The Dissertation Committee for Ellen Stubbe Kester Certifies that this is the approved version of the following dissertation:

Performance on Semantic Language Tasks by Spanish-English Bilingual Children with Varying Levels of Language Proficiency

Committee:

Elizabeth D. Peña, Supervisor

Lisa M. Bedore

Barbara G. Dodd

Ronald B. Gillam

William R. Koch

Performance on Semantic Language Tasks by Spanish-English Bilingual Children with Varying Levels of Language Proficiency

by

Ellen Stubbe Kester, B.A., M.A.

Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

December, 2002

Dedication

I dedicate this work to my dad, Donald Carl Stubbe, 1936-2002.

I promised you I would finish this, and here it is. I miss you, Pop.

Acknowledgements

I would like to thank my wonderful husband, Steve Kester, for his undying support and encouragement throughout this process. I could not have accomplished this without him. Also, thanks to my mom, Mary Ellen Stubbe, my brother and sister-in-law, John & Vera Stubbe, my grandfather, Carl Lenggenhager, and my in-laws, Jim & Metha Kester, for their emotional support and encouragement.

Liz Peña, my brilliant advisor, guided me through this process and encouraged me to be my best. I appreciate her ability to push me to the edge, but not quite over it. I also want to thank, Lisa Bedore, Barbara Dodd, Ron Gillam, Bill Koch, and Tom Marquardt for their encouragement, support, and enthusiasm.

Performance on Semantic Language Tasks by Spanish-English Bilingual Children with Varying Levels of Language Proficiency

Publication No._____

Ellen Stubbe Kester, Ph.D.

The University of Texas at Austin, 2002

Supervisor: Elizabeth D. Peña

This study explores a functionalist approach to language acquisition by examining the performance of bilingual children with varying levels of proficiency in English and Spanish on a test of semantic language skills with six different tasks. Overall test performance was similar across language groups and for bilinguals in their two languages but differences were seen in performance on the individual semantic language tasks. Specifically, the bilingual children demonstrated better performance on the Linguistic Concepts task in English and on the Functions task in Spanish, and the bilingual children performed better on the Categorization task than predominantly Spanish speaking children. Finally, different developmental trajectories were seen in the different language proficiency groups. These findings would be predicted by input given socialization practices and structural differences in the two languages.

Table of Contents

List of Tables

List of Figures

Chapter 1: Review of the Literature

The growing population of bilingual school children in the United States demands more information in the area of bilingual language development. Hispanic children, most of whom are exposed to both English and Spanish in their environments, are referred for speech and language services at disproportionate rates compared to the Anglo population (Meyer & Patton, 2001). Inappropriate referrals and assessments have been found to play a large role in this trend. The limited information available about language acquisition in bilingual children contributes to the trend of inappropriate referrals and diagnoses.

A significant proportion of the available research with bilingual children in the U.S. focuses on vocabulary acquisition (e.g., Dunn, Padilla, Lugo, & Dunn, 1986; Pearson & Fernandez, 1994; Umbel, Pearson, Fernandez, & Oller, 1992). Specifically, research on assessment of semantic language skills, particularly vocabulary skills, has demonstrated that children from bilingual backgrounds perform more poorly on single word tests than children from monolingual backgrounds (Dunn, Padilla, Lugo, & Dunn, 1986; Duran, 1988; Peña & Quinn, 1997; Saville-Troike, 1991; Tamayo, 1987; Valdes & Figueroa, 1994). However, because bilingual children receive input in two languages, it is important to explore the effects of input on performance, especially with respect to a variety of semantic tasks that may provide better diagnostic accuracy of semantic development than single word tests alone (Gray, Plante, Vance & Henrichsen, 1999; Crystal, 1998).

As semantic language skills encompass far more than single word vocabulary, it is important to examine these skills across a variety of tasks, including categorization skills, analogies that explore understanding and use of relationships between words, description skills, matching skills, and comprehension of passages that examines children's ability to understand and infer information from texts. The use of a variety of tasks allows for a more in depth view of a child's semantic language skills, and is consistent with the semantic tasks they focus on in school.

Functionalist accounts of language development focus on language performance as driven by input. As such, input from the environment provides linguistic information that allows mappings between language forms and language functions (MacWhinney, 1997). Such an account predicts a strong relationship between input and output, or in terms of semantic language skills, a strong relationship between linguistic experiences and semantic language performance. Both structural and sociocultural aspects of the target language provide linguistic experiences that may influence language output (Bowerman, 1996; Peña, Bedore, and Zlatic-Guinta, 2002). With respect to the acquisition of semantic language skills in bilinguals, a functionalist model might predict that bilinguals with different amounts of exposure, or levels of proficiency in each language, may exhibit different performance on semantic language tasks. In particular, semantic language skills and concepts associated with particular environments, such as social routines that take place in the home (e.g. cooking meals, eating meals, preparing for bed), academic

content discussed in school (e.g. description, categorization, story telling), or school-based social routines (e.g. playing on the playground, eating in the cafeteria), will likely influence semantic performance differently depending on the language used in those situations. In addition, the factor of exposure over time also plays a role in possible changes in performance over time.

Studies of language development in bilingual children have often focused on performance from a monolingual perspective, comparing each language of bilinguals to monolinguals. This type of comparison is attempted through the use of tools designed for monolingual speakers of each language. As Hakuta and colleagues (Hakuta, Ferdman, & Diaz, 1986; Hakuta & Garcia, 1989) note, such tests often exclude mental content that is available to the bilingual in the other language, as well as mental processes and abilities that are the product of bilingualism. For example, Jensen (1974), studied receptive vocabulary scores in English, as measured by the *Peabody Picture Vocabulary Test* (Dunn, 1959), of Anglos, African Americans, and Mexican Americans. Not surprisingly, the Mexican Americans, who were from bilingual households, did not score as well as the other groups who were monolingual English speakers but their performance in Spanish was not taken into account. More recently, Dunn (1988) reported that Spanish-English bilinguals in the U.S. demonstrated poorer performance than both English monolinguals and Spanish monolinguals on the *Peabody Picture Vocabulary Test-Revised* (PPVT-R) (Dunn & Dunn, 1981), a test designed for monolingual English speakers, and the *Test de*

Vocabulario en Imágenes Peabody: Adaptactión Española (TVIP) (Dunn, 1986), an adapted version of the PPVT-R normed on monolingual Spanish speakers outside of the U.S., respectively. While Dunn's interpretation was that the vocabulary skills of Mexican American bilinguals were inferior to those of monolinguals, another interpretation might be that bilinguals are put at a disadvantage when tested from a monolingual perspective alone.

Researchers have begun to use bilingual approaches to the examination of semantic development that consider both L1 and L2. For example, researchers such as Kohnert (2002), Kohnert and Bates (2002), and Kohnert, Bates, and Hernandez (1999) have examined vocabulary acquisition over the lifespan focusing on performance and the relative crossover in performance and processing speed in each language. They found that speed and accuracy shifted higher in L1 to higher in L2 as the amount of exposure to L2 increased. Pearson, Fernandez, and Oller (1993), and Peña, Bedore, and Zlatic-Giunta (2002) have been interested in the percentage of overlap and nonoverlap in semantic knowledge in L1 and L2. Their findings indicate that when both languages are taken into account, a more complete picture of bilingual children's lexical skills is provided. Such current research considers the fole of input language acquisition and performance.

FUNCTIONALIST PERSPECTIVES OF BILINGUAL ACQUISITION

Bates and MacWhinney (1982, 1987, 1989) have proposed the Competition Model as an explanation of how language is learned. They explain that language

learners rely on cues in the input to learn the rules of the language(s) to which they are exposed (MacWhinney, 1987). Cues that occur more frequently in the input and lead to correct performance (i.e., have higher validity) are used more often.

Crosslinguistic studies indicate that the validity of cues is not universal across languages (MacWhinney, 1997). A comparison of Spanish and English further illustrates this point. In English the preverbal position has high cue validity for identification of the subject. In Spanish, however, the subject is placed in front of the verb less often as a result of the pro-drop nature of the language, thereby minimizing the cue validity of preverbal position in Spanish (MacWhinney, 1987).

