ethnic, class, gender, religion) are argued to have produced tensions among organizational strategies that ultimately felled the multiethnic Teotihuacan state by the A.D. 600s (Clayton 2009, 2011; Manzanilla 2015b, 2017). Recent research in the prehispanic American Southwest, however, suggests a more complex situation where socially diverse contexts exhibiting low ceramic stylistic diversity appear strongly associated with settlement persistence owing to social situations conducive to the tolerance of diversity (Hegmon et al. 2016; Torvinen et al. 2016). Lacking evidence for economically motivated ethnic enclaves in Chaco Canyon equivalent to those of Teotihuacan, fragmentation and dispersal of once exclusive Chacoan ritual practices including bifurcated baskets and clay coated and painted vessels could be construed as a consequence of a perceived failure of ritual and its leading practitioners during episodes of climatic downturn in the twelfth century.

Fractures in ritual organization would necessarily translate into heightened sociopolitical tensions among the canyon's diverse residents that served to undermine social cohesion and challenge the efficacy of a shared belief system, or meta-identity (e.g., Whiteley 2008). Thus, as important as communal ritual seems to have been for organizing people and promoting unity within Chaco Canyon and across the regional system, it could have also contributed to the unraveling of the Chaco regional system. From the perspective of Southwestern ethnography, it seems likely that established ritual and other social networks provided avenues for social groups leaving Chaco Canyon to join other communities. Small group migration following Chaco's decline
could easily account for the thirteenth century distribution of the bifurcated and clay coated and painted ritual basketry complexes further west.

Given the geographically wide social connections available to participants in the Chaco system it seems highly probable constituent groups' ties to their former homes and kin were never completely severed and that those who left Chaco Canyon were able to return to their places of origin, empowered by the ceremonies and knowledge they acquired. Although this lies in the realm of speculation, if the emergence and growth of a shared Chacoan belief system can be tied to population heterogeneity and the unification of diverse ritual practices in one place, then it makes sense that the demographic reorganization seen during the late twelfth century A.D. and after in the northern Southwest was accompanied by a return to more localized ritual practices, as is suggested by the persistence (or recasting) of aspects of Chacoan ritual organization, including the bifurcated basket complex in the Kayenta region, and ritual involving clay-coated and painted baskets in the Flagstaff vicinity and elsewhere. Even if the descendants of the Chaco Canyon community intentionally rejected the form of society that emerged during the Bonito phase, the power of communal ritual to unite diverse peoples remained an effective social mechanism throughout subsequent turbulent centuries, as attested by the success of later Southwestern cult and katsina ceremonialism (Adams 1991; Crown 1994; Whitehouse and Lanman 2014).

Today, however, conflict surrounding Chaco Canyon does not simply entail debate over archaeological interpretation, but different and competing perspectives on how to balance the concerns and interests of diverse stakeholders and publics (Claw et
al. 2017; Schillaci and Bustard 2010; Sullivan 2000). In the case of the Native American Graves Protection and Repatriation Act, federal law encourages the extension of contemporary ethnic and social identities into the past despite the fact that they are dynamic and shifting, and always have been. In the future we might hope that renewed interest in questions about the origins and nature of human diversity will not only complicate such a simplistic view of past identities but also promote flexible approaches to determining affiliation with diverse descendants.
References Cited

Abbott, David R., Sophia E. Kelly, Andrew D. Lack, and Margaret E. Beck

Adams, E. Charles

Adams, Karen R.

Adams, Richard N.

Adler, Michael A.

Adler, Michael A., and Richard H. Wilshusen

Adovasio, J. M.

1972 Coahuila Coiled Basketry. Unpublished manuscript on file at the Perishable Artifact Laboratory, Department of Anthropology/Archaeology, Mercyhurst University, Erie, Pennsylvania.


Adovasio, J. M., and R. L. Andrews


Adovasio, J. M., and Joel D. Gunn


Adovasio, J. M., and J. S. Illingworth

Adovasio, J. M., and D. R. Pedler

Adovasio, J. M., D. R. Pedler, and J. S. Illingworth
2002 Fremont Basketry. Utah Archaeology 15:5-47.

Adovasio, J. M., Olga Soffer, and Jake Page

Ainsworth, Caitlin S., Patricia L. Crown, Emily Lena Jones, and Stephanie E. Franklin

Akins, Nancy J.


Akins, Nancy J., and John D. Schelberg

Allen, Marti Lu, and Shane Baker

Altschul, Jeffrey H.

Alves, Eileen, E.

Ambler, J. Richard

Anderson, Keith M.

Anderson, Robert T.

Andrews, R. L., and J. M. Adovasio


Anschuetz, Kurt F., and Richard H. Wilshusen

Anthony, David W.

Arakawa, Fumiyasu, David Gonzales, Nancy McMillan, and Molly Murphy

Arnold, Dean E.

Ashmore, Richard D., Lee Jussim, and David Wilder (editors)

Badenhorst, Shaw

Badenhorst, Shaw, and Jonathan C. Driver

Baker, Larry L.

Baldwin, Stuart J.


Begay, Richard M.

Bell, Joyce M., and Douglas Hartmann

Bellorado, Benjamin A.

Bellorado, Benjamin A., Laurie D. Webster, and Thomas C. Windes

Benson, Larry V.


Benson, Larry, Linda Cordell, Kirk Vincent, Howard Taylor, John Stein, G. Lang Farmer, and Kiyoto Futa

Benson, L. V., E. M. Hattori, H. E. Taylor, S. Poulson, and E. A. Jolie


Peter H. McCartney, pp. 251-257. University of Calgary Archaeology Association, Calgary, Canada.

Berreby, David

Berrey, Ellen C.

Berry, John W., and David L. Sam

Berry, John W., and Colleen Ward

Billinger, Michael, and John W. Ives

Blackburn, Fred M., and Ray A. Williamson

Blanchette, Robert A., Benjamin W. Held, Joel A. Jurgens, and John E. Haight

Blom, Franz

Bluhm, Elaine A.

Borck, Lewis, and Patricia L. Crown

Bowser, Brenda J.

Boyd, Robert, and Peter J. Richerson

Bradley, Bruce

Brandt, Elizabeth A.


Bray, Tamara L.

Brettell, Caroline
2003 *Anthropology and Migration: Essays on Transnationalism, Ethnicity and Identity*. AltaMira Press, Walnut Creek, California.

Briggs, Xavier de Souza (editor)

Brody, J. J.

Brondo, Keri Vacanti, and Linda A. Bennett

Bronk Ramsey, Christopher

Brown, Gary M.

