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The Structure of Knowledge and Departmental Social Organization: A Study of Some Effects of Disciplinary Paradigm Development on the Social Systems of University Departments

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This dissertation, directed and approved by the candidate's committee, has been accepted by the Graduate Committee of The University of New Mexico in partial fulfillment of the requirements for the degree of

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Title THE STRUCTURE OF KNOWLEDGE AND DEPARTMENTAL SOCIAL ORGANIZATION: A STUDY OF SOME EFFECTS OF DISCIPLINARY PARADIGM DEVELOPMENT ON THE SOCIAL SYSTEMS OF UNIVERSITY DEPARTMENTS

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DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of
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in the Graduate School of
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This study examines the relationship between the structure of knowledge of academic disciplines and the social structures of their associated university departments. It was designed to generate propositions which could be ordered into a theory to explain and predict departmental processes of decision making and influence in curriculum planning.

Initially two concepts guided selection of departments for study and classification of data. Kuhn's (1962, 1970) concept of paradigm calls attention to several conditions of knowledge in a discipline, including: (1) the number of symbolic generalizations (expressions which can be used without question or dissent); (2) the extent of shared beliefs in particular models which define the criteria both for selection of research problems and for evaluation of their solutions; and (3) shared values.

The French and Raven (1968) typology of social power was used to categorize data on intra-departmental influence.

French and Raven use the perceptions of the influenced individual to define five types of social power: (1) reward power; (2) coercive power; (3) legitimate power; (4) referent power; and (5) expert power.

Three departments of similar size and degree of complexity in a midwestern university of approximately 20,000 students were selected for study. Chemistry and political science were selected as representatives of fields at the extremes of high and low paradigm development respectively. Mechanical engineering was selected as a discipline in a professional school.

The primary data source was a series of lengthy unstructured interviews with faculty in the three departments. Additional data were obtained from questionnaires, various documents, e.g., departmental reports to the Graduate Committee, and minutes of department meetings.

As the data were analyzed, Homans' (1950) social systems theory emerged as the conceptual framework within which the major elements identified in the study could best be explained and interrelated. From Homans' basic theory, a model of the development of departmental social structures as a function of paradigm development was derived. This model links disciplinary paradigm development to departmental decision making, influence processes, elaboration of external and internal systems, and the crystallization of norm structures. Research on the effects of task clarity on task groups

supported this model (Anderson, 1975; Raven & Rietsma, 1960).

The study found that if the discipline exhibits a high degree of paradigm development, the potential for intra-departmental conflict over curriculum is low, and the perceived desirability of group decision making relative to curriculum planning is high. As a result, the external system is elaborated as faculty interact frequently in the formal decision making process. The elaboration of the external system in turn promotes the elaboration of the internal system of informal interactions. The extensive interactions promote the development of a highly crystallized norm structure which governs the exercise of influence. Departmental decision making tends to be time consuming because all members tend to participate in all decisions.

Conversely, the study found that if the discipline exhibits a low degree of paradigm development, the potential for intra-departmental conflict over curriculum is high, and the perceived desirability of group decision making in curriculum planning is low. As a result, the external system remains unelaborated as faculty interact as little as possible in the formal decision making process. The internal system also remains unelaborated. The low interaction rate prevents the growth of a crystallized norm structure. Factors other than group norms limit the exercise of influence. Members of the department attempt to avoid situations in which

influence might be exercised. With few normative controls, junior faculty may be especially vulnerable when senior faculty choose to exert influence. A pluralistic pattern of decision making, in which only those faculty affected by the outcome participate in decisions, develops.

The discipline's structure of knowledge is a significant aspect of the department's technological environment. It determines both the clarity of the department's teaching tasks and the degree of consensus about those tasks. The extent of task clarity and departmental consensus determine the degree of elaboration of the social system, the nature of departmental decision making processes, and the exercise of influence among faculty members.

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CHAPTER I

INTRODUCTION

A. The Problem

This study began as an exploratory examination of the processes of decision making and influence in university departments. Prior research provided some quantitative data and impressions about academic departments; however, these studies have rarely been guided by theory, and they have produced no adequate theory of departmental decision making.

The collegial model of governance has been applied to academic departments (Andersen, 1968; Boulding, 1975). This model describes a "community of scholars" whose members share values and goals. The assumption of consensus within the community prevents the collegial model from explaining conflict and its resolution (Baldridge, 1971b). Studies of professionals in organizations describe conflict between professionals and the administrative bureaucracy but avoid discussion of conflict among professionals (e.g., Scott, 1966).

However, conflict clearly exists in academic departments. Caplow and McGee (1958) list several

intra-departmental divisions "likely to be represented in any good sized department" which provide the basis for departmental conflict and the crystallization of personal rivalries. These divisions include those between "Young Turks and Elder Statemen," "Generalists and Specialists," and "Humanists and Scientists" (p. 165). A model which ignores conflict is unlikely to explain the ways in which a faculty coordinates the activities of individuals, plans curricula and programs, and makes other decisions.

Coordination is problematical among professionals who value individual autonomy. Faculty autonomy, academic freedom, and faculty participation in decision making are often considered to be interdependent. Faculty members argue that professional expertise legitimates their claims to autonomy, academic freedom, and participation in decision making (Baldridge, 1971b). The individual's autonomy relative to non-professionals and to his own colleagues is based on professional expertise. The professional asserts that only his colleagues are qualified to evaluate his work and influence his behavior. However, increasing specialization of knowledge limits the ability of his colleagues to do so. In universities, specialization has made it difficult for others, even in the same department, to evaluate a professor's work (Clark, 1966). Thus the individual may have considerable autonomy. This autonomy

may conflict with a department's need to develop a sequence of requirements, coordinate course content, or change the existing curriculum.

A review of existing research on academic departments provided little understanding of intra-departmental coordination, decision making, or conflict resolution. While these studies had no common theoretical framework, they frequently used the variable "power." However, this variable was not defined consistently across studies of departments. The literature on power, authority, and influence was examined. Of the many uses of the concept of power, the French and Raven (1968) conceptualization of social power appeared to have the greatest potential utility. Because this conceptualization takes the perspective of the individual to be influenced and includes many bases of power, it can be applied to many situations. French and Raven's five types of social power--reward, coercive, legitimate, expert, and referent--provided categories for classification and analysis of data. This typology of social power provided the first theoretical perspective guiding data collection.

Another theoretical perspective was needed to establish a rationale for selection of settings. Academic departments vary on so many dimensions that they must be differentiated systematically to be studied. Attempts to do this have focused on institutional variables such as

size and complexity which explain differences between schools (Darkenwald, 1970; Dressel et al., 1970), and departmental size which explains differences in the same institution (Haas & Collen, 1971). Within institutions, aspects of the structure of knowledge of departmental disciplines may explain differences among departmental social structures and decision making processes (Haas & Collen, 1971; Lodahl & Gordon, 1972). The concept "paradigm" (Kuhn, 1962, 1970) describes disciplinary differences and thus provides a theoretical perspective for selection of departmental settings.

The literature review helped to clarify the research problem. It directed selection of settings so that the research became a comparative study of the decision making and influence processes in university departments representing the extremes of paradigm development. The French and Raven typology of social power was used to classify the nature of influence.

B. Methodological Approach

Existing literature provides neither the descriptive data nor a theoretical framework from which useful and testable hypotheses about departmental decision making can be derived. This condition suggests that qualitative research directed toward hypothesis generation is appropriate. Darkenwald (1970) argues that research on academic departments

would benefit from the use of qualitative methods:

> Field studies of a comparative analytical nature would be especially valuable. Studies of this type would employ techniques such as participant observation, the focused or semi-structured interview, and the analysis of documents and records for the purpose of inductively developing comprehensive explanations or models of the social systems under investigation (1970, p. 92).

B.1. Selection of Settings

A study of departments in a single institution holds constant institutional factors of size, complexity, reputation, and wealth which may affect departmental organization. The university housing the three departments studied is a state supported university in the midwest. In the fall of 1974, 19,582 students attended the main campus of the university, and 872 full time faculty were employed. The university contained fifty-four departments and non-departmentalized schools and colleges, a graduate school, a law school, and a school of medicine. The master's degree was offered in fifty-two fields, the doctorate in twenty-seven.

Departmental settings were selected to represent disciplines at the extremes of paradigm development. Kuhn's initial definitions contrasted the social sciences, or "pre-paradigm disciplines," with the physical sciences in which highly developed paradigms guide research. To refine this distinction, Lodahl and Gordon (1972) asked 1161 respondents in eighty university departments to rank seven

fields according to paradigm development. The responses showed "remarkable agreement" about the extent of development of these disciplines. Physics and chemistry ranked as most developed, and sociology and political science were considered least developed.

To control for departmental complexity and size only departments offering a range of programs from the bachelor's degree to the Ph.D. and those of roughly similar size were considered. These restrictions eliminated physics and sociology from consideration. The departments of chemistry and political science were selected as settings. Because of the suggestion that departmental procedures in professional schools whose "products" must meet external certification requirements might differ from those in departments whose "products" were less visible (Haas & Collen, 1971), the mechanical engineering department was added.

B.2. Data Sources

Interviews, documents, and a questionnaire provided qualitative and quantitative data. The primary source of information was a series of semi-structured interviews conducted over a ten week period in the spring of 1975. Twenty-two faculty members participated in the interviews which lasted approximately one hour each.

Whyte recommends the interview as especially suited

to getting information on "interpersonal events taking place through time" (1954, p. 22). However, threats to the validity of interview data exist. A respondent's access to the information and events he is describing, the time elapsed since events, and his motivation for revealing the information must be considered. Newman and Newman (1969) add that the degree of tension may affect the credibility of reporting about an issue or event.

Faculty members interviewed were participants in the social systems and decision making processes which they described. Those willing to participate in the interviews represented the full range of academic ranks and broad fields of their departments. Respondents were asked to discuss departmental procedures and their own participation in decisions relating to curriculum, a subject considered to be relatively uncontroversial and involving less tension than decisions regarding promotion and tenure. There was nothing in the interview situation to produce apprehension, desire to please the interviewer, or hostility. While individual responses may be biased by selective recall or idiosyncratic factors, the collective responses of many subjects should correct for that source of error. Both Whyte (1954) and Trow (1969) note that the single interview does not stand alone but is significant in terms of other interviews and information from other sources.

Hyman et al. (1954) reported that a significant

source of interviewer induced bias occurs in the recording of responses. To reduce this, all interviews were tape recorded and then transcribed.

A variety of documents provided both quantitative and qualitative information. University catalogs provided information about official changes in department faculty from attrition, promotion, and expansion, course offerings and major program changes. Although the match between catalog descriptions of programs and objective reality is not always perfect, respondents argued that they felt an obligation to follow the course descriptions listed in the catalog. The precise wording of requirements and course descriptions received considerable departmental attention when written, and thus reflect a degree of departmental commitment. The Division of Institutional Research provided comparative information about departmental grading practices. The office of the University Secretary made available information on faculty tenure.

In the fall of 1974 all departments with graduate programs submitted to the university Graduate Committee a report evaluating their programs, describing the circumstances underlying program and departmental strengths and weaknesses, and justifying existing programs and planned revisions. These reports contained descriptions of faculty qualifications and activities. Some reports ranked departmental faculty according to professional reputations.

The extent and quality of information included in the reports varied. The chemistry department and the political science department included reports made by external evaluating committees.

Two of the departments made available the minutes of their department meetings. These minutes included attendance, descriptions of issues discussed, and statements of final decisions. Neither included the vote on specific issues. None of the departmental curriculum committees kept official minutes. Two committees made available documents describing recommended program changes. One department also had developed a detailed statement of departmental goals.

Most respondents completed a questionnaire before the interview (Appendix A). This questionnaire was designed to elicit quantitative information about individual participation on committees, interaction rates, and the extent of interaction involved in course planning. It also contained items about faculty perceptions of the legitimacy of attempts to influence particular curriculum or student policy decisions. The questionnaire responses provided some background information about the respondents before the interview. Information acquired during the interview often contradicted responses made on the questionnaire. The questionnaire data did not add significantly to other data collected in the course of the study.

C. Summary

This study examined the consequences of the structure of knowledge for departmental social structures and for the processes of decision making and influence among colleagues. The concepts of paradigm and social power guided selection of the departmental settings and the initial classification of data.

Chapter II, the literature review, describes other research which has been done on academic departments, examines some attempts to conceptualize power, and discusses the utility of the concept of paradigm for differentiating departments. Chapters III, IV, and V describe the social organization and decision making processes in each of the three departments. Chapter VI analyzes this descriptive data, presents a series of inter-related propositions which form a model of departmental social organization, and discusses the implications of this study for further research on university departments and task groups.

CHAPTER II

REVIEW OF THE LITERATURE

A. Introduction

No consistent conceptual frameworks have directed research on academic departments. However, two areas of emphasis emerge from a review of this research. The first is an examination of the relationship between institutional characteristics (e.g., size, wealth, prestige, and complexity) and departmental characteristics (e.g., the chairman's role, departmental autonomy, and collegiality). Research in the second area focuses directly on the power of the department chairman. This chapter discusses the research in these two areas and notes deficiencies in the study of power relations within departments. Relevant studies of professionals in other organizations which may illuminate power relationships among colleagues are cited.

Despite many attempts to define and clarify the concept of power there is no established definition of that term. This chapter briefly reviews various definitions that have been used in studies of departments. French and Raven's (1968) five categories of social power are examined

in greater depth and applied to data about influence among professionals.

In addition, this chapter discusses organizational culture. Kuhn's (1962) concept of paradigm describes an aspect of organizational culture, the structure of knowledge. Research which suggests that the structure of knowledge may affect social structure in academic departments is examined.

In the conclusion the themes of the literature review are focused to refine the research problem for this study. The rationale for anticipating a relationship between structure of knowledge of the discipline and departmental social structure is developed, and some probable relationships are suggested.

B. Studies of Academic Departments

B.1 Institutional Variables and Departmental Power

Several recent studies have examined relationships between the institutional variables of size, wealth, prestige, and complexity and the distribution of power both between the faculty and the central administration and between faculty and the department chairman. This body of research provides both an extensive descriptive data base and a conceptual framework ordering data.

Murray (1972) interviewed and observed faculty and administrators at twenty-two universities of varying size,

prestige and geographic location. From this data he develops a departmental typology based on university and department size. He posits a developmental process in which, as institutions and departments grow, goals become more complex and prestige increases. As departments grow, their structure evolves from a monolith controlled by the chairman, to a competitive and often conflict-ridden pluralist structure, to the stable, collegial relationship characteristic of large, prestigious institutions. If departmental growth continues beyond this point, Murray suggests, departments develop an internal bureaucratic structure to coordinate faculty activity.

According to Murray, institutional growth also is accompanied by changing relationships between the central administration and departments. In the small institution, the chairman works closely with the central administration. In the larger pluralistic department the chairman will have less power, and the faculty will compete with the central administration for the right to determine those policy issues important to them. In the large, prestigious institutions, Murray argues, little conflict exists between faculty and administration.

Murray does not validate his typology with specific data. He omits discussion of the process of specialization which tends to limit departmental size as specialties develop and break away from the departments originally housing them.

Dressel et al. (1970) provide support for the contention that departmental quality or prestige is associated with a high degree of faculty influence over many decisions. Dressel et al. studied departments with varied ratings in the Cartter survey[1] at fifteen private and public universities of varied size and location. Departments rated in the survey as "very attractive," "attractive," and "acceptable plus" gave high priority to basic research and to developing their disciplines nationally. In these departments faculty influence was high and the department did not involve itself in the affairs of the rest of the university. Departments rated below "acceptable plus" deemphasized research and the development of their disciplines nationally. Some of these departments reported relative autonomy from the central administration; however, they attributed this autonomy either to university policy or to their prestige in the institution. Departments rated "acceptable plus" or above attributed their autonomy either to their size or to their support from external funding agencies.

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[1] Alan M. Cartter, An Assessment of Quality in Graduate Education (Washington, D.C.: American Council on Education, 1966). This survey of the opinions of "well-informed scholars within the academic community" rated departments in thirty fields in the 106 institutions which averaged at least ten doctorates a year in the period 1953-1962. Department doctoral programs were rated as "very attractive," "attractive," "acceptable plus," or "(not grouped)."

Blau (1973) also found a positive correlation between institutional size and quality and faculty influence. In his study of 114 institutions, 2,577 faculty responded to questionnaires. Research assistants visited the campuses to interview the central administration. Large institutions tended to be wealthy; thus large size was positively associated with high salaries, superior faculty qualifications, emphasis on research and high research productivity, many specialized departments, a large number of graduate students, high student aptitudes, high faculty influence over faculty appointments and low central administration influence over faculty appointments. Blau explained that the affluence which tends to accompany increasing size enables an institution to compete more effectively for the most qualified faculty (who, according to academic norms, are also the most committed to research).

Blau argued that the faculty as a whole gains power relative to that of the central administration because of the especially favorable bargaining position of the most distinguished and highly qualified faculty members who would not remain at an institution which imposed undue bureaucratic restrictions upon them. The significance of high salaries, Blau stresses, is not that they motivate faculty but that they are only one aspect of the favorable working conditions for which highly qualified individuals bargain. The individual authority of highly qualified

faculty tends to become institutionalized over time, thus establishing the basis of collegial authority for the faculty as a whole.

Thompson (1967) explains the bargaining advantage prestigious individuals hold. Because universities have no clear criteria for evaluating their own performance or convincing the important parts of their environment that they are doing well, they seek highly visible external measures of worth. As a result, Thompson explains, the prestigious faculty member's high level of research productivity, national reputation, and job offers from competing institutions provides visible evidence of institutional quality.

Elton and Rogers (1973) found that size variables such as the number of Ph.D.s awarded between 1960 and 1964, the number of full-time students, and the number of faculty could be used to predict the Cartter ratings for mathematics, chemistry, physics and geology departments. However, Elton and Rogers argued that this evidence showed the ratings to be unduly influenced by quantity rather than quality. They would thus disagree with the position that quality is a result of increased size.

Darkenwald (1970) utilized the theoretical construct of institutional differentiation to order variables in his study of the role of the department chairman. Differentiation refers to the "degree of separateness and autonomy

among the sub-units of an organization." The extent of differentiation in institutions of higher education are related to three factors: size, quality and research orientation.

Talcott Parsons and Gerald Platt developed the Scale of Institutional Differentiation (S.I.D.) to operationalize this theoretical construct. In an unpublished pilot study Parsons and Platt used this instrument to obtain an institutional differentiation score for 1,015 institutions and found that the S.I.D. score explained many of the response distributions on faculty attitudes, opinions and behaviors which "previously appeared unintelligible and unreasonable" (quoted in Darkenwald, 1970, p. 20). Darkenwald found that institutional S.I.D. scores ordered the variables he had selected to examine the power of department chairmen.

The low differentiated institution is a simple organization:

> The low differentiated institution is typically a small, locally oriented college of little academic distinction. The reward system emphasizes teaching as opposed to research. The majority of faculty do not hold doctoral degrees (1970, p. 75).

Darkenwald found that the administration in the low differentiated schools has "more power" than faculty. The president or dean makes decisions on hiring, promotion, and curriculum. The chairmanship is considered the lower

echelon of the administrative hierarchy. The chairman considers himself an administrator but has little power independent of that of the dean or president.

The medium differentiated institution is less easily described:

> The medium differentiated institution is characterized by marked discrepancies in the factors associated with level of organizational differentiation. It may be relatively large and research oriented but low on the criteria that determine quality. On the other hand, the medium differentiated school may be small, high in quality, but teaching as opposed to research oriented. These institutions tend to be organizationally unstable due to imbalances in the factors that affect differentiation (1970, p. 76).

Darkenwald explains that, because the organizational structure is in a state of flux in the medium differentiated institution, departmental autonomy is limited. The chairman experiences more conflict with the administration in reaching decisions affecting the department than does the chairman in a low differentiated institution.

The high differentiated institution is likely to be large, wealthy, and prestigious:

> The high differentiated institution is most often a university. The more prestigious public and private universities fall into this category. These schools tend to be large, affluent, both financially and in terms of faculty and student assets, and heavily research oriented. The highly differentiated institution is characterized by fully developed collegial structures coexisting with the administrative bureaucracy (1970, p. 77-78).

Darkenwald indicates that department chairmen in the high

differentiated institutions have "little prestige." They often see themselves as departmental "chore-boys." The chairmanship rotates. The central administration rarely has a voice in selection of the department chairman.

These studies provide considerable evidence for associating institutional size and complexity with institutional quality, and strong evidence for associating institutional size and complexity with differing patterns of organizational structure. This relationship appears clearly enough established to make further quantitative studies of the power of the chairman and of the power of departments or university faculties in relation to that of the central administration redundant. Darkenwald notes:

> . . . there is perhaps a more urgent need for research on the decision-making process in academic departments. How are decisions made in such areas as hiring a new faculty member, awarding tenure, and revising the curriculum? Who is involved in a particular decision? What is the chairman's role? There has been almost no research to date on these important questions, especially research that has compared the decision-making process in different institutional settings (1970, p. 91).

B.2 Power and Influence within Departments

Several researchers have examined the kinds of power and influence which operate in academic departments and have attempted to relate bases of power or influence to faculty performance and satisfaction. These studies have no common conceptual frameworks.

Hill and French (1971) examined the power of department chairmen in five state-supported colleges in two western states. While they did not present data on institutional size or quality, they noted that all five schools emphasized undergraduate teaching. State agencies determined teaching loads for all five.

Hill and French developed an instrument to measure faculty perceptions of the power of department chairmen and related perceived chairman power to faculty productivity and satisfaction. Hill and French defined an individual's power in terms of the sanctions others perceive he can employ in ways that affect them.

In all five schools, chairmen were perceived to have few organizational sanctions available to deploy against faculty and to have little influence on higher administration. However, some chairmen had personal qualities or engaged in activities which influenced faculty performance and satisfaction. Their personal power varied widely, indicating to Hill and French the importance of personal attributes rather than organizational role in determining how a chairman behaves.

Hill and French found six chairman abilities to be positively related to reported faculty satisfaction with their working conditions: the abilities 1) to "exert professional leadership and stimulation"; 2) to "know what was going on around the college"; 3) to establish contact

with higher administration and to establish good relationships with the community; 4) to help professors develop professional acquaintances; 5) to establish a stimulating environment by sponsoring seminars and visiting lecturers; and 6) to advise faculty about teaching and research.

However, perceived chairman power showed a weak negative correlation with professional research productivity. Hill and French offered alternative explanations for this relationship: It may be interpreted as evidence that productive professors attribute less power to chairmen because their extra-organizational achievements weaken institutional power over them; or the correlation may imply that the stronger the chairman the greater the probability that he will be able to secure faculty compliance in emphasizing the "primary goal of the college" (i.e., teaching) while de-emphasizing other goals. The second interpretation is supported by the positive correlation between perceived chairman power and reported faculty productivity in attaining organizational goals. The chairman's sanctions associated with institutional productivity were the same attributes and behaviors associated with faculty satisfaction.

Caplow and McGee (1958) also found wide variance in chairmen's styles and power. Like Hill and French, Caplow and McGee indicate that power, defined as the ability to influence the behavior of others, results from particular

individual characteristics rather than from structural conditions:

> Being defined loosely, authority is allowed to roll free and is taken into whatever hands are capable of exercising it. It is not tied to specific positions . . . because the tasks in which members of the university must perform are so diversified and so complex that men must be chosen for them on the basis of their skills and not their amenability to supervision. Since that is the case, there is always the chance that the occupant of any given position will be unable to exert authority or to submit to it. The system works then, by distributing power in such a way that anyone who is able to exercise it may do so if he chooses. The product of this system is the university "strong man"--dean, chairman, or professor--who converts his prestige, either disciplinary or local, into authority by enlisting the support of the men around him (p. 207).

Power then appears related to the individual's propensity to seek support and to use power. The apparent base of success in gaining support is academic prestige derived from national reputation, or organizational prestige which may result from knowledge of the system or from personal persuasive or manipulative skills. However, Caplow and McGee seem to view power as randomly distributed among individuals.

Taylor (in Demerath, Stephens & Taylor, 1967) surveyed a sample of thirty departments at the universities of Chicago, Northwestern, Indiana, Cornell, and Pennsylvania. He sought to identify patterns of departmental decision making and distribution of power and esteem among department members. Taylor found that chairmen were perceived

to have the most power in areas that the faculty considered unimportant, e.g., making committee appointments, assigning graduate students, and public relations. Faculty members felt their chairmen had the least power over decision areas they ranked as most important, e.g., faculty appointments, curriculum, and research support. Taylor reported a correlation of -.57 between the perceived importance of policy areas and the number of chairmen considered most influential in them. However, in the policy area ranked as most important by 195 of the 211 respondents, faculty appointments, 17 of the 30 chairmen had more power than their departmental colleagues or university administration. In the second and fourth ranked policy areas, curriculum and research support, 15 of the 30 chairmen were considered most influential in the decision making process. The decision area in which all chairmen were considered to be most powerful, budget decisions, was considered relatively unimportant by the faculty respondents.

Taylor does not account for the variance among departments. That over half the chairmen were viewed as most influential in the most important decision area seems an important piece of information. But Taylor does not account for the high power of some chairmen in important policy areas, nor does he identify departmental or institutional characteristics which might explain the variance in chairman power. Whether all the powerful chairmen were

located in the same universities or were found in certain disciplines is not known.

Taylor also asked respondents to rate each of their departmental colleagues according to their "contribution to the intellectual climate of the department." Only three of the thirty chairmen were at the top of the departmental "ladder of esteem" according to that measure. Four other chairmen tied for first place with two or three colleagues. Slightly more than a third of the chairmen fell below the median of all faculty members in their departments. Only three were at the bottom or next to the bottom of the esteem rankings.

The distribution of power corresponded closely to the contribution faculty members made to their departments' intellectual climates. The mean correlation was +.50 for all departments. Within departments it ranged from +.21 to +.87 except for two departments where there was a small negative relationship (-.07 and -.09). Taylor concluded that the influentials in departmental policy areas were also those who contributed "more than their share" to its intellectual climate. However, he again avoided the differences among departments in this regard. He reported that the power structure of individual departments ranged from almost perfectly monolithic, with the same individuals having power in all areas, to pluralistic structures. Thus the conclusion that power is associated with esteem is

questionable. Taylor did not explore the inter-departmental or inter-institutional differences which might help to explain the variance.

Bachman et al. (1968) also identified characteristics of academic administrators as significant in explaining power in academic settings. Bachman et al. asked faculty members in twelve liberal arts colleges to rank the five bases of social power identified by French and Raven (reward power, coercive power, legitimate power, referent power, and expert power) according to their effectiveness in securing their own compliance with the dean's directives. The respondents rated themselves most responsive to expert power, and about equally responsive to legitimate and referent power. Respondents' satisfaction was negatively related to the dean's use of legitimate power (-.52), reward power (-.80), and coercive power (-.70). Their satisfaction was positively related to the dean's use of expert power (.75) and referent power (.67). Expert power and referent power were not only more salient than the other three power bases, they were clearly the preferred means of influence. Both power bases derive from attributes of the individual exerting power rather than from organizational position and the ability to reward and punish.

Williams' (1956) study of communication in his department's faculty meetings describes a setting where senior faculty dominate and intimidate their junior

colleagues. Although many department members regarded their department as "the most democratic department in this or any other university," a small clique dominated decision making and even discussion in faculty meetings. Junior faculty members were so intimidated that they said nothing in the meetings. A critical minority of the department considered the meetings to be unimportant but attended out of "fear that rewards will be withheld if they give expression to their convictions." In this department, a colleagial relationship existed for the senior professors who were free to make policy without administrative interference. Junior members, excluded from decision making, consider the power of the senior professors to be illegitimate.

Williams explained that faculty meetings served not as settings for decision making but as mechanisms enabling the senior professors to maintain their status. The meetings consisted almost entirely of ceremonial and affective remarks exchanged among the senior professors. "Frequent comments, observations, and parliamentary actions expand the ego and simultaneously give a feeling of importance and security," Williams argued. The potential power of the senior members of the department to punish or reward precludes any untoward action or comment by a junior member.

B.3 Professionals in Organizations

In their preference for working conditions which emphasize faculty autonomy from the central administration and collegial decision making within the department, academics resemble other professional groups. Literature on professional organizations emphasizes the conflict between bureaucratic and professional definitions of authority. A complex professional organization requires coordination of highly specialized activities. In most organizations this coordination is achieved within a bureaucratic authority system. However, the professional recognizes as legitimate only that authority derived from the specialized knowledge base of the profession. Thus, almost inevitably, he is in conflict with the employing organization as he rejects its bureaucratic standards, rules, and supervision (Scott, 1966). The extent of this conflict may be narrowed by delimiting areas of professional authority and areas where bureaucratic authority is recognized. Decisions related to the professional's treatment of clients or other professional areas are reserved to the profession, while bureaucratic authority to coordinate non-professional activities is recognized (Goss, 1961). Allowing professionals to determine organizational goals and procedures also limits the extent of conflict between profession and organization. However, coordination within the area defined as subject to the professional's authority

or in areas where authority is unclear is problematical, especially where autonomy norms stress the individual's responsibility for his decisions and his actions.

Goss (1961) found that a superordinate physician in an outpatient clinic was reluctant to attempt overtly to influence a subordinate physician's professional actions. Although the superordinate was a recognized expert, he felt a direct attempt to influence a physician's decision about patient treatment to be illegitimate. If he strongly felt a subordinate physician's decision to be in error, the superordinate would not directly intervene, but by manipulating the situation, for example using the subordinate's patient as the focus of a teaching session where faculty discuss cases for student benefit, he would attempt to influence his subordinate. However, the ultimate decision resided with the subordinate.

Hagstrom (1966) described the social control among elite scientists which maintains their commitment to the scientific community's norms and values despite countervailing pressures from their employing institutions. He explains social control as a process of exchange in which the individual provides the scientific community with information derived from his research in exchange for the community's recognition. When the exchange mechanism does not enforce conformity to the norm of research and publication, the community has no legitimate means to influence

a member to conform. This theory of social control offers no means of understanding how colleagues in an institution coordinate their programs, curriculum decisions, and other institutionally defined instrumental activities. Even coordination of research efforts is not explained by the exchange theory.

B.4 Conclusion

Neither the literature on academic departments nor that on other professions provides an adequate analytical framework for explaining how professionals coordinate their professional activities. While professionals define bureaucratic coordination as illegitimate when it entails attempts to control a professional's decision or behavior, the profession offers no legitimate coordinating mechanism.

Studies of universities show that where professors are in a position to bargain for organizational concessions, they will demand autonomy. In the large, complex universities, the faculty as a group receives autonomy. Both the central administration and department chairmen have little influence. In smaller schools which emphasize the task of undergraduate teaching, the administration not the faculty makes major decisions; however, even in these schools the "average" chairman has little power.

There has been little effort to study the differences within institutions in departmental decision-making,

patterns of influence, or chairman's role. There is some evidence that personal attributes rather than organizational position determine the influence a chairman can wield. An individual's expertise is an especially significant base of influence; however, the processes of exercising expert power remain undescribed. In some instances the potential to reward and punish vested in the senior faculty who make promotion and tenure decisions gives senior faculty an important base of influence.

The studies of departments tend to be atheoretical. They emphasize the variable "power," particularly the power of the chairman in relation to other members of the department. Since these studies have not been consistent in their definition of power, they do not provide an extensive data base for comparison and analysis.