With respect to bilinguals, MacWhinney (1987) proposes that there are cues that are consistent and cues that vary across languages. If cues work similarly across languages, their transfer will be positive and cue validity will be strengthened, whereas if they work differently across languages, they may result in negative transfer and cue validity will be weakened (MacWhinney, 1987). Strategies of cue use by bilinguals include *differentiation*, in which bilinguals use separate strategies for each language that are identical to those used by monolinguals; *forward transfer*, which is the use of L1 strategies in L2; *backward transfer*, which is the use of L2 strategies in L1; and *amalgamation*, which is a single set of strategies applied to both languages.

Similar to the Competition Model, models of lexical access also propose that bilinguals demonstrate differences in performance in their two languages, largely as a

result of their exposure to the languages. The *Word Association* and *Concept Mediation* approaches are two proposed models that explain how bilinguals learn lexical information in their two languages (Potter, So, Von Eckardt, & Feldman, 1984). Studies indicate that as bilinguals become more proficient in their second language, they move from a *Word Association* approach, in which they use L1 to mediate the L2 lexicon, to a *Concept Mediation* approach, in which they access concepts directly from the lexicon of each language (Dufour & Kroll, 1995; McLeod & McLaughlin, 1986). These models are consistent with the Competition Model, as they propose that as bilinguals receive more input in their second language (i.e., increased cue frequency in L2), they shift from an approach of using L1 cues when operating in L2 (i.e., a Word Association approach) to using L2 cues when operating in L2 (i.e., a Concept Mediation approach).

These models have implications for examination of the semantic skills of children who are learning language in a bilingual environment. For example, when assessing categorization skills, children who are using a word association strategy might access lexical information learned in L1, while those using a concept mediation strategy might access concepts learned in L2. In terms of speed of production, children using a word association strategy may require more time to respond to questions than those using a concept mediation strategy. Additionally, those using a word association strategy might use the form of L1 when producing L2. Thus, based

on these models, children might be expected to perform differently depending on how much exposure they have had to L2 and what type of strategy they employ.

CURRENT RESEARCH ON SEMANTIC LANGUAGE SKILLS IN BILINGUALS

The role of input on bilingual semantic acquisition has been explored through a number of studies of bilingual adults and children with different levels of language proficiency in each language. Generally, these studies of semantic language tasks have found that bilinguals differ in strategy use and performance across their languages as a result of input, which is further affected by both cultural experiences and linguistic structure (Altarriba & Mathis, 1997; Dufour & Kroll, 1995; Dufour, Kroll, & Sholl, 1996; Hernandez, Bates & Avila, 1994; Kohnert et al., 1999; Kohnert & Bates, 2002; Kroll & deGroot, 1997; Peña et al., 2002; Talamas, Kroll, & Dufour, 1995).

The Role of Input on Semantic Language Performance in Bilinguals

Social/Cultural Input

Social and cultural experiences influence the concepts learned in different languages. The vocabulary children learn is directly related to their experiences and those experiences may differ by language (Pearson, Fernández, Lewedeg, and Oller, 1997). Activities that take place in the home and at school will likely result in different vocabulary in each language. Pearson and colleagues (Pearson, Fernández, Lewedeg, & Oller, 1997) studied the relationship between exposure to Spanish and English to the percentage of words produced in each language. Their findings

indicated that the proportion of input in L1 and L2 was strongly related to the proportion of vocabulary output in L1 and L2, providing strong evidence for the role of input in language development. In another study, Pearson, Fernandez, and Oller (1995) examined receptive vocabulary skills based on the MacArthur Communicative Development Inventory (Fenson, Dale, Reznick, Thal, Bates, Hartung, et al., 1993) and found that for children who were learning language in bilingual environments, the proportion of overlap of words known in both languages was roughly 30 percent, while 70 percent were unique to Spanish or English. Similar findings were reported in a study of category generation (Peña et al., 2002), which demonstrated that 68.40% of the category items produced by bilingual children in their two languages were unique to one language. These studies provide evidence that vocabulary acquisition varies across languages, likely as a function of input.

Specific vocabulary used in each language may also vary as a function of input. For example, For example, Peña et al. (2002) found that bilingual children produced different responses when generating words for the category of "food" in English than in Spanish, which they proposed was culturally based. Specifically, in English "hamburger," a prototypical American food, was one of the most frequent responses, while in Spanish, "sopa," a prototypical Mexican pasta or rice dish, was one of the most frequent responses.

The types of words used most frequently may also vary from language to language as a result of input. Lexical frequency is an important factor in vocabulary

acquisition, as words with high frequency and salience in the input tend to be more easily acquired (Tamayo, 1987). However, it is not the case that two languages will demonstrate the same word frequencies. Research on socialization practices has indicated that Latino mothers place more emphasis on the actions involved in activities (Peña, Thal, Jackson Maldonado, & Greenblatt, 2001) as compared to research on Anglo mothers who have been found to place more emphasis on objects (Choi, 2000). As a result, children's output in Spanish might be more action-based while in English it might be more object-based.

Task performance may also vary across languages as a function of input. In an earlier study that included a subset of 54 participants from the current study, bilingual children were found to perform better in English on some tasks (word associations, and similarities and differences) and better in Spanish on other tasks (characteristic properties and functions) (Peña, Bedore, & Rappazzo, in press). As approximately two-thirds of the children in their study were school age, the school curriculum may contribute to these results. Texas, the state of residence for the participants has a statewide curriculum. For kindergarteners and first graders, the curriculum includes tasks such as learning school vocabulary (numbers, colors, directions, and categories), using vocabulary for description, retelling spoken messages, discussing word meanings, and listening to and discussing passages read aloud (Texas Education Agency, 1997). For learners of English as a second language, the curriculum expectations apply to their English performance, thus the

specific academic tasks (e.g. linguistic concepts) are emphasized in English rather than Spanish which could lead to differences in task performance across languages.

Linguistic Input

The structure of the languages to which people are exposed has been found to play a role in conceptual representation and linguistic performance. Spatial words such as prepositions have been found to result in different representations in different languages. Bowerman (1996) found that spatial prepositions are defined differently across languages. For example, "in" and "on" in English are represented by the single preposition "en" in Spanish, which leads to a Spanish speaker's representation of "en" as something related to "touching the superior surface," while English speakers differentiate "in" and "on" by the depth of the surface the object is touching. Differences in conceptual representation can lead to differences in linguistic performance across languages. With sequential Spanish-English bilinguals in the U.S., this difference in conceptual representation would likely be more apparent to those with less exposure to English. Additionally, structural differences between languages make some aspects of language more salient in one language than the other. For example, Spanish verbs contain information about the subject, action, tense, mood, and sometimes direction. On the other hand, English verbs contain only information about action and tense, as well as limited information about the subject (Gathercole, Sebastian, & Soto, 1999). In English directional information is highlighted in a preposition following the verb, making prepositions very salient in English. However, in Spanish verbs often contain directional information, which minimizes the salience of prepositions. From a functionalist perspective, differences in performance might be predicted by these structural differences. For example,

Spanish-speaking children might be expected to perform better than English-speaking children on verb-based tasks due to the salience of verbs in Spanish.

Changes in strategy use with exposure

Amount and timing of input

Language proficiency, which is influenced by exposure, has been shown to be an important factor in the strategy used, as less proficient bilinguals generally demonstrated forward transfer, the use of L1 strategies in L2, while more proficient bilinguals use both forward and backward transfer (the use of L2 strategies in L1) (Hernandez et al., 1994). Both the amount and timing of input in each language have been found to affect language performance in bilinguals through shifts in strategies that drive performance. In terms of cue use across languages, Hernandez et al. (1994) examined on-line sentence interpretation in Spanish-English bilingual adults and found that bilinguals do not use the same strategies as monolinguals of either language. Instead, bilinguals were found to use an amalgam of the strategies used by monolinguals in either language. The bilinguals transferred the strategies that were found to be efficient, or have high validity, in one language to the other language. Changes in strategies also have been noted as experience with a second language increases. For example, a reduction in forward transfer has been found with increased proficiency in the second language (McDonald, 1987). Additionally, timing in language acquisition (e.g., early vs. late bilingualism) has been shown to affect patterns of cue transfer. For example, forward transfer has been shown to be

the most common pattern among bilinguals who acquired their second language after puberty (Liu, Bates, & Li, 1992; MacWhinney, 1987) and forward transfer and amalgamation have been the most common patterns among early bilinguals (Hernandez et al., 1994). There is also evidence that speakers who live in dual language communities, such as the Latino communities in California and Texas, tend to use an amalgamated system of cues (Wulfeck, Juarez, Bates, & Kilborn, 1986). Though some accuracy within each language may be lost with such a system, it is likely more efficient in terms of processing capacity than two separate systems (Case, 1985).