Brown, Gary M. and Cheryl I. Paddock

Brown, Gary M., Paul F. Reed, and Donna M. Glowacki

Brown, Gary M., Thomas C. Windes, and Peter J. McKenna

Brown, Gillian R., Thomas E. Dickins, Rebecca Sear, and Kevin N. Laland (editors)

Brubaker, Rogers

Brubaker, Rogers, and Frederick Cooper

Bryant, Vaughn M., Jr., and Don P. Morris

Bryant, Vaughn M., Jr., and Glendon H. Weir

Brugge, David M.


Burgh, Robert F., and Charles R. Scoggin
Burmeister, Stefan

Bustard, Wendy

Byers, Douglas S., and Noel Morss

Caine, Renata Nummela, and Geoffrey Caine

Callaway, Donald G., Joel C. Janetski, and Omer C. Stewart

Cameron, Catherine M.

Cameron, Catherine M., and Andrew I. Duff

Cameron, Catherine M., and Scott G. Ortman

Cameron, Catherine M., and H. Wolcott Toll (editors)

Canuto, Marcello A., and Jason Yaeger (editors)

Carlyle, Shawn W.

Carlyle, Shawn W., Ryan L. Parr, M. Geoffrey Hayes, and Dennis H. O'Rourke

Carr, Christopher


Carr, Christopher, and Robert F. Maslowski

Carr, Christopher, and Jill E. Neitzel (editors)

Carriere, Ed, and Dale R. Croes
Carter, Stuart

Case, D. T., R. J. Hill, C. F. Merbs, and M. Fong

Cavalli-Sforza, Luigi Luca, and Marcus W. Feldman

Caywood, Louis R., and Edward H. Spicer

Chaco Research Archive

Chaiklin, Seth, and Jean Lave (editors)

Chapman, Kenneth M.

Charles, Mona L. (guest editor)

Chavez, Fray Angelico

Chenoweth, John M.


Chuipka, Jason, and Jerry Fetterman
2013  Examining Orthodoxy in the Upper San Juan Region of the Northern Southwest. Kiva 78:449-476.

Chute, Janet E.

Clark, Jeffery J.


Clark, Jeffrey J., and Karl W. Laumbach

Clark, Jeffery J., and Paul F. Reed
2011  Chacoan Immigration and Influence in the Middle San Juan. Kiva 77:251-274.

Clark, Jeffery J., Deborah L. Huntley, J. Brett Hill, and Patrick D. Lyons
2013  The Kayenta Diaspora and Salado Meta-identity in the Late Precontact U.S. Southwest. In The Archaeology of Hybrid Material Culture, edited by Jeb Card,
Clark, John E., and William J. Parry  

Claw, Katrina G., Dorothy Lippert, Jessica Bardill, Anna Cordova, Keolu Fox, Joseph M. Yracheta, Alyssa C. Bader, Deborah A. Bolnick, Ripan S. Malhi, Kimberly TallBear, and Nanibaa' A. Garrison  

Clayton, Sarah C.  

Clune, Dorris  

Cobb, Charles R.  

Cohen, Ronald  

Coleman, Julie (compiler)  

Collins, Henry B., Jr.  

Coltrain, Joan Brenner, Joel C. Janetski and Shawn W. Carlyle  
Colwell-Chanthaphonh, Chip

Conkey, Margaret W.

Conkey, Margaret, and Christine Hastorf (editors)

Connolly, Thomas J., Pat Barker, Catherine S. Fowler, Eugene M. Hattori, Dennis L. Jenkins, and William J. Cannon

Cooper, Laurel Martine

Cordell, Linda S., and Don D. Fowler (editors)
2005  Southwest Archaeology in the Twentieth Century. University of Utah Press, Salt Lake City.

Cordell, Linda S., and W. James Judge

Cordell, Linda S., and Keith W. Kintigh

Cordell, Linda S., and Maxine E. McBrinn
2012  Archaeology of the Southwest. 3rd ed. Left Coast Press, Walnut Creek, California.

Cordell, Linda S., and Fred Plog
Cordell, Linda S., H. Wolcott Toll, Mollie S. Toll, and Thomas C. Windes

Cordell, Linda S., Carla R. Van West, Jeffrey S. Dean, and Deborah A. Muenchrath

Cordell, Linda S., and V. J. Yannie

Corruccini, Robert S.

Cosgrove, C. B.

Costin, Cathy Lynne


Costin, Cathy Lynne, and Melissa B. Hagstrum

Costin, Cathy Lynne, and Rita P. Wright (editors)

Coy, Michael W. (editor)

Crabtree, Stefani A., R. Kyle Bocinsky, Paul L. Hooper, Susan C. Ryan, and Timothy A. Kohler

Cressman, Luther S.

Crisp, Richard J., and Rose Meleday

Croes, Dale R.

Croes, Dale R., and Jonathan O. Davis

Cross, John R.

Crown, Patricia L.


2010 Learning In and From the Past. In The Anthropology of Learning in Childhood, edited by David F. Lancy, John Bock, and Suzanne Gaskins, pp. 397-418. AltaMira Press, Walnut Creek, California.

2012 Chocolate Consumption and Cuisine from Chaco to Colonial New Mexico. El Palacio 117:36-42.


Crown, Patricia L. (editor)


Crown, Patricia L., and W. Jeffrey Hurst
Crown, Patricia L., and W. James Judge (editors)  

Crown, Patricia L., Janet D. Orcutt, and Timothy A. Kohler  

Crown, Patricia, Keriann Marden, and Hannah V. Mattson  


Crown, Patricia L., and W. H. Wills  

Cully, Jack F.  

Cully, Anne C., and Jack F. Cully, Jr.  

Cummings, Byron  


Cummings, Linda Scott, Kathryn Puseman, and Chad Yost

Dalrymple, Larry

Davis, James T.

Dawson, Lawrence E.

Dean, Jeffrey S.

Dean, Jeffrey S. (editor)

Dean, Jeffrey S., William H. Doelle, and Janet D. Orcutt

Deaux, Kay, and Maykel Verkuyten

DeBoer, Warren R.
DeBoer, Warren R., and James A. Moore

Deegan, Ann Cordy

di Leonardo, Micaela

Di Peso, Charles C.

Díaz-Andreu, Margarita, Sam Lucy, Staša Babić, and David N. Edwards

Dietler, Michael, and Ingrid Herbich

Dobres, Marcia-Anne

Dobres, Marcia-Anne, and Christopher R. Hoffman (editors)

Dongoske, Kurt E., Michael Yeatts, Roger Anyon, and T. J. Ferguson

Dorshow, Wetherbee Bryan

Doyel, David E. (editor)

Doyel, David E., Cory D. Breternitz, and Michael P. Marshall

Dozier, Edward P.

Drake, Brandon L., Wirt H. Wills, Marian I. Hamilton, and Wetherbee Dorshow

Dransart, Penny

Driver, Harold E.