C. Power, Authority, and Influence

The problems of governance and decision making in institutions of higher education are often analyzed in terms of "power." Recent titles such as Power and Conflict in the University (Baldridge, 1971), Power and Authority (Hodgkinson & Meeth, 1971), and Power, Presidents, and Professors (Demerath, Stephens, & Taylor, 1967) reflect the continuing emphasis on power and its distribution in analysis of higher education. Studies of academic departments have also stressed this concept (Darkenwald, 1970; Hill & French, 1971; Hind, 1971; Taylor, 1967).

However, the studies of "power," "authority," and "influence" in academic departments have not added significantly to the understanding of coordination and decision making among colleagues. The lack of precision of definition of these terms limits their usefulness. This section of the literature review will examine some ways of conceptualizing power and will discuss the potential of the French and Raven (1968) typology of social power in studying academic departments.

Much of the effort in analysis of power has focused on defining or classifying types of power. However, few universal definitions have been established. "Authority" connotes legitimacy while "power" and "influence" may be legitimate or illegitimate. "Legitimate power" (Goldhammer & Shils, 1939) appears indistinguishable from authority. Analysts disagree over the set of behaviors to which "authority" applies (Peabody, 1962) and whether the term can be restricted only to observable behaviors (Banfield, 1957).

Power has been defined as a perception of the influenced person which may not correspond to "objective" qualities in the influencer (French & Raven, 1968). As such, it may be a passive potential, such as the power which supports the "non-decision making process" by influencing values, procedures, and rituals (Bachrach & Baratz, 1968). However, others argue that power must be exerted

to be observed and observed to be "real" (Dahl, 1968).

Power may be used either to gain compliance or to infuence decision outcomes (Riker, 1964). When the object of power is compliance, it is defined as a dyadic relationship between the influencer and the influenced. Attributes of the influencer and the perceptions and motivations of the influenced may be used to classify power. When the object of power is to influence outcomes in settings where several actors have autonomy, the right or ability to participate in the decision making process is significant. Power is a political process of bargaining and coalition formation. In this context, "to have power is to be taken into account in others' acts (policies)" (Lasswell & Kaplan, 1950, p. 77). Power may be an attribute derived from an actor's resources or skills and is a quantity which may be depleted or invested for future gain (Banfield, 1964).

Studies of academic departments have used all of these perspectives of power: Caplow and McGee (1958) and Hill and French (1971) stress the dyadic relationship of one agent attempting to influence an actor. Hind (1971), Darkenwald (1970), and Taylor (1967) focus on participation in decision making. Williams (1956) identifies the power supporting the "non-decision making process" in which values and procedures as well as fear of undefined consequences inhibit behavior and make overt attempts at influence unnecessary.

The group process perspective of power and influence has received little attention in studies of universities. However, since departments are human groups as well as organizational units, the group process perspective may offer insights into departmental decision making.

Homans (1950) explains that social control can be described in the language of reward and punishment, of distribution of goods, and of social exchange and reciprocity; however, all three models can be subsumed under another model which describes social control in terms of maintaining group equilibrium through interaction.

> [A] social system is in moving equilibrium and authority exists when the state of the elements that enter the system and of the relations between them, including the behavior of the leader, is such that disobedience to the orders of the leader will be followed by changes in the other elements tending to bring the system back to the state the leader would have wished it to reach if the disobedience had not taken place (p. 422).
>
> .....
>
> The elements of the system are interconnected in such a way that if a man disobeys an order, his action automatically does damage to his interactions, his friendships, his social rank, and the attitude of the leader toward him (p. 420).

In this same context, other analyses of informal groups tend to use the concept of influence to explain differing abilities to control behavior and determine outcomes. Hopkins (1964) suggested that a series of sequential relationships in which structural features of the group determine each member's influence maintains the group's moving equilibrium. An individual's rank in the group

determines his frequency of participation, his visibility, and, finally, the extent of his conformity to group norms. Legitimacy implies correspondence between influence and rank. Influence is defined, not as a dyadic relationship, but as the result of a constant process of interaction among members of a group.

Studies of the diffusion of knowledge and innovations provide supporting evidence for Hopkins' definition of influence. Crane (1972) found that the social orgazanization of research areas consists of an invisible college or network of productive scientists who link separate groups of collaborators in the field. As a new research area begins to expand, individuals who contribute many publications to the area begin to emerge as influentials in its development. These influentials set the research norms and maintain the cohesion of the research area over a long period of time, often by surrounding themselves with groups of collaborators. Geographical isolates lack opportunity for interaction with the central research group, exert little influence, and are not as productive as those within the network.

House's (1974) analysis of Carlson's (1965) study of superintendents' adoption of "new math" curricula also supports Hopkins' theory of influence. Among urban superintendents, the earlier adopters were men intimately involved in the social structure with higher status than

later adopters. Superintendents tended to seek advice from individuals of higher status in the superintendent social system. The more distant from the center of the superintendent friendship group the later an individual adopted the new math curriculum.

Crane and Carlson both describe processes compatible with Hopkins' theory of influence. In geographically dispersed groups of professionals, rank was closely related to visibility and frequency of participation. Differences in influence corresponded to differences in rank.

The French and Raven (1968) typology of social power offers a convenient framework for classification of data on influence in many contexts. It applies to relationships within organizations and small groups and between individuals. The following section describes the typology and discusses research studies which have used it.

C.1 Social Power

French and Raven identified five bases of social power derived from relationships between O, the influencer, and P, the influenced: (1) reward power, based on P's perception that O has the ability to mediate rewards for him; (2) coercive power, based on P's perception that O can mediate punishment for him; (3) legitimate power, based on P's perception that O has the legitimate right to prescribe behavior; (4) expert power, based on P's perception that O has some knowledge or expertise; and (5) referent

power, based on P's identification with O (French & Raven, 1968). The classification of one type of power as "legitimate" does not imply that the other forms are perceived as illegitimate.

Its use of the perspective of the individual subject to influence rather than that of the influencer makes the French and Raven conceptualization of social power helpful in examining control among professionals. The professional works in a complex arrangement of colleague relationships. While he has considerable autonomy and responsibility for his own decisions, the professional must also orient his behavior to his immediate colleagues and to other professionals outside the employing institution. His success may depend on his ability to accommodate himself to both groups.

The French and Raven typology includes reward power and coercive power which both the employing institution and other professional groups may have. The typology also includes the type of power normatively most acceptable to professionals--expert power. Referent power provides a category for both the influence of immediate colleagues and that of more distal professionals on an individual's behavior and attitudes.

Since the organizational use of reward power, coercive power, and legitimate power may have undesirable consequences, social psychologists have recommended the

use of expert power and referent power as either supplements or substitutes (Katz & Kahn, 1966, p. 303). Bachman et al. (1968) found that a sample of faculty members reported expert power to be the most effective of the five types of social power in gaining their compliance to their dean's directives.

While recommending the use of expert power and referent power, analysts offer no clear operational definitions of the concepts. Warren (1968) operationalized expert power in a questionnaire item which asked teachers to rate their principal as "logical-rational." He obtained a measure of referent power from three items. The first asked teachers to rate their satisfaction with their current "teaching assignment"; the second asked teachers if they expected to be in another school "five years or so from now." The third measure was derived from teacher responses to a list of sources of staff disunity and "disagreement with administration in the building." The more sources of disunity and disagreement selected, the less referent power was presumed to exist. These operational definitions seem inconsistent with the constructs. A "logical-rational" principal could lack specific expertise in subject matter and methodology. Job satisfaction rests on factors other than the principal's referent power, such as the kind of clientele, available resources, location of the school, etc.

The Bachman et al. items were more consistent with

French and Raven's definitions. Expert power was measured by the item: "I respect his competence and good judgment about things with which he is more experienced than I." Referent power was measured by the item: "I admire him for his personal qualities, and want to act in a way that merits his respect and admiration" (1968, p. 232). There is no explanation of how faculty determine the areas in which the dean is more experienced.

Student (1970) operationalized referent power with an item in which subordinates rated the extent to which they comply with their supervisor's directives because he is a "'nice guy' and they don't want to hurt him" (p. 242). Expert power was measured by an item rating the extent to which subordinates comply with their supervisor's directives because he can give special help and benefits to those who cooperate with him. The match between these definitions and the constructs is questionable. A "nice guy" is not necessarily a referent person. Student's operational definition of expert power appears more closely related to reward power.

More precise definitions are needed before expert power and referent power can be used effectively to discuss influence among professionals. Large-scale survey research based on the existing operational definitions would be unlikely to provide further insight into the processes of influence among professionals. Other studies where data

were gathered through interviews and participant observation indicate that the processes of influence which mold a professional's behavior and affect his decisions are highly complex.

C.2 Social Power among Professionals

While studies of professionals have not used the concept of social power to analyze behavior, they provide evidence of the existence and salience of both expert power and referent power. Carlin's (1966) study of the New York City Bar provides data showing the importance of referent power in determining individual compliance with ethical norms.

Carlin found that the legal profession could not enforce a uniform set of norms of ethical conduct among all lawyers. The coercive power of formal punishment was virtually nonexistent, since there was little chance that the profession would censure, much less disbar, a violator. Referent power affected individual behavior. However, the division of the profession into distinct groups with little professional or social contact or possibility for mobility prevented the legal profession as a whole from exerting referent power for all lawyers.

The bar was split into two distinct sub-castes, each adhering to a differing set of ethical norms. Lawyers in elite firms tended to deal with the higher--and more ethical--courts, a higher status clientele, receive their

education at elite schools and share a common ethnic and religious background. These firms tended to be ethically strict.

Members of low status firms tended to deal with the lower courts and with low status clients. They were thus subject to more temptations, opportunities, and client pressures to violate ethical norms than were members of elite firms.

Lawyers in elite firms appeared to respond to referent power by conforming to the high ethical norms of the firm. Carlin cited a statement from a member of such a firm:

> I worked in the _____ office. It was a small, elite group, and we had very high standards. I would be ashamed to do anything that group would not think was right (p. 99).

Colleague groups within firms exerted referent power. "The longer a lawyer has been a member of the office, and the more socially cohesive the office, the more likely it is that his behavior will be in line with the attitudes of his colleagues" (p. 167). In the low status firms, lawyers subject to external pressures to violate the ethical norms learned in law school sought and received support for violation of these norms from their colleagues in the firm. Thus the normative structure of the office reinforced external pressures to violate general ethical norms. Because members of low status firms had little

contact with and little hope of attaining the status of elite lawyers, the elite lawyers could exert referent power.

Hagstrom's (1965) discussion of leadership among scientists identifies "informal leaders" whose "brilliance and skill lead others to emulate them" (p. 184).

> The active process in informal leadership is not so much the desire of leaders to influence others--they tend to respect the norms of independence--as the desire of followers to benefit from the lead of outstanding men. Followers emulate leaders by changing the direction of their research in conformity with the leaders' examples (1965), p. 185).

A condition for the existence of highly influential informal leaders in a field is that "such persons be able to demonstrate their superior abilities." Thus such informal leadership can be expected to occur most often in the formal sciences and the mathematical aspects of the empirical sciences (p. 185). This influence could be classified as either expert power or referent power.

Although he does not use the term expert power, Blau (1955, pp. 127-143) describes its use and explains conditions which limit its scope in a small group. Blau's study of a department in a federal agency charged with enforcing new regulations on business and industry found that, while official policy prohibited consultation, agents consistently sought advice from their colleagues. The complexity of the rules and regulations applicable to the cases and the wide latitude for individual discretion made

an ambiguous condition where agents became anxious about the accuracy of their decisions. Asking the supervisor for advice did not allay that anxiety but rather added to it, since agents did not want to expose their weaknesses to one who evaluated their performance. Thus agents sought advice and reassurance from each other. Through the process of consultation, departmental status was confirmed and relationships stabilized.

Blau explained the process as a social exchange in which experts gave advice in exchange for status and recognition of their superior expertise. The agent who continually sought advice lost status in the department as he admitted his inability to solve his problems.

> The cost of advice became prohibitive if the consultant, after the questioner had subordinated himself by asking for help, was in the least discouraging--by postponing a discussion or by revealing his impatience during one.

To avoid such rejection, agents tended to consult colleagues with whom they were friendly, creating partnerships in which both members were likely to give and seek advice equally and thus maintain a balance of status. Agents could then save only the important cases for consultation with the expert.

Informal discussion of complex and interesting cases also served the function of consultation without the cost of seeking advice. Experts tended to engage in this practice more often since they were more confident and

had more interesting cases. These discussions allowed them to display their expertise as they exhibited their skill in solving the problems. The sessions also allowed other agents to learn and occasionally to contribute suggestions. The experts' status was enhanced in the process. Blau explains that a process of social exchange limits overt influence derived from expert power:

> If a person supplies important services to another, the second becomes dependent on and obligated to the first. If the second can reciprocate by rendering important services to the first, he has discharged his obligations and balanced his dependence by making the other also dependent on him. But if the second cannot reciprocate in this manner, his dependence remains onesided and he must discharge his obligations by deferring to the other's wishes in order to continue to receive the benefits on which he has become dependent, which means that the first person has acquired power over the second. It is the desire to avoid becoming subjugated to the power of another that exerts such a compelling force to reciprocate for the services he has provided by providing, in turn, services to him if at all possible. For, unless this is possible, a loss of independence is inevitable. Persons who have become dependent on the services rendered to them by an individual and who have no services to offer that are equally important to him must discharge their obligations by deferring to his wishes. In the absence of coercive force, making others dependent on one is the source of power over them; indeed, its extreme form is not very different from coercion (1955, p. 141).

Thus the desire for independence limits the individual's receptivity to expert power within his group. Among professionals the desire to maintain the image of expertise and to maintain autonomy may limit the active seeking or offering of advice based on perception of expert power.

In professional groups the opportunity to discuss mutual activities and problems, whether in formal or informal settings, may provide the condition for unobtrusive exercise of expert power. These discussions allow experts to display their expertise, indirectly offer useful solutions to problems a colleague may be considering and may allow less recognized colleagues to raise questions or issues which may be of general interest as a subject of conversation. The ensuing discussion allows him to benefit from another's knowledge without losing status or becoming indebted to the expert.

Unsolicited expert advice becomes illegitimate, not only as an infringement on professional autonomy, but as an attempt to establish control over another if the social exchange model of group behavior is accepted. Thus expert power may also be viewed as potentially coercive. Its exercise in predictable directions to accomplish organizational or individual ends is problematical.

Expert power may be more effective among individuals who are not in continual contact. The research community may be more responsive to expert power than the academic department. In the department, extensive interaction maintains status and influence. The exchange process in such a group may limit the scope of expert power.

C.3 Conclusion

The evidence Carlin, Hagstrom, and Blau gathered from observation and interviews provides interesting data about phenomena French and Raven identified as referent power and expert power. This evidence suggests that the mechanism through which these aspects of social power are exerted may be a process of modeling. The individual consciously or unconsciously molds his own behavior according to a standard set by significant others. Bandura's (1969) studies of learning in children found that imitation of adults, peers, and filmed or televised incidents, shaped children's attitudes as well as their behavior. Several variables affected the likelihood that a child would imitate the model's actions: the model's power (defined as controlling rather than receiving valued resources), consequences to the model of the behavior, and the child's affective attachment to the model. Children would even imitate behavior they stated was morally wrong, though they would try to rationalize this discrepancy.

Socialization studies indicate that this process shapes adult as well as child behavior and attitudes. Throughout his life, every person learns new roles and adapts to new interpersonal relationships. Some individuals are more influential to the adaptation than others. Brim states:

> In the life of every person, there are a number of people directly involved in socialization who have great influence because of their frequency of contact, their primacy, and their control over rewards and punishment (1967, p. 8).

These same variables which influence modeling affect the referent power of the professional group or individual. Thus in peer-group offices, where colleagues have a high rate of interaction, office colleagues reinforced pressures from the clients and the court system in which Carlin's low status lawyers functioned. The normative system accepted by elite lawyers, higher courts, and the instructors in law school exerted no comparable effect, since the profession as a whole had no power to reward, little inclination to punish and little contact with the non-elite.

If referent power influences behavior through the mechanism of modeling, it cannot be separated completely from reward power and coercive power. The individual responds, not to the possibility that he may be directly rewarded or punished, but to the person who has these forms of power.

Hagstrom's example of scientific leaders is evidence of individuals who exert referent power because of their demonstrated expertise. Expertise is more than an individual attribute; it is a group norm among scientists, held in varying degrees by sub-groups. Thus among some professionals expert power and referent power may be inseparable.

The established expert also has reward power and coercive power derived from his position in the profession. This position gives him institutional control as an editor of journals, a referee, an evaluator of papers submitted to professional societies and proposals submitted to funding agencies, and as a senior member of his department. This potential to reward or punish and his success in exemplifying group norms makes the expert powerful model. Thus, though autonomy norms would prvent him from directly attempting to shape a colleague's behavior, he succeeds in doing so, though possibly in an unpredictable manner. The actor may select any number or combination of the model's characteristics.

Blau indicates that the direct use of expert power may be limited by the social-exchange process in small groups. The expert may exert influence indirectly as a teacher when, through informal discussions, he demonstrates solutions and problem-solving methods for difficult cases.

The power and authority relationships in departments are potentially complex. Colleagues, particularly senior colleagues, may exert influence because of institutional resources, and right to participate in tenure and promotion decisions. This influence may result not only from the fear of punishment or hope of reward but from the modeling mechanism. The colleague group may establish

a normative climate in which teaching, student policy and course planning are subject to greater or lesser group discussion and varying legitimacy of attempts to influence behavior in these areas. The normative climate may either enhance or limit the potential for exercise of expert power through establishing patterns of interaction and thus visibility among colleagues.

In addition, professionals are subject to expert power and referent power exerted by individuals outside the immediate colleague group. The normative structure of the external influentials may correspond in varying degrees to that of the institutional colleague group.

Thus the department may be a setting in which several perspectives of power may explain behaviors. Direct attempts to gain another's compliance probably will be limited by autonomy norms. The power to influence outcomes may derive from an individual's perceived expertise as well as from persuasive abilities. Departmental norms may affect professional behavior. The processes of influence may be subtle and highly complex.

D. Organizational Culture

Although some analysts indicate that the distribution of power in universities (Caplow & McGee, 1958) and in departments (Hill & French, 1971) results from chance combinations of personalities, it may be argued that

identifiable variables limit the range of possible behaviors and thus the use of power in university departments. Thompson (1967, p. 102) argues that the homogenizing effect of both the general culture and the organizational "contract" in which the individual agrees to participate and the organization agrees to accept him limits the repertoire of participants' behavior in specific settings. Katz and Kahn (1966) identify organizational "culture" or "climate" as "distinctive patterns of collective feelings and beliefs" possessed by members of the organization and transmitted to new members.[1] Institutions having similar functions may exhibit varied cultures.

However, Katz and Kahn admit that the concept of organizational culture, though potentially valuable, lacks clarity:

> In spite of the obvious differences between the cultures of organizations performing essentially the same types of functions, it is not easy to specify the dimensions of such differences (Katz & Kahn, 1966, p. 66).

They advocate the use of participant observation as the most appropriate research methodology to provide the

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[1] Although Katz and Kahn use the terms "organizational culture" and "organizational climate" interchangeably, this study will use "organizational culture" exclusively in order to avoid confusion between this construct and Halpin's (1966) "organizational climate."

"insightful leads" which would "facilitate the development of adequate conceptual and operational definitions of organizational climate, so that this potentially valuable research concept might become more than a vague analogy from meteorology" (Katz & Kahn, 1966, p. 66).

Professions may be seen to have distinctive cultures which their members acquire during the long period of formal training. Goode (1960) defines professions as communities where, within the sphere of common action, members are bound by a sense of identity and shared values, role definitions are accepted by both members and non-members, and a "common language" only partially comprehensible to outsiders is used. The similar technologies and common kinds of problems which confront members of the profession facilitate the development of a shared perspective.

Kuhn (1970) defines a "scientific community" as "the practitioners of a scientific specialty":

> To an extent unparalleled in most other fields they [the practitioners of a specialty] have undergone similar educations and professional initiations; in the process they have absorbed the same technical literature and drawn many of the same lessons from it. Usually the boundaries of that standard literature mark the limits of a scientific subject matter, and each community ordinarily has a subject matter of its own. . . . As a result, the members of a scientific community see themselves and are seen by others as the men uniquely responsible for the pursuit of a set of shared goals (Kuhn, 1970, p. 239).

However, Kuhn notes that scientific communities exist at several levels: the community of all natural scientists, the "main scientific professional groups" such as physicists and chemists, as well as practitioners of subspecialties.

Task and technology define professional and scientific cultures. In universities, technology, or the structure of knowledge of the discipline, divides the academic profession. Clark (1966) notes that specialization has fragmented the academic profession into many groups with differing systems of values and few common interests beyond group benefits such as salaries. Although disciplinary and departmental differences have not been described systematically, there is evidence that departmental cultures may be differentiated according to discipline.

Haas and Collen (1971) found departmental differences in evaluation and control of faculty to be related to the "humanistic orientation" of the discipline. Chairmen of departments whose "subject matter deals primarily with human beings in their social and cultural orientation" were found to be more "humanistic" in their techniques for handling an unsatisfactory department member than chairmen in other departments. "Humanistic techniques" emphasize the "dignity and needs of the unsatisfactory performer" rather than formal procedures of evaluating competence. The social sciences and applied disciplines based on them were

more "humanistic" in the treatment of unsatisfactory faculty than were the physical and biological sciences and related disciplines. Departments whose performance was subject to public evaluation because their graduates had to take national examinations to enter professional practice tended not to use "humanistic techniques."

Several studies provide evidence that teaching and relations with undergraduate and graduate students vary according to discipline. Hagstrom (1966, p. 134) cited a study in which twice as many respondents in the physical sciences agreed with the statement "Major professors tend to exploit doctoral candidates" than did respondents in mathematics, history, and the social sciences. "Exploitation" was defined as the prolongation of graduate work and subordination of the student's educational interests to a professor's research interests.

Vreeland and Bidwell's (1966) interviews of faculty at an "elite, Eastern Seaboard university" found differing patterns of interest in and interaction with undergraduates among disciplines. Faculty in the physics and chemistry departments indicated both low interest in and low interaction with undergraduate students. Respondents in history, economics, and fine arts exhibited both high interest in and high interaction with undergraduates.

Chambers (1972) conducted a national study of chemists and psychologists to determine the effects of

college teaching on students' career productivity and creativity. He found that chemistry instructors and psychology instructors whom students described as "facilitators" of their learning displayed contrasting teaching styles and different rates of interaction with students. Psychologists in contrast with chemistry teachers:

> . . . more often conducted their classes in an informal atmosphere, lectured to their classes less often, and generally speaking, conducted their classes more often in an unstructured "freewheeling" manner with less reliance on course outlines. In the same vein, psychologists more often "challenged" classes with brutally strong statements in order to elicit class discussions.
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> .....
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> Psychologists more often asked students to state preferences for materials to be covered in class. They less often read from notes or books, but they were less likely to be well-prepared for class and less likely to convey penetrating insights into problems. They also were more likely to use language in class that the students did not understand.
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> .....
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> The psychology teachers less often demonstrated strong enthusiasm about learning in general, and did not encourage independent study as much as the chemists.
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> .....
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> Outside of the classroom, psychology teachers were less available to students. They also were less likely to encourage students to come to them for discussions on academic or personal matters. Finally, psychologists less often encouraged students to be independent thinkers than did the chemistry teachers (Chambers, 1972, p. 76).

Despite this contrast in teaching styles, all of the instructors in this group had been identified as "facilitators" of learning by their former graduate students.

Among the more interesting differences between chemistry and psychology instructors is the finding that

facilitating psychology teachers less often demonstrated strong enthusiasm about teaching, less often encouraged independent study and thinking, and less often were available to students than were their chemistry counterparts. This finding contradicts Kuhn's (1970) descriptions of learning in the social sciences and physical sciences. The student in history, philosophy, or a social science is:

> constantly made aware of the immense variety of problems that the members of his future group have, in the course of time, attempted to solve. Even more important, he has constantly before him a number of competing and incommensurable solutions to these problems, solutions that he must ultimately evaluate himself (Kuhn, 1970, p. 227).

In the natural sciences, however, the student:

> relies mainly on textbooks until, in his third or fourth year of graduate work, he begins his own research. Many science curricula do not even ask graduate students to read in works not written especially for students. The few that do assign supplementary reading in research papers and monographs restrict such assignments to the most advanced courses and to materials that take up more or less where the available texts leave off. Until the very last stages in the education of the scientist, textbooks are systematically substituted for the creative scientific literature that made them possible (Kuhn, 1970, p. 227).

Chambers' findings that "psychologists less often encouraged students to be independent thinkers than did chemistry teachers" appear irreconcilable with Kuhn's descriptions. Several explanations for this contradiction appear likely. In psychology, the nature of the discipline makes independent thinking imperative. Instructors of graduate psychology

courses may assume that students do this without particular encouragement from the faculty. The highly structured chemistry curriculum may develop an uncritical approach to the discipline in undergraduates that graduate instructors must work to eradicate. Kuhn's description of physical science programs may be an accurate description of student experiences before the 1960s; however, since this description was first written (1962), science curricula have changed to stress independent thinking.[2]

Lodahl and Gordon (1972) help explain Chambers' findings about relative faculty accessibility to students and Hagstrom's findings about graduate students' perceptions of exploitation. Using Kuhn's notion of paradigm development to distinguish among disciplines, Lodahl and Gordon sampled eighty departments stratified so that five graduate departments in each of the four levels identified in the Cartter report in four fields--physics, chemistry, sociology, and political science--were represented. In physics and chemistry, fields with high paradigm development, departments tended to agree across institutions over content of survey courses and requirements and content for graduate degrees more than did sociology and political science departments. Lodahl and Gordon explained that high paradigm

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[2] Evidence for changes in chemistry and engineering curricula will be presented in Chapters III and IV.

development facilitated graduate teaching. Responding professors in physics and chemistry reported less conflict over teaching than did the social scientists when asked if they felt time spent with graduate students was well-spent and intellectually stimulating. The use of graduate assistants for teaching, research assistance, and as co-workers in cooperative projects, Lodahl and Gordon argue, is promoted by the shared vocabulary and clear structure found in fields with highly developed paradigms. The structure of knowledge of the physical science disciplines facilitates student-teacher interaction and makes instructors' relations with graduate students both productive and pleasant.

Thus there appears to be evidence that both faculty and student experiences vary according to departmental discipline. The sociology of knowledge offers little guidance for research attempting to determine the impact of cognitive structure of various disciplines on the social structures of university departments. Merton and Zuckerman note:

> In principle, the sociology of knowledge and, more narrowly, the sociology of science are concerned with the reciprocal relations between social structure and cognitive structure. In practice, however, sociologists of knowledge have dealt almost exclusively with the influences of the social structure upon the formation and development of ideas. And when sociologists of science have investigated the "impact of science upon society," this has been principally in the form of examining the social consequences, chiefly

> unanticipated, of science-based technology. In neither case is the effort made to trace the consequences of the cognitive structure of the various sciences for their distinctive social structures (Merton & Zuckerman, 1973a, p. 506).

Lodahl and Gordon attribute the lack of study of differences among the various fields of science to "the lack of conceptual frameworks around which hypotheses could be developed" (1972, p. 57). Researchers have identified several aspects of disciplinary structure which distinguish among university departments.

"Humanistic orientation" (Haas & Collen, 1971) may predict relationships among faculty and may explain the Vreeland and Bidwell findings about interest in and interaction with undergraduates; however, it offers no way of explaining Chambers' findings regarding interactions with graduate students or reconciling the contrast between Vreeland and Bidwell's data and Chambers' results. Logically humanistic orientation would predict the same amount of interaction with and interest in students for both graduate and undergraduate students. As a concept, "humanistic orientation" is vague.

Thompson et al. (1969) offer "truth strategies" as a concept to distinguish among disciplines. Truth strategies are sets of rules which guide research. The strategies are determined by the degree of reliance on experience and the degree of codification of reasoning. Merton and Zuckerman's (1973a) concept "codification" is

similar to "truth strategy." "Codification refers to the consolidation of empirical knowledge into succinct and interdependent theoretical formulations" (Merton & Zuckerman, 1973, p. 507). The extent of codification in a field, they argue, should affect the ways of gaining competence in it:

> Experience should count more heavily in the less codified fields. In these, scientists must get command of a mass of descriptive facts and of low-level theories whose implications are not well understood. The comprehensive and more precise theoretical structures of the more codified field not only allow empirical particulars to be derived from them but also provide more clearly defined criteria for assessing the importance of new problems, new data, and newly proposed solutions. All this should make for greater consensus among investigators at work in highly codified fields on the significance of new knowledge and the continuing relevance of old (Merton & Zuckerman, 1973, p. 507).

Truth strategy and codification may be subsumed under a broader construct--Kuhn's notion of paradigm (Kuhn, 1962, 1970). Since the publication of Kuhn's The Structure of Scientific Revolutions in 1962 the idea of "paradigm" has received a great deal of attention and has been applied to many fields of knowledge. "Paradigm" offers a framework that encompasses and explains the findings of the above studies.

D.1 Paradigm

Kuhn's (1962, 1970) concept of paradigm has aroused controversy "largely because of its ambiguity" (Crane, 1972, p. 29). Analysts have isolated at least two categories of

paradigm in Kuhn's discussion: metaphysical paradigm which entails a "new way of seeing, a myth, a metaphysical speculation" (Crane, 1972, p. 29) and paradigm as puzzle-solving device which supplies "a set of tools or instrumentation" to solve specific problems. The metaphysical paradigm may be shared by an entire discipline, while the puzzle-solving paradigm is confined to a specific research area (p. 30).

In an attempt to clarify the concept, Kuhn (1970, Postscript) referred to a "disciplinary matrix" with four components, each of which has been included in the definition of "paradigm":

1. Symbolic generalizations--expressions deployed without question or dissent which can readily be cast in logical form. Without general acceptance of such expressions, there would be no points at which group members could attach the powerful techniques of logical and mathematical manipulation to their puzzle-solving enterprise (p. 245).

2. Metaphysical paradigms--shared commitments to such beliefs as "Heat is the kinetic energy of the constituent parts of bodies." Such commitments are beliefs in particular models which define both the criteria for selection of puzzles to be solved and for evaluating the solution (p. 246).

3. Values--more widely held throughout the scientific community. The most deeply held values concern prediction, e.g., the preferability of quantitative over qualitative predictions (pp. 246-247).

4. Exemplars--"The concrete problem-solving solutions that students encounter from the start of their scientific education, whether in

> laboratories or examinations, or at the end of chapters in texts." More than any other component of the disciplinary matrix, differences between exemplars provide the community fine structure of science. For example, all physicists begin by learning the same exemplars. Through following these exemplars they acquire "tacit knowledge" which is learned by doing science rather than by acquiring rules for doing it (p. 253).

Kuhn's description of "normal science" as dominated by a ruling paradigm has been both challenged and defended. Popper (1970) argues that Kuhn's picture of scientists is one of well-indoctrinated technicians rather than scientists. In attacking the "myth of the framework" Popper argues that critical scientists are capable of expanding and breaking frameworks and of finding bases of communication between them. Just as languages can be translated, he argues, so can frameworks be made mutually understandable; thus a scientist is not limited by acceptance of a framework. Paradigm is not so powerful a perspective that it excludes acknowledgement of other frameworks. While he admits that dogmatic technicians exist in the scientific community, Popper characterizes them as "applied" rather than "pure" scientists.