Several other studies with bilingual adults provide support for differential strategy use by bilinguals with different proficiency levels in their two languages. Talamas et al. (1995) examined translation recognition with more- and less-fluent bilinguals. Visual word pairs were presented to bilinguals, who were to determine whether or not they were translation equivalents. The word pairs were similar in form (e.g. hombre vs. hambre (man vs. hunger)) or meaning (e.g. mujer vs. hombre (woman vs. man)). More fluent bilinguals exhibited more interference as a result of meaning similarities in the word pairs while less fluent bilinguals demonstrated more interference resulting from form similarities. Similar results were found in a study of translation of true cognates (words with similar form and meaning across languages (e.g. “tomato” (English) and “tomate” (Spanish)) (Kroll & deGroot, 1997). Less fluent bilinguals translated cognates more quickly than more fluent bilinguals,

suggesting that less fluent bilinguals relied more on a lexical translation strategy, or Word Association approach, than more fluent bilinguals who relied more on a Concept Mediation approach (Dufour, Kroll, & Sholl, 1996). In a category recognition task, participants heard a category name followed by the names of objects that either were or were not members of the category. There was a within-language condition, in which the target and stimulus were in the same language, and a between-language condition, in which the target and stimulus were in different languages. Less-fluent bilinguals were less accurate and slower in a between-language condition compared to more-fluent bilinguals, and compared to their own performance in a within-language condition. Again, these results provide evidence that less-fluent bilinguals use a less efficient strategy, Word Association, than more-fluent bilinguals, who use a more efficient strategy, Concept Mediation. These studies provide support for the idea that strategy use, and therefore performance, is affected by input.

Age Related Change

In monolingual development, input has also been found to be a factor in semantic language development. As children get older, they have increasing exposure to the language of their environment. With greater exposure, their semantic language skills grow. In terms of vocabulary skills, children acquire new words as well as the understanding that words can have multiple meanings and multiple words can have the same or similar meanings (Hulit & Howard, 2002). With this broader understanding of meaning comes an understanding of the relationships among words,

including an awareness of similarities and differences between objects, object properties, such as color, shape, texture, and function. As children make connections between words they begin to categorize and develop analogous relationships. With continued input, children create stronger connections between words and the concepts they represent, which allows for more rapid retrieval of words. These patterns of development in semantic language skills highlight the importance of examining a number of semantic tasks (Crystal, 1998; Peña, Bedore, & Rappazzo, 2002).

To date, the limited number of studies of bilingual semantic acquisition demonstrate increases in both languages with differing trajectories. Kohnert and colleagues (Kohnert et al., 1999; Kohnert & Bates, 2002; Kohnert, 2002) examined patterns of expressive and receptive vocabulary development in sequential bilingual children whose L1 was Spanish and L2 was English (with formal instruction beginning at 5 years of age) and found that, while vocabulary comprehension and production continue to increase in both languages, speed and accuracy shift from higher levels in L1 at earlier ages to higher levels in L2 at later ages (between 5-10 years of age for comprehension and 8-13 years of age for production) likely as a function of increased schooling in English. Thus, it is clear that as exposure to bilinguals' languages shifts, so do strategies and performance in those languages.

While many studies have looked at lexical skills at one point in time, few studies have examined lexical skills in bilinguals over time. Pearson and Fernández (1994) examined lexical growth over time in the two languages of bilingual infants

and toddlers. They found that bilinguals exhibited different developmental trajectories in their two languages, which were thought to be due to experience in their two languages. Additionally, Pearson et al. (1994) found that bilinguals used different learning strategies in their two languages and that these strategies changed over time. Specifically, some children used a personal/social learning style (Nelson, 1973) in one language and a referential learning style (Nelson, 1973) in the other, and then shifted to a referential style, which has been found to be associated with more efficient vocabulary learning (Goldfield & Reznick, 1990; Horgan, 1981), in both languages. These shifts in strategy use that occur with experience suggest that changes occur over time as a result of input.

It has often been assumed that semantic acquisition is driven by development. While cognitive development plays an important role in semantic acquisition, input also plays an important role. From a research standpoint, if cognitive development was the primary driving force, we would expect to see main effects for age but not task by age interactions. Task by age interactions would suggest that input plays an important role in semantic acquisition. In other words, children with less exposure to their second language may exhibit patterns on the tasks that are very different from children who have had more exposure to their second language, and these patterns may change with age. While there is evidence that input plays a role in semantic acquisition, more information is needed about the changes that occur with exposure. Bilingual children in the U.S. provide an opportunity to explore these changes

because many of them typically speak primarily Spanish in the home and have greater exposure to English when they start school.

QUESTIONS OF THE CURRENT STUDY

The primary purpose of the current study was to examine the performance of Hispanic children ages 4 to 6 years with varying levels of language proficiency in English and Spanish on a test of semantic language skills in order to explore variations in performance relative to their proficiency level in each language. Overall performance (e.g., across semantic tasks) was analyzed, followed by an examination of performance on the six different types of semantic tasks (Analogies, Categorization, Characteristic Properties, Functions, Linguistic Concepts, and Similarities & Differences). First, overall test performance was examined to see whether possible differences in performance could be seen from the level of the test as a whole. Specifically, the following questions were addressed:

1) Do the Predominantly English Speaking and Bilingual groups demonstrate similar or different overall performance on the English semantics test?

2) Do the Predominantly Spanish Speaking and Bilingual groups demonstrate similar or different overall performance on the Spanish semantics test?

3) Does the Bilingual group demonstrate similar or different overall performance on the English and Spanish versions of the test?

4) Do the Predominantly English Speaking and Predominantly Spanish Speaking demonstrate similar or different overall performance in their respective languages?

5) Are there differences between ages 4 and 5 and ages 5 and 6 on the test as a whole?

Next, performance on the different tasks was examined to see whether performance varied by task. Specifically, the following questions were addressed:

1) Do the Predominantly English Speaking and Bilingual groups perform similarly or differently on each of the six different types of semantic items on the English version of the test?
2) Do the Predominantly Spanish Speaking and Bilingual groups perform similarly or differently on each of the six different types of semantic items on the Spanish version of the test?
3) Does the Bilingual group demonstrate similar performance on each of the six different types of semantic items across the two language versions of the test?
4) Do the Predominantly English Speaking and Predominantly Spanish Speaking groups demonstrate similar or different performance in their respective languages on each of the six different types of semantic items?
5) Are there age-related differences within tasks and within language proficiency groups, and what are the patterns of those trends?

Chapter 2: Methods

PARTICIPANTS

185 children, ages 4 to 6, with normal language development participated in the study. They were recruited through school districts and early childhood programs in the Central Texas and San Diego areas. The children represented three language proficiency groups, Predominantly English Speaking, Bilingual, and Predominantly Spanish Speaking (see Table 1). Language proficiency was determined based on parent and teacher ratings about the proficiency and use of each language (see below). All participants were Hispanic, defined as having at least one parent who identified himself/herself as Hispanic. All of the children were from school and/or home environments in which they were exposed to both Spanish and English, although no minimum amount of exposure to either language was required. Children were primarily from working class families. Approximately 20 percent of the children were eligible for free or reduced lunch programs. Additionally, all children passed a pure-tone hearing screening at 25 dB HL at 1000, 2000, and 4000 Hz administered by their school or the study investigators. Though the groups were uneven, there were no significant differences in the age distributions across the groups.

Evaluation of differences across sites

Using four measures from the language samples, percent of grammatical utterances, total number of words, number of different words, and mean length of utterance in words, four ANOVAs were run for each language to explore differences

across sites. Each language sampling measure was entered as the dependent variable and site was entered as the independent variable. No significant differences were found across the sites and effect sizes (η_p^2) ranged from negligible to small (.002 to .028). Thus, the data from the two sites were combined.

