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THE ROLE OF SES AND ASL FOR LITERACY SUCCESS IN ASL-ENGLISH BILINGUALS

Paul Twitchell

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**THE ROLE OF SES AND ASL FOR LITERACY SUCCESS IN
ASL-ENGLISH BILINGUALS**

by

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B.A., LINGUISTICS

THESIS

Submitted in Partial Fulfillment of the
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THE ROLE OF SES AND ASL FOR LITERACY SUCCESS IN ASL-ENGLISH BILINGUALS

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ABSTRACT

Research on spoken language bilinguals has shown that there is a significant relationship between socioeconomic status (SES) and literacy outcomes. The mechanism of SES as a predictor of literacy success has two competing explanations. One assumes a direct impact of SES on literacy through expanded opportunities to read and better maternal mediation of literacy activities; the other assumes an indirect relationship because SES has been shown to influence first language (L1) and second language (L2) spoken language proficiency which impacts literacy development. American Sign Language-English deaf bilingual children exhibit a unique profile because L2 literacy is achieved without prior development of spoken L2 proficiency. This provides an opportunity to evaluate the role of SES without the confound of spoken language proficiency influencing literacy development.

To date, no studies have investigated the effects of SES on L2 literacy in ASL-English bilinguals. This study aims to determine whether SES and L1 language proficiency account for

variation in signing bilinguals' L2 literacy success, and to help identify specific needs during the process of achieving literacy outcomes. Measures of SES, ASL proficiency and English reading proficiency were collected from a sample of 184 deaf participants.

Multiple regression indicates that although SES and ASL are not positively correlated, both factors in a single regression analysis were significant predictors of reading proficiency in signing bilinguals. We address the implications of these findings for educational reform in schools with deaf student populations.

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Chapter 1

1.0 Introduction

What are the most important factors that are needed for literacy success during a bilingual's childhood? Socioeconomic status (SES) and first language (L1) proficiency both predict reading outcomes for spoken language monolinguals. SES also has a strong correlation to various aspects of L1 proficiency (Hoff, 2003). Thus, it is not clear that SES and L1 spoken proficiency contribute independently to reading ability in the monolingual population. The mechanism of SES as a predictor of literacy success has two competing explanations. One assumes a direct impact of SES on literacy. The other assumes an indirect relationship of SES on literacy outcomes. First, higher SES parents read more, thus providing a strong role model for their children to read. High SES children also have more reading opportunities and have more books. This would account for a direct effect of SES on reading development. Second, higher SES parents speak to their children more, and use fewer directives in child-rearing. These characteristics are associated with high SES children's faster rate of spoken language development. This greater level of proficiency could allow children of high SES to have an easier transition between speech skills to reading skills. This second scenario does not show that SES has a direct impact on reading, but instead a direct effect on language skills, which mediate reading success.

Because SES and L1 proficiency are confounded in research on spoken language monolingual readers, it is difficult to discern the impact of SES and/or L1 proficiency on reading. Bilinguals who are proficient in a spoken L1 present the same confound as well. L1 proficiency predicts second language (L2) literacy, but SES predicts L1 proficiency; therefore

we cannot disentangle the role of SES from L1 proficiency very easily in bilinguals. However, signing bilingual readers can provide an opportunity to look closer and deeper at that relationship. Because signers learn to read in a second language without achieving oral proficiency in the L2, effects of SES can be examined without the L1 proficiency confound that exists for most monolinguals and bilinguals. This particular type of bilingualism provides a unique situation where we can isolate the effects of SES from L1 proficiency.

This study focuses on two factors that potentially influence literacy success of American Sign Language-English deaf bilingual children (ASL-English bilinguals): SES and L1 proficiency in ASL. Despite the numerous previous studies on SES, L1 proficiency and literacy skills, there have been no studies of the effect of SES on literacy skills in ASL-English bilinguals. This study aims is to determine whether SES and/or L1 directly impacts ASL-English bilinguals' L2 literary success, and will help identify specific needs during the process of achieving literacy outcomes.

Chapter 2

2.0 Review of Related Literature

2.1 Monolinguals: SES impacts development of language skills

The role of SES is a complicated and dynamic factor that contributes to both language and literacy development. In order to understand how SES specifically impacts children's developmental stages of their L1, it is important to first define this construct. Family SES is a measure that includes multiple factors that may influence an individual child's growth. For example, the Hollingshead Four-Factor Index of SES includes: marital status, retired/employed status, educational attainment, and occupational prestige (Hollingshead, 1975). The constellation of these four factors predicts a variety of behaviors, including the language use and childrearing practices of parents, allowing us to explore the relationship of SES and L1 proficiency on literacy outcomes.

One specific and critical portion of literacy relating to language development has been explored. Hoff (2003) studied children from 33 high-SES families (meaning parents received college education) and 30 mid-SES families (meaning parents received high school education). The data was collected by recording maternal speech and the child's vocabulary at two points in time so that rate of vocabulary learning and amount of maternal vocabulary exposure could be compared across the two groups. At the start of the study, children ranged from 16 to 31 months. Hoff developed the criteria to select participants based more on the children's level of language development, not on age. The goal of the study was to look at the environment as an explanation

for the relation between SES and language development. The evidence that Hoff found was that the high-SES mothers produced more utterances and produced more replies to their children than the mid-SES mothers. Moreover, the children in the high-SES group showed a faster rate of vocabulary growth over the same time period than the children in the mid-SES group. Using multiple regression, Hoff then evaluated what proportion of variance in child vocabulary development could be attributed to SES once the variance associated with child vocabulary size at study onset and maternal language complexity had been removed. The results showed that the association between SES and child vocabulary disappeared once the mediating factor of maternal language had been included in the model. Hoff concludes that the evidence reveals the mediator (measure of maternal speech) that underlies the relationship of SES to child language.