Critics challenge not only the assumption that in periods of "normal science" a paradigm dominates thought in a field, but also Kuhn's contention that paradigm-dominated thought is beneficial for science and essential for its advancement (Watkins, 1970). Watkins notes the parallel between Kuhn's view of science and theology.

Masterman argues:

> . . . That there is a normal science--and that it is exactly as Kuhn says it is--is the outstandingly, the crashingly obvious, fact which confronts and hits any philosophers of science who set out, in a practical or technological manner, to do any actual scientific research. It is because Kuhn--at least--has noticed this central fact about all real science (basic research, applied, technological are all alike here), namely that it is normally a habit-governed, puzzle-solving activity, not a fundamentally upheaving or falsifying activity (not, in other words, a philosophical activity), that actual scientists are now, increasingly reading Kuhn instead of Popper: to such an extent, indeed, that "paradigm" and not "hypothesis: is now the "o.k. word" (1970, p. 60).

Williams (1970, pp. 49-50) states that there is insufficient evidence to support either Kuhn's or Popper's view of the essential nature of science and the impetus for scientific revolutions. He further doubts that sociological inquiry can gather the requisite data. A significant problem in gathering and analyzing data about what scientists do is the question of whose scientific activities are the most significant--the exceptional thinker or the average scientist.

Other discussions have emphasized various aspects of the "disciplinary matrix." In an elaboration of the original construct of paradigm, Kuhn (1970, p. 255) stated that the most significant component of the disciplinary matrix is the fourth--the exemplar--which is the key to the socialization of future practitioners:

> One of the fundamental techniques by which members of a group, whether an entire culture or a specialists' sub-community within it, learn to see the same things when confronted with the same stimuli is by being shown examples of situations that their predecessors in the group have already learned to see as like each other and as different from other sorts of situations. . . . They may be presentations of the members of natural families, say of swans on one hand and of geese on the other. Or they may, for the members of more specialized groups, be the examples of the Newtonian situation, of situations, that is, that are alike in being subject to a version of the symbolic form f=ma and that are different from those situations to which, for example, the law-sketches of optics apply (Kuhn, 1970, p. 256).

This process is not the learning of rules and the ability to apply them, he argues, but the acquisition of "tacit knowledge." The deployment of rules and criteria occurs after the acquisition of tacit knowledge through repetition of exemplars.

Lodahl and Gordon emphasize "paradigm" as consensus, concentrating on the extent of agreement and uniformity of practice which "results from generally accepted theory and agreed-upon methodologies" (Lodahl & Gordon, 1972, p. 59, footnote 9). The agreement over both scientific goals and means results in a high probability for certain courses of action, thus making scientific activities predictable.

Baldridge (1971c) concentrates on paradigm as a model which organizes knowledge and provides appropriate research questions and the methodology and evaluative criteria for answering them. However, paradigms may compete

with each other to explain the same phenomena (e.g., Rational, Social Process, and Open Systems paradigms in organizational theory), and thus cannot be seen as shared commitments among group members. They are limited tools which help formulate questions and emphasize differing aspects of the subject studied.

Popp (1975) applies "paradigm" to education, arguing that "educational practice" is analogous to the "practice of science." If the teacher fails within the "accepted paradigm," educators define the failure as personal. In "extraordinary practice" the educational community begins to view failure as the fault of the theories and tools of educational practice. When a "crisis in the classroom" occurs, researchers may begin to explain failure in terms of new "disciplinary matrixes" which show why the failure is predictable and where modifications will have to be made.

Popp addresses the difficulties inherent in the "eclectic approach" of accepting all paradigms as partially valid or applicable to a limited area. He is unable to explain or describe the processes in which the field of education adopts a new paradigm.

This difficulty may derive from the nature of the educational research community. Corwin (1975) notes that the field of "educational research" at best consists of "many disparate and (as yet) rather nebulous research

communities" (p. 4). In addition, education is far more subject than are the physical or even other social sciences to public pressures which may define its research problems and establish evaluative criteria for their solution.

Crane (1972) argues that the concept of paradigm when combined with the concepts of "social circle" and "invisible college" can provide the basis for a sociology of culture which explains changes in the arts and humanities as well as in the sciences:

> [S]eemingly diverse areas, the sciences, the visual and literary arts, and religion are sufficiently similar in their modes of social and ideational development so that the same theoretical concepts can be applied to all (p. 131).

The study of the belief systems of practitioner groups, whether scientific, artistic or religious, and sociometric analysis of the relationships among groups and between group members would explain the development of the arts and of scientific fields.

Citing evidence that cultural change follows the pattern Kuhn described--long periods of "normal practice," in which the possibilities of a style are exploited, interrupted by revolutionary periods--Crane argues that "paradigm" may be applied to the unifying style or idea in the arts. During periods of normal practice, the style is the norm of an entire social circle. During revolutionary periods members of an invisible college challenge the norm

and develop their own "paradigm" which may eventually be adopted by a larger circle.

Thus, while Kuhn introduced the concept of paradigm to explain the growth of scientific fields, others have applied the term to diverse areas. Of the components of the disciplinary matrix, they have emphasized consensus. "Paradigm" is applied on many levels from a specialized research area, to a discipline, to broad areas of culture.

In the "Postscript" to the 1970 edition of The Structure of Scientific Revolutions Kuhn responded to the disparate uses of his idea of "paradigm."

> A number of those who have taken pleasure from it [The Structure of Scientific Revolutions] have done so less because it illuminates science than because they read its main theses as applicable to many other fields as well. I see what they mean and would not like to discourage their attempts to extend the position, but their reaction has nevertheless puzzled me. To the extent that the book portrays scientific development as a succession of tradition-bound periods punctuated by non-cumulative breaks, its theses are undoubtedly of wide applicability. But they should be, for they are borrowed from other fields. Historians of literature, of music, of the arts, of political development, and of many other human activities have long described their subjects in the same way. . . . If I have been original with respect to concepts like these, it has mainly been by applying them to the sciences, fields which had been widely thought to develop in a different way. . . .
>
> This book, however, was intended also to make another sort of point, one that has been less clearly visible to many of its readers. Though scientific development may resemble that in other fields more closely than has often been supposed, it is also strikingly different. To say, for example, that the sciences, at least after a certain point in their development, progress in a

> way that other fields do not, cannot have been all wrong, whatever progress itself may be. One of the objects of the book was to examine such differences and begin accounting for them.
>
> Consider, for example, the reiterated emphasis, above, on the absence or, as I should now say, on the relative scarcity of competing schools in the developed sciences. Or remember my remark about the extent to which the members of a given scientific community provide the only audience and the only judges of that community's work. Or think again about the special nature of scientific education, about puzzle-solving as a goal, and about the value system which the scientific group deploys in periods of crisis and decision. . . (Kuhn, 1970, pp. 270-271).

He notes the need for further study of the community structure of science and of other fields.

That social scientists have so eagerly adopted the notion of paradigm may be a function of the paucity of concepts available to describe and analyze the interaction between the structure of knowledge of a field and the social structures of those who work with that knowledge. Further study of the relationships between the structure of knowledge and social structures should lead to clarification of this concept or introduction of others which communicate more clearly. However, despite its ambiguity, the term has utility.

D.2 Conclusion

Although the concept of paradigm remains unclear, many researchers have found it helpful in explaining the development of knowledge and in differentiating among

disciplines. The concept appears to have potential value in the analysis of the culture of academic departments.

The degree of paradigm development of its discipline is a significant aspect of a department's culture. The highly developed paradigm provides a clear technology and promotes consensus. It enables a department to define its tasks or goals and the processes for reaching them with relative precision. Where the discipline has a low degree of paradigm development, there is no basis for consensus and the task and technology may be ambiguous. Thus it appears probable that the degree of paradigm development in its discipline may affect the department's social structure.

E. Conclusion

The literature on academic departments contains no systematic description or analysis of processes of influence. While many studies have used the variable "power," this research does not form a coherent body of knowledge because the variable has been defined in many ways. Although the effects of inter-institutional differences in size, complexity, wealth, and prestige on departments have received considerable attention, intra-institutional differences remain largely unexplored.

The use of power and influence among professionals appears problematical. Norms of autonomy militate against

the use of or response to reward power and coercive power. However, professional norms would support response to expert power and referent power. While a limited sample of professors indicated that they were more responsive to the dean's use of expert power than to his use of any of the other four types, studies of professional groups using qualitative methods find little evidence of expert power. Blau has described a process which limits expert power in groups whose members are in frequent contact. Expert power appears to influence the adoption of innovation and individual choice of research topics where individuals are not in constant contact with the "expert."

When professionals are organized into task groups, they may have to make some decisions as a group. In the decision making process, power may be used to control behavior or to influence outcomes. It appears logical that disciplinary paradigm development may affect the conditions under which influence is exercised in academic departments.

Because the highly developed paradigm provides practitioners with shared criteria for evaluating expertise, differing degrees of expertise and thus expert power exist. A "halo effect" could allow the recognized expert to influence decisions not specifically related to his own sphere of competence (French & Raven, 1960). If its structure is so complete that other perspectives are excluded,

the paradigm may limit deviant ideas about the curriculum. Where members of a discipline share a paradigm, curriculum practices of a department would not differ significantly from those of the external reference groups. One might expect little need for discussion about curriculum in such a department.

In a discipline with a low degree of paradigm development, debate over fundamentals, rules, and methods is typical. Much of the content of that debate is included in the curriculum so that future practitioners learn to evaluate various perspectives and models as part of their training (Kuhn, 1962). Low paradigm development may create a condition of non-comparable bases of expertise which makes differential influence based on expert power problematical. In a low paradigm discipline a department is more likely to be divided into camps supported by external reference groups with differing perspectives. Curriculum issues might be expected to create the basis for constant debate and conflict which cannot be resolved unless adherents of one position leave the department. Divergent views may be accommodated through the practice of mutual tolerance which allows each professor autonomy in the instruction of his own graduate students (Hagstrom, 1965) and autonomy in conducting his own courses. It seems probable that differing perspectives can coexist only if there is no need to coordinate the teaching activities of

individual instructors. The more interdependent individual courses become, the greater the likelihood that instructors will attempt to influence their colleagues and the greater the likelihood that some form of social power will be evident.

Thus it appears probable that disciplinary paradigm development may affect curriculum decision making and the exercise of influence in academic departments. The relationship between the structure of knowledge of a discipline and social processes in the academic departments to be studied emphasizes the effects of disciplinary paradigm development on social power and curriculum decision making processes.

CHAPTER III

THE MECHANICAL ENGINEERING DEPARTMENT

A. Introduction

This chapter presents data used in the analysis in Chapter VI. It discusses the structure of knowledge of mechanical engineering in terms of paradigm development and considers curriculum and program as departmental tasks. It describes the decision making processes and the nature of social power in the mechanical engineering department.

A.1 Faculty

The mechanical engineering department studied consists of eleven full time, regular faculty members, a visiting assistant professor, and various adjunct professors hired occasionally to teach specialized subjects. Two members of the department are on sabbatical leave. Table 1 summarizes information about the full time regular faculty.

A.2 Background

During the past ten years the department's size has decreased slightly from thirteen full time faculty to eleven. A surplus of engineers, especially in the

TABLE 1

Rank	Year Ph.D. Received	Field in Mechanical Engineering	Tenure	Number of Years in Department
Professor	1958	Theoretical Mechanics/ Fracture Mechanics	yes	10
Professor	1956	Applied Mechanics/ Rheology	yes	9
Professor	1966	Applied Mechanics/ Experimental Methods	yes	10
Professor	1966	Thermal Science	yes	9
Professor	1960	Thermodynamics	yes	10
Professor	1964	Applied Mechanics	yes	9
Professor	1942	Applied Mechanics/ Wind Energy	yes	10
Professor	1963	Thermal Science/ Solar Energy	yes	10
Associate Professor	1964	Theoretical Mechanics/ Fracture Mechanics	yes	7
Associate Professor	1968	Thermal Science	yes	7
Assistant Professor	1968	Machine Design	no	4

aerospace industry, created a temporary decline in enrollments. Although enrollments have recently increased, the department has not received the funds needed to hire more staff. The composition of the department has changed slowly. Eight faculty members have been in the department for at least nine years.

B. Paradigm

Kuhn (1962, 1971) included four components in the "disciplinary matrix" in defining "paradigm." Mechanical engineering clearly has the first two elements of the disciplinary matrix--symbolic generalization, i.e., expressions whose definitions are accepted without question and which may be stated in mathematical form, and "metaphysical paradigms," i.e., shared models and theories. These shared elements serve to unify the field of knowledge. A respondent in the mechanical engineering department explained that mechanical engineering, unlike sociology and psychology, is not divided into camps because engineers agree on basic terms and criteria for proof while social scientists do not. Several respondents described research, both basic and applied, as the accretion of new knowledge on an established base.

The third element of Kuhn's disciplinary matrix, shared values, does not entirely apply to mechanical engineering. Engineering is not only a research area and

an academic discipline but is also a profession. Historically, groups in the profession have stressed varied values, and the profession has shifted its conception of what an engineer should be. In research as well as in the training of engineers there is some conflict between "basic" and "applied" orientations.

Changing patterns of engineering education reflect changing values. The emphasis of engineering education has shifted from the purely "practical" values of the practitioner to the "scientific" values of the researcher. In the nineteenth century engineering training evolved from the apprentice system in which the discipline was defined as "essentially an art, epitomized by the practical inventors" (Perrucci & Gerstl, 1960, p. 58) to training in institutions which provided a firm grounding in mathematics and the physical sciences.

Early programs emphasized training in settings analogous to the industrial work world. A 1918 report on engineering education even expressed the doubt that a student's performance in mathematics and science courses was an accurate indicant of his ability to do engineering work (Perrucci & Gerstl, 1960, p. 59). This view of the profession declined steadily. A 1955 report, influential in the design of engineering programs, recommended that the sciences and mathematics provide the basis for engineering education. This report was:

> . . . the culmination of efforts to move engineering from a practical art to a science-based profession that is concerned primarily with the functions of research development and engineering design (Perrucci & Gerstl 1960, p. 60).

By the late 1960s, the science-based perspective characterized most engineering programs.

As the scientific curriculum became dominant, the field experienced tension between the orientations of those trained before the scientific emphasis and those trained afterward. This conflict was less divisive in universities than in industry where managers and senior engineers tended to view the training of their younger colleagues with skepticism. However, engineering education must accommodate both views of the profession.

In universities, debate centered less on the value of scientific curricula than on the way in which science should be taught. A respondent stated that instruction usually follows the textbook used in a class; thus, changes in textbooks are an indicant of changes in courses and curricula. In the early 1960s texts stressed acquisition of content. Later in the decade they emphasized understanding and application of basic principles. The respondent noted that the field has begun to question this approach, since some instructors feel students do not acquire sufficient content.

Differing research values are reflected in the engineering journals. A member of the department explained:

"The high-powered mathematical [journals] won't touch the low-grade [applied] material."

A member of the mechanical engineering department contrasted the outlook of the researcher interested in applications with that of the theoretician:

> Some people are very interested in direct applications, their specific application, without being able to generalize it. They don't have much use for the high-powered guy who is looking at an idealized case that doesn't exactly fit anywhere. . . . The person who is more mathematically inclined may not want to be bothered with mundane details of daily work as long as they come out with an analytical solution to the problem.

The applied researcher and the theoretician have a somewhat different view of what constitutes adequate "proof." The theoretician must be able to provide an explanation which can be evaluated by acceptable criteria of proof. For the applied engineer, the test of proof is that something "works."

> [The analytical solution] may be something that's difficult to evaluate but [the theoreticians] feel they've solved the problem. . . . Generally, the high-powered theory is way behind what's actually being done in practice, for example, in the area of fluidity. A fluid amplifier--they've built these things and are using them--nobody's really analyzed what goes on inside them. We can build all kinds of things that work and not be sure why. It's an experience factor--try one thing, try something else.

A member of the chemistry department, who had an undergraduate major in chemical engineering, contrasted the orientation of the engineer with that of the chemist. Although he considered engineering a science, he argued it also is an art:

> By art I mean some people have it and some people don't. You can do all the calculations you want to on a piece of paper, but that doesn't guarantee this refinement is going to work. You get a feeling for it after a while. If you design some stuff that worked for some people, you say, "Even though all the calculations are right for this tank we are going to do the experiment in, it just isn't right. It's too thick, or too thin, and I'm going to add a certain fudge factor to it." . . . Chemists, in general, believe their calculations. . . . The thing that really makes a great chemical engineer is based on his own intuition. . . . To me, it is just like a doctor. A good doctor knows more than just what is in a textbook.

Although journals can be classified according to their emphasis on theoretical or applied problems, and the two orientations appear to have different values about the nature of proof, the gap between "pure" and "applied" orientations is not significant to the respondents in this department. Some respondents reported that they customarily engage in both basic and applied research and had no difficulty doing both. One respondent felt that the outlook of funding agencies was as important as personal preference in determining the direction of an individual's research. He noted that the research emphasis of the department's "principal funding agency" differed from that of many of the faculty members.

> N.S.F. is our principal funding agency, and they seem to be staffed mostly by scientific-oriented people who perceive research being more, the let's say, less practical research. Whereas, I think, many of the engineering faculty see research as more development that is very practical

> and very applied. N.S.F. tends to be less practical. In my mind, there is a little gap between the type of research money that is available and the type of problems that need to be solved.

The value differences between basic and applied research do not appear to create serious divisions among those engaged in engineering research, at least on the university level.

Respondents did not recognize the fourth element in Kuhn's disciplinary matrix--the examplar. Rather they stressed learning as the development of creative problem solving skills. Because this point was not central to the research question, it was not pursued in the interviews.

Mechanical engineering may be considered a high paradigm discipline. Its shared terms, criteria, and theories prevent the development of diverse schools of thought. The value differences do not appear to create a serious split in the research community.

C. Curriculum and Programs

The task of teaching undergraduates has relatively clear goals. The processes by which the goals are attained are well defined. The curriculum is structured at the undergraduate level. Students must take courses in a prescribed sequence, as their ability to do the work in advanced courses depends on specific knowledge and skills acquired in the prerequisite courses.

The curriculum is in a transitional period. In the fall of 1974 the faculty approved an outline of a revised curriculum; however, the specific courses have not yet been planned. It will take another year for the revisions to be implemented.

The present curriculum is designed to serve many needs. Having made the decision to prepare graduates capable of either advanced study or immediate employment, the faculty must offer a wide range of courses reflecting the diversity of engineering activities. Because of rapidly expanding knowledge and technology and changing engineering priorities, the curriculum must maintain some flexibility. The catalog description of the program indicates that the department tries to meet all of these needs:

> In view of the rapid expansion and changes taking place in technology, the preparation of the engineering student must be broad; hence the program of study is designed to give the engineer not only the basic skills of his profession, but also a general education which enhances the ability to adapt to the changing needs of his profession.

The student's program is highly structured. All College of Engineering students take the same courses during the freshman year with the exception of one humanities or social science elective and a science elective. In the sophomore year, the student begins to specialize in one of the engineering departments. The student is allowed one

elective a year during the sophomore and junior years. During the senior year, only three courses are required; the remainder may be selected from a list of technical electives and from the humanities or social sciences. The student must take at least three courses in the elective of his choice in order to develop some understanding of the structure of a discipline other than engineering. The department chairman must approve each student's choice of electives.

Although the framework of the program appears rigid with a specified series of required courses, individual interests and topics of current relevance can be accommodated in both required courses and special problems courses. A respondent described this flexibility:

> Say some student comes up and says he wants to cover something, and would like to see the professor cover something on pollution controls in a core course. The professor will probably do something on it. There is quite a bit of flexibility even in those courses. Let's say the real basic stuff you can't change takes two-thirds of your time, and the rest of the time could be applications of the basic materials to pollution controls rather than whatever he used last semester. That's some flexibility.

Upper division students, either individually or in groups, often initiate special problem courses. For example, a student group developed a residential solar heating project for a national competition. Another year, a group initiated a course on environmental problems.

The graduate programs are more flexible but also more limited. Only the areas of thermal energy, fluid

mechanics, and solid mechanics are offered. At the master's level the graduate advisor has responsibility for student recruiting and admissions and planning student programs. This allows flexibility but may produce discontinuities in student policies when a different faculty member assumes the position of graduate advisor (Departmental Report to the Graduate Committee, 1974, p. 24). The graduate advisor also has responsibility for recruitment and admission of doctoral candidates. However, the committee on studies and dissertation committee are most influential in determining each student's program.

Current programs will be altered when the revised curriculum goes into effect. However, the new curriculum retains the clarity and well defined sequence of the present plan. The faculty treats the curriculum and programs as group tasks requiring cooperation and coordination among individuals. Decision making and coordination are accomlished through both formal and informal interaction.

D. The Decision Making Process

The mechanical engineering department's decision making process is highly formalized. This group consciously supports the formal system in order to insure that all members of the department participate. However, informal interaction is so extensive that it is difficult to determine precisely where an idea has originated.

D. 1 The Formal System

The faculty distributes its decision making power among four standing committees: the Policy Committee, the Undergraduate Committee, the Graduate Committee, and the Promotion and Tenure Committee. Ad hoc committees may be formed if an issue requires extra work.

Committee assignments change annually. The chairman proposes committee assignments to the entire faculty which discusses the assignments, makes any desired changes, then formally approves the committee list. Criteria for making assignments include individual preference, the desirability of faculty rotation to bring new ideas into the committees, and a policy which at one time specified what ranks would be represented on the committees. The latter criterion has become somewhat irrelevant, since all but three members of the department are full professors.

An elaborate structure directs decision making for individual courses. The department chairman assigns a director to each course. The director is not necessarily the instructor of the course. The director makes several decisions about his course, including:

> . . . selection of text, content, and catalog description of the course, coordination of the course with appropriate group coordinators, administration of special exams, and direction of other faculty when they are teaching the course (memo from the Undergraduate Committee, no date).

When an individual who is not also the director teaches

the course, his professional autonomy must be accommodated. One director described this process:

> If some new instructor was going to teach [the course the director has responsibility for], I'd tell him what kind of content it should have. He's still the master, will teach this course. I give guidance. . . . He has to decide on his own how to teach, how to organize. I'm not going to furnish him any notes. He chooses his own textbook.

Thus while the official policy statement assigns the responsibility of textbook choice to the director, in practice that decision may rest with the course instructor.

When asked what would occur if the instructor disagreed with the director about course content or method, a respondent replied:

> We can talk--exchange information. I have never known of anything like that.

The hypothetical dispute would be confined to the director and the instructor. They would be expected to resolve their differences without drawing in other faculty or the chairman. However, the respondent could not see anything in the director-instructor relationship that would lead to serious conflict: "Engineers are usually pretty flexible," he noted. The instructor may make minor changes in the course without consulting others.

The content of an individual's courses is a legitimate area of concern for the rest of the department, particularly when the courses are prerequisites for advanced work. Where the course is not a prerequisite for others,

and coordination and sequencing are not at issue, the instructor has wide latitude.

An individual's teaching methods and grading practices are not a legitimate area of concern for the rest of the department. Of the five faculty in this department who responded to the questionnaire administered before the interviews (Appendix A), all indicated that they would consider another faculty member's intervention illegitimate in decisions about teaching methods to be used, assignments, examinations, and grading criteria. Respondents report no overt attempts to influence such decisions.

Each course is grouped with similar courses. The chairman appoints a coordinator of the group of courses who must:

> . . . assure that his group of courses provides continuity, consistency, and adequate coverage. He should confer with directors of courses in his group and recommend changes in course content to course directors, the undergraduate committee, or the department faculty when it seems appropriate to him (Undergraduate Committee memo, no date).

The Undergraduate Committee supervises the entire undergraduate curriculum. It should:

> . . . confer with coordinators, specify and coordinate the groups of courses, review and plan changes of undergraduate program as a whole, and approve catalog changes of undergraduate courses (Undergraduate Committee memo, no date).

When asked about the potential for conflict in this process, a respondent had difficulty envisioning

a situation in which conflict would have to be resolved:

> Well, I guess it [a hypothetical conflict which arose as a result of the complex system of course planning] would have to be worked out some way. There would have to be a compromise someplace. I don't know of anything quite like that. I suppose in the ultimate analysis, if a particular professor says flat "no" he won't compromise, and the committee does not want to compromise, then I suppose the committee chairman might try to work out--you know, he could just say you have got to do it as it could be enforced. But I think that is pretty extraordinary, and I don't think we are going to see anything like that at all. In general, I find the engineering people very cooperative, agreeable to change and improve things, particularly when they have had some role in the discussion.

If a conflict arose, the instructor would have to compromise or, according to the formal system, capitulate to the committee. However, it is unlikely that a major confrontation would ever occur.

Faculty members report that the department consciously attempts to maintain this formal system through continued use. The elaborate system has existed for only four or five years. According to one member of the department, it was instituted in order to:

> . . . make sure the whole faculty entered into the decision making process--force everybody to think about it a little more.

Another faculty member indicated that, since the University Faculty Handbook specifies that certain matters are the responsibility of the faculty, and since chairmen often have insufficient input, the department as a group decided:

> It would be beneficial to set up a formal system to give the faculty the means of implementing their responsibilities in the faculty handbook.

This respondent did not consider the new, more formal system, as a major change in the departmental decision making process:

> I guess the chairman made--he still made decisions probably about like he does now, except now there are formal means of obtaining input. Before, he did it generally on an informal basis.

Although the formation of this system was not associated with a conscious dissatisfaction with a chairman, with a change in chairmen, or with any group or individual dissatisfaction with the decision making process, the formal system may be a conscious attempt to prevent the development of a strong chairman. All faculty, including the chairman, stress the democracy of their procedures and emphasize the uniqueness of their own department in the College of Engineering, where other departments reportedly are organized as hierarchies dominated by their chairmen.

While the exact date of the creation of the formal decision making system is unclear, faculty estimates place the date at a time when a department chairman had left the department to become dean and a senior professor left to become associate dean. That change could have provided the appropriate conditions for the faculty to assert its collective authority. However, there is no memory of the department chafing under a strong chairman.

An alternative explanation for the introduction of the formal system may be that the department feared it

would be unable to maintain the satisfactory informal procedures without the former chairman's leadership. The new chairman, an associate professor, may not have been perceived as adept at managing the complex informal system.

The formal process appears to promote participation of all members of the department in departmental decisions. Although, according to one respondent, attendance at the committee meetings varies, attendance at the department meetings is good. The minutes of the 1974-1975 department meetings list attendance and explain any absences. There was only one unexplained absence the entire year. Absences were rare; most occurred only when a faculty member was hospitalized or attending an out of town conference.

Everyone participates in the discussions. Meetings reportedly are lively, with nearly any issue having the potential to create general debate. Faculty "scream and yell," get "purple in the face," and "pound the table." However, once the department has voted, faculty forget their differences. Respondents had difficulty recalling the specifics of any debates. Arguments do not result from or produce lasting schisms. Members of the department report:

> I may, for example, disagree with somebody, and may have a violent disagreement, arguing with them, but we come out of the faculty meeting [unclear] pat each other on the shoulder. . . . We respect each other intellectually.

> One of the charming things about this department is that everyone gets along reasonably well. In department meetings they may scream and yell . . . but they can walk out and are still as friendly as before they went in. That's what we claim anyway.

The group avoids divisive arguments by defining issues as problems to be solved rather than causes to be defended. A member of the department indicated:

> And the attitude, I think, of most of the people in the department is this: We suspect there is a need for something, like a hiring policy. And so we'll put a clay pigeon out--write something up and throw it out to the faculty and let them chew on it, make some adjustments and changes. Then it goes back to the Policy Committee and we work on it, incorporating the ideas and changes, the comments and the criticisms. . . . And there are disagreements most times. But we just sit down and say, "What are the pros and cons?" and try to weigh it and do it pretty much on a rational basis.

As a result:

> We don't hold grudges, and I think that's a good thing. There's none of this grudge-making, where "because you don't back me this time, I won't back you the next."

The formal system of decision making insures that every member of the department is informed and has the opportunity to attempt to influence major decisions. Even decisions such as the content of individual courses are subject to discussion and broad participation.

D.2 The Informal System

Despite the development of the formal system, extensive informal interaction occurs around many decisions. Any major change receives considerable attention before it

even enters the formal committee system. One faculty member described the informal consultation when asked how he would introduce a change:

> I would, first of all, talk to other people about it on a very informal basis before I would even bother to write it up. And I would probably even talk to the people on the committee about it informally, before I'd bother to write it up. Or we may talk about it, hash it--we brown bag it--hash it out over lunch or over coffee, or take a few minutes to talk to somebody about it. It's very informal. . . . But I think we work out a lot of things before it ever comes to the general faculty meeting.

Informal consultation serves to create support for an idea:

> There's always, you know, rallying support for your idea, and that's probably a legitimate part of the game. But it's not done in a vindictive way.

The process also exposes opposition or even flaws in the original idea which can be remedied before submitting it to the responsible committee. When asked how he responded when his idea met opposition in the course of informal discussion, a member of the department explained:

> I'd reevaluate it. I wouldn't just forget it, but I'd reevaluate it and try to take the criticism under consideration if I still throught it was a good idea. Eventually, the thing would be resolved. Either I'd convince them, or they'd convince me. It's done fairly.

Thus conflict may be avoided through informal consultation. The proponent of a change could either alter his recommendations, be convinced that they were not as valuable as he had thought at first, or convince doubters of the proposal's

worth. Thus, if an idea reaches the formal decision making process, the debate about it will be unlikely to lead to permanent divisions or irreconcilable disagreements.

In an emergency situation, the informal process may supplant the formal decision making system. A member of the department described such a situation in which his colleagues influenced him to change his course. As a result of a previous substitution of a computer course for a mathematics course in the required program, students were not acquiring the mathematical skills needed in advanced courses. Faculty complained about the students' lack of knowledge. To remedy the problem, after informal discussion, the instructor of the computer course included mathematical content. He explained:

> It was almost at the request of a number of faculty that came in individually to me. It was like a departmental decision, but there wasn't time to have a faculty meeting and spend three, four, or five weeks talking about it. We were into the semester and something had to be done.

The entire process, from identification of the problem to implementing a solution, was informal.

Informal and formal discussion occur so frequently that it is difficult for respondents to recall how a specific issue developed. However, in trying to make the formal system work, the department usually insures that issues are considered formally.

> Sometimes we discuss things over coffee, but any time a decision is made . . . there is a formal meeting and some kind of discussion [before the vote] to let everybody know what has [transpired?].

Attention to the formal process, even when a majority has been convinced informally, keeps the entire department informed and provides anyone omitted in the informal discussions a legitimate forum in which to influence the decision.

D.3 Curriculum and Program Revision

Until the most recent curriculum revision, change in both the curriculum and in individual courses was incremental. In the past ten years only "relatively minor changes of course content and order" occurred. A member of the department described the nature of the changes:

> The basic courses have changed essentially none in principle, but they have changed in presentation. Maybe they have changed a little in emphasis with different professors. Some of the advanced courses possibly have changed somewhat in emphasis and material that they present. It might be decided that one particular computational method, say, is no longer the most efficient, and so that would be phased out and a newer computational method would be introduced.

There is little need for change in the introductory courses because:

> Newton's Law hasn't been revised. The First Law of Thermodynamics hasn't been repealed.