Driver, Harold E., and William C. Massey
Drooker, Penelope Ballard (editor)


Drooker, Penelope Ballard, and Laurie D. Webster (editors)

Drucker, Phillip

Duff, Andrew I.


Duff, Andrew I., and Stephen H. Lekson

Duff, Andrew I., Jeremy M. Moss, Thomas C. Windes, John Kantner, and M. Steven Schackley

Duff, Andrew I., and Alissa L. Nauman

Duff, Andrew I., and Richard H. Wilshusen
Dungan, Katherine Ann

Durand, Kathy R.

Durand, Kathy R., Meradeth Snow, David Glenn Smith, and Stephen R. Durand

Durand, Stephen R., and Kathy R. Durand

Dutton, Bertha P.

Earle, Timothy

Echo-Hawk, Roger
2010 *The Magic Children: Racial Identity at the End of the Age of Race*. Left Coast Press, Walnut Creek, California.

Eckert, Suzanne L.

Edgar, Heather J. H., Edward A. Jolie, Joseph F. Powell, and Joe E. Watkins
Eerkens, Jelmer W., and Robert L. Bettinger

Eerkens, Jelmer, and Carl P. Lipo


Eggan, Fred

Eiselt, B. Sunday

Ellen, Roy

Ellen, Roy, Stephen J. Lycett, and Sarah E. Johns (editors)

Elliott, Michael L.

Ellis, Florence Hawley


Ellis, Florence Hawley, and Mary Walpole

El-Najjar, Mahmoud Y.

Elsasser, Albert B.

Emberling, Geoff

Emerson, Thomas E., and Kristin M. Hedman

Emery, Irene

Emlen, Nicholas Q.

English, Nathan B., Julio L. Betancourt, Jeffrey S. Dean, and Jay Quade
Eriksen, Thomas Hylland

Esteban, Joan, Laura Mayoral, and Debraj Ray

Ezzo, Joseph A., and T. Douglas Price

Fainstein, Susan S.

Faist, Thomas

Farabee, William Curtis

Feinman, Gary M., Kent G. Lightfoot, and Steadman Upham

Ferguson, T. J.

Ferguson, T. J., and Chip Colwell-Chanthaphonh
2006 *History is in the Land: Multivocal Tribal Traditions in Arizona's San Pedro Valley*. University of Arizona Press, Tucson.

Fewkes, Jesse Walter


Finger, Judith W., and Andrew D. Finger 2006 Katsina Imagery on Hopi Wicker Basketry. Grace Hudson Museum and Sun House, Ukiah, California,


Ford, Richard I., Albert H. Schroeder, and Stewart L. Peckham

Forrest, Ray, and Ade Kearns

Foster, George M.

Foster, Michael K.

Fowler, Catherine S.

Fowler, Catherine S., and Lawrence E. Dawson

Fowler, Catherine S., and Eugene M. Hattori


Fowler, Catherine S., Eugene M. Hattori, and Amy J. Dansie

Fowler, Don D.

Fowles, Severin M.

Fowles, Severin M., and Barbara J. Mills

Fox, Robin

Franquemont, Christine R.

Franquemont, Ed M., and Christine R. Franquemont

Freer-Waters, Rachel A., and Mike Jacobs

Frisbie, Theodore R.


Fritz, John M.

Gámez Martínez, Ana Paulina

Gámez Martínez, Ana Paulina (guest editor)

Geib, Phil R.
2011 Foragers and Farmers of the Northern Kayenta Region: Excavations along the Navajo Mountain Road. University of Utah Press, Salt Lake City.

Geib, Phil R., and Edward A. Jolie

Gifford, E. W.

Gillespie, Susan D.

Gillespie, William B.

Gilmore, Kevin P.

Gilpin, Dennis
2003  Chaco-Era Site Clustering and the Concept of Communities. *Kiva* 69:171-205.

Glascock, Michael D., and Hector Neff

Glowacki, Donna M.

Glowacki, Donna M., Jeffrey R. Ferguson, Winston Hurst, and Catherine M. Cameron

Goin, Peter, and Lucy R. Lippard

Goff, Sheila
Good, Irene

Goodman, Alan H.

Gosselain, Olivier P.

Graves, Michael W.

Gravlee, Clarence C.

Grebingher, Paul

Gregory, David A., and David R. Wilcox (editors)

Greene, Michelle

Greenfield, Patricia M.


Griffith, James Seavey

Grillo, Ralph D.

Grimstead, Deanna N., Sharon M. Buck, Bradley J. Vierra, and Larry V. Benson

Grimstead, Deanna N., Jay Quade, and Mary C. Stiner
2016a  Isotopic Evidence for Long-Distance Mammal Procurement, Chaco Canyon, New Mexico, USA. *Geoarchaeology* 31:335-354.

Grimstead, Deanna N., Amanda C. Reynolds, Adam M. Hudson, Nancy J. Akins, and Julio L. Betancourt
2016b  Reduced Population Variance in Strontium Isotope Ratios Informs Domesticated Turkey Use at Chaco Canyon, New Mexico, USA. *Journal of Archaeological Method and Theory* 23:127-149.

Gruner, Erina

Guernsey, Samuel James
Guernsey, Samuel James, and Alfred Vincent Kidder

Guiterman, Christopher H., Thomas W. Swetnam, and Jeffrey S. Dean

Haas, Wm. Randall, Jr.

Habicht-Mauche, Judith, Suzanne L. Eckert, and Deborah L. Huntley (editors)

Haeberlin, H. K.

Haeberlin, H. K., James A. Teit, and Helen H. Roberts

Hagstrum, Melissa

Hale, Kenneth, and David Harris

Hall, Robert L., and Arthur E. and Dennis

Hall, Stephen A.
Hamilton, Marian I., B. Lee Drake, W. H. Wills, Emily Lena Jones, Cyler Conrad, and Patricia L. Crown  

Hanges, Paul J., Juliet R. Aiken, Joo Park, and Junjie Su  

Hannerz, Ulf  

Hantman, Jeffrey L., and Stephen Plog  

Hardy, Bruce L., Marie-Hélène Moncel, Camille Daujeard, Paul Fernandes, Philippe Béarez, Emmanuel Desclaux, Maria Gema Chacon Navarro, Simon Puaud, and Rosalia Gallotti  

Hardy, Karen  

Harris, Oliver J. T.  

Harvey, Byron  

Harvey, Marian  

Hassan, Fekri A.  
Hattori, Eugene M., and Catherine S. Fowler

Haury, Emil W.
1945b *Painted Cave, Northeastern Arizona*. Amerind Foundation, Dragoon, Arizona.

Hawley, Florence M.