Hoff's conclusion is supported by other findings that show variation in language development within a single SES level. The amount of maternal speech is related to different levels of language development for children of the same SES level. Shimpi et al. (2012) focuses on non-European American, low-SES families (parents with less than high school education). The reason for classifying all the participants at a lower SES level was to see whether differences in the children's outcomes could be related to the mother's input. The participants were 30 African-American children, ages from 1 month to 2 years, and their mothers. The study is a replication of Hoff's framework of the mediator relating to the outcome. They found not only the correlation of the amount of maternal speech input with child language outcomes in low SES families, but that the consistency of input impacts language outcomes as well. Hurtado, Marchman and Fernald (2008) also specifically tested if the maternal input is a factor that influences vocabulary development in low SES families. The samples recorded 27 children and their mothers interacting in Spanish when the child was at age 18 months and again at age 24

months. The amount of maternal utterances and the child's vocabulary size was coded and assessed. They found that children who experienced more input from their mothers had larger vocabulary outputs at 24 months compared to children who had less input from their mothers. The overall results show that the quality and quantity of mother's input predicts children's language understanding and vocabulary growth within a low-SES environment. These studies provide evidence that supports Hoff's (2003) conclusion that the reason SES is related to children's language development is because children in different environments are exposed to a different quantity and quality of language input. This suggests that the monolingual family's SES does not directly impact language development. SES is nevertheless correlated with language outcomes because SES indexes the amount and style of parental input. This suggests that language development has a mediating effect for SES and literacy outcomes.

In sum, the findings that have been documented in crosslinguistic research (English for Hoff; Spanish for Hurtado et al.) show that mother-to-child speech, including the amount of words, phrases, and utterances used, is critical to a child's development of vocabulary and language overall. These findings of SES indirectly impacting language development are found in a monolingual environment.

2.2 Monolinguals: SES impacts development of literacy skills

After looking at the relationship between SES and early stages of language development, there is a need to look at how SES contributes specifically to literacy development. While the current study will focus on family SES, the literature on SES and literacy has included studies evaluating effects of family SES as well as studies focused on school and peer SES as well.

Beals and De Temple (1992) provided a combination of home social and economic measures, family conversation measures, and child language measures to determine what are the best predictors of early literacy success in low-income families. Beals and De Temple visited a total of 28 families focusing on one parent (mother) and the child, excluding variables of other adults in the home such as fathers, stepfathers, and grandparents. Participants varied in cultural and economic background. Two home visits were made, one was when the child was three and second was when the child was four, in order to collect measures of the home language. During the home visit, recordings were made of the interaction while the mother and child read two books together. Mother was also asked to record meal time sessions with the child. Recordings of mother-child book sharing and the mealtime conversations were subsequently analyzed for both quantitative and qualitative measures of home language usage, such as use of immediate vs. displaced reference, content of child responses to questions, and the frequency of narrative and explanatory talk. At the end of the children's kindergarten year, the children completed a series of standard tests of linguistic, cognitive, and reading comprehension skills. Beals and De Temple found that the family SES and overall child's language production best predicts literacy success. They also concluded that a mother's ability to mediate the child's involvement in conversation at home during the literacy development stages can impact the child's development by transferring the responsibility of conversation from herself to the child. The mother's mediating skills with her child will be further discussed in the conclusion.

While children may begin learning to read in the home, most children make considerable gains in literacy development in school. Thus, in addition to evaluating the impact of family SES on reading, it is important to consider the possibility that school and country SES may also impact literacy. Chiu and McBride-Chang (2006) have investigated whether different types of

SES can have a crucial role in literacy development. The definition of SES that Chiu and McBride used considers not only individual families' SES, but also the SES of the children's environment at the level of the school and the country. Their study collected information from 43 countries, including measures of 193,841 15-year-olds' gender, SES (country, school, peers' family and child's family), number of books in the home, survey of enjoyment of reading, and reading achievement scores. They modeled reading achievement using sequential sets of multi-level regressions to explain the variance of each set (gender, country SES, school SES, family SES, number of books at home, and reading enjoyment). The findings show that each factor was significantly associated with reading achievement. Combined SES effects at the country, school, and family level accounted for 24% of the variance in reading achievement. However, variation in reading level was greater within countries than across countries, and within schools than across schools, indicating the importance of considering explanatory variables at all levels. Chiu and McBride concluded that across nearly all countries, not only personal family SES influences literacy achievement, but also school SES and peers' SES within a school. They suggest that further research is needed to address the specific mechanisms that explain why schools provide literacy success beyond the individual and family characteristics of the student. At the level of the family, number of books in the home mediated the SES effect, whereas at the level of the school, peers' family SES was a more influential factor. There is abundant evidence that SES, in general, plays an important role in a monolingual child's literacy development stages; however, there is a need to detect whether SES directly correlates with literacy success, and/or whether language development and proficiency has a greater impact on literacy outcomes compared to SES.

Research has taken different measures of SES for monolingual children and repeatedly found that SES has a significant impact on language and literacy development. However, language proficiency also impacts literacy development (Oller & Eilers, 2002). There is a need to distinguish effects of SES and language proficiency on literacy outcomes to determine whether SES actually has unique effects on literacy that are independent of language proficiency. This approach of looking at the direct effects of SES and language proficiency will contribute to our understanding of the effects of SES on literacy skills.

2.3 Bilingual children: Effects of SES and L1/L2 proficiency on literacy

One approach, in order to find the unique effects of SES on literacy achievement, is by looking at child bilinguals and the development stages of L1 and L2. General research on bilingualism has shown that bilinguals are not like two monolinguals in one person. It proves a very difficult task to master each language at the same level of monolingual speakers of the respective languages (Negro & Genelot, 2012). Bilingualism researchers have examined 1) how childhood developmental stages of L1 minority language proficiency impacts majority L2 language and literacy; 2) the impact of different SES levels on L2 child's acquisition of majority language and literacy proficiency, 3) and lastly, what exactly the advantages of being bilingual are.