More advanced courses must be changed in response to expanding knowledge in the field:

> We try to keep them up to date. I can, in some courses, just inject new things into the notes I used the year before and jerk out other things. But in other courses, if you want to do it well, you have to re-do it. That takes a lot of time, and when you're pressed for time, you grab last year's notes. I unfortunately do this with at least one course each semester. Usually, I do it with the one I feel most comfortable with and can ad lib off the top of my head to bring them up to date. But I don't think that's as good as having it worked out and planned ahead.

Another member of the department attributed the press to revise advanced courses to the growth of engineering knowledge:

> Just the nature of teaching requires you to update things fairly regularly. I would say, maybe every two or three years you have to be making fairly substantial changes. This is one of the challenges of the teachers in engineering. It is not like teaching history or literature or something like that.

The mechanical engineering department broke the pattern of evolutionary, incremental change when it approved a completely revised curriculum. It is seen as a major change:

> . . . there have been changes made each year. But this [the new curriculum] is a fairly major overhaul we are talking about now.

The process of developing and adopting the revisions occurred in the formal decision making system.

Several factors produced pressure for a major revision. The decline in engineering enrollment which followed the curtailment of the aerospace program was important:

> What we need are more students, that's the point. . . . You recall about two years ago

> the number of engineering students was down. We don't have students, so, we thought, maybe some new plans would attract students.

Faculty members who felt that science was being over-emphasized to the detriment of applied engineering pressed for changes. Other faculty felt the curriculum did not have sufficient internal coordination of courses. The diversity of course offerings had become so great that it created problems. Some members of the department felt "we were a little too diverse--too many options for the students. We just weren't able to teach all those courses and give proper quality and support to all of these different areas."

The national engineering accrediting agency had recommended a broader curriculum, a change it was promoting nationally. A member of the department reported:

> Now we've got the fact that our students don't have enough humanities, so maybe we ought to put in some more humanities. The ECPF [Engineer's Council for Professional Development] people come in every five years and say, "Gee, you ought to add a few more humanities."

The department felt it should respond to this suggestion, even though it might be difficult to add more requirements.

The department also felt it should respond to perceived industrial and regional needs. Some members felt a manufacturing option would meet these needs.

These demands created difficulties for the department. There was pressure to consolidate or to eliminate

options coupled with pressure for more required humanities and communications courses and, in addition, a manufacturing option.

The student program was already so full of requirements that in order to add more, the department had either to eliminate some requirements or to advertize its degree as a five-year degree. Since the five-year B.S. degree was perceived as unattractive to students, the department had to decide to eliminate parts of its curriculum.

Planners of the revised curriculum attempted to consolidate rather than eliminate content areas. This strategy creates a situation in which everyone is affected slightly and no one is affected disproportionately.

The proposed curriculum was written in great detail. For example, the planners specified that the content of the Humanities I course would include physiology of people, biochemical and biological processes, basic needs, capabilities and limitations, birth and growth, aging, prevention of disease and disability, hygiene--maintenance of health and happiness, nutrition, exercise, work, sleep and recreation.

A respondent indicated that the recommended content in the revised curriculum was a significant change for the department. The revisions tended to stress applications rather than the previous emphasis on scientific principles.

The process of changing the curriculum is slow. The planning sequence from initiation of discussion to implementation of the change will cover about five years. Discussion began in 1971 with the formulation of departmental goals. The goals were approved by the faculty in 1972. During the 1972-1973 academic year, the faculty approved a "Definition of an Undergraduate Program" prepared by the Policy Committee and the Undergraduate Committee. In the fall of 1973, the chairman asked the authors of that report to redesign the undergraduate program. That group released its plan in the summer of 1974. In October, the faculty approved the report. Individuals were then assigned the task of preparing catalog descriptions for the new courses. The department hoped these revisions could be approved in time for the 1976-1977 course catalog.

The department willingly sacrifices speed in order to insure full participation in decision making. One of the faculty members involved in developing the new curriculum discussed the advantages and disadvantages of extensive discussion:

> We are actually moving very slowly with a lot of committee input--discussion. This may be one of the frustrating things. The university is very slow to react or to act because of all this committee input. When it does happen, it is not rammed down somebody's throat. They have really had time to think it over and get their say into the new program. So I don't think we will have much resistance. In fact, most people have had their input into it, and it is something they want to do.

Through formal and informal interaction, the group achieves a consensus. Members of the group have opportunity to learn of their colleagues' views and to adapt their own or make small compromises. If the group approves a new policy, all of its members will support it. During the discussion, a group norm may be shifted. A majority does not impose its will on a minority.

E. Social Power

An understanding of the group and its norms is necessary for an understanding of social power in the mechanical engineering department. The department is a highly cohesive group. Formal meetings and informal discussion promote a high degree of interaction. "Unfortunately," one member of the department said, the heavy teaching load and pressures to keep informed about current research leaves members of the group little time for socializing with each other after work.

There appear to be no distinct sub-groups, interest groups, or departmental isolates. Junior faculty are accepted as influential colleagues. One younger member of the department discussed his relations with the rest of the department:

> I've really disagreed with people at times. And even though I was a junior professor, if I had something to say, my words were listened to. They didn't just count them off as from a new faculty member who doesn't know what he's talking about. And I appreciate that.

Disagreements do not produce lasting divisions or individual animosity. A respondent remarked:

> We don't hold grudges, and I think that's a good thing. There's none of this grudge-making, where, "Because you didn't back me this time, I won't back you the next.

Departmental membership has been stable. Of the eleven full-time faculty members, five have been in the department for ten or more years and three for nine years. The most recent addition to the faculty was hired four years ago, although a visiting assistant professor in the department will join the staff as a regular faculty member next year.

Members of the department have positive sentiments about the group and about individual colleagues. A respondent described the favorable relationships:

> We know each other well, professionally and personally. We are a good group. Everybody is proud of himself. We can cooperate. . . . When I came here in '67, we already had this kind of nice situation. I guess it's because of nice people.

Another stated: "We respect each other intellectually." Not a single respondent made a negative remark about the department or any of his colleagues.

The high rate of interaction and cohesive group structure enables the group to develop a number of strongly held norms and shared sentiments. One of the strongest norms is that of faculty participation in and control of departmental decision making. Although the extensive

discussions are costly in faculty time, respondents did not resent the time spent in meetings, and they expressed positive sentiments about the value of the formal system and the need for "input" from everyone.

Closely related to the value placed on high participation is the sentiment that faculty, not administration, should make decisions, and that the chairman should be a faculty member, not a "head." This view of the chairman's role is maintained not only by a policy of faculty participation but by informal reinforcement of the sentiment. A member of the department related an incident indicative of informal maintenance of the chairman's role:

> I tweak [the chairman] about that. I call him "boss." He says, "I'm not the boss, I'm the chairman. I'm a faculty member, not an administrator!" Last Friday I had some fun with him. The Dean now has called the chairmen's meeting with the Dean and Assistant Dean "The Administrators' Meeting." And I said, "Ah Ha! I knew you were one all the time."

Such "tweaking" is likely to prevent the chairman from developing an administrator's perspective, even if he were inclined to.

Extensive participation and expressed interest in departmental affairs, curriculum, and individual courses appear to be norms. No one admits to more or less interest, involvement, or activity than that of the rest of the group. However, in practice, the extent of individual committee activity varies. The department's report to the Graduate

Committee lists each individual's credited committee time, including college and university committees. The amount of time ranged from none to eight hours a week (Mechanical Engineering Report to the Graduate Committee, 1974, p. 7).

Rough equality or at least comparability of perceived expertise is another shared sentiment. Respondents note a high degree of mutual respect among members of the department. The department's report to the Graduate Committee did not follow the suggested format of ranking faculty according to reputation and expertise. It stated only that, "All full-time professors and adjunct professors engaged in graduate teaching hold the highest degrees attainable in their fields," and that, "as would be expected," senior faculty tend to have received more recognition than younger men who had not been conducting research for as many years.

However, national reputation does not necessarily translate into eminence within the department. The funding of research proposals and national reputation were explained as a result of individual skills other than scholarly expertise:

> I have been able to [get research grants]. Some people have more of a marketing skill than others. You may be a real outstanding, bright professor, but if you can't sell your ideas, you can't get research [grants]. . . . This is one of the problems I think some of our faculty have. They may be exceptionally brilliant people but they can't sell.

Another member of the department felt professional reputation could be obtained in only one way, a way which did not necessarily require great expertise:

> Publish a lot of papers, pure and simple--volume. That's what a lot of people buy. It's just that simple. They don't even care if it's any good. If you've got a big bibliography you can tack on, a lot of people think you must be good.

He noted that, while academics look more closely at the quality of publications than do engineers in general, academic reputation is the result of self promotion.

> A lot of it is just public relations, like advertising. They'll shudder if you mention advertising--like to think these ideas are accepted because people recognize they're good, not because somebody's ballyhooed them. You look at some of the experts, and they have essentially gone out and beaten the drum--a little more subtly than a used car salesman--but the effect is the same.

An individual must establish his expertise within the department through interaction with his colleagues:

> From day to day contact you have some idea of how competent [other faculty] are, though this may not be a totally correct impression, I'm sure. . . . You figure a guy either knows it or he doesn't, and if he doesn't, you don't mess with him. And if he does, you don't look at his publications.

Members of the mechanical engineering department see each other as roughly equal in expertise, although they accede to specialists in their area of specialization. Specialization is not so great that individuals feel unable to evaluate colleagues in other specialties or to teach undergraduate courses outside their own field.

Flexibility appears to be another important departmental norm. Engineers must be able to shift their research

emphasis when changing conditions demand study of new problems. A member of the department stated:

> I think that is the nature of engineers--you work on the problems that need work on. The department will shift to a great extent, particularly to support research efforts in these areas. . . .

An engineer may apply the same principles to varied problems.

> Like one case, one professor several years ago was working on a project called "Aerospace Problems." He was working on shock tubes and aerodynamics kinds of problems. Of course, the aerospace industry went into a big slump. The man was on the moon and there wasn't such a big interest . . . the professor is now working on windmills, in which the same basic things apply to design as the air foils. . . . In my case I was working on real basic heat transfer problems two or three years ago. Now, I am working on heat exchangers and heat recovery and some basic things that relate to that.

An individual's expertise does not become irrelevant or outdated if he is flexible enough to "just work at it a little bit to completely retrain himself," the respondent explained. Another member of the department noted that obsolescence is no problem to the engineer willing to work at keeping up with his field.

A member of the department is expected to be equally flexible when initiating or responding to proposals for curriculum or program change. The practice of considering the first draft of a plan as a "clay pigeon" prevents formation of inflexible positions.

Respondents did not identify instructional norms for either teaching methodology or grading practices. While they stated there was no departmental grading standard and no colleague pressure regarding grading practices, members of the department described their grading practices as consistent. The mechanical engineering department's grading practices are more rigorous than those of the other departments in the College of Engineering, so much so that mechanical engineering majors are disadvantaged when the college selects members of the national engineering honorary society. A percentage of the entire college rather than of individual departments is eligible; mechanical engineering students have complained that the department's grading "policy" makes it more difficult for its majors to compete.

This perception is supported by the grading report published by the university's Division of Institutional Research. In the fall of 1974 the mechanical engineering department gave 9.7 percent fewer A's in lower division courses, 4.8 percent fewer A's in upper division courses, and 11.8 percent fewer A's in graduate courses than the average of other departments in the College of Engineering. However, the percentage of A's in lower division courses does not differ from the average of other departments in the university, and the department gives .7 percent more A's in upper division courses than the university average. Its graduate students receive 6.6 percent fewer A's than

the average for other departments in the university. No figures on intra-departmental variance are available.

A member of the department states that, while there are no specific norms about appropriate teaching practices, a person with too divergent an approach "couldn't last" in the department. As an example of a divergent practice, he cited the case of an instructor in another department who had been criticized for using the "European method" of grading. In this method, the student's grade is based on a final examination rather than on a number of tests and assignments given during the semester. His perception that a divergent individual could not last in his department was only a speculation, as he could recall no instances of a faculty member doing anything that different. That respondent also indicated that he saw no substantive difference between the "European Method" and the "American Method" as he had used both without difficulty in other schools. However, in this department, he would use the "American Method." Thus, while no policies are stated, individuals may compare their own actions to those of others in the department and adapt to a perceived group criterion.

In a cohesive group with a norm of equality of expertise, individual exercise of power in any form is inappropriate. Although some individuals may exert expert power, they are not readily identifiable from the interview

data. Group norms would make admission of differential influence unlikely.

Some legitimate power is attached to formal positions such as the course director, committee chairman, or department chairman. When asked about the outcome in a hypothetical dispute between a committee and an instructor who refused to follow its policy, a respondent indicated:

> . . . the committee chairman might try to work it out--you know, he could just say, "You have got to do it," as it could be enforced.

However, it is unlikely that the committee chairman alone could enforce the policy.

The department chairman has legitimate power over some decisions, such as making course assignments. However, even in such decisions, his discretion is limited. If he uses his authority illegitimately, he faces the wrath of the group. A member of the department described an incident in which the group checked the chairman's power. A former chairman had purposely assigned a professor a heavier than average teaching load in order to "encourage" him to obtain another research grant. The entire department except the concerned professor met with the chairman and convinced him to change the assignment to conform with the average teaching load in the department. Thus the group limits the legitimate power, reward power, and coercive power of an administrator.

The group also has limited the chairman's power formally. Although the minutes of department meetings rarely record the exact vote, when the department voted that no one shall serve two consecutive terms as chairman, the minutes indicate that the decision was unanimous (Minutes of the November 11, 1974 department meeting).

Expert power is limited by the norm of equality. Junior and senior faculty members are considered equally influential. An individual who attempts to use expert power may be subjected to group sanctions; however, there are no reported instances of such influence attempts.

Only the referent power of the faculty as a group affects behavior. The group's cohesiveness, the mutual esteem of its members, shared norms, and group control of the decision making process may make group membership and esteem not only emotionally satisfying but essential for an individual's survival. The assertion that a deviant "couldn't last" in the department suggests the group's potential to sanction unapproved behavior. A respondent's admission that he adapts his own grading practices to conform to common practice is indicative of the group's referent power for him.

The elaborate formal decision making process and extensive informal consultation enables the department to avoid situations in which overt power, of any kind, is exercised. By defining issues as problems to be solved

rather than as causes to be defended, the group establishes the expectation that proposals will be modified. An individual who takes an adamant stand on an issue would appear inflexible, and thus deviant from an important group norm.

The extensive consultation process allows the group to reach a consensus, so that a majority does not impose its will on a minority. In faculty meetings, decisions reportedly are made by majority vote. However, the minutes of the meetings do not report the votes. During the 1974-75 academic year, the minutes record only one vote, a unanimous decision.

During the lengthy consultation individuals may make many small compromises in their positions. Over time, the group's opinion may change, but individuals sense no pressure to change their views. While faculty meeting debates are heated, the participants appear to enjoy them. This enjoyment may be the result of a process which insures that no one will lose.

F. Summary

Despite the extensive coordination needed to plan and execute its highly structured program, the mechanical engineering department avoids conflicts between the autonomous professional and his colleagues. The structure of knowledge of the high paradigm discipline creates

a basis for consensus and a criterion with which to evaluate programs, curriculum, and suggested revisions. Faculty members are able to agree about the nature of the tasks of teaching undergraduates and graduates. They perceive that these tasks are clear, and that they require the coordinated action of all members of the group to be accomplished effectively.

The mechanical engineering department is a cohesive group with clear norms and many shared sentiments. The norms of full participation and equality prevent differential exercise of influence from any base of power. Thus, of French and Raven's five categories of social power, on the referent power of the group appears to influence individual decisions and behavior.

CHAPTER IV

THE CHEMISTRY DEPARTMENT

A. Introduction

This chapter describes chemistry as a high paradigm discipline. The curriculum and program tasks, decision making processes, and social power in the chemistry department are considered. This data will be analyzed in Chapter VI.

A.1 Faculty

The chemistry department consists of sixteen and one-half full-time, regular faculty members, and two instructors who work only with specific courses. Members of the medical school biochemistry department are affiliated with the chemistry department. Table 2 summarizes general information about the regular faculty.

A.2 Background

The chemistry department has expanded steadily over the past ten years while offering the same number of degree programs. In 1964-65 the department consisted of ten faculty, including one instructor. By 1974-75 it had grown to sixteen and one-half regular faculty and two

TABLE 2

Rank	Year Ph.D. Received	Field in Chemistry	Tenure	Years in Department
Professor	1949	Organic	Yes	>13
Professor	1956	Organic	Yes	7
Professor	1950	Physical	Yes	>13
Associate Professor	1962	Analytical	Yes	11
Associate Professor	1965	Physical	Yes	7
Associate Professor	1965	Physical	Yes	8
Associate Professor	1961	Organic	Yes	5
Associate Professor	1968	Inorganic	Yes	6
Associate Professor	1968		Yes	5
Associate Professor	1966	Physical	Yes	6
Assistant Professor	1970	Physical	Yes	3
Assistant Professor	1970	Inorganic	No	3
Assistant Professor	1972	Organic	No	1
Assistant Professor	1970		No	1
Assistant Professor	1972	Analytical	No	1
Assistant Professor	1970	Inorganic	No	1

instructors. In that period some change in membership occurred through retirement and resignation, but most of the growth resulted from the addition of new faculty. Over one-third of the staff has been in the department for only three or fewer years.

B. Paradigm

Most areas of chemistry fit Kuhn's description of "normal science," i.e., a field in which the paradigm provides a structure which guides research, and knowledge expands rapidly until the potential set of problems or "puzzles" has been solved. Elite chemists describe their field as highly predictable, while others are excited by the challenges of rapidly expanding applications.

Lessing (1960) interviewed ten American chemists who "by consensus of their colleagues [are] the leading U.S. chemists today." Six of the ten had received the Nobel Prize. This group considered the state of their discipline as one of "crisis."

> [Chemistry] faces a crisis quite unlike that confronting nuclear physics, where the unexplained plethora of basic particles and the mystery still enwrapping the heart of the atom foretell great discoveries yet to be made in the ultimate nature of matter. The problem in chemistry is that to many chemists it appears to be a nearly settled field, explored in all its essentials, predictable, still capable of great refinement, but, except at the periphery where chemistry impinges on and combines with other sciences, unlikely to contain any new surprises of a basic nature. This is a dangerous state of mind in any science, as the chemists are well aware (Lessing, 1960, p. 131).

Consensus characterizes the high paradigm discipline. In a 1960 study of the membership of the American Chemical Society, Strauss and Rainwater interviewed 200 of its members and received completed questionnaires from 3,295 others. The responses showed a high degree of consensus among chemists about their discipline.

> Perhaps the most remarkable feature of chemistry, whether considered as a science, or a profession, is that, compared with the behavioral sciences or with certain other professions (medicine, nursing, and the military for instance), it appears to lack bitter struggles over internal status and professional policy making. Chemistry's multiplicity of tasks and work settings does not appear to cause deep splits among its various specialties or among men within the same specialty. Since this situation is also a characteristic of physics, perhaps a major reason is that clear criteria exist for the speedy recognition of important discoveries that may result in new specialties. Disagreement among "schools of thought" does not exist; neither do methodological disputes as in the behavioral sciences. All this does not deny the waxing and waning of fashionable areas within the discipline or of personal animosity, but there is a surprising absence of denigration by chemists of colleagues whose efforts are turned in other directions, and an equally surprising lack of hostility displayed over intra-professional politics (Strauss & Rainwater, 1962, p. 213).

Respondents in this study indicate that, except for one specialty, the condition Strauss and Rainwater described in 1962 still exists in chemistry:

> In my opinion, there hasn't been any true revolution in chemistry since, probably, quantum mechanics in 1928. People say things are very new and exciting--and they are new and exciting--but they are not new, basic scientific principles. They are really new aspects of old scientific principles.
> .....
> I'm fairly confident that there have been no revolutionary changes in the last ten or fifteen years

> in the other fields [other than physical organic chemistry] with the exception of biochemistry.

Thus chemists still agree about the fundamentals of their discipline. One respondent noted:

> I, to the best of my knowledge, have never met a person on the faculty of an accredited institution who had ideas different than mine on basic--I'm talking about basic principles.

While Lessing's elite scientists viewed this condition as a "problem," Kuhn argues that the state of "normal science" promotes rapid advancement and expansion of knowledge.

Rapid expansion characterizes chemistry. One respondent described the rate of change:

> [There is] massive change in application from semester to semester, hour to hour, or day to day for that matter. I find my courses are changing in the middle of the semester when a new paper has come out--at a graduate level.

The rate of change is so great that the field appears unpredictable to many scientists. A respondent explained:

> I'm sure that I could not even tell you what inorganic chemists would be working on ten years from now, because someone along the line is going to find something that opens a whole new area of research.

Chemists in the Strauss and Rainwater (1962) study shared a sense of "an expanding scientific universe."

> Chemists have a kind of Columbus complex: they are explorers of a brave, new, and important world, but they are only at the outset of their exploration--which means that nobody can really predict the future with certainty except that it will be bigger and grow more exciting (pp. 205-206).

The apparent contradiction between the elite scientists' description of chemistry as settled and predictable and the American Chemical Society members' view of the field as unpredictable and exciting results from the differing perspectives of basic and applied research. The elite scientist is more likely to share Popper's definition of "normal science" as "applied science" (Popper, 1970, p. 53). However, the majority of chemists may accept the stability of their field while finding applications and refinements "new and exciting."

In areas where chemistry merges with physics, revolutions still occur. One respondent described the changes in his own specialty, physical organic chemistry, in terms of a paradigm change:

> It is a small paradigm change in the sense that it isn't the development of quantum theory or the discovery of relativity, but he [Kuhn] makes allowances for smaller paradigms. It is a definite shift.

Interestingly, the new theory was first published in 1965 by R. B. Woodward, one of the disillusioned Nobel Laureates Lessing interviewed in 1960. While chemistry has a broad base of shared principles, anomalies arise in the course of rapid growth of knowledge which may be resolved by the acceptance of a new paradigm. Such a paradigm shift is important to specialists, but it does not challenge the basis of the field.

The paradigm includes acceptable criteria of proof for theories. A respondent stressed the importance of experimentation in chemistry:

> [A theory] would have to be experimentally verifiable, as again you can't have in the Humanities. . . . Results [must be] reproducable. Someone else must be able to do it and get the same results. . . . Normally, when we use the word "theory" it is something we have not been able to prove because there is no way that we can see right now to prove it. It explains known facts, . . . but we can't make a sufficient number of predictions and go into a laboratory and prove them to verify it. . . . We have to be able to do it in a lab, and you have to reproduce it.

Chemists value experimentation so highly that they have resisted the role specialization between experimenters and theorists which has occurred in other fields such as physics. Hagstrom quotes an organic chemist:

> There are very few purely theoretical papers; it is hard to get them published. The feeling in the field seems to be that anybody can have ideas (1965, p. 246).

Hagstrom explains that the difficulty of data gathering in fields such as chemistry and biology promotes in scientists a proprietary view of their experiments. Thus:

> A scientist's experimental discoveries are his property, and it is felt to be a kind of theft to utilize the experimental data of others for purely theoretical work (Hagstrom, 1965, p. 246).

This view is less typical among physical chemists.

Where theories cannot be experimentally verified, chemists have many debates. A respondent explained:

> Certainly, on application, on unbasic things, ideas are much different. I've had violent

> arguments about whether something should work, explanations for this, and so on.

Such disagreements do not involve fundamentals.

Although chemists share values relating to the discipline, such as the criteria for proof of a theory, chemistry as a profession has begun to experience value conflicts between basic researchers and industrial chemists. This conflict changed the emphasis of the American Chemical Society.

> The American Chemical Society . . . is now pressed vociferously to concern itself much more with its members' well being: to emphasize its professional function more, its study function less. . . . The widespread discontent of members found a focus in the person of the Society's 1972 President-Elect . . . who intruded into "the Society's largely honorific presidential election process, in which a nominating committee customarily taps two distinguished scientists for a polite contest," and was overwhelmingly elected. The central issue of the "politicized" contest was unemployment (Blume, 1974, pp. 122-123).

Because such conflict involves issues irrelevant to the structure of knowledge of the discipline, it does not expand into institutions such as scientific journals and university departments. However, a split between industrial chemists and university-based scientists has the potential to affect both undergraduate and graduate level curricula and programs.

Chemistry exhibits three of the components of Kuhn's disciplinary matrix: an extensive set of symbolic generalizations, metaphysical paradigms or models which

define the criteria for selection of puzzles to be solved and for evaluating solutions, and values. The profession is beginning to experience value conflict derived from conditions related to employment rather than intellectual differences.

Although the fourth component, exemplars, may guide the education of chemists, there were no data to support Kuhn's description of the role of exemplars in education. Respondents stressed the rational processes of learning and problem solving. Because this question was not central to the research, the interviewer did not attempt to probe in this area.

Chemists' substantial agreement on the fundamentals of their discipline enables chemistry instructors to plan their programs with clear understanding of what content is important. The discipline's consensus extends to curricula and programs.

C. Curriculum and Programs

The chemistry department's curriculum and programs are relatively clearly defined. While there is some disagreement within the department, as well as in the discipline, over the relative emphasis to be given "theoretical" and "practical" content, consensus over goals and processes characterizes the department.

Nationally, the structure of the chemistry curriculum is stable. A respondent estimated:

> First, second, and third year of Chemistry--I think the undergraduate level is pretty well defined and has been over the last hundred years. Maybe a change here and a change there . . . I think, if you looked at the first three years [of the chemistry curriculum in state universities], you would find absolutely no difference from school to school. None whatsoever.

Another respondent noted that textbooks are an indicant of correspondence among chemistry curricula. He stated that general chemistry textbooks contain similar material, though they may present it differently. He uses a textbook also used in "about eighty percent of the chemistry departments in the United States."

The requirements of the American Chemical Society promote standardization of chemistry programs. A member of the department felt that, while elite institutions such as Harvard and M.I.T. do not always have approved programs, less prestigious departments benefit from the Society's certification. Graduation from an approved program implies that a student has the background required for graduate training.

Other respondents argue that, while the curricula of chemistry departments tend to be the same, the field itself has dramatically shifted its emphasis over the past ten or fifteen years.

> Until about 1960 there was a great standard style or way in which general chemistry was

> presented. At that time, essentially an entirely different group of people began teaching the general Chemistry courses who were more theoretically inclined, and a lot of theory got incorporated into the general Chemistry courses early in the game. That changed the nature of textbooks from essentially being very descriptive to being fundamentally theoretical.

And thus, another member of the department stated, course content changed significantly:

> [Before the theoretical emphasis] the tendency in chemistry instruction was to give the students quite a significant amount of factual information--where the substances are found, how they are processed, what they are good for, what use they are made of, and what kind of properties they have. [After the shift] factual information was considered something that the student could pick up for himself if the interest was there. And so, we tried to just build a framework upon which they could build later by themselves.

He felt that the field is now reassessing the theoretical emphasis.

> Now there is a moment of hesitation. The current opinion seems to be that we've carried the point a little bit too far. The students are familiar with quantum mechanics, but they don't know if sodium chloride is a gas or a liquid, or what color copper sulphate is. . . . It may be that we'll go a little bit backward and go easy on the theory and reintroduce--not so much as in the past, but a significant amount of--factual information.

The nationwide reevaluation of the theory emphasis has been reflected in the chemistry department studied, where the debate has centered around the content of introductory courses:

> That's where most people think that we've carried--well not most, but several, many people think that we've carried--things to an extreme with too much theory and very little factual information.

Although in both the discipline and this department "things are not too clear" regarding the shifting emphasis, most respondents perceived consensus nationally and in their own group regarding course content.

> I would say the consensus is very, very high. . . . Everyone here thinks the same--that's probably bad, but it's true.

The structure of the discipline helps to create and maintain the consensus:

> [Interviewer asks for an explanation of the high degree of consensus.] I think because the field is very defined. No one is going to teach Black Studies in Chemistry. It doesn't exist. We don't have that problem here as the field is exceedingly well defined. For that reason I would have to say that there is much more agreement on what should be taught in chemistry than what should be taught in, say, the social sciences.

This respondent noted that there can be "a hell of a lot" of disagreement over an issue such as teaching methods, though even these disagreements are not divisive.

Although nationally the question of the proper emphasis to be given theory and factual content is unresolved, members of this department have maintained consensus by striking "a pretty good balance" between the two orientations.

The chemistry department's undergraduate programs are highly structured. Courses are sequenced, and prerequisites are clearly stated. The department offers two undergraduate degree programs, the B.A. and the B.S. The

less-structured B.A. requires 34 hours. The B.S. requirement is 44-47 hours including prescribed physics and mathematics courses.

The graduate programs are less structured. Before admission to a program a student must pass a series of nationally normed proficiency examinations in the four traditional areas--analytical, inorganic, organic, and physical chemistry. Having established basic competence in the broad fields, the student and his Committee on Studies develop a flexible program constrained only by the Graduate School's policy on the minimum number of hours of coursework and dissertation. Within this framework, the department has few specific course requirements.

Required activities stress discussion and awareness of current research. Students must attend seminars in their divisions whether taking them for credit or not. All students are required to attend departmental seminars at which guest speakers present topics.

Each student's progress is evaluated through a series of cumulative examinations on unannounced topics which require "thorough general knowledge of their chosen field and a familiarity with modern advances in it as described in current chemical literature." The content of many of the examinations is based on seminar topics. During the academic year seven examinations are given at the rate of approximately one a month. Once a student has

begun to take the examinations in his field, he must continue to take them until he has passed the required number. For both Ph.D. and M.S. candidates the minimum rate of passing is one of the first six examinations attempted, and three out of the first twelve. The Ph.D. candidate must pass six out of a maximum of eighteen examinations. These cumulative examinations take the place of comprehensive examinations. The high consensus and the clarity of the discipline enable the chemistry department to structure the task of undergraduate instruction as a curriculum with a clear sequence of content and skills. The department sees a need for faculty communication and coordination to accomplish this task most efficiently. The task of graduate instruction has a clear goal. The department agrees about the knowledge and skills a graduate should have. The process of achieving that goal is neither as clear nor as subject to general agreement as the goal. However, the faculty is willing to experiment with different processes.

Decisions to change the curriculum or program requirements are made by the entire faculty. The following section describes the formal and informal systems in which decisions involving coordination and change are made.

D. The Decision Making Process

A formal system of committees and subcommittees recommends action to the entire faculty on matters concerning the curriculum, programs, and other decisions affecting the entire department. Matters involving a few faculty members, such as coordination of course content among the sections of the same course, are discussed and resolved informally.

D.1 The Formal System

The department has established several standing committees and subcommittees to develop proposals and recommend action to the entire group. Separate subcommittees of the Personnel Committee make recommendations on promotion from assistant to associate professor, promotion from associate to full professor, tenure, and sabbaticals and salaries. The Undergraduate Instruction Committee has subcommittees responsible for recruitment and for undergraduate curriculum and honors. The Graduate Instruction and Research Committee subcommittees discuss graduate recruitment and selection, graduate curriculum and studies, and graduate seminars. Subcommittees of the Finance Committee handle matters regarding supplies and the stockroom, equipment expenditures and maintenance, safety equipment and maintenance, library, and "public relations and social functions."

Additional ad hoc committees may be formed to discuss specific issues, even when the area is within the jurisdiction of a standing committee. For example, an ad hoc committee recently was appointed to develop specific recommendations for changes in the graduate program since members of the appropriate committee were not interested in doing so.