Hayden, Brian, and Aubrey Cannon

Hayes, Alden C., David M. Brugge, and W. James Judge

Hays-Gilpin, Kelley A.

Hays-Gilpin, Kelley, Ann Cordy Deegan, and Elizabeth Ann Morris


Hays-Gilpin, Kelley, and Ramson Lomatewama


Hays-Gilpin, Kelley, and John Ware


Hegmon, Michelle


Hegmon, Michelle, Margaret C. Nelson, and Mark J. Ennes


Hegmon, Michelle, Jacob Freeman, Keith W. Kintigh, Margaret C. Nelson, Sarah Oas, Matthew A. Peeples, and Andrea Torvinen


Heitman, Carrie C.


Heitman, Carrie C., and Stephen Plog

Heitman, Carrie C., and Stephen Plog (editors)

Heizer, Robert F.

Held, Kathryn

Henrich, Joseph

Henrich, Joseph, and Richard McElreath

Herbich, Ingrid

Herr, Sarah, and Jeffrey J. Clark

Hewett, Edgar L.

Heyd, David

Heyden, Doris

Hibben, Frank C.


Hicks, Dan, and Mary C. Beaudry (editors)

Hill, Jane H.


Hill, J. Brett, Jeffrey J. Clark, William H. Doelle, and Patrick D. Lyons

Hirth, Kenneth G.
Hirth, Kenneth G. (editor)
2009 *Housework: Craft Production and Domestic Economy in Ancient Mesoamerica.*
Archeological Papers of the American Anthropological Association Number 19.
John Wiley & Sons, Malden, Massachusetts.

Hodder, Ian

Hodge, Frederick Webb (editor)

Holding, Dennis H. (editor)

Hong, Lu, and Scott E. Page

Hong, Ying-yi, Siran Zhan, Michael W. Morris, and Veronica Benet-Martinez

Horton, Elizabeth Temple

Horvarth, Steven N.

Hoskins, Janet

Hough, Walter

Howell, Todd L.

Howell, Todd L., and Keith W. Kintigh

Howells, W. W.

Hrdlička, Aleš

Hu, Di

Hudson, Dee T.

Hughes, Jack T.

Hughes, Jason, Nick Jewson, and Lorna Unwin (editors)

Hull, Sharon, Mostafa Fayek, F. Joan Mathien, and Heidi Roberts

Hurcombe, Linda M.
Hurst, Winston B.

Hyland, D. C., J. M. Adovasio, and J. S. Illingworth

Ingbar, Eric

Irwin-Williams, Cynthia


Ives, John W.

Ives, John W., Duane G. Froese, Joel C. Janetski, Fiona Brock, and Christopher Bronk Ramsey

Jenkins, Richard

Jernigan, E. Wesley
1978  Jewelry of the Prehistoric Southwest. School of American Research Press, Santa Fe.

Jindra, Michael  

Johnson, Gregory, A.  

Johnson, Irmgard Weitlaner  

Jolie, Edward A.  
2006b  Crafting Plants and People: Basketry Production Systems in Cross-Cultural Perspective. Manuscript draft on file with the author.  

Jolie, Edward A., and Phil R. Geib  

Jolie, Edward A., and Maxine E. McBrinn  

Jolie, Edward A., and Curtis F. Schaafsma

Jolie, Edward A., and Laurie D. Webster
2009 Reconstructing the Organization of Chacoan Perishable Artifact Production. Paper presented at the 74th annual meetings of the Society for American Archaeology, Atlanta, Georgia.


Jones, Siân

Jordan, Peter


Jordan, Peter, and Stephen Shennan


Judd, Neil M.


1925 Archaeological Investigations at Pueblo Bonito, New Mexico. Smithsonian Miscellaneous Collections 77:83-91.


1959 Pueblo del Arroyo, Chaco Canyon, New Mexico. Smithsonian Miscellaneous Collections Volume 138, Number 1. Smithsonian Institution, Washington, D.C.

1964 The Architecture of Pueblo Bonito. Smithsonian Miscellaneous Collections Volume 147, Number 1. Smithsonian Institution, Washington, D.C.

Judge, W. James


Judge, W. James, and Linda S. Cordell


Kaeppler, Adrienne L.

Kamp, Kathryn A., and John C. Whittaker

Kanbur, Ravi, Prem Kumar Rajaram, and Ashutosh Varshney

Kania, John, and Alan Blaugrund

Kankainen, Kathy (editor)

Kantner, John W.

Kantner, John W. (editor)

Kantner, John, Nathan Bower, Jeffrey Ladwig, Jacob Perlitz, Steve Hata, and Darren Greve

Kantner, John, and Ronald Hobgood

Kantner, John W., and Keith W. Kintigh

Kantner, John W., and Nancy M. Mahoney (editors)

Kantner, John W., and Kevin J. Vaughn

Kelley, J. Charles, and Ellen A. Kelley

Kemp, Brian M., Angélica González-Oliver, Ripan S. Malhi, Cara Monroe, Kari Britt Schroeder, John McDonough, Gillian Rhett, Andres Resendéz, Rosenda I. Peñaloza-Espinosa, Leonor Buentello-Malo, Clara Gorodesky, and David Glenn Smith

Kemp, Brian M., Kathleen Judd, Cara Monroe, Jelmer W. Eerkens, Lindsay Hilldorfer, Connor Cordray, Rebecca Schad, Erin Reams, Scott G. Ortman, and Timothy A. Kohler

Kennett, Douglas J., Stephen Plog, Richard J. George, Brendan J. Culleton, Adam S. Watson, Pontus Skoglund, Nadin Rohland, Swapan Mallick, Kristin Stewardson, Logan Kistler, Steven A. LeBlanc, Peter M. Whiteley, David Reich, and George H. Perry

Kent, Kate Peck
1983a *Prehistoric Textiles of the Southwest*. School of American Research, Santa Fe.
Kent, Kate Peck, and Virginia Loehr

Keur, Dorothy L.

Kidder, Alfred V.

Kidder, Alfred V., and Samuel J. Guernsey

Killion, Thomas W. (editor)

King, Mary Elizabeth

King, Valerie Claire

Kintigh, Keith W., Todd L. Howell, and Andrew I. Duff

Kissell, Mary Lois

Kluckhohn, Clyde

Kluckhohn, Clyde, W. W. Hill, and Lucy Wales Kluckhohn

Kohler, Timothy A.

Kohler, Timothy A., and Kathryn Kramer Turner

Kohler, Timothy A., and Matthew J. Root

Kohler, Timothy A., Mark D. Varien, and Aaron M. Wright (editors)

Kowalewski, Stephen A.

Krakauer, John W., and Pietro Mazzoni

Kroeber, Alfred L.

Kroskrity, Paul V.