2.3.1 Impact of L1 development on L2 proficiency

One of the biggest issues, in the educational environment, is what method(s) of teaching bilinguals language and literacy work? The issue is more complex than in a monolingual environment of teaching how to read and write in one language. Many questions must be addressed: i.e. should one language be taught first, then the other language later? Can children be taught two languages simultaneously? At what stage of development can bilingual literacy work effectively? One example of addressing this issue is to consider waiting until children achieve fluency in speaking their L1 before addressing L2, both spoken and written. Gámez and Levine (2013) looked at Spanish-English bilingual children in educational settings. The research looked at the minority group of children and how it affected their literacy development in the majority L2 educational environment. There were 12 participating classrooms with 21 teachers and 101 kindergarten students from the midwestern part of the United States. They collected data that included specific linguistic features of teachers' quality of speech in Spanish and English and children's spoken language assessment scores in Spanish. They elicited data by using speech audio recordings, transcribed the recordings and coded data from both teachers and students at third and fourth quarters of the school year. Based on observations and recordings in the classroom setting, they found that some teachers would only speak Spanish to students. Others would use both Spanish and English to students. The teacher's choice of language production affected the students' test performance of words and sentences in spoken Spanish. They found that the high quality of Spanish-only input from the teacher has a significant role in promoting L1 Spanish children to perform better on the tests. There was less impact on students' performance when Spanish and English were produced equally by the teachers. The evidence shows that the level of syntactic complexity of Spanish input from the teachers promoted L1 Spanish speakers to increase their own sentence and word production. The students were also

tested on their English literacy skills. The study found that those with higher L1 Spanish oral skills outperformed those with lower L1 Spanish oral skills. This suggests the need to have a strong L1 Spanish linguistic foundation in order to transition to L2 English literacy acquisition in later stages of development. They state that for bilinguals, in the developmental process of learning, it is important for teachers to promote and establish a strong language foundation for students in early stages of L1 development in order to have successful literacy outcomes in L1 and L2. There is a complex interaction between L1 language and/or literacy proficiency and L2 proficiency. The important implication to understand is that when a bilingual child has a strong foundation and quality of production and comprehension of one language, it influences literacy success in the other language.

2.3.2 Impact of SES on L2 proficiency/literacy

Next, consider the question of whether family SES in bilinguals influences literacy outcomes. Oller and Eilers (2002) looked at the SES, language of the home, and the method of instruction at school to see how it correlates to both Spanish and English language and literacy. They elicited data from 952 Spanish-English bilinguals and 248 monolinguals in Miami. There are various and complex levels of emphasis on what role both languages have in school and at home. The Spanish-English bilinguals went to either a full English immersion school or a two-way bilingual school. Also, some participants only spoke Spanish at home, while others speak both Spanish and English at home. The data included test results from children in a four-year time period. The procedure of testing was carefully planned to include an objective approach that avoided complications that most monolingual testing procedures have with bilinguals’

performance. The test included standardized tests of spoken-language and academic performance in both Spanish and English. They also included the Woodcock-Johnson test and Peabody picture vocabulary test to include a balance of scores from all participants. The overall data revealed similar patterns between monolinguals and bilinguals, such that high and low family SES is correlated with high and low literacy skills, respectively. The key finding in this data is when the high SES bilingual children reached 5th grade, they had an equivalent level of proficiency in their English L2 reading to monolingual English readers. Oller and Eilers conclude that higher SES in bilingual families is associated with better English and Spanish language and literacy proficiency. For example, in order to achieve a higher SES status in the United States, emphasis is placed on English language. The minority language, such as Spanish, has little implication towards SES, but is just as valuable to learn. The study shows that high SES Spanish-English bilingual children can achieve proficiency in English just like their monolingual peers. While this finding is a helpful first step in showing some similarities of bilingual performance in language and literacy to monolinguals, it is still not clear that SES and L1 spoken proficiency contribute independently to reading ability in this population.

2.3.3 Early exposure to both L1 and L2 languages impacts outcomes

What exactly are some advantages of being a bilingual and attending bilingual schools? Kovelman, Baker and Petitto (2008) evaluated whether the age of the first *bilingual* exposure was a factor that impacted the outcome of literacy skills. There were 150 participants who were categorized into 5 different groups based on attending a bilingual school or a monolingual school and in grade 2 or grade 3. They evaluated various language and literacy skills. Monolingual

English speakers only completed English language and literacy tasks. The remaining participants were tested in both languages. They assessed three areas of language and literacy skills. First, they assessed children's ability to manipulate the sounds within their language. Second, they looked at the children's ability to read words and sentences. Third, they looked at the children's spoken language production, competence, and proficiency. They demonstrated in their study evidence of a reading advantage for students from monolingual and bilingual homes who attend bilingual education. More specifically, they found that monolingual students from English-speaking homes who attend English-Spanish bilingual schools outperform monolingual students who attend monolingual schools on a challenging phonological task. They propose that this is due to an advantage of bilinguals' phonological awareness over their monolingual peers. By virtue of learning two languages, the bilinguals can attain higher levels of metalinguistic cognition, thus outperforming monolinguals on phonological processing tasks.

In sum, there is indirect evidence that shows that L1 language proficiency and L1 literacy correlates to SES from monolingual research. However, the two variables are confounded in the general research within monolinguals studies. There is the general evidence of benefits of bilingualism accounting for the language of L1 and L2 interacting with L1 and/or L2 literacy. Within research on bilinguals, we see stronger effects of SES on the majority population's language than on the minority language. There is evidence showing the effects of L1 language proficiency on L2 literacy. This leads to an important question that bilingualism researchers have examined, i.e., how L1 proficiency is related to L2 literacy. This question is essential for the development of educational approaches in the U.S. since many bilingual school children speak a minority language in the home and develop literacy skills in their L2 English at school. SES and L1 proficiency may indeed contribute uniquely to reading and writing proficiency in bilinguals.

This study is carefully designed to evaluate family SES, L1 language proficiency, and L2 literacy proficiency. Signing bilinguals will help to clarify if both factors, SES and L1 language proficiency, predict literacy development outcomes.