Rank determines membership on the promotion and tenure subcommittees. Only full professors recommend on promotions from associate professor to professor. Associate professors and professors recommend on promotions from assistant to associate professor. Only tenured faculty recommend others for tenure. The department chairman heads each of these subcommittees. Membership on the other committees rotates so that individuals serve on a variety of committees. A member of the department stated that people rarely serve more than two or three years on the same committee. All committees except those which make personnel recommendations have a student member.

Although committees study problems and propose solutions, the department faculty as a group makes policy and curriculum decisions. A respondent described the faculty role in decision making:

> This department is very different from other departments on this campus. . . . All major decisions are made by the entire department--no exceptions. . . . The committees do their own work, but for the final, ultimate decision for all the things that affect the department

> as a whole, policy decisions and so on, they definitely come back to the faculty in every case.

All respondents in this department, including the chairman, supported this description. They stressed the interest and involvement of the entire group in departmental decisions.

Because the entire faculty discusses all significant decisions, the department must meet often. During the academic year, the faculty meet once a week unless special problems such as hiring arise. A member of the department recalled that during the past semester the department had been meeting about twice a week because it was recruiting new faculty.

Despite the number of meetings, respondents report that attendance is excellent:

> The faculty here has virtually a hundred per cent attendance at all faculty meetings. . . . I would say that probably in not more than half the faculty meetings is there any more than one person missing. . . . I haven't missed a faculty meeting this whole year. . . . I just remember this because the seats are always filled.

The chairman indicated that everyone except the two instructors, who teach in a limited area of the program, is expected to participate in the discussions.

Decisions in the faculty meetings are made by a formal vote. Faculty consider majority rule to be legitimate. When a decision has been made, individuals abide by it.

D.2 The Informal System

Some coordination and decision making occurs outside of the formal structure of committees and faculty meetings. Instructors in each of the four fields of chemistry act informally as committees to plan the courses for their own areas.

> [Instructors in a field of chemistry] have actually gotten together to hash out by arguing, discussing, this particular change they want to make. . . . So the arguments really take place at the level of the particular area in the discipline. . . . I would say that 90 percent to 95 percent of the time that a recommendation a group makes is approved by the rest of the faculty.

When the faculty in one of the fields recommends a change that affects only that field, the department tends to accept it, since the faculty are considered to be authorities in that area. If the recommendation affects others, there is more debate.

The extent of coordination of course content varies. More communication occurs within specializations and among instructors of several sections of the same course than at the department level.

Faculty attempt to insure uniformity across sections of the same courses by joint planning.

> If we are going to teach the undergraduate organic course, which is a full year course offered primarily to sophomores, there are a number of textbooks available for that course. And we--those teaching it plus the other organic

> chemists which would be likely to teach it on a rotational basis--well, we get together and discuss which textbooks should be chosen. We make an agreement so that our students don't suffer from having several textbooks for the same courses. Then we also decide among ourselves which chapters we would like to cover within that textbook--that is, roughly how much material should we cover this semester and how much the next semester.

Coordination is considered necessary in introductory courses because:

> students shift from section to section and then go out into another course either within our department or out of it or take this knowledge somewhere else and use it.

The attempt to insure uniformity among sections of the same course extends only to content. Individual instructors determine the order of topics, teaching methods and examination policy, and these practices vary "a great deal" from section to section. As an example, one respondent noted, "We offer a disparate number of examinations through sections of organic chemistry this year." The number of tests in one course ranged from two and a final to five and a final.

The structure of the discipline makes a high degree of coordination at the undergraduate level necessary but also facilitates informal coordination:

> At the undergraduate level the coordination is very strong. It is very strong without much formal agreement because there is a lot of mobility. Most people have taught freshman chemistry at one time or another for example. I guess there is a lot of agreement between people about what should go into freshman

> chemistry. I guess the thing in chemistry is that people need to know what is taught in other courses. I think people need to know what is going on in other classes because things are pretty well set. Again I think that is where things differ. In the humanities you can teach a class with the same subject and the content can be different. At the undergraduate level I don't suppose that is true [in chemistry]. If you teach a course called analytical chemistry, you know exactly what is in the course. I know exactly. There is a top five analytical chemistry books in the nation. . . . When you talk about the lower level courses, again the curriculum is very well defined, and in general I don't have to go around to someone and say, "Hey, you aren't teaching these kids the right kind of organic chemistry," because there is only one type of organic chemistry.

Since course content is essentially a given, coordination involves relatively noncontroversial problems such as textbook selection and sequencing of topics. Thus the process of coordination is unlikely to create departmental discord. Since there are no warring schools of thought, ideological feuds do not erupt in discussions of course content.

Coordination occurs only where there is a perceived need. Because the undergraduate courses are prerequisites for advanced courses, the department feels that clear sequencing of content is important. In upper division and graduate courses, respondents see no reason to try to coordinate courses. Professorial discretion rather than group decision determines content and emphasis.

> In the advanced courses we don't do that [group planning] because there is no reason to do it. These courses are not being taught to prepare a person for another course. I think there is a

> lot of freedom at the advanced level. I'm certain . . . you can go in and teach anything in depth that you please in chemistry and no one is going to say anything about it. At the lower levels, I suppose if you strayed too far from the straight and narrow in preparing your kids for the courses, I suppose you would hear about it.

At the advanced level, courses with the same title may differ considerably. "You are going into things in such depth that you have got to pick and choose from the current research." Many topics are possible.

Because coordination and communication about courses occurs informally where individuals perceive a need rather than formally, individual knowledge about specific courses may be incomplete. A respondent thought the department has only "a rough idea of what is taught in the various classes." Another described the available knowledge:

> Yeah. [We know what everyone else is doing], but not for sure. You hear reports of what kinds of books they use, what basics, what the nature of the exams are, content and overlap to some extent.

Much of this information is the result of student communication rather than direct discussion with other instructors.

Unless he is teaching another section of the same course, it is rare that a faculty member would try to influence, directly or indirectly, another instructor's course.

> Actually, it is pretty much of a hands off policy around here. . . . There is no direct, overt--we don't go into someone's class and say,

> "You can't teach this way." No, we don't do that . . . it wouldn't be a typical practice. I can remember over the last few years probably a couple of times a year complaints about the way a certain teacher works, but it doesn't amount to very much.

A respondent reflected:

> I can't say that I've ever had the feeling myself that I've ever thought anyone was trying to tell me what to teach.

Except where the sequence of presenting content, selection of textbooks, or division of labor is to be coordinated, professorial autonomy is respected. Where coordination occurs, everyone involved in the decisions has a voice in the planning.

Individual autonomy in assigning grades is respected. The department has no explicit or implicit grading policies. However, grading practices do not vary to any extent.

> I think grading practices are pretty similar. . . . I think we all grade on roughly the same basis, although we don't discuss it particularly or have any formal agreement on it. . . . If you look at the grade distribution between classes, they're pretty much the same. . . . There are degrees of rigor, that's true, and reputations get built up saying that so and so requires more of his students than someone else, but these are very minor gradations basically.

Faculty post examination grades and final grades by their offices, so there is opportunity for informal comparison of grade distributions. The department does not collect and analyze data regarding individual grading practices.

The University Division of Institutional Research Grade Distribution Analysis for the chemistry department

shows the department grading practices to be more rigorous than others in the College of Arts and Sciences and in the university as a whole. The department gave 6 percent fewer A's in both lower division and upper division courses, and 9.6 percent fewer A's in graduate courses than the average of other departments in the College of Arts and Sciences, and 9.1 percent fewer A's in undergraduate courses and 8.6 percent fewer A's in graduate courses than the university average.

The department's formal and informal decision making processes promote interaction and group decision making on those issues which affect the entire department or a group of instructors. Where other faculty are not affected, individuals are not subject to overt influence.

D.3 Curriculum and Program Revision

Members of the chemistry department tend to agree on what the content of introductory courses should be. Individual instructors determine the content of specialized, advanced courses. Thus the department rarely discusses content revision. However, issues involving "organization," i.e., the percentage of the student's time to be devoted to each of the fields, changes in student requirements, and program changes receive department-wide attention.

The department chairman described a continual "good-natured competition" among the areas as each attempts to

expand its share of the program. Occasionally, the competition may be less good-natured:

> Sometimes a group might have a tendency to--I don't want to say build an empire, but it's a case of the other faculty thinking so. They're trying to make more of their kinds of courses required of the students, so that they have a little more to say about what the student takes.

Recently, the physical chemists succeeded in expanding that area's share of the program. They argued that the field had expanded to such an extent that it could no longer be covered in two semesters.

> We used to require six hours of physical chemistry lecture of our B.S. majors, and then we found that the faculty in physical chemistry couldn't cover this standard text in six hours of lecture. It is just too much. The field is continually growing, there is just too much there.

The department was reluctant to add another requirement, so the change occurred in a series of small steps.

> The argument was, "You guys have got to go faster." If we go faster we will lost the students, and this type of thing. Finally we put into our curriculum a third semester of physical chemistry for two credits, which I think we initially said was optional--nobody had to take it. Within one year of it being optional, we finally said yes, we will make it required. Then this last year, we, as an entire group, made a decision that instead of giving physical chemistry spread over three semesters for three, three, and two credits, we abolished the third semester and made the first two semesters each a four hour lecture course. . . . Physical chemistry in a period of several years now has gradually worked their component in our curriculum from a total of six hours of lecture to eight.

The physical chemists convinced the rest of the department of the need for a larger share of the program. An organic chemist noted:

> It [physical chemistry] really needed that much time in order to allow the student to really cope with the material they were talking about.

Organic chemists were unsuccessful in expanding their share of the program:

> The organic chemists tried to do this [expand the field's component in the B.S. program], too. We got approval of a third semester of organic for another three hours to make it nine total hours. But that still is a course that we give which is optional with the students.

The department is reluctant to add to the large number of requirements already in existence. The B.S. chemistry major must take 44-47 hours of specific courses and the group requirements specified by the College of Arts and Sciences. In addition, the department recommends that students planning graduate study take enough hours to gain proficiency in German. Yet knowledge expands rapidly, forcing instructors to try to include more material in the same period of time.

During the past two years, the department has discussed, approved, and implemented major changes in the undergraduate B.A. program and in the graduate programs. The faculty revised the B.A. requirements, replaced comprehensive examinations with a series of cumulative examinations, and removed the foreign language requirement. All of these changes involved extensive departmental debate.

Reform of the B.A. program was initiated by younger faculty. An advocate of revision explained:

> The reason it came up was that a number of younger faculty who are new here were disgraced at the idea of such a weak B.A. program, myself in particular. We felt it was a real shame that we would do that [offer a weak program]. In addition, there was some feeling among the physical chemistry staff that they didn't like to teach that survey course [provided for B.A.s], as it is a non-rigorous approach to what is essentially a very rigorous discipline.

The issue arose and was resolved in the formal system as as part of the activity of the undergraduate studies committee:

> The other people in favor of this change were also on that committee. We were unanimous in the committee, and that may have been fortuitous in the appointment of the different faculty members to the committee. There happens to be a bunch of younger faculty by and large.

The committee prepared its case by comparing the existing program with B.A. programs at other institutions.

> We were able to make a very good case that we have one of the weakest B.A. programs in the United States. When we presented this to the rest of the faculty, they went along with it.

The argument was persuasive, and the department drastically revised the B.A. program by increasing the number of required hours and adding a physical chemistry course for which specific mathematics and physics courses were prerequisites. However, the only faculty directly affected were those teaching physical chemistry; the reform allowed them to eliminate a course they did not like to teach and

to increase the enrollment in the regular physical chemistry courses.

Younger faculty also took the initiative in promoting two other major program changes, the substitution of cumulative examinations for graduate comprehensive examinations and the elimination of the foreign language requirement for graduate students. Many of the newer faculty had experienced the cumulative examination system in their own training. They felt continual testing to be more effective than the comprehensive examination in encouraging students to study continuously and to keep up with the current literature.

> A proposal was made [to do away with comprehensive examinations]. One argument advanced was that the graduate students quit working or doing any research for three or four months in order to prepare themselves for this examination. And we, in a way, forced the students to memorize, then regurgitate, knowledge on demand; whereas, with the cumulative examinations, these students can study continuously--they can better keep up with current literature.

Although the change received extensive debate, when the faculty voted, a large majority supported the change. Though not unanimous, the vote was "about seventeen [in favor] with about three people in their hearts wishing it hadn't come about." Only one dissenting vote was reported. Those who, "in their hearts" wished the department had not adopted the new proposal voted the group and are reportedly "willing to give it a good try and go for the system for a few years."

Proposed changes in the foreign language requirement revealed value differences within the department. Younger faculty, arguing that most Ph.D.s in this country rarely use a foreign language, suggested the requirement be abolished. Older faculty strongly disagreed:

> Other faculty members felt that getting a Ph.D. without the slightest knowledge of a foreign language is not good at all. It's provincialism. If anyone has brains enough to get a Ph.D. degree, he ought to have brains enough to learn how to read scientific journals--scientific French. There are several disciplines in chemistry, for example, organic chemistry, where the knowledge of German in particular is very, very, important.

Area of specialization as well as age or period of training provided differing perspectives.

> But, like I said, there was a lot of discussion. People have advanced the argument about computer language today which for physical chemists, analytical chemists and inorganic chemists is more important than the foreign languages.

The emotional argument against provincialism and favoring tradition was not persuasive. The department adopted a compromise. While dropping the language requirement of both undergraduate and graduate students, the department continued to advise students planning advanced study to include German in their programs and allowed the graduate students' committees on studies to set language requirements as appropriate in individual specialties.

Some of the younger faculty are now developing a set of recommendations which would change the nature of the

graduate program. One of the younger faculty explained that he and others wanted a program more like the ones in which they had been trained.

> The graduate program is very old-fashioned right now, and a number of us are attempting to change it in some rather drastic ways. And that is meeting a certain amount of resistance from older faculty members who were trained under the type of program we have here now. But those of us who have come in the last few years or have just been out of graduate school a few years were trained under a very different program.

The recommended reforms would eliminate all required courses from the student's program. Initial diagnosis would indicate weaknesses to be remedied by specific coursework. Having remedied deficiencies, students would concentrate on independent study, seminar attendance and research without enrolling for formal coursework. The respondent who described the reforms had taken only six hours of graduate work in his own doctoral program. He explained that the changes were based on a different philosophy of education from that behind the present program:

> The essential difference is in the number of course hour requirements. Right now [this university] has one of the highest course hour requirements for chemistry graduates in Ph.D. work in the nation. . . . Most modern universities of high stature require no courses. . . . The whole philosophy is that a Ph.D. is a research degree. It requires a significant research project. It requires seminar participation. It requires learning to handle the literature and to think creatively. . . . We feel that the hallmark of a Ph.D. is the ability to teach himself. . . . Chemistry is moving very fast. Fifteen years from now it will bear no resemblance to what it looks like today, so students who are getting a Ph.D. now will have to teach themselves an entire

> new subject every five or ten years. We think they should start right now.

The process of bringing these recommendations to the faculty differed from the established system. Younger faculty had discussed their dissatisfaction informally. Older faculty were either opposed to or uninterested in changing the graduate program. Since the graduate curriculum committee was composed of older faculty, it was not the vehicle for change.

Younger faculty raised the matter in a faculty meeting, and an ad hoc committee was formed.

> We were directed--myself and another faculty member--were directed at the last department meeting to present a proposal outside of the graduate committee. This doesn't seem to have caused any hard feelings on the part of the committee.

Thus the resistance of the members of the committee with jurisdiction over graduate programs did not stifle discussion of change. One of the reformers felt that the ad hoc committee could develop a proposal that would convince the department. More serious opposition would arise outside of the department, in the Graduate School which has a philosophy "which has lent itself to high course requirements" and in the Dean's office, since the Dean has the power to decrease the number of faculty if a department cuts its course offerings.

The most persuasive argument advanced in all of the proposals for program change has been one of comparison

of this department with other chemistry departments. A chemist explained the strategy:

> Essentially we attempt to show them what other schools are doing, what is the national trend. . . . We work on two levels. We like to look at the very top schools and see what they are doing, because we feel that they are the trend setters. Besides, we all come from those schools. Secondly, we like to look at other schools in what we feel is our classficiation [other state universities in the geographical area]. . . . And when we can show that both the top rank of schools and the rank of schools in our classification are doing pretty much the same thing--and if we differ a great deal from that--then this turns out to be reasonably persuasive. It is not entirely persuasive, but it is reasonably persuasive.

The chemistry faculty appear willing to experiment with change and to consider new practices. Describing the reaction to the controversial cumulative examination system, a respondent stated:

> At least everyone is willing to give it a good try and go for the system for a few years. And if it turns out that our graduate students are not up to this kind of examination system, then I think a move would probably be made to reinstitute the old one, or think it over again. I think in that case we [supporters of cumulative examinations] would probably go along after it had been shown it didn't work.

The willingness to discuss and implement different approaches may be explained by the structure of the discipline. The high degree of agreement about what content should be covered means that changes are not disciplinary changes but different ways of delivering the same content. Nationwide consensus on the general structure of chemistry curricula and acceptance of the American Chemical Society as an

accreditation body make comparison with the national discipline a reasonable practice; a department cannot vary too significantly in its offerings and remain accredited. Shared agreement on what students should learn enables the department to evaluate the changes to the satisfaction of all faculty members.

E. Social Power

Of French and Raven's five types of social power, only referent power is readily identifiable in the chemistry department. The discipline's national norm, as exemplified by both elite, "trend setter," institutions and departments in other universities in the region, influences individual and group perceptions and decisions. Members the department respond to the referent power of their group.

The department compares its curriculum and programs with those in other universities. If one of the programs falls short of a perceived national norm, members of the department reportedly feel "disgraced." If a program is to retain approval of the American Chemical Society, it cannot deviate too far from the national standard.

The chemistry department is a cohesive group. Respondents report no identifiable factions. Although there is a "good natured competition" among the fields who want to expand, and there are some value differences between

younger and older faculty, neither competition nor value differences is great enough to generate permanent conflict.

Respondents speak favorably of their colleagues. They see the department as different, and in some important ways, superior to other departments in the university. One noted:

> This department is very different from other departments on this campus. First of all, all major decisions are made by the entire department.

Another noted that the chemistry department was more interested in "education" than most other departments. When problems are identified, they are not perceived as the result of personal or professional shortcomings of the staff. A program, but not its advocates, may be described as "old fashioned." Faculty behave well: "It's not a department in which people sneak around and recriminate and complain after the fact."

Although the group exerts no overt pressure for conformity, and its members would consider such pressure as highly illegitimate, individuals may change their behavior so that it conforms to the group's views. A few members of the department reportedly voted for a program change even though "in their hearts" they wished it were not being implemented. A minority accepts the majority's decision as legitimate and will work to implement it--"give it a good try."

No one appears to have disproportionate expert power within the group. The department recognizes that senior faculty have greater reputations than younger men. This is the only department studied which has published a ranking of the members of the group according to reputation. In its Report to the Graduate Committee the chemistry department presented the results of a poll in which its faculty placed each individual into one of four categories. The highest category, a scholar of national or international reputation, was assigned a numerical weight of four. The category "active scholars" was weighted three. Those competent to teach graduate courses and to serve on graduate committees were given a weighting of two, and those competent to teach graduate courses but not to direct research were given a weight of one. The average weights of the full professors ranged from 3.14 to 3.54, those of the associate professors from 1.85 to 2.77, and those of the assistant professors from 2.00 to 2.87.

Within the group, younger faculty appear influential. They have not had enough time to establish a national reputation; however, their colleagues perceive them as expert and worth hearing. A measure of their influence is the number of program reforms the younger faculty have initiated, developed, and convinced the department to adopt.

The relative equality of expertise may be related to the condition of rapid growth of knowledge. Where a

field is growing and changing, everyone must work to "keep abreast" with new research. A new Ph.D. emerges from graduate school already abreast, and thus is temporarily at an advantage. A recent graduate explained:

> And if you went to graduate school when these [major changes in the specialty] were going on, and if you were trained directly by the people involved in changing their field, then of course you come out extraordinarily familiar with it. . . . Others who didn't have that experience have learned it on their own, and so, it's not the same thing.

In a group where everyone is expert, individuals appear not to recognize or respond to the disproportionate expertise of some members. A member of this group noted:

> In the case of organic, we people get together and talk about these kinds of things, and I think anybody's input is taken about as much as anybody else's.

He thought influence was more related to willingness to make suggestions and give advice than to superior expertise.

The legitimate power of the department chairman is limited. He is constrained both by the group's emphasis on the democratic process and by his own specialization. The current chairman reflected:

> I am sure that in some other chemistry departments some chairman doesn't just sit down and say "This is what we are going to do, and this is the way we are going to do it." He has to seek advice from the people on his faculty because--take myself for example. I'm supposed to be an expert in organic chemistry. I know about the other areas, but I'm not an expert in them . . . there is a heck of a lot of things . . . that I know very little about. You have got to rely on your faculty's advice on what's best.

The legitimate power of formal committees appears minimal. A committee cannot block a proposal as long as another committee can be appointed to consider it. There was no evidence of the use of the reward power and coercive power which often accompanies the position of chairman or of membership on committees in charge of promotion and tenure recommendations to influence a faculty member's behavior.

F. Summary

The structure of the discipline of chemistry provides a basis for discipline-wide and departmental agreement on the content of chemistry curricula. This agreement facilitates communication among the members of a group. The clarity of structure and consensus of the discipline enable the members of the chemistry department to define the task of teaching undergraduates as a clear sequence of required content which requires the coordinated effort of the department to accomplish effectively. The teaching of more advanced classes requires little coordination.

The entire department considers and votes on issues which affect everyone or which would change the curriculum or programs. Thus faculty interact extensively, both in formal meetings and informally. When a decision has been made, members of the department cooperate in implementing it.

The only type of social power which appears in this group is referent power. The department compares itself and adapts its program to disciplinary norms. Individuals may change their behavior to conform to the group's position.

CHAPTER V

THE POLITICAL SCIENCE DEPARTMENT

A. Introduction

This chapter describes the discipline, curriculum and programs, decision making processes, and social power in the political science department. This data will be analyzed in Chapter VI.

A.1 Faculty

The political science department consists of thirteen regular faculty members, two of whom are on sabbatical leave, and three visiting faculty. Table 3 summarizes descriptive data about the eleven regular faculty in residence.

A.2 Background

During the past ten years the department has expanded both in size and in activities. In 1964-1965 the department of "government and citizenship" consisted of seven faculty members and offered programs leading to the B.A. and M.A. degrees. It changed its title to the department of political science in 1967 and added a Ph.D. program in 1970. In this period the number of regular faculty has

TABLE 3

Rank	Year Ph.D. Received	Field in Political Science	Tenure	Number of Years in Department
Professor	1958	International Relations	Yes	10
Professor	1963	International Relations	Yes	5
Professor	1960	Latin American Politics	Yes	9
Professor	1960	American Gov./ Public Law	Yes	7
Professor	1962	International Relations	Yes	5
Associate Professor	1972	Political Socialization/Minority Politics	Yes	5
Associate Professor	1967	Behavioralism	Yes	5
Assistant Professor	1971	American Politics	No	4
Assistant Professor	1974	Latin American Politics	No	4
Assistant Professor	--	Political Theory	No	2
Assistant Professor	--	Methodology	No	2

almost doubled. There has been a high rate of turnover among assistant professors and a much lower turnover rate among associate and full professors.

B. Paradigm

Although political science displays the characteristics of a discipline with a low degree of paradigm development, political scientists have found Kuhn's notion of paradigm helpful in explaining the growth of their field. In 1965 and 1966 presidents of the American Political Science Association discussed "paradigm" shifts in the discipline.

David Truman (1965) identified periods of "normal science" which had preceded the disciplinary dissensus of the 1960s. Truman argued that "something loosely analogous to a paradigm" united American political scientists between the turn of the century and the 1930s. Political scientist shared an "implicit, though fairly general, agreement on what to do and how to proceed in the field."

Shaped by the pragmatism of the Progressive Movement, the "paradigm" stressed "contemporaneity" and "facts" in the name of "realism" and "science." However, Truman argued, its "science" was atheoretical. The strong methodological commitment to description precluded advancement beyond "raw empiricism." The discipline had a "parochial concern with the minutiae of American phenomena," viewed political

change in optimistic terms, and did not concern itself with political systems as systems.

Truman explained that anomalies arose when this paradigm failed to predict or explain post World War I political developments. Political scientists became acquainted with the methodologies of other social scientists when working in multi-disciplinary Federal programs during the New Deal and World War II. The failure of the older paradigm, growing acceptance of quantitative methods, and a drastically altered international situation after World War II provided the bases for dissensus among political scientists.

Gabriel Almond's 1966 presidential address followed Truman's theme. Almond identified a "coherent theoretical formulation in the American political theory of the eighteenth and nineteenth centuries." However, unlike Truman, Almond argued that theoretical development and research rather than the impact of external events produced the paradigm shattering anomalies (1966, p. 869).

Both Truman and Almond saw in behavioralism the potential for a new political science paradigm. They argued that the behavioralist focus on the political system rather than on discrete institutions and its rigorous quantitative methodology provided a framework for the unified development of knowledge.

Somit and Tannenhaus (1970) described the "basic consensus" among behavioralists and listed several behavioralist "articles of faith." The belief that political science

can become a science capable of prediction and explanation is the basis for many of these "articles of faith." So that the field can achieve this potential, political scientists should emphasize the search for regularities in human behavior and avoid purely descriptive studies. They should concern themselves with observable phenomena and quantifiable data and strive to state relationships as mathematical propositions. Since values cannot be proven true or false, the behavioralist considers them beyond the legitimate scope of scientific inquiry. While arguing that research should be theory-oriented and theory-directed, some behavioralists also feel that political science should stress applied rather than basic research in order to solve immediate social problems. Somit and Tanenhaus suggest that these beliefs form the basic outline of the behavioralist position, though not all behavioralists would agree with each statement.

Behavioralism became "the most divisive issue" among political scientists in the period after World War II. However, it became established in the discipline. The Somit and Tanenhaus analysis of the contents of the American Political Science Review provides some measure of its impact. The percentage of articles using the "more powerful quantitative techniques" moved from .7 percent in 1946-1948 to 22.1 percent in 1963-1965. In 1963, a random sample of political scientists asked to name those who have made the

most significant contributions to the discipline since 1945 listed seven behavioralists out of the ten nominated. They also thought that the most significant work was being done in the behaviorally oriented specialties. However, behavioralism did not create a disciplinary paradigm. The American Political Science Review did not become "overwhelmingly behavioral," the basic undergraduate course in the field "remains the traditional offering in American government, "and the best selling textbooks remain "predominantly pre-behavioral." In only a few specialties such as community politics, electoral behavior, public opinion, and political socialization, did behavioral techniques prove "so obviously superior as to recast drastically an area of inquiry" (Somit & Tanenhaus, 1970, pp. 53-54).

Behavioralism has lost some of its momentum and is unlikely to be accepted as the political science paradigm. In an anthology significantly entitled The Post-Behavioral Era, Sandoz cites Easton's 1969 presidential address to the American Political Science Association as evidence that "positivist-behavioral political science is moribund if not dead" (1972, p. 285). Easton, "the apostle of behavioralism," appeared as its "undertaker":

> The 1969 Easton address can serve our illustrative analysis as a prime example of the texture of the newest "new revolution" in political science. A striking, largely unarticulated theme throughout is the traumatic awareness that the behavioral period has ended precisely because a significant fraction of the political science

> profession has belatedly, almost hysterically, reacted to the geometrically intensifying pragmatic problems of political existence. The pathos of desperation pervades the address. The decisive argument to which Easton responds is that, unless political science addresses itself to immediate action and to the solution of snowballing problems which cannot wait for answers through ordered research, catastrophe is likely to overtake the profession, the country, perhaps humanity itself. It is existential trauma rather than rational discourse which has broken the behavioral lockstep of American political science today (if it is broken), just as it compelled abandonment of post-Weberian positivism in Europe a long generation ago (Sandoz, 1972), p. 290).

As further evidence of the collapse of behavioralism, Sandoz notes that a panel devoted to "Post-Positivist Methodology in Political Science" held at the 1969 meeting of the Southern Political Science Association did not elicit from the panelists or from the audience any challenge to the proposition that the behavioral era had ended (1972, p. 286).

The behavioralist goals of generating theory, discovering regularities in human behavior, stating relationships as mathematical propositions, and striving for quantifiable prediction and explanation would appear to provide the basis for the development of a disciplinary paradigm as Kuhn defines it. However, the absence of the first component of Kuhn's disciplinary matrix, symbolic generalizations, may explain behavioralism's failure to unite the field. Without agreement on the meaning of their basic terms, political scientists cannot deploy many of

these concepts without question or challenge. The techniques of logical and mathematical manipulation do not result in universally accepted findings unless the field accepts common definitions. Somit and Tanenhaus noted the behavioralists' inability to convince other political scientists:

> That the merits of [behavioralism] are still being controverted may well be due to the difficulty, indigenous to the social sciences, of demonstrating beyond reasonable doubt the superior explanatory power of the new mode of conceptualization (1970, p. 46).

Lack of consensus about the meaning of basic concepts and disagreement over methodology and evaluative criteria leave the discipline vulnerable to external pressures. Disciplinary paradigms have resulted from political movements, and the political science has been responsive to criticisms from the New Left.

The discipline experiences value conflicts, not only over questions of methodology and proof, but over the broader questions of the appropriate focus of research and study. Although many behavioralists believe that the field's research efforts should be directed toward solution of social problems, there is no consensus on the criteria to be used in selecting relevant problems. The New Left criticized tht discipline's focus and condemned the behavioralist tenet that facts could and should be separated from values as a cause of the field's aloofness to war and discrimination (Lowi, 1970, pp. 13-14).

Not only the relevance of research but the stance of "political science as a profession" is open to question Lowi explained that the New Left attack on the discipline was fueled by anger over revelations that American Political Science Association officers had been involved with the Central Intelligence Agency and disgust with the tendency for political scientists as citizens to be unwilling to sign petitions and commit themselves to social change (1970, pp. 13-14).

The discipline accommodates many challenges to its dominant orientation through political processes rather than intellectual debate. Lowi (1972, p. 12) describes the transformation of the "single most important insurgent movement ever to emerge inside the profession: The Caucus for a New Political Science" as the transformation of an intellectual challenge into a political struggle within the discipline's major professional association, The American Political Science Association.

> The Association was guilty of cynically adopting a pluralistic and incrementalist response in which the majority does not consult its own standards and its own ideology but simply waits to see what demands will be made on it. And the consequent conservatism of the neutral or realistic approach to politics has been clear. The confrontations were redefined into disagreeable issues. Those issues were then compromised and the costs and gains parceled out a little for everyone. The seriousness of the original confrontation was soon destroyed (Lowi, 1972, p. 21).

The Association's "pluralistic and incrementalist" response to the Caucus may typify the discipline's response to other

intellectual challenges. If a new orientation gains sufficient adherents through either "political" or intellectual processes to form an interest group, the field's professional associations, journals, and academic departments may allow it proportional representation.

Kuhn's model of the growth of knowledge posits periods of "normal science" broken by revolutions in which one paradigm is replaced with another. "Revolutions" in political science do not enable one paradigm completely to supplant former orientations. As now constituted, the discipline contains as specializations the older "paradigms," each having distinct content and methodology.