Table 1.

Participant Demographics

	4 years	**5 years**	**6 years**	**Totals**
Predominantly English Speaking	25	25	12	62
Bilingual	10	14	24	48
Predominantly Spanish Speaking	25	32	18	75
Totals	60	71	54	185

GROUPING PROCEDURES

Determining Normal Language

Children were selected for the study if they produced grammatically acceptable utterances in a narrative sample collected using a wordless picture book according to their age (see below), and additionally met two of the following criteria: 1) parent(s) did not express concerns about language development, 2) teacher did not express concern about language development, and 3) an observation by the clinician during the language sample indicated no concerns. The percentage of grammatically acceptable utterances was calculated based on two stories elicited from two wordless picture books. Codeswitched utterances were not included in the calculation.

Children with 75% or more grammatical utterances at age 4, 81% or more grammatical utterances at age 5, and 86% or more grammatical utterances at age 6 who met the above criteria were included in the study.

Classification of Language Proficiency Groups

A combination of the parent and teacher report variables related to language proficiency and language use were used to further classify the children into language proficiency groups. The selected variables were chosen because they had moderate-to-strong positive correlations with the percent of grammatical utterances on the language sample, an indication of fluency in the target language. Children were classified as Predominantly Spanish Speaking if they received parent Spanish language use ratings of 2, 3, or 4 (see the Language Proficiency and Use Rating Scale form in the Appendix), indicating that at a minimum, the child uses the indicated language a little and hears it sometimes, parent or teacher Spanish proficiency ratings of 3, or 4, indicating that, at a minimum, the child has good proficiency with some grammatical errors, some social and academic vocabulary, and understands most idea of what is being said, a parent report that the child uses the language at least 80% of the time, and they did not meet these same criteria in English. Similarly, children were classified as Predominantly English Speaking if they received parent English language use ratings of 2, 3, or 4, parent or teacher English proficiency ratings of 3, or 4, a parent report that the child uses the language at least 80% of the time, and they did not meet these same criteria in Spanish. Children who met the above criteria for

both English and Spanish and used each language at least 20% of the time were classified as Bilingual.

SEMANTIC LANGUAGE TEST

The semantics tasks are part of a language test (the *Bilingual English Spanish Assessment* (BESA)) that is in the developmental process (Peña, Gutierrez-Clellen, & Iglesias, in development). Currently, there are 46 items per language test that are made up of six tasks (Analogies, Categorization, Characteristic Properties, Functions, Linguistic Concepts, and Similarities & Differences, see descriptions below). The make-up of each test was based on pilot data on 77 children. The items that were selected were balanced for difficulty across tests, showed developmental trends, and showed promise for discriminating children with language impairment from children with typical development. As a result, both tests include all six semantic tasks but the tasks are not represented in the same proportions across languages. Thus, task scores are reported as proportion correct rather than in raw scores accommodate for the different number of items per task. The items were incorporated into three stories with common scenes (a birthday party and a trip to the park) in each of the two languages (six stories total) according to the difficulty level of the items.

Task Descriptions

The Analogies tasks focused on relationships between words. Children were required to identify the relationship in one pair of words and use that information to select or produce the correct answer. An example of an Analogies item is “Sun is to

yellow as grass is to (green)." The children were shown four pictures and were to select the green square to get the item correct.

The Categorization task involved generating/identifying lists of items when given a category, or labeling/identifying a category when given items within it. An example of a category generation task is "Tell me all the animals you can think of." An example of a category naming task is "Red, blue, yellow and green are all (colors).

The Characteristic Properties task required children to name and identify characteristics of objects, or name or identify objects when given their characteristics. Examples include "Tell me what the girl looks like" and "Show me the big, blue balloon."

For the Functions task children were asked to identify an object given its function or to name the function of objects. Examples include "Show me what is used for cleaning" and "What do you do with scissors?"

The Linguistic Concepts task involved academic tasks such as understanding spatial concepts, talking about spatial concepts, responding to questions after listening to passages, and identifying sequences of events. An example of an item addressing spatial concepts includes, "Where did Maria put the present with the big, red bow?" (under the table). An example of a comprehension of passages item is "What did the children have to do before they went outside and played?" For sequencing, children were asked to show which toy Diego played with second and which one he played with last.

The Similarities & Differences task involved identifying and naming similarities and differences between objects. For example, when shown 6 party invitations, the children were asked to point to the two that were alike.

Test Administration

The tests were individually administered by a bilingual graduate clinician in speech-language pathology or a bilingual certified speech-language pathologist in a room provided by the child's school or in the child's home. Different language versions were administered on different days.

Scoring

All items were scored dichotomously. Additionally, the items for each test were administered in the target language but they were scored conceptually. In other words, if a child responded correctly in English on the Spanish test, the item was counted correct and contributed to the child's score in Spanish. Similarly, when children engaged in code-switching, correct responses were counted toward the language of testing. For some Categorization and Characteristic Properties items, three correct responses were required. For those items, a conceptual scoring system proposed by Pearson, Fernandez & Oller (1992) was used, awarding credit based on the number of different concepts demonstrated across the two languages rather than only accepting responses in one language or crediting the same concept expressed in two languages.

ANALYSES

Similarities across tasks

A principal components analysis was used to gain a better understanding of the relationships between the tasks. This analysis provides information about total variance shared among the tasks and was performed as a validity measure to ensure that the tasks were measuring similar skills.

Evaluation of group differences

The performance of the different language proficiency groups was analyzed for the different semantic tasks using proportion correct scores for each task, and for the test as a whole using the average of the proportion correct scores for all of the different tasks. For each of these two sets of analyses, comparisons were made between the Predominantly English-Speaking group and the Bilingual group on English tasks, between the Predominantly Spanish-speaking group and the Bilingual group on Spanish tasks, between the Predominantly English-Speaking group and the Predominantly Spanish-Speaking group in their respective languages, and between the performance across languages for the Bilingual group on Spanish and English tasks. Effect size partial eta squared (η_p^2) was calculated for all significant effects. Partial eta squared is a measure of the proportion of variance in the dependent variable that can be accounted for by the independent variable. Cohen (1988) interpreted partial eta squared as follows: .01 to .058 is small, .059-.137 is medium and anything .138 or greater is large.

Analyses for performance on the test as a whole

For the English version of the test, data were entered into a 2 (language proficiency group) by 3 (age) ANOVA with English average proportion correct score as the dependent variable. For the Spanish version of the test, data were entered into a 2 (language proficiency group) by 3 (age) ANOVA using Spanish average proportion correct score as the dependent variable. To examine differences between the Predominantly English Speaking and Predominantly Spanish Speaking Groups, data were entered into a 2 (language proficiency group) by 3 (age) ANOVA using the average proportion correct scores for all tasks. To evaluate performance across languages by the Bilingual group, data were entered into a repeated measures ANOVA with average proportion correct scores as the within-subjects factor and age as the between-subjects factor.

Analyses for performance on different tasks

To analyze performance on each of the semantic tasks, the same four comparisons as above were made for each of the tasks separately. For comparison on the English items, data were entered into 2 (language proficiency group) by 3 (age) ANOVAs using the proportion correct score for each of the semantic tasks as the dependent variables. For the Spanish version of the test, data were entered into 2 (language proficiency group) by 3 (age) ANOVAs using the proportion correct score for each of the semantic tasks as the dependent variables. To examine differences between the Predominantly English Speaking and Predominantly Spanish Speaking groups, data were entered into a 2 (language proficiency group) by 3 (age) ANOVA using the

proportion correct score for each of the semantic tasks as the dependent variables. To evaluate performance across languages by the Bilingual group, data were entered into repeated measures ANOVAs with semantic task proportion correct values as the within-subjects factor and age as the between-subjects factor. In order to avoid an increased error rate due to performing multiple ANOVAs, a Bonferroni adjustment was used in each analysis, setting the Alpha level at .0083 (or .05/6).

Analyses for age trends within groups

A qualitative analysis was performed to explore the relative performance on the different semantic tasks within language proficiency and age groups. Mean proportion correct scores for each language proficiency and age group were used to examine age-related differences within language proficiency groups, as well as to provide information about relative performance on each task within groups.