2.4 Reading development in ASL-English bilinguals

Signing bilinguals have a unique profile because L2 literacy is achieved without prior development of spoken L2 proficiency. This allows for a novel investigation of the impact of SES and L1 language skills on L2 literacy achievement. There is a great deal of variability of language skills in the deaf population. To begin, the process of acquiring ASL parallels the acquisition of other languages in the world if exposure to ASL begins at birth (Newport & Meier, 1985). Unfortunately, exposure to ASL at birth is not the experience of the majority of deaf children in the United States. The majority of deaf children have parents who are not aware of the importance of signing with their child and who are not fluent in ASL. Some children become deaf while still in their language and literacy development stages. Parents struggle to know how to mediate interactions involving their deaf child around language and literacy development. Part of the challenge that parents face is related to the different choices available to address deafness at a young age. Cochlear implant (CI), hearing aids, and other technology are recommended to parents as a means to improve their child's quality of hearing, but none of these technologies can ensure that deaf children will have access to language. Some deaf children attend speech therapy to support the development of spoken English skills to communicate with parents who only know English. Support for sign language exposure can be obtained through some state agencies providing early intervention, such as a deaf mentor who makes home visits, or sign language

classes for parents. However, in no case is the provision of speech therapy or sign language support equivalent to the continuous access to language that deaf children of deaf parents experience.

Parents also have several options for the education of their deaf child. Some deaf children attend a school where they are immersed in ASL with other deaf peers. Some attend private schools that focus on oral speech education. Others attend public schools with some support of technology to access communication better: ASL interpreters, FM system (for amplifying CI and hearing aids in the classroom), real time captioning devices, and note taking resources. Some even attend public school with no support at all! Again, children's exposure to ASL and English varies depending on the hearing loss, family, school, and other issues surrounding deafness.

The majority of the United States population is monolingual and resources at schools are based on monolingual education. Successful communication and employment rely to a large degree on how well you know how to speak, read, and write in English. Within this broader context, the traditional approach to reading in the deaf population has been to evaluate it within a monolingual framework. This research departs from past work in two important ways. One, the question of reading proficiency and the factors related to it are considered within a bilingual framework. Instead of evaluating effects of SES on reading development alone, this study will include a measure of ASL proficiency as well. Hauser, Paludneviciene, Supalla, and Bavalier (2008) provide one of the first ASL tests that can be given to ASL-English bilingual children to directly assess their ASL proficiency. By including measures of both ASL and English proficiency, this study considers all the language skills of the bilingual participants.

Two, past studies have only included native signers (deaf children with deaf parents) due to the lack of ASL assessment tools, which severely limits the size of the population studied, and

the generalizability to the broader deaf population. We use direct assessment of ASL skill, which allows us to include deaf individuals from both hearing and deaf families, and it allows us to distinguish between different levels of language proficiency within deaf individuals who are all native signers, just as there is variability in language proficiency in any population of hearing native speakers of a language. The importance of this change in methods cannot be underestimated. As the results of this study will demonstrate, ASL proficiency is not categorically distinct in deaf individuals with deaf and hearing parents. By excluding deaf individuals with hearing parents from most prior studies, the literature has provided a piecemeal view of linguistic and cognitive skills in the deaf population.

Previous studies in ASL-English bilingualism found that there is correlation between L1 language proficiency and L2 literacy skills, even when signing bilinguals do not have direct access to a L1 that has a writing system (Hoffmeister, 2000; Chamberlain & Mayberry, 2008). Furthermore, the L2 must be acquired via literacy. There are multiple studies of the relationship of SES, language, and literacy in monolingual and bilinguals. Despite the numerous previous studies on SES, L1 proficiency, and literacy skills, there is a dearth of research on ASL-English bilinguals. Thus the goal of the current study was to investigate this relationship in deaf ASL-English bilinguals for the first time, and to provide a clearer understanding of how bilingual children go through the process of achieving literacy skills successfully. The research questions were:

- Does SES predict L2 reading ability in signing bilingual readers?
- Does L1 proficiency predict L2 reading ability in signing bilingual readers?
- If both factors affect L2 reading ability, are they correlated with each other? Can L2 reading ability in signing bilingual readers be modeled with both factors?

Chapter 3

3.0 Methodology and Data

To investigate these possibilities, we assessed family SES, L1 ASL language proficiency, and L2 English writing proficiency in a large population of ASL-English bilinguals. We used mixed-effects linear modeling to explore the relationship of these variables.

3.1 Participants

In general, the data for this study was collected nationally at universities, schools and summer camps for the deaf. The participants are 212 deaf children ranging in age from 6 to 26. There were 84 male and 101 female participants.

3.2 Materials

First, information regarding background of subjects was collected. Parents filled out information regarding their occupation and educational experience. The rating of SES levels was evaluated and coded focusing on various levels of occupation and education level of parent(s). Audiogram showing different levels of dB of hearing loss was included. The age of taking the test was recorded.

Second, subjects were assessed for language competence in ASL. The ASL–Sentence Reproduction Test (ASL-SRT, Hauser et al., 2008) was used to assess ASL proficiency. Participants view 20 sentences increasing in complexity. After each stimulus sentence, participants are asked to repeat the sentence verbatim (cf. TOAL-3, Test of Adult & Adolescent Language, Hammill, Brown, Larsen, & Widerholt, 1994). The ASL-SRT has not yet been normed for different ages. In order to compare performance across participants of different ages,

we modified the ASL-SRT scores into age-normed standard scores by calculating the mean and standard deviation of ASL-SRT scores for 3 age groups: 79 – 120 months, 121 – 160 months, 161 months or older. We subsequently generated standard scores for participants on the basis of their age group.

Third, the standard scores from the reading portion of the Peabody Individual Achievement Test- Revised (PIAT-R, Markwardt, 1989) was used to assess English literacy skills.