Traditional political inquiry, political theory or philosophy, examines questions such as the relationship between the individual and the state, questions of justice and good and evil, and the definition of the ideal citizen. Its methodology emphasizes deductive reasoning. Evaluative criteria emphasize "logical coherence, insightfulness, and the relative moral desirability of . . . conclusions rather than . . . objective accuracy" (Hayes & Hedlund, 1970, p. 5). The descriptive study of the formal properties of institutions, comparative politics, and behavioralism are accepted methods applicable to specific content areas. Behavioralism has had its greatest impact in the specialization of American politics. Fields such as comparative politics, international politics,

and public law continue to use traditional methods of data collection and analysis.

Political science has grown by adding new orientations or "paradigms" to the existing ones. The pluralistic and incremental response to the challenge of behavioralism appears typical of the discipline's growth. Without agreement on the definition of basic concepts, on principles, methods, or even the appropriate objects of research and study, each "paradigm" rules in those areas where it has proven useful. A respondent explained the basis of disciplinary pluralism:

> We felt that we know so little, really, that it is very presumptuous to read anybody out of the department and claim that any one way is right.

B.1 Conclusion

The "pluralist and incremental" response to the behavioral movement resembles the "primary adaptations" Hagstrom found in the physical sciences when "deviant specialties" challenged disciplinary consensus on matters not directly related to the field's paradigm. Primary adaptations occur when sub-fields either reject their status in the discipline or the discipline's central goals, and the discipline's institutions alleviate strains without changing their structure (Hagstrom, 1965, pp. 206-208). For example, university departments and professional associations and journals "give in a little" by adopting

a quota system which allows the deviant group a "fair share" of institutional resources. Hagstrom outlined this process:

> The three most common areas of strain between a deviant specialty and the remainder of the discipline in which it is included occur with respect to university appointments, the instruction of graduate students, and opportunities to publish. In each of these areas, formal pressures may be used; for example, members of deviant specialties may be denied appointments. However, scientists are reluctant to apply formal controls. Instead they adapt principles in various ways in order to control the strains produced by goal conflict. These adaptations may be called "primary," since they do not involve structural change. Three types of primary adaptations have been discussed: Allocating appointments on a quota system, autonomy in the instruction of graduate students, and allocating space in journals on a quota system (Hagstrom, 1965, p. 207).

Such adaptations may contain conflict until the disciplinary strains abate. If the perceived incompatibility between the deviant specialty and the rest of the discipline continues to increase and leaders willing to effect change emerge, secondary adaptations which change structure will occur. The deviant specialty may publish its own journals and in some institutions form new departments.

Political science has made primary adaptations rather than secondary adaptations to accommodate divergent perspectives. The field is pluralistic rather than monolithic. Thus political science can be considered a discipline with a low degree of paradigm development. The field shares few symbolic generalizations, debates the merits of its methods, and has established no unchallenged

laws. Value conflicts over research orientation and political and social ideologies divide political scientists.

C. Curriculum and Programs

The political science department's curriculum and programs are unstructured and flexible. The task of teaching undergraduates and graduates is loosely defined. Individual instructors rather than the department as a group determine most goals and processes.

The department offers a broad selection of courses in four fields: American politics, comparative politics, international relations, and political theory. The curriculum includes courses taught from the behavioralist perspective in addition to those in traditional areas such as political thought and public law. Topics of current local interest such as minority politics and environmental politics are included. The department also stresses Latin American politics.

There are few specific student requirements. A political science major must take the "core course" in at least three of the four main fields. The only other requirement is that the student take at least thirty-three hours in political science, twenty-one of which are in upper division courses.

The graduate program is equally unstructured. A Master of Arts applicant needs only twelve hours of upper division work in political science to enter the program. The student and his committee on studies design an individual program. The Ph.D. candidate must spread his study over four fields; however, these do not have to be the four fields the department has identified. A student may concentrate on a more specialized sub-field or a field in another department. The only departmental requirements are that all graduate students take a course which surveys political science "as a discipline and a profession" and that each student demonstrate proficiency in those research skills stipulated by the committee on studies. These research skills range from competence in a foreign language to computer programming.

There is little course sequencing. Some faculty consider this a problem, since they must "back up a little bit in every course and devote a couple of weeks to kind of basic ideas." Those faculty members who object to starting "every course with two weeks of introductory politics" want to require "good prerequisites" of students.

However, the discipline provides no clear guide for developing a structure. One member of the department explained:

> It's not like mathematics where there are natural, logical sequences one must follow in order to pursue certain types of courses, not like chemistry in that sense.

This respondent thought that departments which emphasize "quantitative approaches are probably a little more successful at [sequencing] than are the more traditional departments."

A behavioralist respondent argued that the discipline does provide the basis for a "natural sequence" which could be implemented, and argued that the curriculum should supply

> . . . continuous building blocks which would allow a person, as he moved from freshman year to senior year, to build an in-depth knowledge of the field--of the discipline.

Individual instructors determine their own course content without consulting other faculty formally. However, some instructors of concurrent sections of the same course may attempt to coordinate content and textbook selection. Even in the basic, introductory courses, instructors have great latitude. A senior professor described the constraints placed on the instructor of a basic course:

> As it turned out [the introductory course] was being taught as an entirely different course by different people, and so we adopted a gentle hint . . . that each person would strive for "universality" in teaching the course. That is . . . it would have something to do with political science and not simply be the idiosyncracy of the professor. . . .

Course content varies according to the individual teaching the course. Without prescribed course content, or at least informal consensus on course content, there is little point in prescribing a rigid course sequence.

Despite the potential for conflict over curriculum inherent in a divided discipline, respondents report few departmental disagreements. One member of the department thought:

> I bet we would have 80 percent to 90 percent consensus on what this department ought to be doing. There are two or three people who disagree, but not too many.

As evidence of this agreement he noted: "We have had next to no problems with new courses, new proposals, new offerings."

However, proposed curriculum revisions provide evidence that this consensus may be tenuous. The following section describes how the impression of consensus is maintained and conflict avoided.

D. The Decision Making Process

The political science department has a simple decision making system. Its formal system is limited, and the informal system is unelaborated.

D.1 The Formal System

The department's committee structure varies according to perceived needs. There are three standing committees: The Executive Committee, the Graduate Committee, and the Undergraduate Committee. The Executive Committee is composed of one person from each academic rank. A

caucus of members of each rank selects the representatives. However, a member of the department noted that this formal selection process is subject to informal influence:

> . . . but actually, this chairman rigs [the selection process] a little by sort of asking people if they wouldn't designate so and so because he is easier to work with. . . . Because nobody really wants to bother, I think, he has gotten pretty much the people he wants to work with--who are mild, easy going, non-threatening types.

However, he thought there would be no problem if a faculty member refused to support the chairman's candidate:

> Because he [the chairman] is so mild that it really wouldn't even be an issue. And if you said, "Well, no. I'd vote for the other guy," he'd say, "Well, O.K."

Membership on the Graduate Committee rotates among those professors the Graduate School has approved to teach graduate courses. Other committee activity depends on the interest in particular issues. Although considered a standing committee, the Undergraduate Committee had apparently lapsed into inactivity until interest in restructuring the undergraduate curriculum led to its reactivation in the fall of 1974 (Minutes of November 19, 1974 Department Meeting). Respondents thought that an ad hoc committee would be formed whenever a group felt one to be necessary. A respondent explained:

> There are ad hoc committees depending on what the particular problem is. . . . It might be

> introductory courses, and then you would have an ad hoc committee of people who do most of the teaching at that level.

Another member of the department elaborated on the process of forming temporary committees:

> I think, if someone thinks of something he wants to do, he tells the chairman about it. He is very good about appointing a committee. If you can get three or four people interested in it, then you have a committee, and the committee reports to the full faculty.

Individuals are selected to the ad hoc committees if they are likely to be affected by the issue, or if they are interested and willing to do committee work. According to one member of the department, members are selected casually during department meetings:

> Usually the chairman would look around and say, "Well, who would be the people who would be concerned with this?" And that person might answer, "Oh, Jesus, no! I am too busy." "O.K. How about you?" It is really an informal bargaining situation.

The chairman appoints a screening committee whenever a faculty position is to be filled. These committees also represent all academic ranks. Of the four screening committees appointed during the 1974-1975 academic year, three had a representative from each rank, and one was composed of two professors and an assistant professor. The department chairman served on two of these committees. At least one representative of the content or methodological area to be filled also serves. Appointments to both the screening committee and the Undergraduate Committee were made during faculty meetings. Selection is not pre-determined.

Issues are discussed in committees which make a report to the entire department at a faculty meeting. If an individual has an issue which does not generate enough interest for a committee, he may take it directly to the faculty for discussion.

The procedure of the faculty meetings is informal. A respondent reported that the process of reaching a decision is structured to avoid conflict:

> In our department, on most any issue that comes up for a departmental discussion, we don't take votes. We discuss and arrive at a consensus. In arriving at a consensus, usually what happens is that people who feel more strongly about the issue are generally more outspoken and generally get their way.
>
> If it gets really hot, they might delay it, table it, or in extreme circumstances, when time is getting short, then we would take a vote.

This respondent could recall only two issues that had been decided by a formal vote during the past year.

The open, non-directive decision-making process is consciously maintained, or at least supported, to prevent confrontation and factionalization. A senior member of the department explained that the department avoids discussing issues which might create conflict. As a result, the faculty has not developed a more coherent course sequence, even though individually many faculty think that specified prerequisites for advanced courses are desirable.

> That [not sequencing] allows us to avoid something that would be bound to be a lot of

> conflict. It would mean involvement of the department and the substance of the upper division courses. And that becomes a very tricky kind of thing.

His earlier experiences in faculty coordination made one respondent wary of involving a group in decisions regarding individual courses.

> My first experience in teaching probably turned me off of trying to develop uniformity in courses. I taught the basic course at _____ as a graduate student. It was a course required by the legislature, and there were about eight or nine thousand students who took it every year. And it was a massive pain. Everybody in the department, every teaching assistant and every faculty member had to teach it. We had a common syllabus, and it was reworked every year. And there were the most acrimonious sessions, because everybody had a little thing they wanted included, then not everything could be included, and certainly couldn't be included with reason. It lost all sorts of system. . . . And if you voted the wrong way, you were likely to be an outcast from some camps for a long time. I didn't think it was beneficial from an educational standpoint and I thought it was very detrimental to personal relations. I believe in trying to minimize conflict.

Respect for individual autonomy also helps the department avoid conflict. Neither a committee nor the faculty as a group can impose a course of action on an unwilling instructor. A respondent stated:

> Everyone knows that what comes out of the committee is not going to be implemented until they have a chance to discuss it in the department meeting. In most academic departments people pretty much have a veto power over anything they have been teaching. They can't just force you to teach something you don't want to do. . . . You have tenure, and they do what they want to do basically.

Thus to prevent unpleasant disagreements, the political science department avoids coordination which would infringe on the right of the instructor to determine his own course content.

The formal department meeting is the only forum where the entire group meets and interacts. However, many decisions are reached outside of the formal meetings.

D.2 The Informal System

Many departmental decisions are made informally and involve few people. For example, course assignments involve only the chairman and an individual faculty member. These assignments are made casually. A senior member of the department speculated about the process:

> I've never put in for [the introductory course]. My guess is that there's probably about one person a year who'd like to teach it who crops up, so it works out all right. . . . Nobody would be forced to do it.

If no one "crops up" a former chairman reported, the chairman may have to assume responsibility for a course himself.

The department identifies and solves most teaching problems informally. It uses formal student evaluations when making recommendations for tenure and promotion. In one case a group of students met with the chairman to complain about an instructor. However, usually "the grapevine suffices" to inform the department when a course

is unsatisfactory. Interested members of the department discuss the problem informally and either ask the chairman to intervene or intervene themselves. A senior faculty member who had participated described the process:

> We've had two people . . . who according to student evaluations have been just awful teachers. And we've been able to see, by watching or listening to them make a presentation, what a struggle it was for them to make sense. Informally, people try [to help the instructor improve] . . . . I think there is all kinds of good will, and the tendency is to try to reform somebody who is not doing well in class. We do care about teaching.

Although the advice usually comes from one or two people, more extensive departmental discussion precedes action. The interested faculty may delegate this chore to the chairman. A respondent recalled a past situation:

> It was decided in the case of one individual that there was an understanding from department-wide discussions that it would be done by the chairman as well as someone else.

When content is questioned, the chairman "might simply discuss the issue with the person in question" according to a former chairman. However, if content becomes "outrageous," another respondent thought that "somebody might make a suggestion." Another member of the department described an attempt to influence an instructor's choice of course content:

> Some gentle pressure was put on him to--very gentle. [Interviewer asks respondent to define "gentle pressue."] "Try not to do it quite that way the next time around."

The chairman exerted the "gentle pressure"; however, he did not act unilaterally, but made the suggestions only after consultation with other members of the department.

The outcomes of attempts to change an instructor's behavior vary. A member of the department described the result of an attempt to alter content:

> To date I think [the chairman] has been able to simply discuss the issue with the person in question. And he has made at least some modifications.

Results of attempts to change teaching have been unsuccessful. One instructor "arrogantly refused to try to do better." A faculty member involved in the attempt to improve him noted:

> . . . because of sheer pigheadedness, and I'm not sure what was behind that, but it was a mature person who made it clear that he was not going to jump through any hoops at all.

In another situation, the respondent sympathized:

> . . . it was odd. The person was a nice guy, but [he couldn't improve his teaching]. The people have been very candid. It was been discussed at some length. He was a bright guy--understood everything you said to him, but he just couldn't [act on the advice].

Only rarely do other faculty members attempt to influence an instructor's choice of course content, and the influence attempts are mild. Only in a core course where "universality" is desired or in an introductory course where content differed significantly from the catalog description would intervention be considered

appropriate. However, in instances of poor teaching, some members of the department consider intervention not only legitimate but obligatory. If an instructor cannot improve, his contract is not renewed. Presumably, tenured faculty have already demonstrated at least minimal competence.

Members of the department report that there is little informal interaction. A respondent stated:

> We don't talk to each other much anyway. There's a kind of consensus in this department that it's a good thing not to try to interact. We get along pretty well. It's like the idea of good fences make good neighbors. . . . I resist [increased interaction] not out of unfriendliness, but out of friendliness.

Lack of interaction protects individual autonomy, enables the department to avoid conflict, and makes formation of coalitions unlikely. A member of the department characterized it as:

> . . . typically a department of isolates rather than any coalitions. One of the things about the department is that everyone leaves you alone.

Another respondent reported that there were no identifiable factions in the department.

D.3 Curriculum and Program Revision

The departmental practice of preventing conflict by avoiding interaction, coordination, and interference with individual courses does not provide a favorable condition for major curriculum revision. Past changes have

been incremental, the results of individual interests rather than departmental planning. A member of the department indicated that the curriculum has not changed much, and the few changes which have been made were done only "to satisfy individual members of the department." Another faculty member felt that "there is almost no chance" that a new course would not be approved.

A senior faculty member explained the department's resistance to curriculum revision:

> We don't make many changes. . . . Add courses, drop them. There's been no major restructuring. . . . Changes are resisted, simply because it amounts to collective action when you reform. And we're opposed [to collective action].

However, other respondents attributed lack of change to faculty conservatism and indifference. One argued:

> I think that academicians, in spite of their claims of being liberal, are extremely conservative when it comes to curriculum. They are not very innovative, and they don't like to change things once they have been established.

Another stated:

> Basically, the majority of the faculty would prefer simply not to be bothered with change.

A respondent attributed the lack of debate to apathy and a desire to avoid conflict:

> And there is not too much debate [about what should be taught, about what a political science should know]. A lot of our faculty members don't care much about that. As long as they are allowed to teach the courses that they want to teach, they don't care much about basic questions. Or they care about them, but don't think they are worth fighting over.

A major curriculum revision, especially one which entailed coordination of content, would confront a tradition of individual autonomy, conservatism, and distaste for collective action. Despite this condition, a small group spent the 1974-1975 academic year planning curriculum changes involving greater coordination and clearer sequencing of courses.

An important antecedent to this curriculum revision was an evaluation of the department which a committee sponsored by the Danforth Foundation conducted three years earlier. The chairman invited "four very distinguished political scientists" who met with the faculty individually and collectively, formally and informally. This committee recommended that the department emphasize its Latin American program and develop courses and hire faculty in ethnic politics.

Respondents' perceptions of the committee's report differ. A former chairman found it "influential" in producing change. He argued that the report led to the recruitment of two additional Latin American specialists, a specialist in minority politics, and an attempt to recruit an American Indian political scientist. Another member of the department argued that the Danforth recommendations never have been addressed. Advocates of expanding the Latin American and minority studies programs still refer to the report to support their positions.

Although, as individuals, many members of the department were dissatisfied with aspects of the curriculum, the immediate cause of renewed interest in revision was the submission of the course descriptions for the new catalog. A member of the Undergraduate Committee recalled:

> I'm not real sure about the origin now that I think about it. It probably developed in the course of discussions about the new catalog that was going to hold for a couple of years. And, they said, if we were going to make any changes, it should be now, because it was a now or never proposition for the next two years. [Individuals suggested minor changes such as new courses], and somebody said, "Maybe we'd better wait and think this over. Maybe it's time to have a look at the undergraduate curriculum."

The Undergraduate Committee was reactivated to begin discussion of change and development of a proposal to submit to the faculty (Minutes of November 18, 1974, Department Meeting). An associate professor interested in curriculum reform was selected as chairman, and another associate professor and an assistant professor volunteered. The committee's deliberations occupied the rest of the school year. The committee planned to distribute its recommendations to the faculty in the summer so that the department could discuss and vote in the fall.

The Undergraduate Committee discussed major revisions. Its final report will recommend a new emphasis in both content and methodology and a clear sequence of courses. A member of the committee reported:

> It is a complete revision. We're developing new courses, getting rid of old courses,

> different requirements . . . just a complete overhaul of the undergraduate curriculum.

The committee identified several deficiencies in the present curriculum. Its chairman felt the major weakness was that:

> The curriculum didn't supply continuous building blocks which would allow a person, as they moved from freshman to senior year, to build an in-depth knowledge of the field, of the discipline.

In addition, "the program was methodologically weak. Students were graduating without having been exposed to behavioral methodologies and not having been exposed to doing research." The committee chairman outlined the goals of the revised curriculum:

> [Students] are going to go out and cope with, say, working with the Department of Motor Vehicles or being public administrators or going on and being lawyers. They would simply be better off and be better lawyers and public administrators if they understood the direction that social science was taking rather than, say, just broad philosophical concepts.

The committee, citing the Danforth recommendations will recommend even greater concentration on Latin America and on areas of particular local interest. A member of the committee described a need to concentrate departmental resources on areas of concern to the state and to create a unique program:

> We ought to maximize those resources that we have that perhaps other areas don't have. So we're going to emphasize and restructure our curriculum around Latin American politics, around multi-ethnic, multi-cultural, minority

> group politics, and around natural resource, environmental, ecological, energy-type politics.

The committee chairman also stressed the need for a unique curriculum suited to regional needs:

> The argument becomes a philosophical one--what does the undergraduate need to be, or have, to get an A.B. in political science at [this unversity]? And I take the position that they don't need to know a hell of a lot of international relations. . . . I simply think we ought to encourage those undergraduates who want to learn about China or the Soviet Union to go someplace else, where we build our strength in the Southwest kind of subject matter.

The reformers see no need to emulate other political science departments or to attempt coverage of the range of political science content.

This committee's position indicates that the department may not have the consensus that respondents reported. The committee chairman anticipated opposition to some of the recommendations. He considered the proposed methodological requirements a potential forcus of disagreements:

> We required a methods course [in the suggested curriculum]. And there will be a lot of people who will philosophically disagree with the need for methodology.

Since two senior professors with specialties in international relations have developed an interest in environmental issues, a member of the committee hoped the proposed elimination of some international relations courses would not meet opposition.

However, the committee is aware that "there is going to have to be a lot of selling" to overcome both departmental resistance to change, coordination, and group action and individual philosophical opposition to some specific recommendations. A committee member explained that its strategy appeals both to the faculty's reason and to individual self interest:

> Right now, there really is no logic to the program. I think if I can convince members of this department that [the revised curriculum] would be more logical, and they could see it--they could see the kind of building blocks that the system would provide. I think they might be encouraged to adapt themselves and take part in it. . . . I think we've been able to highlight what should be the hiring needs in terms of developing a rational hiring policy for the future. And I think the simple logic of it will help sell it.

However, he recognized that logic alone is insufficient:

> I also think that what might help to sell it--maybe, I don't know--it might encourage certain faculty members who've been teaching in a certain area to realize that with a very minimal adaptation they could produce new courses which would be relatively similar to the old, but have a slightly different emphasis, and yet it wouldn't increase their need to learn new knowledge where they wouldn't need to go into new directions that greatly. And at the same time lower their teaching load.

Thus the changes could be presented in such a way as to make them appear to be minor adaptations of present practices rather than part of a "complete overhaul."

Potential opposition from senior faculty may be defused since the revisions are designed so that they do not have to participate.

> And my hope is that I can convince the senior faculty that they would be basically getting the advantage of these small classes [senior seminars] while the younger members of the faculty would be teaching the courses which [the senior faculty] don't like to teach anyway. In terms of class size and flexibility, my hope is that they will be convinced that they will be able, basically, in the seminars to do exactly what they please. . . .

The chairman of the Undergraduate Committee felt that a necessary condition for faculty acceptance of the revised curriculum is expansion of departmental resources. He explained:

> [Enlarging the faculty] is really what we need to do. We need two more full-time people . . . in addition to what we'll have in the fall. Then we'd have no problem meeting the kinds of demands [that the revision entails].

Under a condition of stable or declining resources, some faculty members would have to change their courses. If the department can add new members, faculty less essential to the revised program can be allowed to continue to "do exactly what they please" without participating in the new activities.

Although the strategy used to develop curriculum revisions acceptable to the department includes rational persuasion, it recognizes the limits of logic. The strategy recognizes the value members of the department place on autonomy. The new program provides the senior faculty and anyone else strongly opposed to it the option of teaching senior seminars in their own specialties. This may defuse opposition, if, as some committee members assume,

that opposition is based on self interest. By attempting to persuade faculty members that most of the changes will not entail significant alterations in their classes, the committee attempts to counter philosophical objections to the revisions. Finally, a member of the committee hopes for continued expansion of departmental resources so that new faculty can be hired.

The department attempts to reach group decisions through a consensus achieved in a formal meeting. However, members of the department hold a range of views regarding the appropriate content and requirements to be included in the curriculum. The discipline provides no basis for consensus. Instead, the discipline has a recent history of divisive debate over behavioralism. To avoid resurrecting this debate or others, members of the political science department follow a policy which emphasizes the individual instructor's autonomy and discourages coordination, group decision making, or even extensive interaction. Changes in the curriculum tend to be minor; usually, change entails the addition of a course a faculty member wishes to teach. Thus the direction of change is determined by the hiring of faculty rather than by deliberate departmental planning.

E. Social Power

Respect for autonomy and minimal formal and informal interaction determine the development of bases of power in

the political science department. Faculty recognize the potential for power to be used to influence them and structure their interactions to avoid such influence. This section discusses the five bases of social power in this department.

E.1 Legitimate Power, Reward Power, and Coercive Power

Legitimate power often is associated with the position of department chairman. The incumbent may assign courses, control the budget, and recommend other faculty for promotion and tenure. Reward power and coercive power follow from these tasks.

The members of the political science department limit the power of the position by selecting chairmen who, by inclination or philosophy, will not attempt to use the office to influence other faculty members. A senior member of the department attributed this practice to fear of potential influence:

> . . . most members [of this department] have not had too much experience in university administration, and they tend to look at this intra-department characteristic--someone who can get along. Those were the characteristics of the last two candidates for chairman--very mild, easy going people. [The faculty] fear that people would make them do things they really didn't want to do.

This fear may arise from junior faculty members' perceptions of the potential reward power and coercive power inherent in the office. The respondent continued:

> They are afraid, you know. "If so and so is too tough, he will get after me for not doing this or not having done the other," and so forth. [Interviewer asks, "not having done what?"] Not having published, not keeping up in the field, or not being smart enough. It's just that the people don't articulate--don't verbalize it. It is sort of a vague fear among the junior people. . . . This tenure and promotion thing--they are vaguely anxious but not quite sure what they are anxious about. But whatever it is, whatever comes up, they would just as soon have some nice, easy going, mild-mannered fellow in there that represents no threat.

This respondent felt the practice of selecting "nice, easy going, mild-mannered chairmen put the department at a disadvantage in its relations with the College administration:

> In picking a chairman, there's an implicit conflict here between the members of the department who wanted to pick a chairman who is mild-mannered, agreeable, easy to live with and for better relations within the department instead of one who is firm enough and tough enough to stand up to the Dean and fight for the department.

Although the department selects chairmen who will not interfere aggressively in an individual's affairs, the chairman by virtue of the office has some power. He must make decisions and represent his colleagues. According to one professor:

> The chairman has to make decisions, regardless--recommendations for salary increases, and rank, and maintenance of standards generally--especially among the junior people.

As part of the responsibility of "maintenance of standards" the chairman participates in faculty action to "speak to"

individuals whose teaching methods or course content is to be corrected. Given the general indifference to departmental affairs, an aggressive chairman could use such duties to develop a base of influence.

Because senior faculty play a major role in promotion and tenure decisions, they also have a basis from which to exercise reward power or coercive power. Junior faculty are apprehensive of the potential power to evaluate them and to control their advancement.

Coercive power may have been the perceived base of influence used to attempt to change the two reported instances of "perfectly rotten" teaching. However, the threatened loss of a contract was insufficient to change behavior. One instructor accepted the potential punishment and refused to change. The other was willing to change but incapable of adopting the behaviors necessary to avoid the loss of his contract.

E.2 Expert Power

Respondents recognize the existence of expert power in the department, though they find it difficult to describe precisely. Both junior and senior faculty recognize a gradation of expertise. A young member of the department explained:

> It is a very subtle thing. If you asked everyone in the department to list who was the most expert political scientist and who was the least expert, and right on down the line, you would probably

> get different lists from everybody. But there would be substantial consensus at the top part and at the bottom part. People would not be in the same rank, but they would be in approximate lumps.

In its Report to the Graduate Committee, the department reported varying reputations among its graduate faculty:

> Six [members of the department] have national or international reputations, two are active scholars, and three are competent to teach graduate courses and serve on graduate committees. The third category includes young people who show signs of moving into another class (Political Science Department, Report to the Graduate Committee, 1974, p. 5).

Respondents indicated that rank and expertise were not necessarily related, and a junior faculty member implied that in some cases there was a negative relationship.

The primary criteria for determining expertise is publication of research, though there is some debate as to whether quantity or quality is more valued. An individual with a substantial number of publications reported:

> . . . most people in the department, I think, are very unsophisticated. They will think of publication in terms of the number of books or articles published. There may be one or two people in the department who will say, "The important thing is not the quantity of things a person turns out but the important thing is the quality of a person's mind, if he is on top of things--his material--if he has kept up in his field."

However, the respondent also noted that the "quality of a person's mind" and his ability to keep "on top of things" is "usually reflected in publication":

> It wouldn't have to be, but it usually is. . . . It is really a question of quality, of how good

> his writing is. But then you have to have enough self-confidence to assume that you are in a position to judge quality, and you have to have enough interest in it to read your colleagues' stuff. Most [of the faculty in this department] don't have that. And so [the criterion for determining expertise] becomes simply the number of titles.

Specialization tends to limit the "confidence" one faculty member has in evaluating another's teaching and research.

Faculty members rarely recognize the expert power of a colleage over their teaching or research. A respondent explained why it is unlikely that members of the department would exercise influence over each other's courses:

> I've spent twenty years developing my knowledge about _____, and I really don't think anyone who has not developed that as a specialty is going to make much of a contribution to me on how to restructure the course. I certainly would not be in a position to tell [another professor] what to do with [his courses]. I have enough trouble keeping up with my own material.

This respondent thought it was somewhat more likely that others in the same specialty would have something to contribute.

Expertise provides a basis for influence in other areas. A professor explained:

> Now as far as the internal ranking of people goes, you get that ambivalence. You get respect, respect for his opinion, deference to his opinion, because he has stature in the field--disciplinary stature and local stature.

An assistant professor described how the top-ranked faculty members influenced policies:

> Well, primarily by subtle means. . . . People would respect their opinions more. They would

> exert a disproportionate amount of influence. I wouldn't necessarily say they would win whatever battle it was, but they certainly would exert a disproportionate amount of influence on policy decisions. . . . It would be in a general discussion or making their views known about on a particular issue that they would exert an influence.

The potential expert power is limited by a disinclination to participate in many decisions. The individual who has "stature" does not have to protect himself.

> In fact, if there were a relation [between stature and influence], it would be negative. The person with stature doesn't have to defend himself. And he's not as vulnerable when anything comes up, like who's going to teach what, who's going to get the uncomfortable hour, who's going to get a salary raise, or whatever it is. If you have stature, then you are relatively invulnerable to this sort of thing.

However, the individuals with stature may exert influence without actively participating if their views are known:

> And on the other hand, then you have a certain amount of fear when you have someone who does have stature. It is a form of power. He's on the other side and tends to be a threat.

If "to have power is to be taken into account in others' acts (policies)" (Lasswell & Kaplan, 1950, p. 77), the recognized experts have power. While they remain aloof from curriculum revision, their potential influence is taken into account when the planners try to design the reforms so that senior faculty are unaffected. They have potential power resulting from others' knowledge that should they choose to participate, they will have "disproportionate" influence and may be able to block any change.

The views of external experts on the Danforth Committee reportedly had an impact. Some respondents argued that the department changed its emphasis as a result of the committee's recommendations. Other faculty continue to use the Danforth recommendations to support their views. The department expected to use the expert opinion of the Danforth Committee as a lever in negotiations with university administrators. The chairman used the committee's evaluations and recommendations to justify his proposed budgets and expansion.

Expert power has its effect in group discussions about departmental concerns. The attempts to improve the teaching of two former members of the department demonstrate the difficulty of attempting to change individual behavior through influence based on expert power. Although some members of the department considered themselves competent to evaluate teaching and suggest ways to improve, their intervention, through motivated by "all kinds of good will," failed. In one case the instructor "arrogantly" rejected the advice. He may have rejected the expertise of his colleagues and their right to violate his autonomy and probably his colleagues' actions as coercive.

Although the words of experts are given more respect than those of other faculty members, and experts reportedly exert a "disproportionate" amount of influence, general respect for autonomy, minimal group interaction, and

the experts' aloofness to departmental decision making limit expert power. Their invulnerability, connected as much with their rank and tenure, enables the men of stature to avoid participation without harming their interests. Their power in many cases is passive. If other members of the department know the experts' positions, they will take them into account in their planning.

E.3 Referent Power

The interview data provides no evidence of referent power. The discipline as a whole does not exert referent power. The department does not try to emulate a disciplinary standard, and many of its members promote a curriculum with particularistic emphasis, even to the exclusion of content areas normally considered an important part of the field. "I take the position that [students] don't need to know a hell of a lot of international relations," argued one respondent.

Elite institutions do not set a standard for this department. One of tis members described a typical reaction to proposals that are "demanding at all as to quality":

> "This isn't Harvard." That's what everyone says. And when anybody wants to denigrate scholarship or quality, they say, "Well, this isn't Harvard, you know."