Chapter 3: Results

The primary purpose of the current study was to examine the performance of Hispanic children ages 4 to 6 years with varying levels of language proficiency in English and Spanish on a test of semantic language skills. In order to examine differences within and across languages for overall performance and performance on the different tasks, two sets of analyses were conducted. One set examined overall performance and the other set examined task performance. Results indicated minimal differences within or across languages on overall performances, but differences were found on some of the individual semantic tasks.

SHARED VARIANCE ACROSS TASKS

Next, the data from the six different semantic tasks were analyzed for each language separately using a principal components analysis to gain a better understanding of the relationships that exist between the tasks. The semantic tasks selected were thought to represent some aspect of semantic language skills. Thus, it was expected that there would be a relatively large amount of shared variance between the tasks. The Kaiser-Meyer-Olkin measure was .865 for Spanish, and .845 for English indicating a high degree of shared variance between the variables for each language. For Spanish the variables loaded primarily on one component, accounting for 56.7% of the total variance. Similarly, for English 54.8% of the total variance was accounted for by one component. The variance for each task ranged from .307 for Analogies to .725 for Categorization items. The final communality estimates for the Spanish and English items types can be found in Table 2 below. These results

suggest that there is some underlying semantic language skill driving performance on all of the different item types but that there are likely other factors that work to influence performance on the different tasks as well.

Table 2.

Final Communality Estimates from Principal Components

Item Type	Spanish	English
AN	.345	.307
CT	.732	.725
CP	.544	.556
FX	.554	.519
LC	.588	.533
SD	.640	.649

OVERALL PERFORMANCE WITHIN AND BETWEEN LANGUAGES

The next set of analyses addressed overall performance on the tests. Two 2 (language proficiency group) by 3 (age) ANOVAs were used to explore overall differences in performance on each test language (English and Spanish), a 2 (language proficiency group) by 3 (age) ANOVA was run to explore between-language effects for the Predominantly English-Speaking and Predominantly Spanish-Speaking groups, and a repeated measures ANOVA was used to determine whether the Bilingual group demonstrated differences in performance across language.

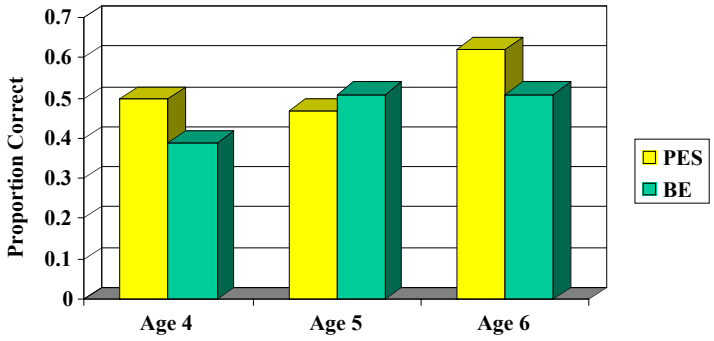
Within Language Comparisons

For each within-language comparison, the average proportion correct score for all tasks in the target language was entered as the dependent variable into a 2 (language proficiency group) by 3 (age) ANOVA. Recall that there were different numbers of items within each semantic task for each language version of the test because the best items for each language were selected from a larger group of items. For this reason the proportion correct score was used for this set of analyses. Results for English indicated no significant main effects for language proficiency groups, $F(1, 107) = 1.364$, $p = .26$, $\eta_p^2 = .025$, indicating that overall test performance was similar for the Predominantly English-Speaking group and the Bilingual group in English. Additionally, there were no interactions between language proficiency group and age, $F(2, 107) = 1.689$, $p = .190$, $\eta_p^2 = .031$. However, a significant main effect was found for age, $F(2, 107) = 3.223$, $p < .05$, $\eta_p^2 = .057$, indicating a general trend of development on overall test performance (see Figure 1 below).

The same pattern of results was found in Spanish. No significant main effects for language proficiency group were found, $F(1, 118) = .907$, $p = .409$, $\eta_p^2 = .015$, and no interactions were found between language proficiency and age, $F(2, 118) = 1.568$, $p = .201$, $\eta_p^2 = .038$. Similar to the overall performance on the English test, a significant main effect was found for age on the Spanish test, $F(2, 118) = 21.265$, $p = < .05$, partial $\eta^2 = .265$, indicating a large difference between age groups on overall test performance from age 4 to age 6 (see Figure 2 below).

Figure 1.

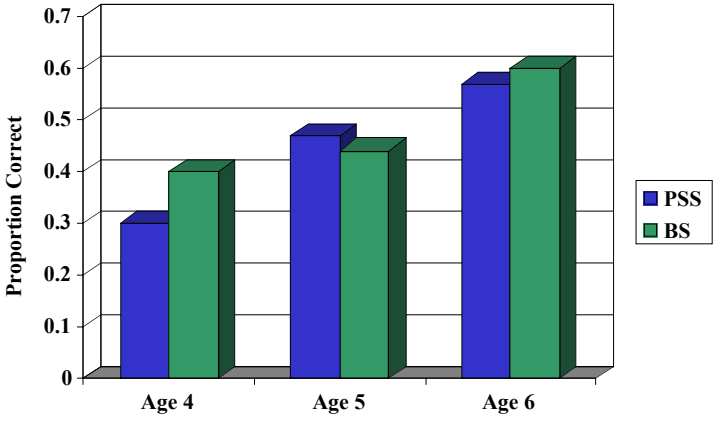
Predominantly English Speaking vs. Bilinguals in English Overall Performance



Note: PES = Predominantly English Speaking, BE = Bilinguals in English.

Figure 2.

Predominantly Spanish Speaking vs. Bilinguals in Spanish Overall Performance



Note: PSS = Predominantly Spanish Speaking, BS = Bilinguals in Spanish

Between Language Comparisons

For between-language comparisons for the Predominantly English- and Spanish-Speaking groups, a 2 (language proficiency) by 3 (age) ANOVA was calculated using the average proportion correct score for all of the tasks combined in each group's target language as the dependent variable. A significant main effect, $F(1, 131) = 8.152$, $p < .05$, $\eta_p^2 = .059$, was found for language proficiency group, indicating differences in overall performance between the predominantly single language groups. Additionally, a significant age by language proficiency group interaction was found, $F(2, 131) = 5.432$, $p < .05$, $\eta_p^2 = .077$. Post-hoc pairwise comparisons indicated that the Predominantly English-Speaking 4-year-old group

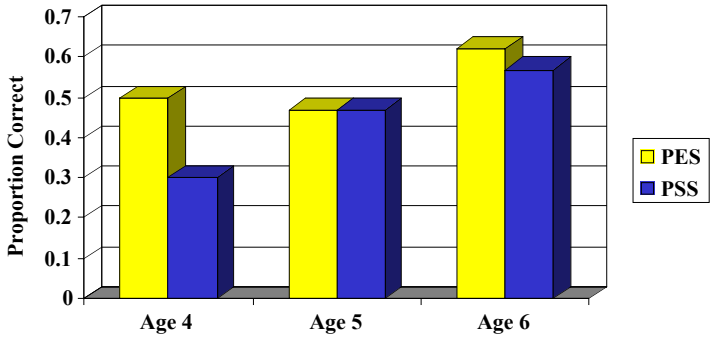
demonstrated significantly better performance than the Spanish-Speaking 4-year-old group, however there were no differences between the two groups at 5 or 6 years of age. This difference could result from differences in task familiarity resulting from socialization practices, as English-speaking mothers have been found to request previously-known information more often than Spanish-speaking mothers (Rogoff, 1990). Finally, there was a main effect for age, $F(2, 131) = 5.432$, $p < .05$, $\eta_p^2 = .166$, indicating a general developmental trend across ages (see Figure 3 below).

Patterns of overall test performance for the Bilingual group were similar to those of the within-English and within-Spanish analyses. English and Spanish average proportion correct scores were entered as the within-subjects variable into a repeated measures ANOVA and test age was entered as the between-subjects factor. No significant main effects were found on the total test scores for the two tests, $F(1, 45) = .003$, $p = .960$, $\eta_p^2 = .000$, indicating that the bilinguals demonstrated similar performance in each language on the tests as a whole. Similar to the findings on the English and Spanish tests, a main effect for age was found, indicating a trend of development between the ages of 4 and 6, $F(2, 45) = 6.867$, $p = < .05$, $\eta_p^2 = .234$ (see Figure 4 below).