Kuwanwisiwma, Leigh J.

Kvavadze, Eliso, Ofer Bar-Yosef, Anna Belfer-Cohen, Elisabetta Boaretto, Nino Jakeli, Zinovi Matskevich, and Tengiz Meshveliani

Lamont, Michèle, and Virág Molnár

Lamphere, Louise

Lamphere, Louise (editor)

Lange, Charles H.

Larkin, Karin, and Randall H. McGuire (editors)

Lave, Jean

Lave, Jane, and Etienne Wenger

Leap, William L.

LeBlanc, Steven A.
1999  *Prehistoric Southwestern Warfare.* University of Utah Press, Salt Lake City.

Lechtman, Heather

Lee, Rechanda

Legare, Cristine H.
Lekson, Stephen H.

Lekson, Stephen H. (editor)

Lekson, Stephen H., and Catherine M. Cameron

Lekson, Stephen H., Curtis P. Nepstad-Thornberry, Brian E. Yunker, Toni S. Laumbach, David P. Cain, and Karl W. Laumbach

Lekson, Stephen H., Thomas C. Windes, and Patricia Fournier

Lekson, Stephen H., Thomas C. Windes, and Peter J. McKenna

Lekson, Stephen, Thomas Windes, John Stein, and James Judge

Lemonnier, Pierre
2012 *Mundane Objects: Materiality and Non-Verbal Communication*. Left Coast Press, Walnut Creek, California.

Lemonnier, Pierre (editor)

Leslie, Paul, and J. Terrence McCabe

Levine, Hal B.

Levy, Jerrold E.

Lightfoot, Kent G.
Lightfoot, Kent G., Antoinette Martinez

Lightfoot, Kent G., Antoinette Martinez, and Ann M. Schiff

Lillios, Katina T.

Lim, May, Richard Metzler, and Yaneer Bar-Yam

Lipe, William D.

Lipe, William D., and Scott G. Ortman

Lister, Robert H.

Lister, Robert H., and Herbert W. Dick

Little, Christopher A. J. L., and David F. Lancy

Longacre, William A.

Longacre, William A., Kenneth L. Kvamme, and Masashi Kobayashi

Loud, Llewellyn L., and M. R. Harrington

Love, David W., Mary L. Gillam, Larry V. Benson, Richard Friedman, Phil L. Miller, and Kirk R. Vincent

Lowell, Julia C.

Lindsay, Alexander J., Jr.

Lyons, Patrick D.


Lyons, Patrick D., and Jeffrey J. Clark

Lyons, Patrick D., J. Brett Hill, and Jeffery J. Clark

Lyons, Patrick D., and Alexander J. Lindsay, Jr.

Mace, Ruth, Clare J. Holden, and Stephan Shennan (editors)

Mackenzie, Maureen A.

MacNeish, Richard S.

MacNeish, Richard S., Antoinette Nelken-Terner, and Irmgard W. Johnson

Madsen, David B.

Madsen, David B., and David Rhode (editors)

Maffi, Luisa

Magers, Pamela C.

Magill, Richard A. (editor)

Malhi, Ripan S., Holly M. Mortensen, Jason A. Eshleman, Brian M. Kemp, Joseph G. Loenz, Frederika A. Kaestle, John R. Johnson, Clara Gorodezky, and David Glenn Smith


Manzanilla, Linda R. 2015b Cooperation and Tensions in Mutliethnic Corporate Societies Using Teotihuacan, Central Mexico, as a Case Study. *Proceedings of the National Academy of Sciences* 112:9210-9215.


Mason, Otis Tufton

Mathien, Frances Joan

Matson, R. G.

Matson, R. G., and Martin P. R. Magne

Mattson, Hannah V.

Maybury-Lewis, David

McBrinn, Maxine E.


McClure, Sarah B.


McDonald, Kae


McGreevy, Susan Brown


McGreevy, Susan Brown, and Andrew Hunter Whiteford (editors)


McGregor, John C.


McGregor, Roberta

McGuire, Randall H., and Dean J. Saitta

McKenna, Peter J.

McKenna, Peter J., and H. Wolcott Toll

McKenna, Peter J., and Marcia L. Truell

McManamon, Francis P.

McMechen, Edgar C.

McNeil, Lynda D., and David L. Shaul

Meer, Nasar, and Tariq Modood

Mefford, Jill J.
Mendoza, Ruben G.

Menlove, Becky (editor)
2013 Weaving a Revolution: A Celebration of Contemporary Navajo Baskets. Natural History Museum of Utah, University of Utah, Salt Lake City.

Merriam, C. Hart

Meskell, Lynn

Meskell, Lynn, and Robert W. Preucel

Meyer, Daniel A.

Miller, Kye

Miller, Wick R.

Mills, Barbara J.


Mills, Barbara J. (editor)


Mills, Barbara J., and Patricia L. Crown (editors)

Mills, Barbara J., and Severin Fowles (editors)

Mills, Barbara J., Matthew A. Peeples, Leslie Aragon, Benjamin Bellorado, Jeffery Clark, Evan Giomi, and Thomas C. Windes

2015 Multiscalar Perspectives on Social Networks in the Late Prehispanic Southwest. *American Antiquity* 80:3-24.

Mills, Barbara J., and William H. Walker (editors)
Minar, C. Jill


Minar, C. Jill, and Patricia L. Crown (editors)

Mitchell, John R.

Mithun, Marianne

Moorehead, Warren K.
1906 A Narrative of Explorations in New Mexico, Arizona, Indiana, Etc. Andover Press, Andover, Massachusetts.

Morris, Don P.

Morris, Donald J.

Morris, Earl H.


Morris, Earl H., and Robert F. Burgh


Morris, Elizabeth Ann

Moses, Michele S., and Mitchell J. Chang

Mulhern, Dawn M., Cynthia A. Wilczak, and J. Christopher Dudar

Murdock, George P., and Caterina Provost

Murrell, Monica L., and David T. Unruh

Muysken, Pieter
Naranjo, Tessie

Nash, Stephen E., and Chip Colwell-Chanthaphonh (editors)

Nauck, Bernhard

Neitzel, Jill E.

Neitzel, Jill E. (editor)
2003  *Pueblo Bonito: Center of the Chacoan World*. Smithsonian Institution Press, Washington, D.C.

Neitzel, Jill E., and Ronald L. Bishop

Neitzel, Jill E., Hector Neff, Michael D. Glascock, and Ronald L. Bishop

Nelson, Ben A.
Nelson, Margaret C., Michelle Hegmon, Stephanie Kulow, Matthew A. Peeples, Keith W. Kintigh, and Ann P. Kinzig

Neuzil, Anna A.

Newton, Dolores

Niezen, Ronald

Nordby, Larry V.