Many members of the department support a curriculum that emphasizes political issues of regional concern rather than one that reflects a national standard. The Danforth

Committee, a group of eminent political scientists, also recommended that the department attempt to stress areas that were unique to the geographical region. The discipline of political science has no national accrediting agency to insure that departments meet a national standard of offerings and requirements. It is doubtful that a national organization of political scientists could agree on a set of criteria for all institutions.

The members of the political science department do not comprise a cohesive group capable of exerting referent power on its members. The sentiment that "good fences make good neighbors" limits interactions and thus the development of group norms.

However, the group shares common sentiments. In addition to the sentiment that it is desirable to avoid interaction and the related shared value of individual autonomy, the members of the department share an agreement on grading. A respondent stated:

> We're all, I think, tough graders. The department has a reputation of tough grading, very serious exams, none of the--you know--rap sessions and if you're alive you get an A, that you get in some departments. Traditionally structured, demanding, factual.

Another member of the department supported that statement, observing:

> . . . I know when our College about three years ago had a vote about some of the Dean's proposals regarding student evaluations, and so forth--the importance of grading--I was surprised that all

> the department members who attended (though not everyone attended) voted the same way, and they voted for the more traditional approach.

While no data on individual grading practices or intra-departmental variance are available, the University's Division of Institutional Research grade distribution analysis supports the respondents' perception that their department maintains a more rigorous than average grading standard. During the 1974 fall semester, the department gave 9 percent fewer A's and 4.3 fewer B's in its upper division courses and 4.4 percent fewer A's and 1.2 percent more B's at the graduate level than the college average. Deviance from the university average followed the same pattern, with 12 percent fewer A's and 5.6 percent fewer B's in the upper division courses and 5.6 percent fewer A's and 9.6 percent fewer B's in graduate courses. Figures for 1973-1974 and for Spring, 1975 were similar.

Although the department has no permanent coalitions, factions or groups defined by interaction, it has definable constellations. Senior professors may be differentiated from the rest of the department according to their areas of expertise, courses taught, interest in change, and to some extent, expertise or reputation outside the department.

Senior professors tend to specialize in international relations or comparative politics, though two reportedly are developing other fields of expertise. Since it is more likely that people in the same specialty will feel competent

to evaluate each other's work and view each other's suggestions as more valuable than those from people in different specialties, senior faculty are more likely to discuss their courses and work with other senior faculty than with junior faculty.

Because senior faculty are less likely than junior faculty to teach undergraduates, they are less likely to be involved in the courses which entail at least a minimum of coordination (to determine who will teach which sections, how many of sections to offer, times, common texts, etc.). A member of the department explained:

> You get differentiation between types of participation. . . . The most senior people teach the graduate seminars. So junior people are involved more in the large undergraduate teaching. And then the committee on undergraduate teaching tends to be [junior people], and one thing leads to another.

Whether because of their participation in the courses which require coordination or because of personal inclination, some younger faculty report more interaction and attempts to keep informed about other courses.

In the past, promotion and tenure issues have illuminated a conflict of interest between senior and junior faculty members. Though all faculty agree on the criterion of teaching, junior faculty differ from senior faculty on criteria for evaluating scholarship. A respondent described an attempt to create a statement of departmental policy on tenure and promotion:

> A committee of two full professors and two assistant professors [was appointed] to try to work out a statement of departmental standards on these things. . . . They worked, and argued, and harangued each other. And then they decided that they would come up with two full reports--one by the full professors, one by the assistant professors. [The chairman requested that they try to present one statement to the faculty meeting.] And so they worked longer, and they did present us with one statement. But then in the course of departmental consideration of it, it seems to me that over half of it was eliminated simply because we couldn't agree. So we simply excised a very large portion of it.

As a result, standards remain ambiguous, and the most junior faculty remain "vaguely anxious."

E.4 Conclusion

The low rate of interaction among members of the department prevents the development of departmental norms regarding social power. Without such norms, the department must limit the chairman by selection of an unaggressive incumbent. Tenured full professors are invulnerable. Untenured faculty are most vulnerable. Without norms about the use of influence, these members of the department cannot predict the ways in which social power may be used to affect their behavior. Thus they remain "not quite sure what they are anxious about." The autonomy of untenured faculty with serious teaching deficiencies is not always respected. While all respondents reportedly valued their own autonomy and that of others, some members of the department are willing to participate in activities which disregard

another faculty member's autonomy in the classroom. Because there are no norms limiting power, the recipient of any attempt at influence may view it as illegitimate.

Expert power appears to have some effect in issues which affect the entire group. Individuals with "stature" reportedly exert "disproportionate" influence when they choose to participate.

However, there is not a stable, predictable pattern of social power in the department. Senior faculty with expertise and the power to reward and punish tend to remain aloof from departmental decision making. As much as possible, the department allows individuals complete discretion over their courses. Members of the department act to avoid the potential use of power rather than to use power.

F. Summary

Political science typifies the low paradigm discipline. Without generally accepted criteria for proving one paradigm or perspective superior, the field accommodates the challenge of a new paradigm by allowing it a share of institutional resources. The pluralist accommodation creates a potential for conflict.

In the past, disciplinary conflict split many political science departments. To avoid such conflict individuals in this department avoid interaction. The faculty does not attempt to coordinate individual activity or to

communicate about the courses. The task of teaching is not defined as a group activity but as a combination of discrete individual courses. Thus change usually has resulted from willingness to satisfy an individual's wishes rather than from departmental planning.

Patterns of social power are unpredictable. Although other members of the department listen more attentively to the words of experts, and senior faculty have potential power, these individuals do not necessarily exert influence. They tend to avoid participation in many decisions. When they choose to become involved in an individual instructor's affairs, their intervention may be perceived as illegitimate and be resisted. The senior faculty's power is the potential "to be taken into account in others' acts" (Lasswell & Kaplan, 1950, p. 77). A committee revising the curriculum took into account the senior faculty in designing its recommendations to avoid opposition.

The department is not a cohesive group. By avoiding interaction the department prevents the development of strong norms which direct individual behavior. Without norms regulating the use of influence, junior faculty may be apprehensive. Such apprehension reinforces the tendency to avoid interaction, particularly with senior faculty.

CHAPTER VII

ANALYSIS

A. Introduction

The preceding three chapters considered curriculum and programs as departmental tasks and described the departmental social structures which developed around those tasks. The narrative stressed both consensus and clarity of structure in the discipline and clarity of structure and need for coordination or cooperation in the departments. The decision making processes were discussed as combinations of formal structures and informal interaction. Social power in the departments appeared related to group structure.

The structure of knowledge of the discipline, here conceptualized in terms of the degree of paradigm development, may help to explain the differences in departmental social structures. This chapter first examines a theory which initially appeared to have the potential to explain the relationship between disciplinary paradigm development and departmental social structures but failed to do so. It then uses Homans' (1950) social systems theory as a conceptual framework within which a series of interrelated

propositions are presented. The chapter discusses social power in the three departments as an outcome of social structure. Finally, the chapter suggests some implications of the findings of this study for further research and for administrative practice.

B. Decision Making Theory

This study's concentration on departmental decision making would suggest that decision making theory would explain the data. This section briefly explains the rationale which led to initial consideration and later rejection of decision making theory as the guiding conceptual framework for analysis.

Decision making theory considers three possible knowledge related conditions: certainty, risk, and uncertainty. Under the condition of certainty the decision maker knows all alternatives and their outcomes; under the condition of risk, the decision maker knows all alternatives and the probability of various outcomes; under the condition of uncertainty, the decision maker knows neither all possible alternatives nor the probabilities of outcomes of alternatives (March & Simon, 1958, p. 137). Each condition implies a different decision making process involving different patterns of search, evaluation, and choice. Under conditions of certainty and risk, rational patterns of identifying alternatives, evaluating them, and selecting

the optimal alternative are available. The rational process of decision making can occur only when there is a stable set of criteria by which all alternatives can be evaluated.

Decision makers rarely have knowledge of all alternatives or of the probabilities of all outcomes. Further, differing criteria for evaluation may exist. Thus decisions are made more often under conditions of uncertainty than under those of certainty or risk. Under conditions of uncertainty the organization seeks minimally satisfactory alternatives and makes a decision or choice when a satisfactory alternative rather than the optimal solution is found (March & Simon, 1958).

Thompson (1967) elaborates on organizational behavior under conditions of uncertainty. He identified two "basic variables of decision": beliefs in the completeness of cause and effect knowledge, and crystallization of standards of desirability. These two variables, Thompson argues, enable one to predict the ways in which organizations evaluate their actions and make decisions. These variables guide evaluation and self-assessment--parts of the decision making process. When organizational participants believe that the cause and effect knowledge needed to accomplish their tasks is complete, and when standards of desirability are crystallized, organizations adopt the criterion of efficiency to evaluate their actions. When the knowledge

of cause and effect relationships is believed to be incomplete but standards of desirability are crystallized, the organization uses the instrumental test and is considered successful if it meets its goals.

When standards of desirability are either ambiguous or disputed, assessment becomes difficult. Thompson found that the literature on complex organizations offers little guidance in predicting organizational behavior when standards of desirability are unclear. However, social psychology provides literature on an analogous problem--individual behavior under conditions of uncertainty. Thompson suggests that when standards of desirability are ambiguous and when cause and effect knowledge is believed to be incomplete, organizations, like individuals, assess their behavior by comparison with a reference group. Which group becomes the referent depends on the stability of the task environment. For example, when the task environment is stable, the organization will refer to its past achievements and will attempt to show improvement over time. If the task environment is dynamic, then the organization seeks favorable comparison with similar organizations.

Thompson's theory of organizational behavior initially appears appropriate to the analysis of decision making in university departments. Disciplinary paradigm development affects both beliefs about the completeness of cause and effect knowledge and crystallization of standards

of desirability. Knowing the degree of paradigm development in the discipline would enable one to predict departmental decision making processes. However, there was only a partial fit between the data and Thompson's theory. The most interesting anomaly was the prevalence of referent power in the high paradigm departments and its absence in the low paradigm department. In the high paradigm departments where standards of desirability were crystallized, the departments compared their programs to those in other institutions, and individuals referred their actions to those of other members of the group. This did not occur in the low paradigm department. Thompson's theory would have predicted that referent power would be significant in the department with a low paradigm discipline and less significant in departments with high paradigm disciplines. Thus, Thompson's theory was rejected as a useful means of explaining the data.[1]

C. The Social System

Homans' (1950) social systems theory provided the framework for organizing and explaining the descriptive

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[1] This anomalous finding suggests that further investigation of Thompson's theory would be profitable. Thompson applies literature from social psychology explaining the relations between the individual and the group to the behavior of the complex organization as a whole. This study indicates that his analogy may not always hold for smaller organizational units in the university organization.

data about the three departments. Homans describes group behavior as a function of the interaction between systems and their environments. The environment has physical, technical, and social aspects. The social system consists of an external system imposed on the group by forces external to it or developed to accomplish tasks necessary for the group's survival, and an internal system, the elaboration of group behavior which results from and either reinforces or undermines the structure of the external system.

Homans' framework of the social system orders many factors, including the structure of knowledge of the discipline as part of a department's environment, the formal organizational structures and decision making processes, informal interactions, and the bases of power existing in the group.

C.1 The Environment

The discipline, the profession, and the university organization are important aspects of the department's environment. The discipline provides the structure of knowledge, or technology, within which individuals attempt to create and communicate knowledge. It also defines the relevant data and skills to be included in the curriculum. The discipline provides criteria for evaluating individual research and teaching and assessing departmental

programs. The discipline is more than a knowledge base. It is also an extended national or international social group and may be a reference group for individuals and for departments.

The profession provides the norm of autonomy common to professors as well as to members of other professions. It may also provide standards of behavior common to professors in general (Moore, 1970) rather than to instructors in a particular discipline.

The university provides both the organizational structure and physical space--offices, laboratories and equipment, and classrooms. It directly impacts on the social environment through its admissions policies and hiring practices.

The environment of the three departments studied is similar in all respects except the structure of knowledge of the disciplines. The formal task requirements are similar. All three offer undergraduate and graduate programs. Faculty in all departments conduct research, publish the results, and teach at both the graduate and undergraduate levels. Organizational structures are similar. The size of the departments ranges from eleven to fifteen and one-half full time regular faculty. The faculty rather than the chairman makes the major decisions in all three departments. Two of the departments are housed in the College of Arts and Sciences, and the third

is located in the College of Engineering. The members of all three departments share the professional norm of autonomy.

However, the departments differ in the structure of knowledge of their disciplines. The structure of knowledge is a major determinant of the department's tasks. The departments in which the disciplines exhibit a high degree of paradigm development, chemistry and mechanical engineering, display a high degree of consensus about the nature of the teaching task and the criteria for evaluating its accomplishment. The high paradigm disciplines have clear research technologies and a subject matter which includes a large body of cause and effect knowledge. The paradigm's symbolic generalizations and accepted body of theory and evaluative criteria direct researchers in the selection of "puzzles" they know can be solved with effort and ingenuity (Kuhn, 1962). While the research puzzles may be complex and difficult, the technology by which they are solved is relatively clear and predictable.

The curriculum of the high paradigm discipline is also relatively clear and predictable. Course content, especially at the introductory level, does not vary significantly among institutions or among instructors. Members of the discipline tend to agree on the necessary skills and knowledge a student must acquire. The curricula in high paradigm disciplines are highly structured. Courses must be taken in a prescribed sequence.

The discipline with a low degree of paradigm development, political science, shows little consensus over what should be the subject of study, what problems are important, what methods are of value, and what criteria are to be used to evaluate research. Course content varies according to the instructor. Departments have few external criteria for determining the content and skills to be included in their curricula. Both the nature of the task and the means of accomplishing it are disputed.

The highly developed paradigm enables members of the discipline to reach a consensus and clarifies the tasks of research and teaching. The degree of consensus and clarity of task and technology affect both the external system and the internal system of academic departments.

C.2 The External System

While the outline of formal structures--department meetings, committees, the position of chairman--are similar in all three departments, the degree of development and use of these structures varies. In the chemistry and mechanical engineering departments, the formal structures are highly elaborated. These departments meet often, and either the entire department or separate committees discuss most issues intensively. In the mechanical engineering department a highly developed structure insures communication about decisions regarding individual courses. In the

political science department, decisions about individual courses are made by individual instructors with no formal provisions for coordination. This department had fewer formal committees than did the chemistry and mechanical engineering departments.

The clearly structured chemistry and mechanical engineering curricula create a perceived need for coordination. Instructors of advanced courses want to insure that students are prepared for them. Thus they are interested in lower division courses. Coordination of activities in order to maintain a desirable sequence of content is facilitated by disciplinary agreement about the content of lower division courses.

> If you teach a course called analytical chemistry, you know exactly what is in the course. I know exactly. There is a top five analytical chemistry books in the nation.

The rapidly expanding knowledge of the high paradigm discipline continually adds to the content which legitimately should be included in a curriculum. However, time is limited. The number of student hours required of a major cannot be expanded indefinitely. The mechanical engineering major is already so structured that the department must delete existing requirements, restructure courses, or expand to a five year B.S. program to accommodate developments in the field. The need to fit a growing field into a relatively inflexible amount of student time creates a need for group

planning and decision making. A new requirement or course must appear justified to the entire department before being adopted.

The need for coordination and sequencing and the problems of accommodating rapidly expanding knowledge within the standard number of student hours creates a perceived need for group decision making. March and Simon (1958) in discussing joint decision making among separate organizational units suggest that both the greater the interdependence of timing of activities, and the greater the mutual dependence on any limited resource, the greater the perceived need for joint decision making. Individual members of a department are analogous to organizational units. These individuals perceive a need for joint decision making in sequencing courses (analogous to timing), and fitting their content to the student's time (a limited resource).

Other limited resources in the chemistry and mechanical engineering departments are space, equipment, and supplies. Although not related to paradigm development, the need for specific laboratory space, elaborate equipment, and many kinds of supplies is related to the accepted methods of teaching the knowledge. Since these resources cannot be expanded indefinitely with limited university funds, members of the department may have to share them. Thus another aspect of the department's

technology provides a condition in which group decision making may be perceived as necessary.

In the low paradigm discipline, the faculty as a group sees little need to coordinate its actions. Although many would like "good prerequisites," they do not engage in the joint decision making needed to establish them. However, the behavioralists, whose technology is clearer than that of traditional political scientists, see the need for a structured curriculum and think it is possible to develop one. Because individuals make their decisions autonomously whenever possible, the members of the department perceive little need for joint decision making.

The dissensus characteristic of the low paradigm discipline makes conflict more likely in political science than in chemistry and mechanical engineering. Conflict over curriculum is not readily resolved by referring to established evaluative criteria; thus attempts to coordinate or to subject individual actions to group decisions may create unresolvable conflict. To avoid conflict, the political science department avoids attempts to coordinate course content through group decision making.

The relationships between the paradigm development of the department's discipline and the need for group decision making may be states as propositions:

> If a department's discipline is characterized by a high degree of paradigm development, then

members of the department will perceive group decision making to be desirable in coordinating their course offerings.

Conversely, if a department's discipline is characterized by a low degree of paradigm development, then members of the department will not perceive group decision making to be desirable in coordinating their course offerings.

The consensus on evaluative criteria which the highly developed paradigm provides affects the potential for unresolvable conflict within the department. Therefore:

If a department's discipline is characterized by a high degree of paradigm development, then the potential for unresolvable conflict over curriculum is low.

Conversely, if a department's discipline is characterized by a low degree of paradigm development, then the potential for unresolvable conflict over curriculum is high.

The perceived need for group decision making and the potential for conflict involved in any departmental attempt to coordinate individual course decisions impacts on the department's formal decision making structure (the external system).

If the members of the department perceive group decision making to be desirable, then the department's external system will be elaborated.

If there is low potential for conflict in group decisions, then the department's external system will be elaborated.

Conversely:

If the members of the department do not perceive group decision making to be desirable, then the department's external system will be unelaborated.

> If there is high potential for conflict over curriculum, then the department's external system will be unelaborated.

If these propositions are treated as postulates, they may be reduced to a theorem and its converse (Zetterberg, 1965, pp. 94-100):

> If the department's discipline is characterized by a high degree of paradigm development, then the department's external system will be elaborated.
>
> Conversely, if the department's discipline is characterized by a low degree of paradigm development, then the department's external system will remain unelaborated.

C.3 The Internal System

Homans states that an internal system of informal interaction supplements the interaction required by the external system. The external system affects the development of the informal system. Homans hypothesizes that people who interact frequently with each other tend to like each other; as frequency of interaction increases, mutual liking increases (unless interactions occur under a condition such as an authority relationship which makes interactions unpleasant). Thus frequency of interactions in the external system fosters the growth of sentiments of liking; as sentiments of liking develop, further interactions beyond those required by the external system occur. These interactions in turn increase sentiments of liking and facilitate increased interaction in the external system.

March and Simon (1958) offer a related proposition to explain relations between the individual and the group. They state that the more frequent the interaction between an individual and the other members of a group, the stronger that individual's propensity to identify with the group.

Data from chemistry and mechanical engineering support these contentions. In the mechanical engineering department, which has the most highly developed formal structure of any examined in the study, respondents reported frequent informal interaction during lunch, over coffee, and between classes. Almost every respondent volunteered sentiments of liking and respect for his colleagues. The small number of respondents in the chemistry department limits the confidence of statements about informal relationships; however, the available data indicate that many members of the department engage in extensive informal interaction. Those interviewed also volunteered positive statements about their group, and none volunteered negative comments about individual colleagues or the department. Thus the elaborated external system appears both to promote and be reinforced by informal interaction and mutual liking.

In the political science department, the less elaborated formal system is not supplemented by an elaborated internal system. Individual faculty members report a lack of informal interaction. One respondent characterized

the department as a "collection of isolates." Another argued that low interaction promotes good relations among members of the department--"Good fences [make] good neighbors." A few respondents volunteered negative comments about individual colleagues, though no one reported animosities. Some respondents felt increased interaction would lead, not to increased liking, but to conflict because of varied disciplinary orientations.

This evidence supports Homans' posited relationship between interactions in the external and internal systems. His proposition can be applied to departments and restated:

> If the department's external system is elaborated, its internal system will also become elaborated. Increased interaction in the internal system will produce greater sentiments of liking which will lead to greater interactions in the external system.

The converse of this proposition does not appear to be true, as informal groups with no tasks and little formal structure may have extensive interactions. However, the lack of consensus and potential conflict which limits interactions in a department's external system may also limit interactions in the internal system.

Studies of the effects of task clarity and shared goals point to a relationship between disciplinary paradigm development and a department's internal system. March and Simon (1958) posit that the greater the extent

to which shared goals are perceived among members of the group, the stronger the propensity of the individual to identify with the group. The consensus of the high paradigm discipline and the ensuing agreement about curriculum enable individual instructors to perceive that the department has many common goals and that individual courses contribute to those goals. In the low paradigm discipline, instructors have conflicting or unrelated goals and may not perceive any relationship between their own activities and departmental goals.

The clarity of both the task and the technology for achieving it affects group development. Raven and Rietsma (1960) experimentally examined the effects of clarity of goal and path on the individual's relation to the group. They found that subjects who had a clear picture of the group's task and the means for achieving it reported a greater feeling of belonging to the task group, greater concern for group performance, and greater task involvement than did those under conditions of ambiguity. They were also more able to perceive social differentiation and were more willing to accept influence from the group than were subjects for whom the goals and paths were ambiguous. There was weak, but not significant, support for the hypothesis that the individual would evaluate the group more highly when participating in a group project with clear goal and path than would the

individual under conditions of ambiguity of goal and path.

Anderson (1975) also found that the level of cohesiveness of a task group is a function of goal-path clarity, even under varied conditions of value similarity and level of prior attraction among members. He suggested that the effect of value similarity among members of a task group is less salient to group cohesiveness than the effects of goal-path clarity.

The task of the department with a high paradigm discipline is clear. External accrediting agencies and general consensus define course content for introductory and lower division courses and provide criteria for evaluating departmental programs. The means to accomplish this task are not based on a clear technology of teaching derived from an understanding of human learning. However, department members perceive clear goals because they agree on the skills and knowledge students should acquire.

In the department in a low paradigm discipline, the task is unclear or disputed. Members of the department do not necessarily agree about the knowledge and skills a major or graduate student should acquire. The individual instructor does not define his activities as integrally related to a group task.

Two aspects of the highly developed paradigm facilitate group development--the consensus among

practitioners and the clarity of the technology or knowledge base. Raven and Rietsma (1960) and Anderson (1975) found clarity of goal and path to contribute to an individual's identification with the group and to group cohesiveness. March and Simon (1958) argued that goal consensus promotes individual identification with a task group. The data from this study support this proposed relationship. The members of the chemistry and mechanical engineering departments participated in closely knit groups. The group structure of the political science department was fragmented. The relationship between disciplinary paradigm development and departmental internal structure can be stated as propositions.

> If the department's discipline is characterized by a high degree of paradigm development, then the department's internal system will be elaborated.
>
> Conversely, if the department's discipline is characterized by a low degree of paradigm development, then the department's internal system will remain unelaborated.

Alternative explanations for the elaborated internal system of the chemistry and mechanical engineering departments and the limited internal system of the political science department could involve stability of group membership, time available for formal meetings and informal interaction, personality characteristics of the members of the departments, and differing patterns of professional socialization. However, these explanations appear less

plausible than the proposed relationship between paradigm development and social structure.

C.4 Social Power as a Group Norm

When a group has developed an elaborated internal system, Homans argues, it also develops ideas about appropriate behavior under a given condition. These ideas are norms. Norms may vary in clarity, in intensity of approval or disapproval evoked by appropriate or inappropriate behavior, and in the degree of crystallization among members of the group (Jackson, 1960). The more cohesive the group, the more likely its norms are to be crystallized and to be held with intensity. The higher the interaction rate, the more likely group members are to understand the meaning of norms and to hold them to the same degree. The more cohesive the group, the more significant to its members is group approval or disapproval. Thus if a norm is understood and held with a high degree of intensity, individuals are likely to conform to it. When a group has an unelaborated internal system, the low interaction rate impedes the crystallization of norms and makes unlikely the development of a large number of intensely held norms.

Norms may regulate the amount and types of social power any individual has and the conditions under which is is appropriate to exert power or respond to it. In

the departments of chemistry and mechanical engineering where the internal systems are elaborated, norms limit both the legitimate power of the office of chairman and the reward power and coercive power associated with that office. The exercise of influence is predictable. In the political science department, where the internal system is unelaborated, norms limit neither the legitimate power of the chairman nor the reward power and coercive power of the senior faculty. The exercise of influence is unpredictable, and junior faculty are reported to be anxious about the potential power that senior faculty may use. Therefore:

> If the department's internal system is elaborated, then clear, crystallized group norms regarding social power will develop.
>
> Conversely, if the department's internal system is unelaborated, then clear, crystallized norms regarding social power will not develop.

C.5 Summary

Figure 1 summarizes the model derived from Homans' (1950) theory of social systems. The model links the degree of paradigm development of a discipline with the development of departmental social systems and norm structures. The propositions advanced for departmental development in a low paradigm discipline may not predict the current condition of a department which has developed a consensus by purging a minority. The model does not provide a basis for prediction about the specific content of a

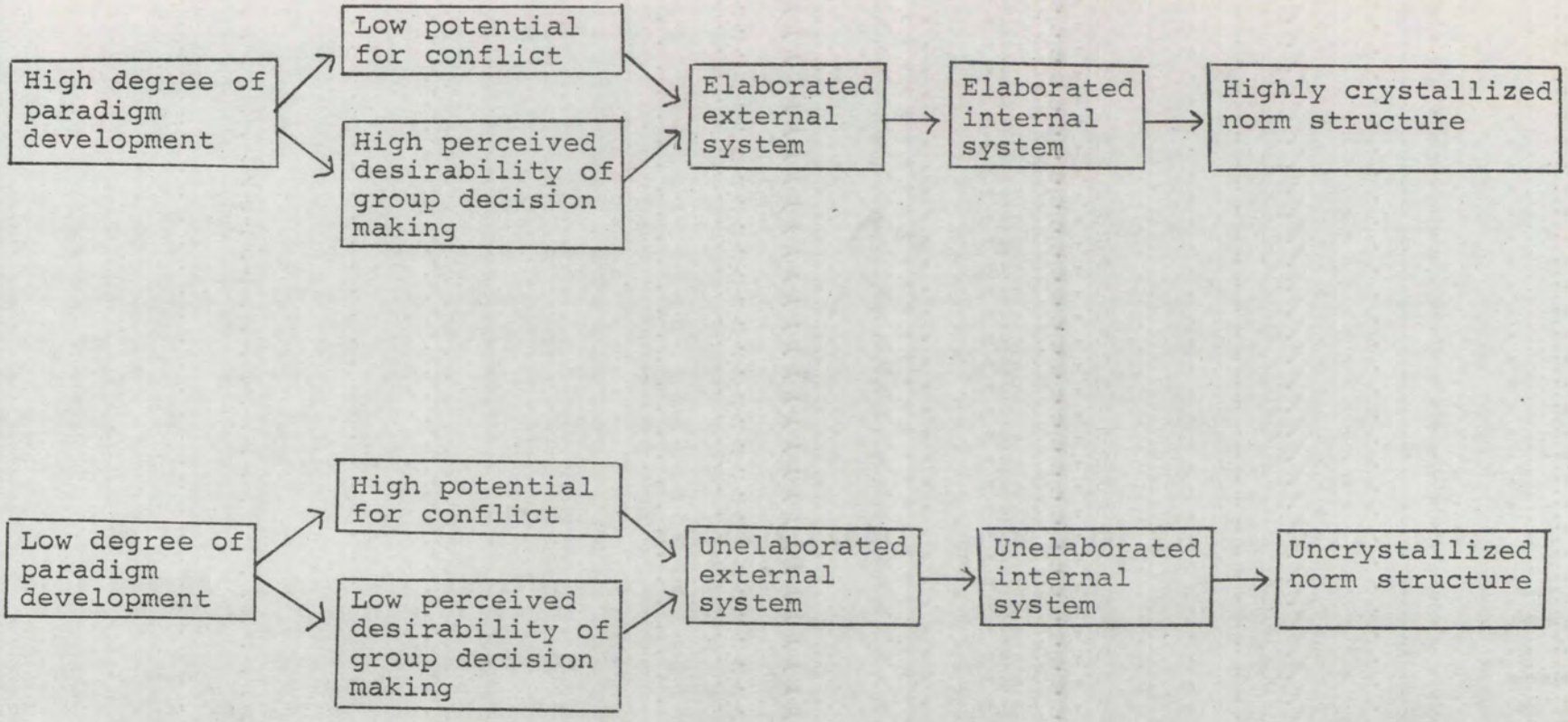


Figure 1. Summary Propositions Specifying the Development of Departmental Social Systems as a Function of Degree of Paradigm Development

department's norms. For example, among departments with crystallized norm structures, a variety of normative patterns could exist.

D. Social Power

The bases and extent of social power differ according to the extent of elaboration of the department's social system. Members of all three departments attempt to limit the influence that may be brought to bear on them. However, the means of limiting influence vary. This section contrasts the bases and extent of social power in the departments with elaborated and unelaborated social systems.

D.1 Social Power in Elaborated Social Systems

In the departments where a high degree of paradigm development in the discipline has promoted an elaborated social system, faculty members are accustomed to frequent communication and cooperative efforts. This extensive interaction enables the group to develop norms regarding social power.

Norms govern the legitimate power, reward power, and coercive power of the position of department chairman. Faculty and chairmen in the mechanical engineering and chemistry departments reported that the faculty as a group, not the chairman, makes all important decisions.

Chairmen stress their role as faculty members, not administrators.

The mechanical engineering faculty limits the chairman's power through informal discussion and, when an occasion demands it, by applying group sanctions. By "tweaking" the chairman about his administrative role, group members help to remind the chairman of the norm. The group may act more directly when a chairman attempts to exceed the normative bounds of power. The former chairman who attempted to assign a faculty member extra courses as an incentive to seek research funds quickly felt the pressure of the group. The entire department except the aggrieved professor met with the chairman and convinced him to rescind the assignments. Group standards regarding the number of hours an instructor should teach and the chairman's legitimate right to interfere with a faculty member's research activities existed, and group sanctions were brought to bear. The department has established limits on the chairman's position so that any incumbent's influence will be predictable.

Group norms and the conditions of "normal science" in high paradigm fields limit the range of expert power in the two departments. While senior faculty reportedly have established greater reputations outside the department than their junior colleagues, this reputation does not provide the basis for the exercise of greater expert power.

The advantage of seniority is countered by the junior faculty's advantage of more recent training in high paradigm disciplines (Merton & Zuckerman, 1973b, p. 511). In "normal sciences" where everyone faces the problem of keeping up with rapidly expanding knowledge, past accomplishments do not guarantee current expertise.

The junior faculty's position is also enhanced by the clarity and universality of evaluative criteria. Merton and Zuckerman explain:

> [In] the more codified sciences, new ideas, whatever their source, can better carry their own credentials. Important contributions by young scientists . . . are not only more visible in the codified fields; they are taken more seriously, since their theoretical importance can be more readily assessed. This tends to put the young on a par with eminent seniors in communicating ideas and in having them noticed (Merton & Zuckerman, 1973a, p. 516).