The analyses of overall performance generally reveal no differences between groups, with the exception of the comparison of the predominantly single language groups, which indicated a significant difference in performance between the Predominantly English- and Predominantly Spanish-Speaking groups at the four-year-old level.

Figure 3.

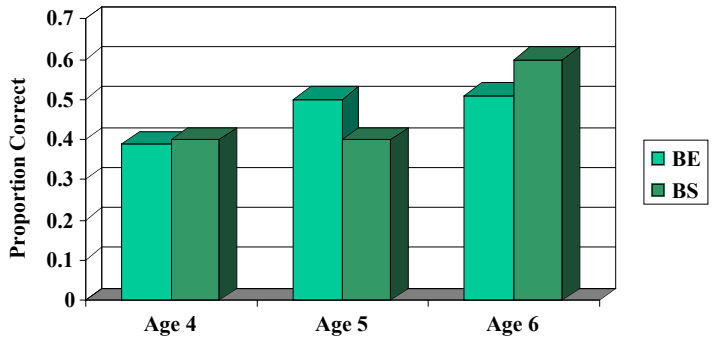
Predominantly English-Speaking vs. Predominantly Spanish Speaking Overall Performance



Note: PES = Predominantly English Speaking, PSS = Predominantly Spanish Speaking.

Figure 4.

Bilinguals in English vs. Bilinguals in Spanish: Overall Performance



Note: BE = Bilinguals in English, BS = Bilinguals in Spanish

TASK PERFORMANCE WITHIN AND BETWEEN LANGUAGES

Of greater interest was whether children in the different language proficiency groups performed differently across semantic tasks. A functionalist approach to language acquisition would predict that the different language proficiency groups, who have received different input in their languages in terms of both quantity and topic, might perform better on some tasks in one language and other tasks in the other language as a result of variations in input.

Within Language Comparisons

To address the questions related to differences across semantic tasks, the proportion correct score for each of the semantic tasks was entered as the dependent variable into a 2 (language proficiency group) by 3 (age) ANOVA. Because the patterns for the individual semantic tasks were of particular interest, six ANOVAs, one for each semantic task, were run for each test language. A Bonferroni adjustment was used, setting the alpha at .0083 to account for possible increased Type I error resulting from running multiple ANOVAs. For the within-language comparisons, the Predominantly English-speaking group was compared to the Bilingual group in English and the Predominantly Spanish-speaking group was compared to the Bilingual group in Spanish. The results of these analyses are presented in Table 3 and are summarized below.

Table 3.

Within-Language Findings for Language and Age

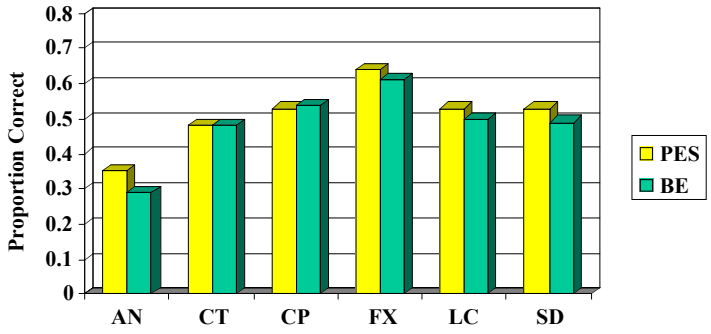
	Spanish vs. Bilinguals in Spanish						**English vs. Bilinguals in English**					
Findings	AN	CT	CP	FX	LC	SD	AN	CT	CP	FX	LC	SD
Main effect LP		X										
Main effect age	X	X	X	X	X	X		X	X	X		X
LP * AGE												

Note. X = a statistically significant finding at the _ = .0083 (derived from .05/6) level. LP = language proficiency group.

The age patterns were similar across languages and semantic tasks, indicating development in semantic language skills from age 4 to age 6. For every task in both languages except Analogies in English, there was a main effect for age, indicating general trends of development. The skills required for the Analogies task may be acquired later than those required for the other tasks, which could explain the low performance and flat developmental trend across ages and language proficiency groups for the Analogies task. Main effects for language proficiency group were found for the Spanish Categorization task, indicating a difference in the performance of the Bilingual group and the Predominantly Spanish-Speaking group performance, which could be contributed to cultural experience (see Figures 5 and 6 below).

Figure 5.

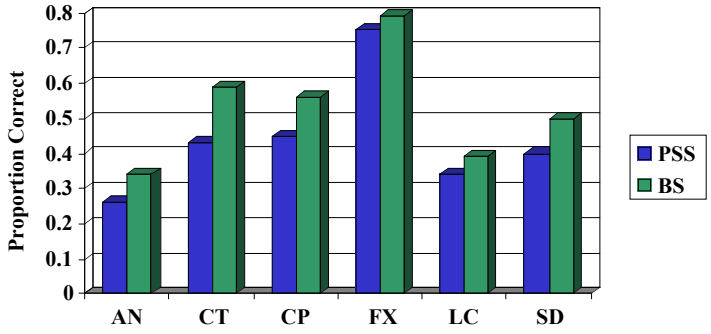
Predominantly English Speaking vs. Bilinguals in English by Task



Note: PES = Predominantly English Speaking, BE = Bilinguals in English.

Figure 6.

Predominantly Spanish Speaking vs. Bilinguals in Spanish by Task



Note: PSS = Predominantly Spanish Speaking, BS = Bilinguals in Spanish.

Between Language Comparisons

Comparisons across languages for the Predominantly English- and Predominantly Spanish-Speaking groups using a series of 2 (language proficiency group) by 3 (age) ANOVAs with alpha set at .0083 indicated differences across the groups. Table 4 provides a summary of the findings, which are discussed below.

Table 4.

Between-Languages Findings for Predominantly Single Language Groups

	Tasks					
Findings	AN	CT	CP	FX	LC	SD
Main Effect--Language Proficiency Group	X		X	X	X	X
Main Effect—Age	X	X	X	X	X	X
Language Proficiency Group * Age		X	X	X	X	

Note: X = a statistically significant finding at the alpha = .0083 level.

There were many statistically significant differences between the Predominantly English- and Predominantly Spanish-Speaking groups. The interactions will be discussed first, followed by the main effects for the tasks that did not have interactions. Language proficiency group by Age group interactions were found for the tasks of Categorization, $F(2, 136) = 3.860$, $p. < .05$, $\eta_p^2 = .056$, Characteristic Properties, $F(2, 136) = 3.443$, $p. < .05$, $\eta_p^2 = .050$, Functions, $F(2, 136) = 5.174$, $p. < .05$, $\eta_p^2 = .073$, and Linguistic Concepts , $F(2, 136) = 3.920$, $p. < .05$, $\eta_p^2 = .056$. The direction of the differences were the same for all of the semantic tasks with the exception of Functions. For Categorization, Characteristic Properties, and Linguistic Concepts, the Predominantly English-Speaking 4-year-olds performed

better (M = .454, .503, and .505, respectively) than the Predominantly Spanish-Speaking 4-year-olds (M = .259, .449, and .339, respectively), though the 5- and 6-year-olds performed similarly. Similar to the finding related to overall performance for these two groups, these results could be due to variations in socialization practices across the language proficiency groups that may influence task familiarity. The opposite pattern was seen for the Functions task, which is a verb-based task. At 5 years of age the Predominantly Spanish-Speaking group performed better (M = .785) than the Predominantly English-Speaking group at 5 years of age (M = .592), yet 4- and 6-year-olds performed similarly across groups (M = .622 and .662 for the 4-year-olds, respectively and M = .852 and .693 for the 5-year-olds, respectively). Again, input could play a role in this finding, as patterns of verb use among Spanish-speaking and English-speaking mothers have been shown to differ, with Spanish-speaking mothers emphasizing them more (Choi, 2000; Peña et al., 2001).