Nordenskiöld, Gustaf

Novellino, Dario, and Füsun Ertuğ ( compilers)

Novoa, Cristina, and Fathali M. Moghaddam

O’Brien, Michael J. (editor)

Odegaard, Nancy, and Matthew Crawford

Odegaard, Nancy, and Kelley Hays-Gilpin

Odegaard, Nancy, and Marilen Pool

O'Donnell, Alexis, and Corey S. Ragsdale
2017  Biological Distance Analysis and the Fate of the Gallina in the American Southwest. *Kiva* 83:515-531.

O’Hara, Michael

O'Neale, Lila M.

Ortiz, Alfonso

Ortiz, Alfonso (editor)

Ortman, Scott G.

2012  *Winds from the North: Tewa Origins and Historical Anthropology*. University of Utah Press, Salt Lake City.

Ortman, Scott G., and Catherine M. Cameron

Osborne, Carolyn Miles


Ousley, Stephen

Ozden, Hilmi, Yasemin Balci, Canan Demirüstü, Akin Turgut, and Mehmet Ertugrul

Padilla, Amado M.

Parezo, Nancy J., Kelley A. Hays, and Barbara Slivac
Parsons, Elsie Clews  

Paseka, Rachel E., Carrie C. Heitman, and Karl J. Reinhard  

Pearsall, Marion  

Peck, Stuart L.  

Pelto, Pertti J., and Gretel H. Pelto  

Pepper, George H.  

Peregrine, Peter N.  
Peregrine, Peter N., and Melvin Ember

Petersen, James B. (editor)
University of Tennessee Press, Knoxville.

Petersen, Karen Daniels
1963 *Chippewa Mat-Weaving Techniques.* Bureau of American Ethnology Bulletin 186,

Pfaffenberger, Bryan

Philips, Lisa
2011 Unexpected Languages: Multilingualism and Contact in Eighteenth- and

Pilles, Peter J., Jr.
1996 The Pueblo III Period along the Mogollon Rim: The Honanki, Elden, and Turkey

Plog, Fred
Handbook of North American Indians, Vol. 9, William C. Sturtevant, general
editor. Smithsonian Institution, Washington, D.C.
1989 The Sinagua and Their Relations. In *Dynamics of Southwest Prehistory*, edited by
Linda S. Cordell and George Gumerman, pp. 263-291. Smithsonian Institution
Press, Washington, D.C.

Plog, Stephen
1990 Sociopolitical Implications of Stylistic Variation in the American Southwest. In
*The Uses of Style in Archaeology*, edited by Margaret Conkey and Christine
2003 Exploring the Ubiquitous Through the Unusual: Color Symbolism in Pueblo Black-
2008 *Ancient Peoples of the American Southwest.* 2nd ed. Thames and Hudson,
London.

Plog, Stephen, and Carrie C. Heitman

Plog, Stephen, Carrie C. Heitman, and Adam S. Watson

Plog, Stephen, and Adam S. Watson

Polanich, Judith Kessler
2005 Crossing the Western Boundary: Prehistoric Textiles in California. Paper presented at the 70th annual meetings of the Society for American Archaeology, Salt Lake City, Utah.

Pollard, Mark, Catherine Batt, Ben Stern, and Suzanne M. M. Young

Popelish, Linda

Porčić, Marko

Portes, Alejandro, and Erik Vickstrom

Potter, Gayle
1981  Social Differentiation of Mesa Verdean Culture as Shown by the Examination of Manipulated Fiber Artifacts in Burials from Salmon Ruin, New Mexico. Master’s paper, Department of Anthropology, New York University.

Potter, James M., and Jason P. Chuipka

Potter, James M., Jason Chuipka, and Jerry Fetterman

Potter, James M., and Elizabeth M. Perry


Powers, Robert P., and Ruth M. Van Dyke (editors)

Preucel, Robert W.

Price, Karen E., Catherine Higitt, Thibaut Devi'se, Colin McEwan and Bill Sillar

Price, T. Douglas, Stephen Plog, Steven A. LeBlanc, and John Krigbaum

Pryor, John, and Christopher Carr

Pullen, Virginia, and Dean Krakel

Puri, Rajindra K.

Putnam, Robert D.

Quirolo, Mary M.

Ramenofsky, Ann F., Fraser Neiman, and Christopher D. Pierce

Raney, Anne

Rautman, Alison E.

Raybeck, Douglas, and Paul Y. L. Ngo

Redman, Charles L.

Reed, Alan D.
1994  The Numic Occupation of Western Colorado and Eastern Utah During the Late Prehistoric and Protohistoric Periods. In *Across the West: Human Population*
Reed, Paul F.

Reed, Paul F. (editor)

2006 Thirty-Five Years of Archaeological Research at Salmon Ruins, New Mexico. 3 Vols. Center for Desert Archaeology, Tucson.

2008 Chaco’s Northern Prodigies: Salmon, Aztec, and the Ascendancy of the Middle San Juan Region After A.D. 1100. University of Utah Press, Salt Lake City.

2011a Chacoan Immigration or Emulation of the Chacoan System? The Emergence of Aztec, Salmon, and Other Great House Communities in the Middle San Juan. *Kiva* 77:119-274.

2011b Middle San Juan Settlement Patterns: Searching for Chacoan Immigrants and Evidence of Local Emulation on the Landscape. *Kiva* 77:225-249.

Reid, J. Jefferson


Reid, J. Jefferson, and Stephanie M. Whittlesey


Richert, Roland

Riggs, Charles R.

Riggs, Marilyn B.

Roberts, Frank H. H., Jr.

Roberts, Helen H.

Roberts, John M.

Robicsek, Francis

Rodriguez Lacanzo, Catalina, and Sergio Torres Quintero
1992 *La Cestería Maya de Tierras Bajas.* Catalogo de las Colecciones Etnograficas del Museo Nacional de Antropologia. Instituto Nacional de Antropología e Historia, Mexico City, Mexico.

Roediger, Virginia More

Rogers, Nora

Rohn, Arthur

Roney, John R.

Ross, Marc Howard

Rouse, Roger

Rousseau, Jérôme

Roux, Valentine

Roux, Valentine, Blandine Bril, Jessie Cauliez, Anne-Lise Goujon, Catherine Lara, Claire Manen, Geoffroy de Saulieu, and Etienne Zangato


Rudmin, Floyd W.


Rudy, Sara Sue


Ruiz y Costello, Donna, and Sarah Striker


Russell, Frank


Ruttan, Lore M.


Sackett, James R.


Safi, Kristin N.


Safi, Kristin N., and Andrew I. Duff

Saitta, Dean J.

Salamone, Frank A., and Charles H. Swanson

Salwen, Bert

Sampson, C. Garth

Sanders, Jimy M.