3.3 Procedure

From the total sample of participants, we selected a sub-sample using the following criteria: completion and intelligible writing or signing to allow accurate scoring. A total of 123 DoD (deaf children of deaf parents) and 60 DoH (deaf children of hearing parents) were identified for inclusion in the study. Traditionally, DoD and DoH have been analyzed separately because there have not been tools available to directly assess ASL proficiency. The assumption has been that DoD will always have better ASL proficiency than DoH. Further, many studies do not include DoH at all since their ASL proficiency is highly variable. DoD account for roughly 5% of the deaf population in the U.S. On the other hand, DoH represent 95% of the deaf population (Mitchell & Karchmer, 2002). Although DoH account for a wide range of variability of timing in L1 and L2 language acquisition as opposed to DoD, there is a need to have data that represents the majority of the deaf population. In this study, we were able to include both groups, since we can directly assess ASL proficiency. This means that the assumed traditional approach can be eliminated. The ability to look at all 183 subjects, regardless of parental status of deafness, provides a fuller representation of the target population. Demographics and language assessment values for the sample are listed in Table 1.

| 123 DoD, 60 DoH | Range (min – max) | Mean | SD |
|----------------------|-------------------|-------|-------|
| AGE in years (n=183) | 6.58 – 26.25 | 15.65 | 4.45 |
| SES (n=159) | 6.00 – 64.00 | 38.45 | 15.43 |
| ASL-SRT (n=157) | 0.00 – 18.00 | 7.4 | 4.13 |
| PIAT.SS (n=179) | 55.00 – 132.00 | 83.68 | 16.99 |

Table 1. Demographic characteristics and language assessment scores of the sample (n=183 total participants; note that the number of participants for whom data was available for each assessment is listed in the first column).

The data were analyzed using mixed effects regression using the lme4 package in the R statistical computing software (R Development Core Team, 2012; Bates, Maechler & Bolker, 2012). Four different analyses were completed. First, to answer our question if SES predicts L2 reading ability in signing bilingual readers, we modeled PIAT reading scores as a function of SES. This allows us to ask whether SES effects in deaf readers are consistent with general monolingual patterns of higher SES being associated with better English written proficiency. The second step, we evaluated whether L1 proficiency predicts L2 reading ability in this sample of signing bilingual readers. We looked at the relationship between ASL and the PIAT to answer this question. If ASL proficiency predicts variation in PIAT reading scores, this will replicate and extend prior studies showing that ASL proficiency is correlated with English literacy in both children (Hoffmeister, 2000) and adults (Chamberlain & Mayberry, 2008; Freel et al., 2011). In the third step, , we tested the correlation between SES and ASL to see if these two measurements

are correlated. We found that SES and ASL are not correlated. Therefore, we ran a fourth analysis that investigates the amount of variability in English reading proficiency that is explained by the independent variables of SES and ASL in a single regression model.

Chapter 4

4.0 Results

As predicted, independent analyses of SES and ASL proficiency both can account for variability in PIAT scores, i.e., in English literacy ability. Higher SES and higher ASL proficiency are associated with higher literacy scores in deaf bilinguals (see Figures 1, 2, & 3).

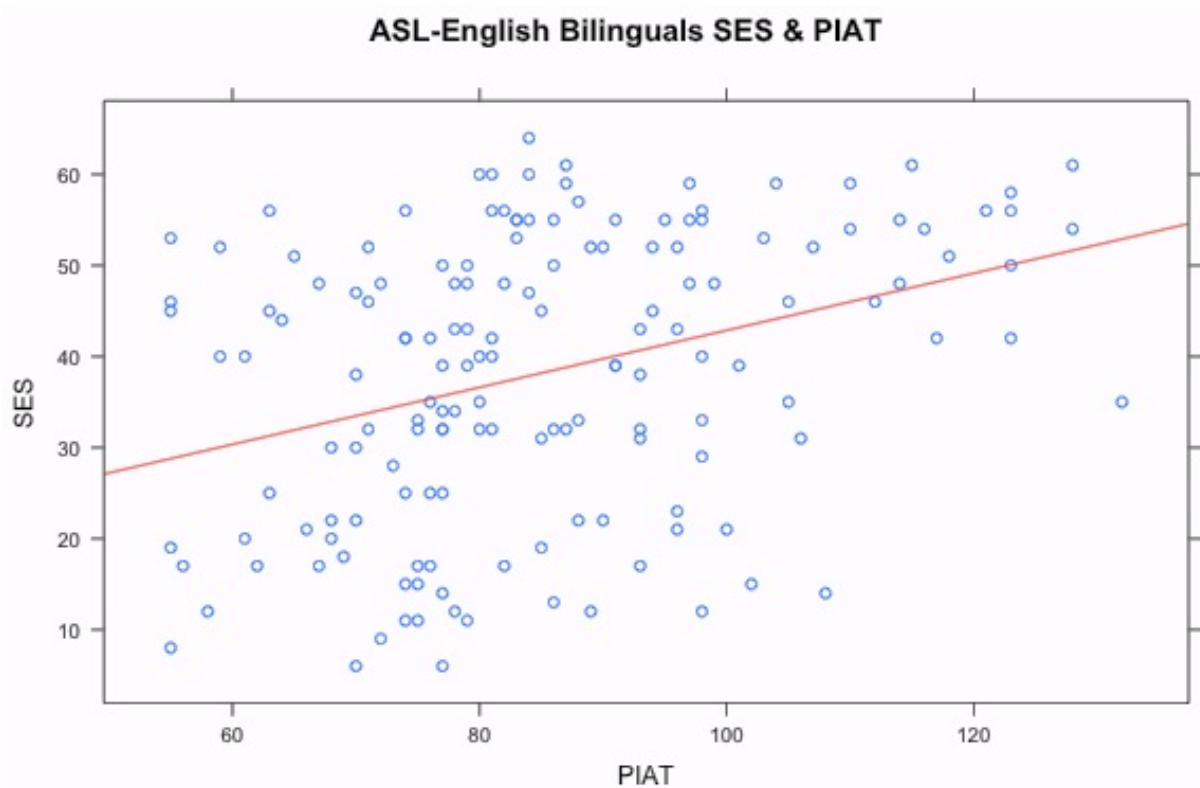


Figure 1. Significant correlation between PIAT and SES ($n=155$; Multiple R-squared= 0.12; adjusted R-squared=0.1147; $p < .001^{**}$). Mixed effects regression: fixed factor = SES, random factor = participant.