Main effects for language proficiency group and age group were found for the tasks of Analogies , $F(1, 136) = 5.283$, p. < ..05, $\eta_p^2 = .039$, and Similarities and Differences, $F(1, 136) = 3.216$, p. < .05, $\eta_p^2 = .073$. For both tasks, findings indicated that the Predominantly English-Speaking group performed better than the Predominantly Spanish-Speaking group and that there were general trends of development for the tasks (see Figure 7 below).

For the Bilingual group, repeated measures ANOVAs were run to explore possible differences in performance across languages, the within-subjects factor. Age was used as the between-subjects factor on all analyses. Table 5 below provides a summary of the findings, which are discussed below.

Table 5.

Findings for the Bilingual Group across Languages

	Tasks					
	AN	CT	CP	FX	LC	SD
Within-subjects effects						
Main effect for task				X	X	
Task by Age interaction					X	
Between-subjects effects						
Main effect Age		X	X	X		X

Note: X = a statistically significant finding.

Within-Subjects Factors

Across languages, the Bilingual group demonstrated similar patterns for all of the semantic tasks except Functions, and Linguistic Concepts. A task by age interaction, $F(2, 45) = 7.616$, $p < .05$, $\eta_p^2 = .253$, was revealed for the Linguistic Concepts task, indicating differences in performance in Spanish and English at different ages. Post-hoc analyses revealed that at 4 and 5 years of age the Bilinguals performed better in English (M = .453 and .560, respectively) than in Spanish (M = .250 and .259, respectively on the Linguistic Concepts task but at 6 years of age, they performed similarly in each language. As the Linguistic Concepts task focuses on academic concepts typically taught in school, it is likely that their better performance in English is a result of the language of input for such concepts. The opposite pattern

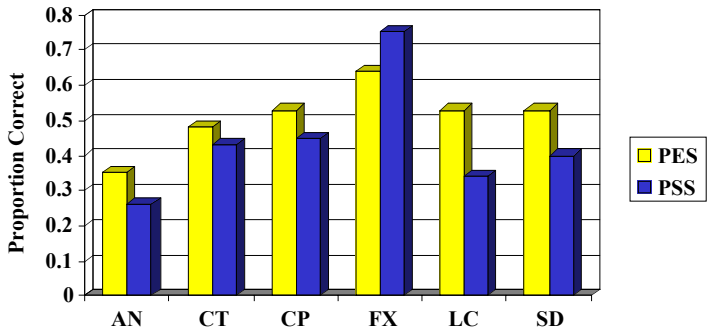
was seen for the Functions task. The Bilingual group performed significantly better on the Functions task in Spanish than in English, $F(1, 45) = 11.736$, $p = .001$, $\eta_p^2 = .207$. These results are consistent with research on socialization that demonstrates that Spanish-speaking mothers use more verbs in talk to their children (Peña, et al., 2001), while English-speaking mothers use more nouns (Choi, 2000).

Between-Subjects Factors

The between-subjects factor explored the effects of age on task performance. Between-factors age effects were found for the Categorization, Characteristic Properties, Functions, and Similarities and Differences tasks ($F(2, 45) = 8.634$, $p < .05$, $\eta_p^2 = .277$ (Categorization), $F(2, 45) = 4.336$, $p < .05$, $\eta_p^2 = .162$ (Characteristic Properties), $F(2, 45) = 3.295$, $p < .05$, $\eta_p^2 = .128$ (Functions), $F(2,45) = 8.341$, $p < .05$, $\eta_p^2 = .270$ (Similarities and Differences)). A significant main effect for age was also found for the Linguistic Concepts task, which is likely indicative of general cognitive development. Additionally, as noted above, a task by age interaction, $F(2, 45) = 7.616$, $p < .05$, $\eta_p^2 = .253$, was found, indicating differences in performance in Spanish and English at different ages, which is likely a result of input differences. These findings indicate that children perform better on semantic language tasks over time from age 4 to age 6 (see Figure 8 below).

Figure 7.

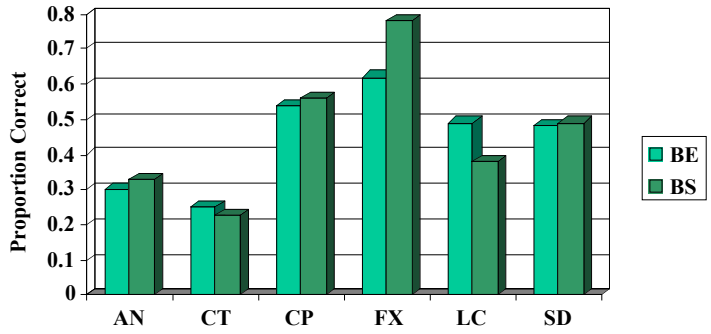
Predominantly English Speaking vs. Predominantly Spanish Speaking by Task



Note: PES = Predominantly English Speaking, PSS = Predominantly Spanish Speaking.

Figure 8.

Bilinguals in English vs. Bilinguals in Spanish by Task



Note: BE = Bilinguals in English, BS = Bilinguals in Spanish

ANALYSES FOR AGE TRENDS WITHIN GROUPS

A qualitative analysis was performed to explore the relative performance on the different semantic tasks within language proficiency and age groups. Mean proportion correct scores for each language proficiency and age group were used to examine developmental trajectories within language proficiency groups, as well as to provide information about relative performance on each task within groups. Results are provided in Figures 9-12.

A variety of developmental trajectories was seen but within each group there was one prevalent trajectory, with the exception of the Bilingual group in English, which demonstrated different trajectories across tasks. The Predominantly English-speaking group demonstrated prevalent trend of a flat slope between the ages of 4 and 5 followed by a moderate increase between the ages of 5 and 6, indicating that between the ages of 4 and 5 years, before starting school, they demonstrated minimal development in the academic-like semantic tasks presented in the tasks but with schooling, these skills increased. The trend for the Bilingual group in Spanish was similar except that they started lower, showed flat development between ages 4 and 5, with a steeper slope between ages 5 and 6 than the Predominantly English-Speaking group. Though these trends were similar, it should be noted that these two groups did not start out at the same level of performance. The Predominantly English-Speaking group demonstrated better performance at 4 years of age, thus even though the Bilingual group in Spanish showed steeper development between the ages of 5 and 6, the performance of the Bilingual group in Spanish was still lower than that of the

Predominantly English-Speaking groups 6 years of age, with the exception of the Functions task, on which they demonstrated superior performance at 4, 5, and 6 years of age. The Predominantly Spanish-Speaking group demonstrated a steady developmental trajectory from age 4 to age 6 and the Bilingual group in English demonstrated a mixture of trajectories depending on the task, including a pattern of slight increase from ages 4 to 5 years followed by a slight decrease in performance from 5 to 6 years of age on the Linguistic Concepts task. This mixture of trajectories may be indicative of the strategy changes that are believed to take place as exposure to the L2 increases.

Figure 9.

Bilingual Group Developmental Trajectories in English

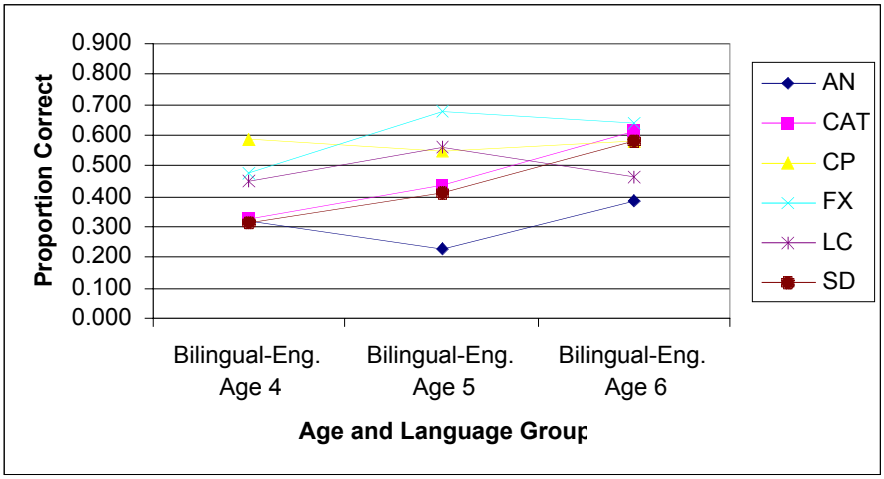


Figure 10.