Sayles, E.B.

Schaafsma, Curtis F.
1984  Grants Basket Site, LA47818. Manuscript P-972 on file at the Laboratory of Anthropology, Santa Fe, New Mexico.

Schaafsma, Polly

Schaafsma, Polly (editor)

Schachner, Gregson  

Schaefer, Jerome  

Schaefer, Stacy B.  
2002  *To Think with a Good Heart: Wixárika Women, Weavers, and Shamans.* University of Utah Press, Salt Lake City.

Scheans, Daniel J.  

Schelberg, John D.  

Schiffer, Michael Brian  

Schiffer, Michael Brian (editor)  
2001a  *Anthropological Perspectives on Technology.* University of New Mexico Press, Albuquerque.

Schiffer, Michael Brian, and Andrea R. Miller  

Schiffer, Michael Brian, and James M. Skibo  
Schillaci, Michael A.  

Schillaci, Michael A., and Wendy J. Bustard  


Schillaci, Michael A., and Steven A. Lakatos  

Schillaci, Michael A., Erik G. Ozolins, and Thomas C. Windes  

Schillaci, Michael A., and Christopher M. Stojanowski  


Schillinger, Kerstin, Alex Mesoudi, and Stephen J. Lycett

Schleher, Kari L.

Schleher, Kari L., and Susan M. Ruth

Schoeffel, Penelope

Schönpflug, Ute (editor)

Schortman, Edward M., and Patricia A. Urban

Schroeder, Albert H.

Schwartzlose, Richard A., and Alan Ferg

Sebastian, Lynne


Seltzer, Carl C.
1944 *Racial Prehistory in the Southwest and the Hawikuh Zunis*. Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, Vol. 23,
Sen, Amartya

Sekaquaptewa, Emory, and Dorothy K. Washburn

Shanks, Ralph
2010  California Indian Baskets: San Diego to Santa Barbara and Beyond to the San Joaquin Valley, Mountains and Deserts. Costaño Books, Novato, California.

Sharrock, Susan R.

Shaul, David Leedom
2014  *A Prehistory of Western North America: The Impact of Uto-Aztecan Languages.* University of New Mexico Press, Albuquerque.

Shaul, David Leedom, and Jane H. Hill

Shennan, Stephen

Shennan, Stephen, and James Steele

Sherzer, Joel

Shimada, Izumi (editor)

Schlanger, Sarah H., and Richard H. Wilshusen


Silverstein, Michael


Silvestre, Ramon Eriberto Jader


Simpson, Georgiana Kennedy


Singer, Robert N.


Sinkey, Leslie-lynne


Smith, Michael E.


Smith, Richard A.


Smith, Watson

American Archaeology and Ethnology, Harvard University, Cambridge, Massachusetts.

Smith, Watson, Richard B. Woodbury, and Nathalie F. S. Woodbury

Snead, James E. (editor)

Snow, David H.

Snow, Meradeth H., Kathy R. Durand, Martha Gustafson, and David Glenn Smith

Snow, Meradeth H., Kathy R. Durand, and David Glenn Smith

Snow, Meradeth H., and Steven A. LeBlanc

Sofaer, Anna

Soffer, Olga

Soffer, Olga, J. M. Adovasio, and D. C. Hyland

Sparling, John B.

Spicer, Edward H., and Raymond H. Thompson (editors)

Spielmann, Katherine A.

Spielmann, Katherine A. (editor)

Spurr, Kimberly

Stanczak, Gregory C.

Stanfield, John H.
Stanislawski, Michael B.


Stanislawski, Michael B., and Barbara B. Stanislawski

Stark, Miriam T.

Stark, Miriam T. (editor)

Stark, Miriam T., Brenda J. Bowser, and Lee Horne (editors)

Steele, James, Peter Jordan, and Ethan Cochrane (editors)

Steen, Charlie R.

Stein, Mary Anne

Stein, John R., and Andrew P. Fowler

Stephen, Alexander M.


Steward, Julian H.

Stewart, Omer C.

Stoczkowski, Wiktor

Stojanowski, Christopher M., and Michael A. Schillaci

Stone, Elisabeth Ann

Stone, Tammy
2015 *Migration and Ethnicity in Middle-Range Societies: A View from the Southwest*. University of Utah Press, Salt Lake City.

Stone, Tammy, and William D. Lipe

Sturgis, Patrick, Ian Brunton-Smith, Jouni Kuha, and Jonathan Jackson

Sullivan, Martin

Susser, Ida

Susser, Ida, and Thomas C. Patterson (editors)

Sutherland, Kayla

Sutton, Mark Q., and Eric Ritter W.

Swentzell, Rina

Talen, Emily

Tankersley, Kenneth Barnett

Tanner, Clara Lee  

Taylor, Walter W.  

Teague, Lynn S.  

Teague, Lynn S., and Dorothy K. Washburn  

Tehrani, Jamshid J., and Felix Riede  

Teiwes, Helga  

Thompson, Kerry F., and Ronald H. Towner  

Thornton, Barrie M.  

Thuen, Trond

Thulman, David K.

Tilly, Charles

Titiev, Mischa

Toll, H. Wolcott


Toll, H. Wolcott, Eric Blinman, and C. Dean Wilson

Toll, H. Wolcott, and Peter J. McKenna
Frances Joan Mathien, pp. 17-530. Publications in Archaeology 18G. National Park Service, Santa Fe.

Toll, H. Wolcott, Mollie S. Toll, Marcia L. Newren, and William B. Gillespie

Torrence, Robin

Torvinen, Andrea, Michelle Hegmon, Ann P. Kinzig, Margaret C. Nelson, Matthew A. Peeples, Colleen Strawhacker, Karen G. Schollmeyer, and Laura Swantek

Tosi, Arturo

Towner, Ronald H.

Towner, Ronald H. (editor)

Truell, Marcia L.

Tschopik, Harry, Jr.
1938 Taboo as a Possible Factor Involved in the Obsolescence of Navaho Pottery and Basketry. American Anthropologist 40:257-262.


Tsosie, Neomie

Tuohy, Donald R.

Tuohy, Donald R., and Eugene M. Hattori

Turner, Christy G., and Jacqueline A. Turner
1999 *Man Corn: Cannibalism and Violence in the Prehistoric American Southwest*. University of Utah Press, Salt Lake City.

Turner, Nancy J., and Dawn C, Loewen

Twiss, Katheryn

Ugent, Donald

Underhill, Ruth

Upham, Steadman, Patricia L. Crown, and Stephen Plog

van der Leeuw, Sander E.

van der Leeuw, Sander, and Charles L. Redman

van der Leeuw, Sander E., and Robin Torrence

van der Meer, Tom, and Jochem Tolsma

Van Dyke, Ruth M.
2007b  *The Chaco Experience: Landscape and Ideology at the Center Place*. School for Advanced Research Press, Santa Fe.