As seen in Figure 1, higher SES scores are associated with higher PIAT scores. This evidence supports the hypothesis that ASL-English bilinguals' SES influences their literacy achievement, similar to the cases of hearing monolinguals (Beals & De Temple, 1992; Chiu and

McBride-Chang, 2006). The SES effects in deaf readers are consistent with general monolingual patterns of higher SES being associated with better English reading proficiency. SES does contribute to literacy development for signing bilinguals, presumably through amount of books, encouragement of reading, mother's mediation skills, and role model of teachers and peers at school.

Next we turn to the question of the relationship between ASL and English proficiency by evaluating whether L1 proficiency predicts L2 reading ability. The analysis demonstrates that there is also a significant correlation between ASL proficiency and English reading skills. The reason for testing these two values is to provide evidence that ASL can provide a general linguistic benefit to the acquisition of a written language, English. Importantly, this relationship holds even though the participants have both deaf and hearing parents, who presumably differ extensively in their ASL proficiency level. Even when ASL is not learned from a native signer, it nevertheless is closely associated with successful acquisition of a second language. One implication of this result is that the majority of the deaf population, regardless of parental hearing status, is bilingual. This contradicts the assumption that is implicit in much prior research on deaf readers treating deaf individuals as monolingual learners.

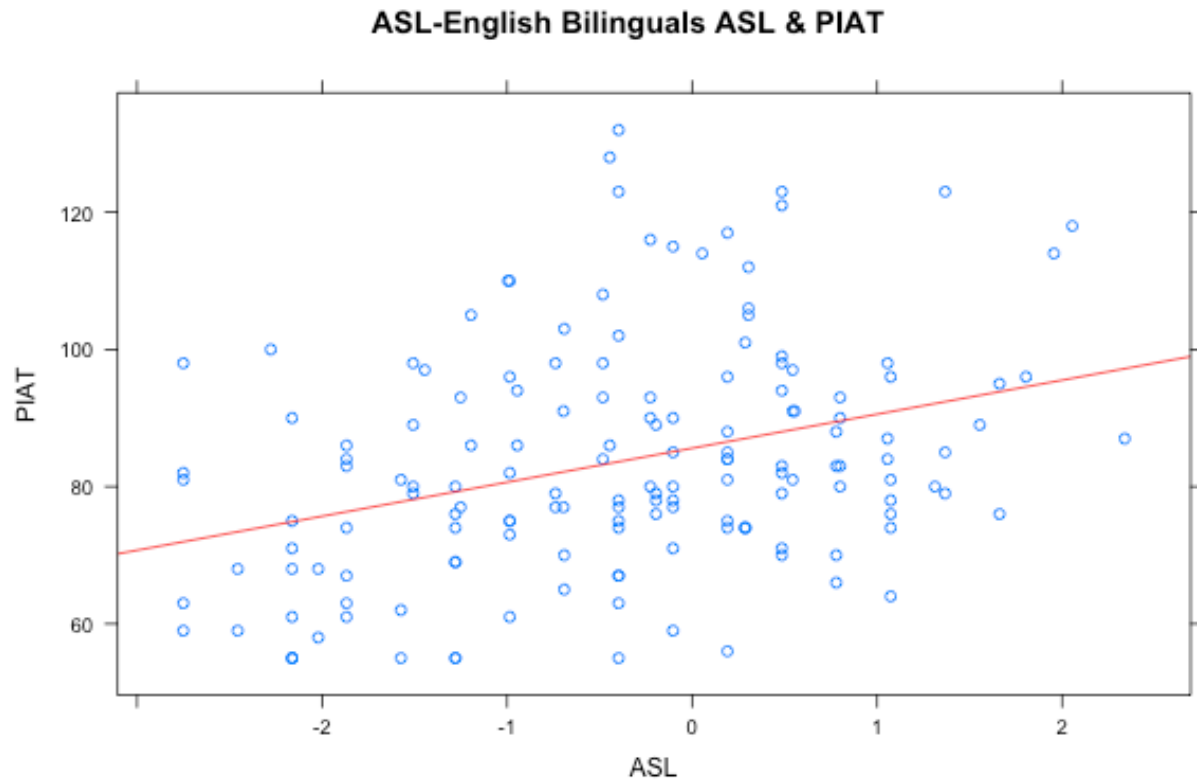


Figure 2. Significant correlation between PIAT and ASL ($n=153$; Multiple R-squared=0.1151; Adjusted R-squared= 0.1093; $p < .001^{**}$). Mixed effects regression: fixed factor = ASL, random factor = participant.

The graph provides results that the majority of the subjects who have a higher PIAT scores also have higher ASL scores. In sum, the first two analyses show that SES and ASL both predict English literacy ability. Higher SES and higher ASL proficiency have a positive impact on literacy in ASL-English bilinguals.

If both SES and ASL are positively associated with English literacy ability, it is possible that these factors are confounded, and that they do not explain independent aspects of the variation in English literacy ability. To explore this possibility, we completed a test to see whether SES and ASL are correlated. The results show that SES is not significantly correlated to ASL (Multiple R-squared= 0.021; Adjusted R-squared=0.014; $p=0.091$, n.s.). This is an important finding. SES is correlated with English proficiency, however not with ASL

proficiency. This may be an indication that ASL is indeed a minority language in the English majority language environment in the United States. Since we see how SES is related to each language, English and ASL, the next question that needs to be addressed has to focus on the interaction between the languages. Are deaf signing readers actually bilinguals or monolinguals?