Younger respondents in chemistry and mechanical engineering reported no difficulty in having their research published in refereed journals. The mechanical engineering department expects even its theses and disserations to result in at least one publication. Nationally, the physical, chemical, and biological science journals have the lowest rejection rates of journals in all academic disciplines (Merton & Zuckerman, 1973b, p. 470). Clear criteria help the researcher to select research topics the discipline will view as significant and methods the discipline considers valid. The young scientist may establish a

reputation through his publications more quickly than will the recent graduate in the low paradigm discipline.

Junior faculty enjoy a position as colleagues of equal influence in the chemistry and mechanical engineering departments. They are active in departmental discussions and have successfully promoted their ideas. Their arguments are heard "with respect."

While individual expertise may differ according to objective criteria such as the number of publications or research grants, members of a high paradigm department tend to discount these differences in order to define all members of their group as of roughly equal expertise. A mechanical engineer discounted publications as a basis for determining expertise, arguing:

> From day to day contact you have some idea of how competent [other members of the department] are. . . . You figure a guy either knows it or he doesn't, and if he doesn't, you don't mess with him. And if he does, you don't look at his publications.

Two respondents attributed research grants and external reputations to public relations skills rather than expertise. Thus the individual's external reputation does not contribute as much to his reputation within the group as the reputation he develops in interaction with his colleagues.

The only area where differential expertise is recognized is in the specialties of the members of the group. Others will defer to a specialist's

greater knowledge of his field. However, in areas such as curriculum and program, expertise is undifferentiated. When asked from whom they would seek advice in these areas, mechanical engineering respondents reported seeking advice from everyone in the department. No one reported a specific individual as an opinion leader. Thus no individual in the mechanical engineering department appears to exert disproportionate expert power. Similarly, there is no data indicating that any member of the chemistry department has disproportionate expert power.

The referent power of the external discipline and of the departmental group is evident in both high paradigm departments. In evaluating its program and considering changes, the chemistry department compares its programs to those of departments in both comparable and elite institutions. An individual may feel "disgraced" when his department's program appears inferior. A convincing argument for a change is one that demonstrates how that change conforms to practices of other chemistry departments. Although there is some feeling that the nature of students and resources may make some kinds of graduate programs inappropriate, the chemistry department attempts to reflect national standards.

Both chemistry and mechanical engineering are evaluated by national disciplinary accrediting groups which attempt to maintain national standards. Both departments

evaluate their curricula in terms of national criteria and programs in other schools.

The highly developed paradigms in both disciplines promote the referent power of national groups and of other departments. Lacking competing schools of thought, the high paradigm disciplines exert a unified influence on all members. The consensus which exists in a high paradigm field makes the discipline rather than the local institution the primary referent for departmental programs.

The referent power of the department is also strong in the high paradigm departments. The individual's response to the referent power of a membership group may be discussed as "conformity." Hollander and Willis (1971) distinguish two processes of conformity: congruence and movement. Congruence is measured in terms of the extent of agreement between a given individual's response and the group's normative ideal. Movement is measured in terms of change in an individual's response resulting in a greater or lesser degree of congruence.

The occurrence of both congruence and movement conformity is evidence of the referent power of the departmental groups. The presence of strongly held, highly crystallized norms shows congruence. Two specific incidents suggest the process of movement conformity as well.

A mechanical engineer explained that he followed a particular grading practice as a member of the department. In describing a conflict in another department over an instructor's use of the "European method" (i.e., basing the entire grade on a final examination) rather than the "American method" (i.e., basing the grade on several examinations or assignments), he argued that there was no substantive difference between the two. He had experienced both as a student and used both as a teacher. However, in this department he used the American method because that was the accepted one.

A member of the chemistry department described the vote in which the department decided to replace the comprehensive examination with a series of tests. He noted that several faculty members voted for the change while "wishing in their hearts it wasn't so."

The process of congruence rather than movement would appear more typical of academic departments. It would be considered illegitimate for the group to attempt overtly to influence a professional. "Autonomous" professionals would be unlikely to admit that they changed their behavior to conform with a group norm. Thus there would be few reported incidents of movement conformity in a professional group, even when the process had occurred.

Because unanimity, or at least consensus, is the typical condition in the high paradigm discipline, individuals may anticipate consensus and reevaluate their own views before rejecting the group judgment. A mechanical engineer reported willingness to reevaluate a proposal which had received criticism from his colleagues. If, after reevaluation he remained convinced of the proposal's worth, he would attempt to persuade others. However, his first response to criticism would be to reconsider and reevaluate his ideas.

Kuhn describes this kind of comparison as typical of a scientist's response when he first encounters an anomalous finding. When an anomaly, a fact or result which appears contradictory to the paradigm, arises, the scientist first checks his experiment, methods, and apparatus. If his data still conflict with the paradigm, he may attempt a minor modification of the paradigm, but not a rejection. The existence of a paradigm enables the researcher to refer his findings to an external standard. Kuhn describes the process:

> Normal science does and must continually strive to bring theory and fact into closer agreement, and that activity can easily be seen as testing or as a search for confirmation or falsification. Instead, its object is to solve a puzzle for whose very existence the validity of the paradigm must be assumed. Failure to achieve a solution discredits only the scientists and not the theory. Here . . . the proverb applies: "It's a poor carpenter who blames his tools" (Kuhn, 1962, p. 80).

While neither the existence of a cohesive group nor the intellectual practice of referring results to the paradigm can be said to force conformity upon scientists, both provide the conditions for dialogue and debate according to accepted rules in an atmosphere of mutual respect. An individual may advance an idea without identifying himself with it. He remains "flexible." Mechanical engineering respondents report frequent lively debate in which faculty members become emotional, pounding the table and getting red in the face. When the debate is over, everyone remains friends. Interactions in departmental debates appear to strengthen rather than divide the group.

In summary, in the two departments where the disciplines show a high degree of paradigm development, an elaborated social system has developed. Members of these groups share sets of crystallized norms. Among the more strongly held are those which limit legitimate power, coercive power, reward power, and expert power.

The specific norms of these departments are not necessarily characteristic of departments in high paradigm disciplines or of departments with elaborated social systems. For example, the norms of parity of expertise and influence may not be typical. Homans (1950) and Hopkins (1964) cite research which indicates that groups rank their members with those of higher rank exerting

more influence and the group leader having the most influence. The highly developed paradigm's evaluative criteria would appear to facilitate ranking in a group where expertise is a norm. (The chemistry department, for example, is able to assign a numerical weight to the expertise of each of tis members.) It would appear logical to assume that a cohesive department with a high paradigm discipline could develop a normative structure supporting the legitimacy of differing degrees of influence and of a strong chairman as easily as one which supported parity of influence among members. The professional's assumption of competence and autonomy may counter a group tendency to stratify by levels of influence.

D.2 Social Power in Unelaborated Social Systems

In departments with unelaborated social systems, clear, crystallized norms governing social power do not develop. Because the political science department lacks such norms, the exercise of influence from any base of power is unpredictable. Lacking a clear normative structure governing the exercise of influence, the department attempts to avoid situations in which social power may be exercised.

The chairman's social power is limited, not by norms surrounding the position, but by the selection of incumbents. As long as the chairman's personality or philosophy precludes interference in a colleague's affairs,

the power of the position is limited. Faculty select "mild" chairmen because they mistrust the potential for power in the position.

Although they may exert a "disproportionate amount" of influence, the "men of stature" may not choose to use their power. Much of their power results from the possibility that they may act rather than from their overt attempts to influence others. Other faculty members consider their sentiments when making decisions. When schedules are drawn, the "men of stature" are not assigned undesirable times. When the curriculum is being revised, planners attempt to design changes that will not involve them. Indifference and reluctance to exercise influence rather than norms limit expert power. Thus, the power of the "men of stature" may not be evident in their overt actions. Since these faculty members do not have to participate in decisions to protect themselves, one respondent estimated that the amount of participation is inversely related to individual stature.

Senior faculty have considerable social power based not only on expertise but on their potential to reward or punish. Their role in faculty selection, promotion, and tenure decisions gives the senior faculty members significant reward power and coercive power. Because there are no departmental norms regarding promotion and tenure decisions, junior faculty are uncertain of how

they may be treated. Members of the department do not accept the same evaluative criteria of their scholarship as legitimate. Without crystallized norms to influence tenure and promotion decisions, junior faculty may be uneasy.

The junior faculty are highly vulnerable. It is only the junior faculty who are "spoken to" if there are problems with teaching. In the past, junior faculty members whose teaching was a problem lost much of their autonomy. Senior professors visited the classes to diagnose problems and suggest solutions. A junior faculty member who "arrogantly" refused to respond to the recommendations did not have his contract renewed.

Junior faculty cannot easily establish their expertise. Merton and Zuckerman state:

> In these less codified disciplines, the personal and social attributes of scientists are more likely to influence the visibility of their ideas and the reception accorded them. As a result, work by younger scientists who, on the average, are less widely known in the field, will have less chance of being noticed in the less codified sciences (Merton & Zuckerman, 1973b, p. 516).

The rejection rate of manuscripts submitted to political science journals in 1967 was 84 percent in contrast with a 31 percent rejection rate for chemistry journals (Merton & Zuckerman, 1973a, p. 471). Merton and Zuckerman attribute the high rejection rate to the lack of shared norms regarding adequate scholarship. If his research is not

published, the young political scientist may not be able to establish the external reputation needed to secure his position in the department as easily as the young chemist. Thus junior faculty members may be vulnerable to pressures from senior faculty.

Because the social system is unelaborated, the department has little referent power for its members. There are few departmental norms to which the individual could conform. The only commonly held sentiment regarding teaching reported was the support for rigorous grading standards. However, respondents emphasized that there was no departmental grading policy.

The national community of political scientists does not attempt to enforce a standard curriculum for political science departments. The Danforth evaluation committee, which might be considered representative of the external discipline, recommended that the department stress particularistic areas directly relevant to state and regional concerns. Because the low paradigm discipline lacks unity concerning appropriate content, the department does not compare its curriculum and programs to those in other institutions in order to conform to common practice.

D.3 Conclusion

The extent of elaboration of the departmental social system clearly affects the nature of social power.

Elaboration promotes the development of group norms regulating social power. However, the specific content of the norms may vary. There is inadequate support for the proposition that the specific norms of the mechanical engineering and chemistry departments are typical of those in high paradigm departments.

There is support for proposing relationships between paradigm development of the discipline and the referent power of the department and the discipline. Because a high degree of paradigm development promotes an elaborated social system, it supports a high degree of departmental referent power. A low degree of paradigm development does not promote an elaborated social system and thus is not necessarily associated with departmental referent power. Hence:

> If a department's discipline is characterized by a high degree of paradigm development, the department will have high referent power for its members.
>
> Conversely, if a department's discipline is characterized by a low degree of paradigm development, the department will have low referent power for its members.

Consensus enables the community in the high paradigm discipline to establish national standards for approved programs. Departments compare their curricula and programs not only to expressed national criteria but to the curricula and programs in other institutions. They may change their programs to conform to the practices

of other departments. The lack of consensus of the low paradigm discipline precludes national standards for departmental curricula. Therefore:

> If a department's discipline is characterized by a high degree of paradigm development, the discipline will exert high referent power for the department as a whole.
>
> Conversely, if a department's discipline is characterized by a low degree of paradigm development, the discipline will exert low referent power for the department as a whole.

E. Departmental Decision Making

Members of each of the three departments have recently assessed parts of the curriculum and programs and have developed remedies for perceived weaknesses. Although respondents in all departments described the process of evaluation and decision making as a rational process of identifying problems and selecting the best solution, the processes differed among the departments and included irrational elements. The structure of the social systems provides the bases for different decision making processes, and the formal decision making processes provide the bases for the development of part of the social system.

In chemistry and mechanical engineering, the formal decision making structures are elaborate. They promote interaction in the internal as well as the external system. In mechanical engineering where the formal structure

is most complex, formal and informal interaction is so extensive that respondents rarely can recall whether an issue arose informally or in committee. An individual may initiate a proposal informally and later change it in response to informal suggestions before submitting it to the formal system.

Even the formal system demands extensive faculty discussion before a committee submits a proposal to a departmental vote. The committee may issue some initial "clay pigeons" so that it can accommodate the proposal to group evaluations before writing up the final proposal.

The mechanical engineering department's stress on full participation precludes rapid change. The department discussed the most recent curriculum revision for four years before approving the outline. It will take another year to refine it. Although this process is cumbersome, it has advantages. It minimizes conflict by allowing everyone to participate in the development of a proposal. Compromises can be made during the development of a proposal rather than after its introduction. Respondents view group maintenance as a goal of their decision making process. The department willingly gives up the advantages of quick problem solution to maintain consensus. As a result, when a proposal is passed, the faculty members willingly participate in implementing it. During the long process of discussion, group norms appear

to shift. The mechanical engineering group shifted position slightly from advocating a "science" or theory oriented emphasis to approving a curriculum with a more applied emphasis.

The chemistry department also discusses issues extensively. When a decision is made, members of the department willingly cooperate to implement it, to "give it a good try," even while "wishing in their hearts" another decision had been made.

In contrast, the social structure of the political science department does not promote and is not supported by extensive interaction. When decisions are made in department meetings, they may not have received prior discussion, and many members of the department are likely to be unprepared for the issue. For example, the undergraduate curriculum committee's extensive revisions were to be presented formally to the faculty for study over the summer. In the spring, many respondents appeared unaware of the committee's activities or direction.

The department follows a pluralist pattern of decision making. Problems are defined and solved by those directly involved. The members of the department attempt to allow the maximum amount of individual discretion. They try to avoid group decision making. Many new courses have been added to the curriculum in order to satisfy individual faculty members. If a change must be

approved or a decision made by the entire group, advocates of a position attempt to define it so that potential opponents will not be concerned.

Until the recent revisions the pattern of curriculum change in both mechanical engineering and political science has been incremental. The political scientists have tended to introduce new courses on the initiative of individual faculty members. The mechanical engineering department also changes its curriculum slowly. While some new courses were introduced and other courses eliminated, course offerings and content did not change dramatically. It took several years for dissatisfaction with the curriculum to induce the department to undertake a curricular "overhaul."

The chemistry department has been able to make major changes such as the revision of the B.A. program and substitution of a new testing system for the comprehensive examination relatively quickly--with a year. However, these changes did not entail major curriculum revision. The changes in the B.A. program required students to take more of the already existing courses. The department did not have to restructure its curriculum beyond dropping an unpopular course. A major restructuring of the curriculum would probably involve a longer period of discussion and consideration. The department's curriculum has not changed dramatically over time.

Its decision making process enables the mechanical engineering department to maintain its consensus and change its programs under adverse conditions. While faced with increasing enrollment and demands for expanded offerings, the department has experienced a decrease in resources. Yet the department has approved a major revision of its curriculum. In contrast a political science respondent estimated that a necessary condition for the adoption of the curriculum revisions was expansion of the faculty. Resources could not be reallocated if reallocation demanded major changes in the activities of existing members of the department.

It has previously been posited that members of departments in disciplines with a high degree of paradigm development perceive a need for group decision making, while members of departments in disciplines with a low degree of paradigm development perceive little need for group decision making. This perceived need then promotes the development of an elaborated external system.

The consensus and clarity which the paradigm provides promote the need for group decision making and create conditions which facilitate group decision making. Divisive conflict over curriculum is unlikely to occur. The consensus on the knowledge and skills to be acquired provides a crystallized standard of desirability for the department. The department may try a change for a few years

to see if it helps to achieve the goal and abandon it if it does not. This fosters a flexible attitude.

Where the paradigm provides no consensus and no generally accepted evaluative criteria, divisive conflict over curriculum may occur. The department has no crystallized standard of desirability against which it can compare its curriculum. If a change is adopted, there is no way to evaluate its effectiveness. Thus conflict may arise in the course of group decision making which cannot be resolved. The department may attempt to make decisions in a setting of constant conflict, a majority may force a decision on a minority, or the department may seek to avoid conflict by avoiding group decisions.

The discussion of referent power is also relevant to the departments' decision making processes. The departments in high paradigm disciplines refer their curricula and programs to those in other institutions. These comparisons affect both departmental self-evaluation and departmental decision making.

The degree of paradigm development in a discipline has an impact on departmental decision making processes. The highly developed paradigm creates a condition in which group decision making is viewed as necessary; when the department perceives group decision making to be necessary, it will develop the necessary formal structure. The interactions in this external system promote interactions

in the internal system and the development of a cohesive group. Members of this group will view group maintenance as a goal of their decision making process. Thus all members of the group will be expected to participate in the process. Participation and interest in departmental affairs may be a group norm. This reasoning leads to two propositions:

> If a department's discipline is characterized by a high degree of paradigm development, all members of the department will be expected to participate in group decision making.
>
> If a department's discipline is characterized by a high degree of paradigm development, a high proportion of issues will be resolved by group decision.

Where the discipline has a low degree of paradigm development, members of the department will not perceive a need for group decision making and will not create formal structures for group decision making. A low rate of interaction in the external and internal systems prevents the development of a cohesive group. Members of the department avoid group decisions to avoid conflict. Decisions will be made only by those involved in an issue. Thus:

> If the department's discipline is characterized by a low degree of paradigm development, only those individuals affected by an issue will be expected to participate in decision making.
>
> If the department's discipline is characterized by a low degree of paradigm development, a low proportion of issues will be resolved by group decision.

F. Summary

The degree of paradigm development of their disciplines has a pervasive effect on academic departments. Paradigm development determines clarity of task and technology and disciplinary consensus which in turn affect the development of departmental social systems. The extent of elaboration of the social system affects the clarity and crystallization of norms, departmental decision making processes, and the group's referent power for its members. Degree of paradigm development directly affects the referent power of the discipline as a whole for the entire department. Figure 2 provides a summary of these relationships.

G. Implications for Research and Administration

Research on professionals in organizations has concentrated on conflicts between the professional and the administration. Little attention has been given to the processes of decision making within a group of professionals. Studies of university departments have examined the division of authority between the chairman and the faculty without giving comparable attention to processes of coordination, decision making, and conflict resolution. This study suggests that the chairman's power is not the most significant determinant of departmental coordination,

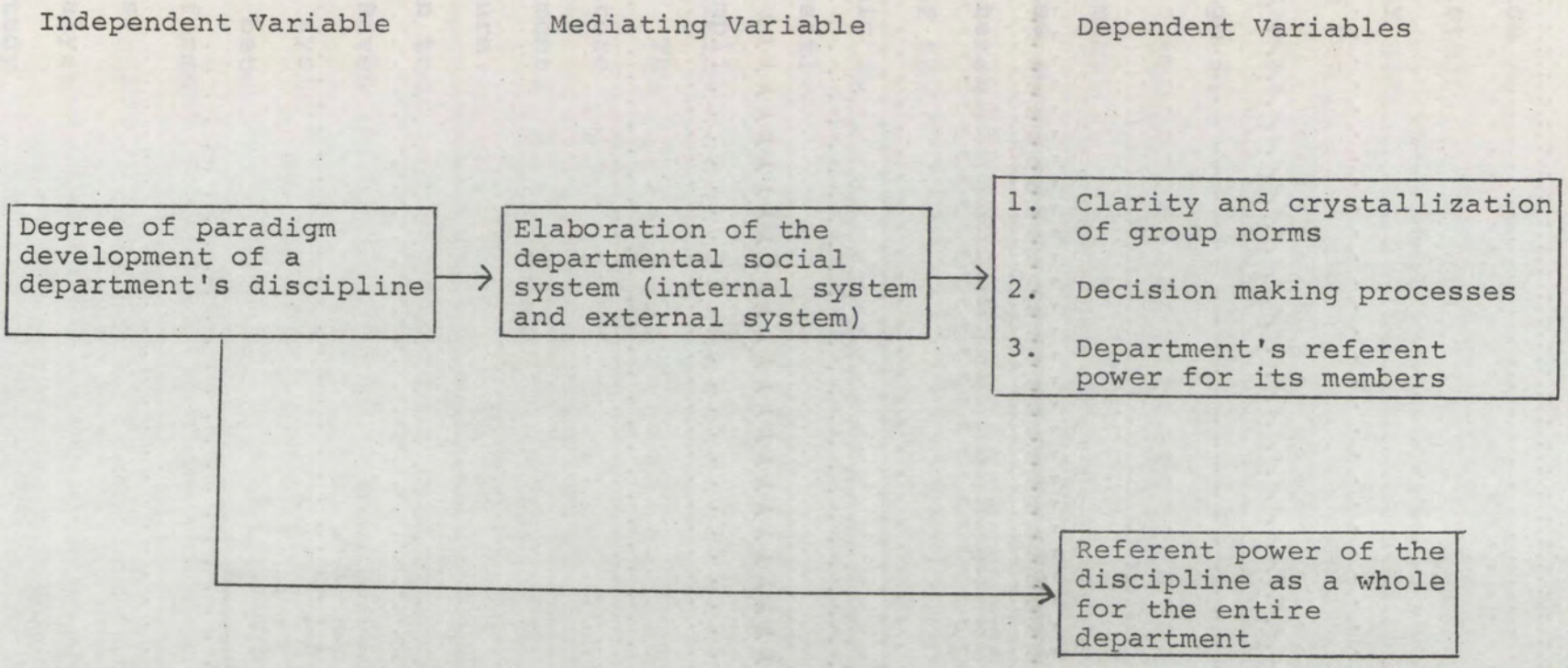


Figure 2. Summary Model: Paradigm Development and its Consequences

decision making, and conflict resolution processes. While the distribution of power between faculty and chairman is roughly similar in all three departments, these processes in the two departments with high paradigm disciplines differ strikingly from those in the department with a low paradigm disciplines.

The model linking the structure of knowledge to departmental social structure generated in this study contributes to the research on academic departments and to the literature on task groups. This section discusses some of this model's implications for the further study of academic units and for the practice of administration in universities.

G.1 Implications for Research

The model provides a means for applying the literature on technology and social structure to academic departments. Relationships between technology and formal structure (Perrow, 1965; Scott, 1972; Thompson, 1967) and between technology and informal structure (Anderson, 1975; Raven & Rietsma, 1971) have been described. Homans' social systems model facilitates analysis of the interaction between the three levels--technology, formal structure, and informal organization--in task groups and larger organizations. This model has not been applied to the description and analysis of the interactions among these factors. This study suggests that distinctive social systems and

social processes occur as a result of these interactions. The nature of the social systems has implications for task accomplishment, control, and decision making.

Kuhn's concept of paradigm appears useful in the analysis of technology and social structure in academic units. The concept of paradigm directs attention to both the clarity of structure and the consensus among practitioners of a discipline. It leads the researcher to consider clarity of goals and processes in academic programs, particularly as these goals and processes often are expressed in terms of content to be presented to or acquired by students.

Homans' social systems theory provides a framework within which a theory of academic departments can be developed. The discipline's structure is a significant component of the environment affecting both formal and informal systems. However, other environmental factors such as institutional size and complexity affect departmental social structure and the nature of the relationships between a department and other organizational units. Homans' social systems theory accommodates these variables as aspects of the environment and the external system.

G.2 Implications for Administration

Administrative practices involving academic departments cannot be developed without considering departmental social structure. This structure defines the role of the chairman, of committees, of individual faculty members, and

of external groups which may attempt to influence departmental decisions.

This study suggests that the nature and use of social power in departments is a consequence of social structure. While faculty may report expert power and referent power to be salient in the abstract context of a questionnaire (Bachman, et al., 1968), the conditions under which they perceive and respond to the expert power or referent power of an individual appear limited. This study suggests that the use of any form of social power to change the behavior of an individual faculty member may be considered illegitimate by the recipient of influence. Overt attempts to affect individual behavior meet with resistance. Where there is an elaborated social system the entire group will oppose attempted influence perceived as illegitimate. Where the social system is unelaborated, the influenced individual will resist. His success may depend on his rank and tenure.

This study also suggests that university departments change slowly. The need to maintain consensus and insure full participation in the department with an elaborated social system entails extensive discussion and revision of proposed changes. The difficulty in reaching consensus in a department with an unelaborated social system precludes major revision in an area such as curriculum. Attempts at major revision may engender conflict and resistance.

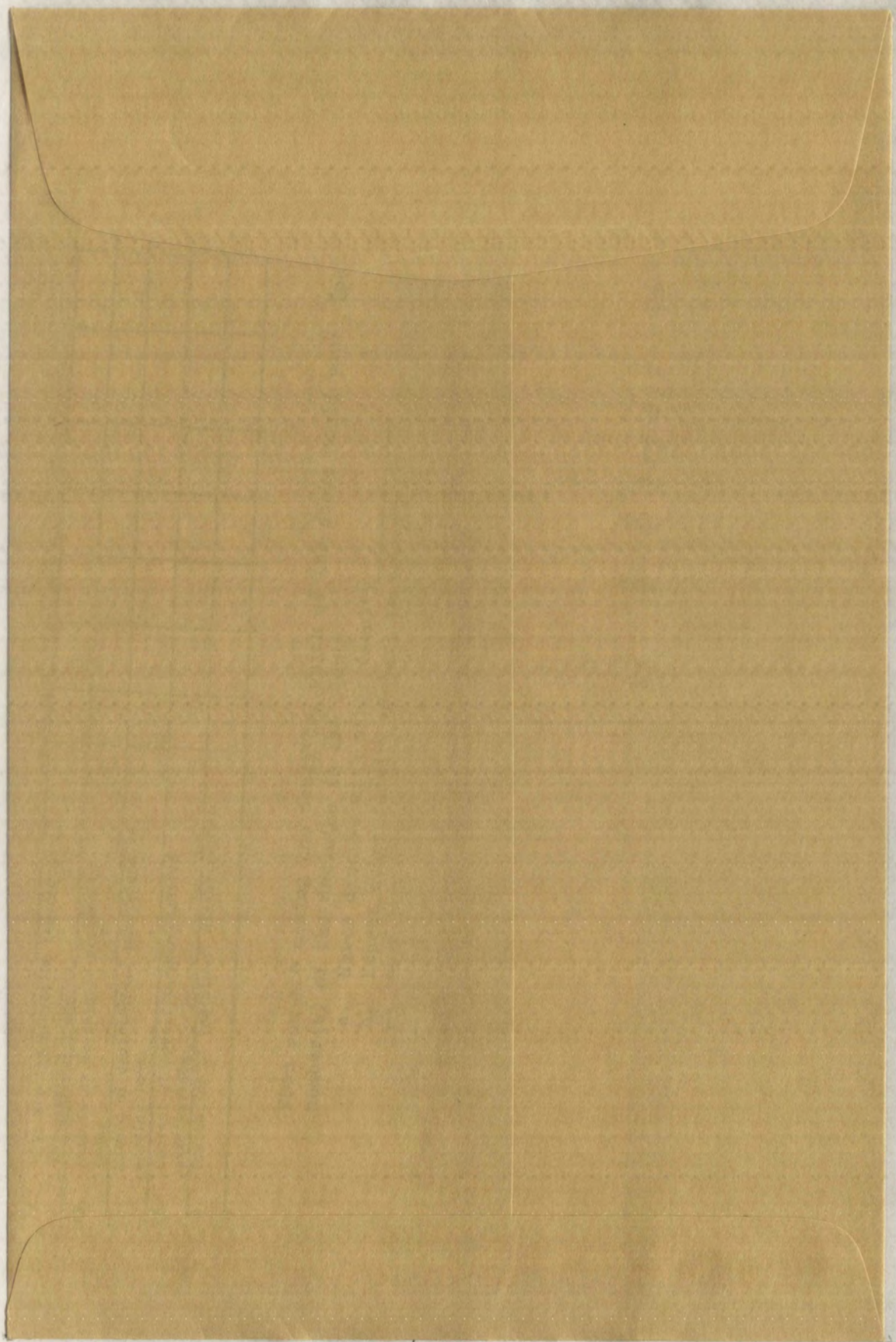
The department chairman in a low paradigm discipline must recognize the potential for conflict inherent in attempts to coordinate course content and to use the process of group decision making in areas affecting curriculum. This conflict may be highly divisive for there is no consensus on the criteria by which differing positions can be evaluated.

The effectiveness of group decision making in the area of curriculum is a consequence of departmental social structure and the structure of knowledge of the discipline. Where the discipline has a high degree of paradigm development and the departmental social system is elaborated, group decision making, though slow, is likely to be effective. It enables all participants to express views, raise issues, and present evidence. Participation will promote cooperation with the final decision. Where the discipline has a low degree of paradigm development and the departmental social system is unelaborated, the attempt to structure a curriculum through group decision making may create divisive conflict.

H. Summary

This study posits that the structure of knowledge of an academic discipline affects departmental social structure. The nature of that structure in turn affects social power and decision making processes in the department. Departmental social structure determined the degree of effectiveness of group decision making.

APPENDIX A



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Name_____ Department_____

Rank_____

In the past three years have you served as department chairman, member of a curriculum committee, or as a university or special program administrator?_____If so, specify which. _____

1. With how many members of your department would you estimate that you discuss your courses, the curriculum, or student-related policies?_____

2. In the past year, about how many members of your department have you consulted about specific questions or problems related to your own courses or teaching?_____

3. In the past year, about how many members of your department have consulted you about their courses or teaching?_____

4. During a typical week, about how much time do you spend talking or communicating (in meetings, through memos, informal conversation, etc.) about curriculum-related matters?

   _____

5. Estimate how often in the course of a month communications about curriculum or student policies originate in the following ways:
   a. Formal meetings_____
   b. A colleague contacts me_____
   c. I contact another faculty member_____
   d. Arises in the course of informal conversation_____

6. In the past year, how many curriculum or student policy issues have received widespread discussion in your department?_____

   Give an example of such an issue_____

7. How many of the courses that you teach involve some coordination or cooperation with those of another faculty member?_____

8. How do you think the amount of time you spend communicating with other faculty about curriculum or student policy compares with that of others in your department?

   Less than average_____ Average_____ More than Average_____

--OVER--

The following chart lists 16 decisions a faculty member may be involved in. Reading across the chart you will see 9 reactions. Please check the one(s) which most closely resemble your feelings about your own involvement when another member of your department is making each decision.

When another member of my department is making this decision I:	Do not care if I am informed	Expect to be informed after the decision has been made.	Would willingly participate if asked.	Expect to be consulted.	Expect to participate in this decision formally because it affects me.	Expect to participate in this decision formally because of my knowledge in this area.	Expect this decision to be made by the department chairman.	Expect this decision to be made by the department as a group.	Would consider it illegitimate to try to influence this decision.
1. Which courses individual faculty will teach.									
2. Which concepts and information will be included in individual courses.									
3. Which reading materials, guest speakers and other resources will be used.									
4. What teaching methods will be used.									
5. What kind of assignments and examinations must students complete.									
6. What grading criteria will be applied.									
7. Which prerequisites or co-requisites are required.									
8. When (time, semester) courses will be offered.									
9. Which courses the department will offer.									
10. What combination of courses constitutes an acceptable major in the department.									
11. Which courses are specifically required for majors and graduate students.									
12. What are the admission requirements for graduate students.									
13. What is an acceptable program of study.									
14. Nature of departmental comprehensive examinations.									
15. Content of specific comprehensive examinations.									
16. Evaluation of individual dissertations.									

When you are making the decision, which of the above would you: (put the number(s) of the decision in the blank)

a. Never discuss with other faculty_____
b. Expect other faculty members to take an interest_____
c. Expect to affect the teaching activities of another faculty member_____
d. Consider another faculty member's intervention illegitimate_____

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