Van Dyke, Ruth M., and Susan E. Alcock (editors)

Van Dyke, Ruth M., R. Kyle Bocinsky, Thomas C. Windes, and Tucker J. Robinson

Van Hoose, Jonathan E.
Van Keuren, Scott


Van West, Carla R., and Jeffrey S. Dean

Varien, Mark D., Scott G. Ortman, Timothy A. Kohler, Donna M. Glowacki, and C. David Johnson

Varien, Mark D., Scott G. Ortman, Susan C. Ryan, and Kristen A. Kuckelman

Varien, Mark D., and James M. Potter (editors)

Vazquez-García, Luis Miguel, and Guadalupe Munguía-Lino
2015 Fibras Vegetales y las Artesanías en el Estado de México. Universidad Autónoma del Estado de México, Toluca, Estado de México.

Vermeulen, Hans, and Cora Govers

Vertovec, Steven (editor)

Vertovec, Steven, and Susanne Wessendorf


Vivian, Gordon 1931 *Basketry of Chetro Ketl*. Archive 2107, National Park Service Chaco Culture National Historic Park Archive, University of New Mexico, Albuquerque.


Vivian, R. Gwinn, Dulce N. Dodgen, and Gayle H. Hartmann

Vivian, R. Gwinn, Carla Van West, Jeffrey S. Dean, Nancy J. Akins, Mollie S. Toll, and Thomas C. Windes

Voss, Barbara

Walker, William H.

Wallaert-Pêtre, Hélène

Warburton, Miranda, and Richard M. Begay

Ward, G. K., and S. R. Wilson

Ware, John A.


Ware, John A., and Eric Blinman

Washburn, Dorothy K.


Washburn, Dorothy K., and Lori Stephens Reed

Washburn, Dorothy K., William N. Washburn, and Petia A. Shipkova

Washburn, Dorothy K., William N. Washburn, Petia A. Shipkova, and Mary Ann Pelleymounter
2014 Chemical Analysis of Cacao Residues in Archaeological Ceramics from North

Washburn, Dorothy K., and Laurie D. Webster

Waters, Tony

Watkins, Joe E.
2000  *Indigenous Archaeology: American Indian Values and Scientific Practice*. AltaMira Press, Walnut Creek, California.

Watson, Adam S.

Watson, Adam S., Stephen Plog, Brendan J. Culleton, Patricia A. Gilman, Steven A. LeBlanc, Peter M. Whiteley, Santiago Claramunt, and Douglas J. Kennett

Webster, Laurie D.


2007d Perishables Analysis at Aztec Ruins National Monument. Report prepared for Aztec Ruins National Monument, Aztec, New Mexico.


2010 Analysis of a Coiled Basket Plaque from Room 219, West Ruin of Aztec. Report prepared for Aztec Ruins National Monument, Aztec, New Mexico.


Webster, Laurie D., Linda S. Cordell, Kelley Hays-Gilpin, and Edward A. Jolie

Webster, Laurie D., and Kelley A. Hays-Gilpin

Webster, Laurie D., and Edward A. Jolie


Webster, Laurie D., and Micah Loma’omvaya

Weik, T. M.

Weiner, Annette B.

Welch, John R., Sarah A. Herr, and Nicholas Laluk

Wells, E. Christian, and Patricia A. McAnany (editors)

Weltfish, Gene
1932b Preliminary Classification of Prehistoric Southwestern Basketry. Smithsonian Miscellaneous Collections Vol. 87, No. 7. Smithsonian Institution, Washington D.C.

Wendrich, Willeke

Wendrich, Willeke (editor)

Wenger, Etienne

White, Leslie A.

Whiteford, Andrew Hunter
1988  *Southwestern Indian Basket: Their History and Their Makers*. School of American Research Press, Santa Fe.


Whiteford, Andrew Hunter, and Nora Rogers


Whitehouse, Harvey, and Jonathan A. Lanman


Whiteley, Peter M.


Whiting, Beatrice Blyth, and Carolyn Pope Edwards


Whittaker, John C., and Kathryn A. Kamp


Whittlesey, Stephanie M., Richard S. Ciolek-Torrello, and J. Jefferson Reid

Whittlesey, Stephanie M., and J. Jefferson Reid

Wiessner, Polly

Wilcox, David R.

Willey, Gordon R., Charles C. Di Peso, William A. Ritchie, Irving Rouse, John H. Rowe, and Donald W. Lathrap

Williams, Eduardo
Wills, W. H.
2017 Water Management and the Political Economy of Chaco Canyon During the Bonito Phase (ca. AD 850-1200). Kiva 83:369-413.

Wills, W. H., and Wetherbee Bryan Dorshow

Wills, W. H., Brandon L. Drake, and Wetherbee Dorshow

Wills, W. H., and Robert D. Leonard (editors)


Wills, W. H., and Thomas C. Windes

Wills, W. H., F. Scott Worman, Wetherbee Dorshow, and Heather Richards

Wilshusen, Richard H., and Scott G. Ortman
1999  Rethinking the Pueblo I Period in the San Juan Drainage: Aggregation, Migration, and Cultural Diversity. *Kiva* 64:369-299.

Wilshusen, Richard H., and James M. Potter

Wilshusen, Richard H., Gregson Schachner, and James R. Allison (editors)

Wilshusen, Richard H., and Ruth M. Van Dyke

Wilshusen, Richard H., and C. Dean Wilson

Windes, Thomas C.


1992  Blue Notes: The Chacoan Turquoise Industry in the San Juan Basin. In *Anasazi Regional Organization and the Chaco System*, edited by David E. Doyel, pp. 159-


Windes, Thomas C., Rachel M. Anderson, Brian K. Johnson, and Cheryl A. Ford

Windes, Thomas C., and Dabney Ford

Windes, Thomas C., and Peter J. McKenna

Windes, Thomas C., and Ruth M. Van Dyke

Wobst, H. Martin

Wolf, Eric

Wolpert, Daniel M., Jörn Diedrichsen, and J. Randall Flanagan

Wood, Peter

Woodson, M. Kyle

Wrobel, Gabriel D., Christophe Helmke, Lenna Nash, and Jaime J. Awe

Wyckoff, Lydia L. (editor)

Yoffee, Norman


Young, Lisa C., and Dennis Gilpin

Young, Lisa C., and Sarah A. Herr (editors)
Young, M. Jane

Yurchenco, Henrietta

Zaldívar Guerra, Ma. Luisa

Zastrow, Leona M.

Zedeño, María Nieves

Zingg, Robert M.