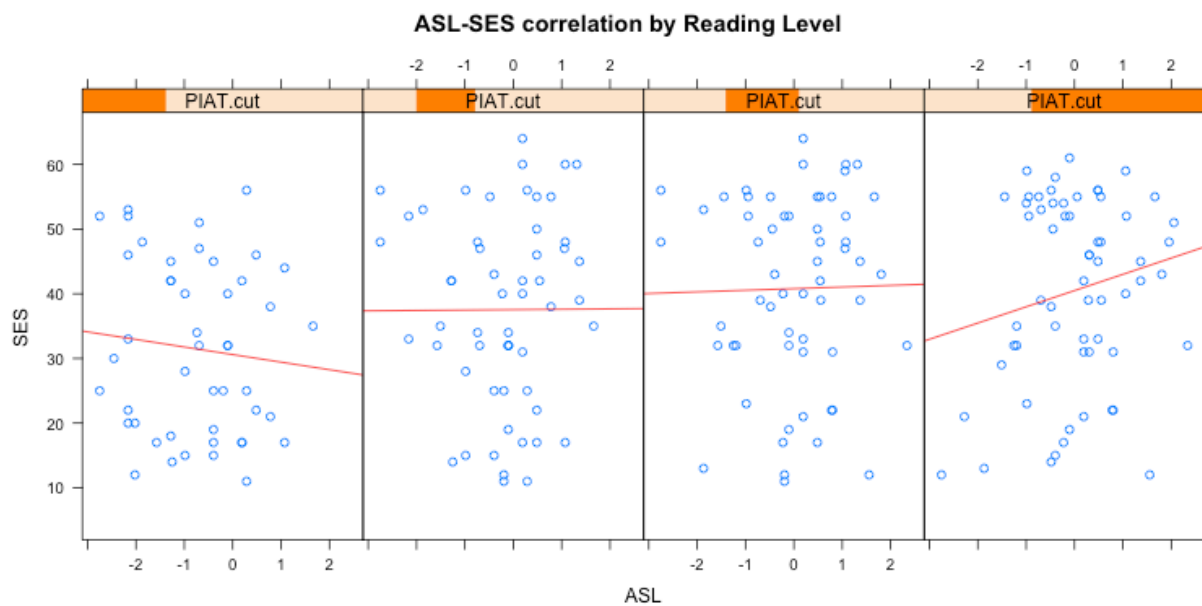


Figure 3. PIAT predicted by both SES ($p=0.00177^{**}$) & ASL ($p=0.00165^{**}$) in a single regression model ($n=149$). Mixed effects regression: fixed factors = SES, ASL, random factor = participants

Now that we have looked at the variables in a one to one analysis, Figure 3 provides the overall interaction of the ASL-English bilinguals: effects of ASL and SES on PIAT. This graph illustrates four different reading groups: PIAT-low, PIAT-midlow, PIAT-midhigh, and PIAT-high. The separation of the PIAT scores into four overlapping groups provides a chance to look closer on what is happening between the three factors. In the PIAT-low, we see that there is a negative correlation of SES and ASL for poor readers. By contrast, in the PIAT-high, we see that SES and ASL are positively correlated for good readers. For the two middle groups, the

regression line is flat, indicating that SES and ASL are unrelated for average readers. The results hint that deaf signers have the greatest success in literacy development when SES and ASL are providing mutual support for development. The poorest readers appear to benefit from one factor, however, not both factors.

Chapter 5

5.0 Discussion

5.1 Discussion of SES effect

The question, from the start, is what are the most important factors that are needed for literacy success during an ASL-English bilingual's childhood? The results above replicate prior studies of SES effects on monolingual and bilingual children and document for the first time that ASL-English bilinguals also benefit from higher levels of home SES. There are several reasons why high SES parents are better at promoting literacy for their children; they provide more books, have strong parental portrayal of reading enjoyment, spend more quality time and use more mediation strategies (Korat & Haglili, 2007). Some examples of mediation strategies include talking with their child about issues that go beyond reading the text in the book. The quality of encouragement they give to the child to participate actively in reading activities is also greater. The style of talk of higher SES parents creates a connection between the text's meaning and the child's own experience. While it is not surprising that these behaviors would be beneficial to deaf children, this study is the first to demonstrate that despite the unique factors influencing relationships between deaf children and their deaf or hearing parents, the association between SES and literacy nevertheless holds.

Mothers from all SES levels overestimate their child's performance on literacy skills (Korat & Haglili, 2007). High SES mothers overestimate less and are more aware of the importance of using different mediation strategies to facilitate literacy development for their child. In other words, the focus of educating a signing bilingual child needs to emphasize the importance of the relationship between the parent(s) and child. This may be particularly critical

in the case of deaf children who are approaching literacy without full mastery of the language represented by print. Deaf children vary in literacy outcomes. The ability of parents to realistically assess their child's literacy performance allows them to then respond in appropriate ways to their child's literacy needs. The topic of literacy has a priority in the educational environment for teachers and educators. However, if a child is to be successful in obtaining good literacy skills at school, the role and responsibility of the parent(s) should be acknowledged and cultivated.

The next step is to consider whether the behaviors of high SES parents documented in previous studies can be expected in families with deaf children. Do higher SES parents who have ASL-English bilingual children accommodate their needs for literacy success? The reason to take this into consideration is the fact that communication from parent to child is different when the parent is learning to sign, and the child is not fluent in the parent's language. The results ultimately support the idea that even when communication skills between parents and signing bilingual children are not similar to other monolingual and bilingual families, high SES parents nevertheless find ways to promote literacy. The majority of signing bilingual children have parent(s) who are learning ASL as a second language or are not signing bilinguals, thus it is highly informative to discover that despite potential communication barriers, SES is still predictive of stronger literacy skills. There has been an attempt to evaluate the language behaviors of hearing parents of deaf children (Harris & Mohay, 1997; Loots, Devise, & Jacquet, 2005; Spencer & Harris, 2006), but there is no implication of the role of SES as a factor. In this study, consideration in designing studies of parental mediation of literacy interactions should take SES into account as a potential factor influencing the parent-child behaviors.

For deaf families, meaning signing bilingual children who are fluent in the parent's language, the relationship of SES and literacy may have a different explanation (Beck, McKeown, & Kucan, 2013). Deaf families face barriers to higher SES levels. Schembri, McKee, McKee, Pivac, Johnston, and Goswell (2009) collected and categorized different SES levels from deaf participants from Australia and New Zealand. They noted that social class is an important factor in their study. However, because of the challenge to recruit a moderate sized pool of participants and compare across working class, middle class, and upper class, they were limited in their ability to code for all variables of social class. For the Australian data they had working class and middle class. For the New Zealand data they did not include any social class as a factor. Despite these methodological concerns, Schembri et al. conclude that deaf individuals' and families' SES levels are not similarly distributed in comparison to the general monolingual population's SES levels. Their account of why there are barriers to higher levels of SES is that fluency in the L1 language is not the majority language. This account is similar to other bilingual situations. Sign languages are recognized as minority languages and are not as socially esteemed as majority-spoken languages. Thus the majority of the DoD families have working and middle-class SES levels compared to DoH families, who can be found at all SES levels. Yet, it is not impossible for DoD families to have high SES levels, it is just more rare. One type of societal change that might be necessary so that more deaf families can attain a higher SES level is the recognition of bilingualism as socially valuable, and the recognition of deaf individuals who use a signed and a spoken language as bilinguals. There is no reason to focus on English only to the detriment of ASL, although language attitudes do influence access to the educational and professional opportunities that allow children of lower SES families to obtain a higher level of SES in their adulthood. When societal views toward bilingualism change,

such that a bilingual advantage is recognized, not only deaf families, but all bilingual families as well, will benefit from this change in societal attitudes.

5.2 Discussion of ASL proficiency

How does ASL promote English literacy despite the fact that it's a different language? Chamberlain and Mayberry (2008) argue that sign language can provide a general linguistic advantage during reading development stages. This general linguistic advantage includes the overall language structure that a child needs to have as a foundation to transition to acquiring a second language and/or written structure. Most importantly, they can distinguish between language-specific transfer and a general language advantage because sign languages do not share phonological, lexical or grammatical features with spoken languages. Sign language also does not have a written orthographic system that could transfer to acquisition of a spoken language orthographic system. The hypothesis that sign language proficiency would predict reading ability was tested in a sample of 31 deaf adults. The procedures included an ASL grammaticality judgment task of highly complex sentences, as well as a sign language narrative response task. Participants were also evaluated for their reading comprehension abilities in English, and separated into two groups: those reading below a grade 8 level, and those reading at grade 8 level or above. Their analysis found evidence that sign language proficiency positively correlates with literacy ability when controlling for non-verbal intelligence, and further, that the better readers had higher scores on the ASL measures than the less skilled readers. Thus, sign language skills do not interfere with or inhibit the ability to develop proficient reading and writing competence. They also state that their findings indicate that the linguistic basis of reading for deaf adults is

bilingual and bimodal, which means that the general linguistic advantage only applies if deaf adults are exposed to both ASL and English. The results of the current study are consistent with Chamberlain and Mayberry's findings, and add to those findings by showing an earlier phase in development. Chamberlain and Mayberry recruited adults for their study (ages 17 to 53). The current study demonstrates that this relationship between ASL and English literacy skills is already apparent in a much younger population.

Kubus, Villwock, Morford, and Rathmann (2014) made additional claims about the impact of sign language knowledge on literacy development. The study focuses on DGS (German Sign Language) and German bilinguals. Kubus et al. argue that knowledge of a signed language develops not only the basic linguistic functions, but that there may also be language-specific benefits of learning a sign language as well. Kubus et al. explain that during the course of L1 acquisition, signers develop extensive semantic networks. Deaf readers can map orthographic forms to both signed phonological forms and prior meaning representations instead of creating new meaning and form representations every time they encounter a written word they have never seen before. Sign language proficiency allows signing bilinguals to become proficient in associating complex orthographic forms to semantic meaning. The interaction between sign language and literacy in a spoken language is clear in the context of facilitating each other on the key developmental stages on both language and literacy levels.

All parents of deaf children can promote their child's ASL proficiency, whether or not it is the parent's L1. The empowerment of key developmental stages for literacy success in children lies with parents, whether they are deaf or hearing. The parent should learn and be skilled at providing bilingual mediating strategies of reading, writing, and signing to their child. These study results are consistent with other current research documenting benefits of

bilingualism strategies for overall language and literacy outcomes. Hauser, Lukomski, and Hillman (2008) focused on executive function (EF), which is a self-regulatory system that has significant implications for both social and academic development functioning of children. Hauser et al. provide an overview of the ways the environment of signing bilinguals has an affect on the development on EF. They found an advantage of bilingualism impacting overall better EF task outcomes compared to monolinguals. They suggest that the evidence provides insights that parents and educators need to know about the consequences of sign-print bilingualism for other cognitive functions.

Pucci, Harmon, and Mounty (2012) provided a profound description of the relationship between ASL proficiency and English proficiency based on the implicit knowledge of parents and teachers who work with deaf signers. Twelve participants in the study were interviewed about the overall relationship that ASL has with English and vice versa in various social and educational environments. Their informants' responses reveal important implications of the relationship between ASL and English proficiency. There is a bi-directionality of influence between both languages. As the development of one language increases, it has a role of supporting and influencing facilitation of the other language. Much of the prior literature has addressed how ASL influences English since many deaf individuals become fluent signers before becoming proficient readers. Pucci et al. found that respondents were sensitive to influences in the opposite direction as well, noting that as English vocabulary increases, signers show more sensitivity to genre and lexical choice in ASL. This creates a bi-directional linguistic progression timing system during the child's developmental stages of language and literacy. This emic data provides additional support to the performance-based measures indicating a beneficial relationship between ASL and English.

Chapter 6

6.0 Conclusion and future implications of SES, Language, and Literacy

Once again, this is an initial study of the effect of SES on literacy skills in ASL-English bilinguals. This study showed for the first time that SES directly impacts ASL-English bilinguals' L2 literary success, and that this effect is independent and additive to the benefits of L1 proficiency in ASL. There is some suggestion that identifies specific needs during the process of achieving literacy outcomes. Since there is no direct 1-to-1 relationship of SES and ASL proficiency for deaf signing bilinguals, it is critical to explore a range of sensitive, complex linguistic and social interactions that can account for the process of acquiring language and literacy during childhood bilingualism. Future research should investigate the impact of different types of literacy mediation between monolingual parents and the monolingual English deaf child vs. bilingual parents and the ASL-English bilingual child. Also, research should explore different possibilities of the role that SES has on ASL-English bilingual children's language and literacy outcomes.

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