Predominantly Spanish-Speaking Group Developmental Trajectories

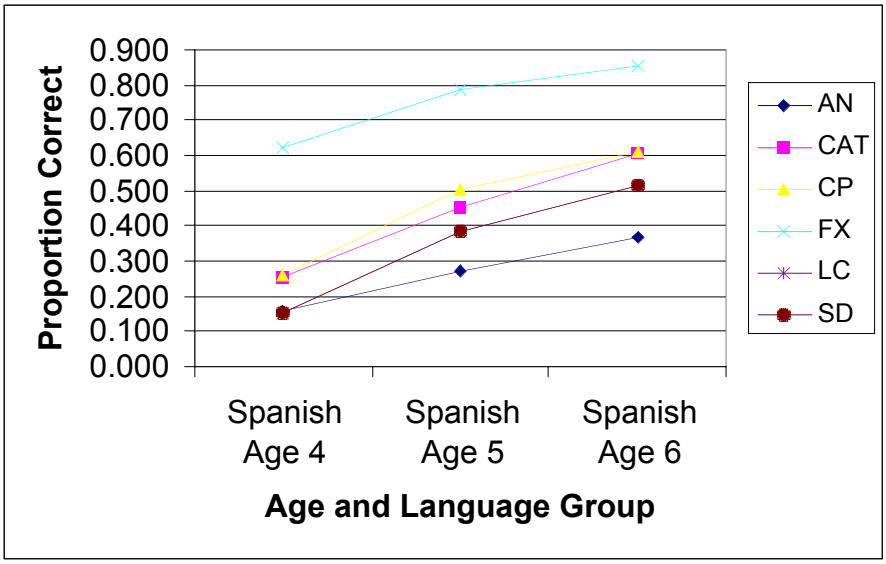


Figure 11.

Predominantly English-Speaking Group Developmental Trajectories

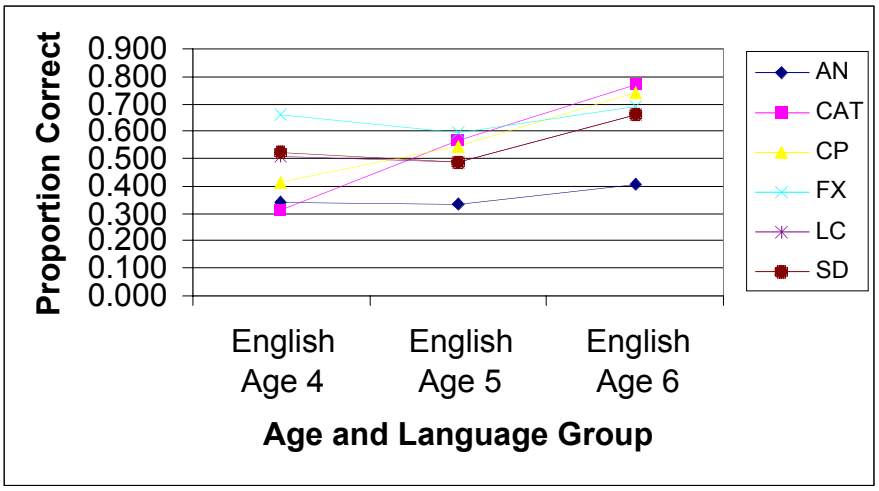
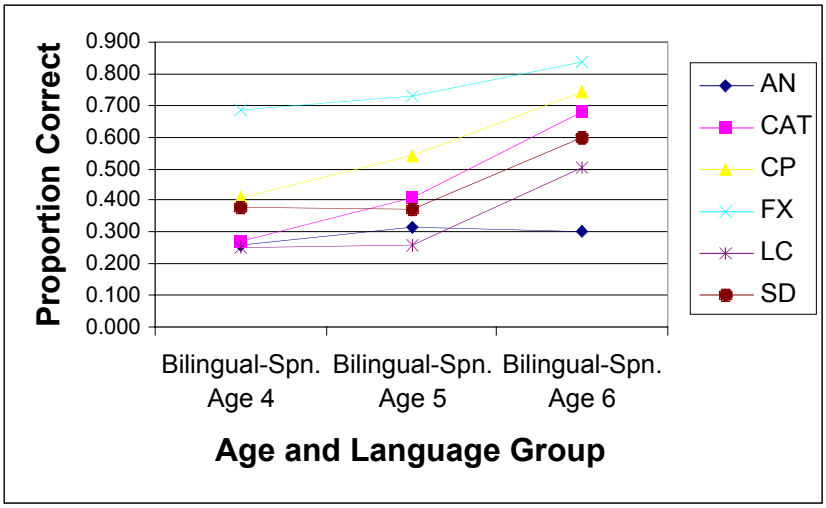


Figure 12.

Bilingual Group Developmental Trajectories in Spanish



Chapter 4: Discussion

The goal of this study was to examine the performance of children from bilingual environments on semantic language tasks. Of specific interest was the performance of children with different levels of exposure to English and Spanish, as estimated by language proficiency. A cross-sectional design was used to explore possible developmental effects as a factor of input. Performance was first evaluated at the level of overall test performance and was then explored at the level of the six different tasks that made up the tests. While overall performance was similar across language proficiency groups, there were within and between language proficiency and age group differences for the different tasks. These difference indicate that both general cognitive development is occurring, as well as development that is influenced by input.

Language Proficiency Groups

The Bilingual group demonstrated overall performance similar to the Predominantly English-Speaking group on the English tasks and similar to the Predominantly Spanish-Speaking group on the Spanish tasks. Further, the Bilingual group performed similarly in English and Spanish, and the Predominantly English- and Spanish-Speaking groups performed similarly in their respective languages, except for the Predominantly English-Speaking 4-year-olds, who performed significantly better than the Predominantly Spanish-Speaking 4-year-olds. This finding could be attributed to differences in socialization patterns. Children whose families have lived in the U.S. for two or more generations have been found to be socialized more to academic tasks than children from families who have recently

immigrated to the U.S. (Lewelling, 1991). Despite the fact that the analyses that compared the groups on overall performance showed minimal differences across the language proficiency groups, it cannot be concluded that the Bilingual and Predominantly English- and Spanish-Speaking groups demonstrated the same patterns of performance. Indeed, there were both language and age differences across tasks.

The observed differences in task variations are consistent with Grojean's (1989) view of bilinguals as distinct from two monolinguals. In other words, bilinguals did not demonstrate the same patterns of performance on semantic tasks as those who are predominantly English speaking or predominantly Spanish speaking, nor did they demonstrate the same performance patterns in each of their two languages. While performance on some tasks was similar across groups, there were differences between and within languages, as well as across age groups. These differences suggest that variations in exposure to the two languages affect performance.

BETWEEN LANGUAGE EFFECTS

Input varies with social and cultural experiences, as well as with differences in linguistic structure. These influences in the input may lead to differences in performance across languages. In this study the Bilingual group demonstrated differential performance across languages. Specifically, they performed significantly better on the Functions task in Spanish than in English, and significantly better on the Linguistic Concepts task in English than in Spanish. An explanation for this finding can be found in comparisons of linguistic structure as well as in research on socialization practices. From a linguistic standpoint, recall that verbs in Spanish are more salient than in English because they carry information about the subject, action,

tense, mood, and sometimes direction, while English verbs contain information about action and tense, and limited information about the subject. The Functions task involved describing the functions of various objects. As object functions are verb-based, it is not surprising that bilingual children performed better on such tasks in Spanish than in English. Additionally, research on socialization practices has indicated that Latino mothers place more emphasis on the actions involved in activities (Peña et al., 2001) as compared to research on Anglo mothers who place more emphasis on objects (Choi, 2000). This pattern of differential performance across languages may be a result of a combination of cultural and linguistic input.

The opposite pattern was seen in performance on the Linguistic Concepts task, a more academic task than the Functions task. The Bilingual group performed significantly better on the Linguistic Concepts task in English than in Spanish. Recall that the language backgrounds of the majority of the children in the Bilingual group was primarily Spanish use/exposure with minimal English exposure at home until 5 years of age when they entered the school system and began receiving academic instruction in English (as well as Spanish in some cases). As a result, these children were much more likely to be exposed to the academic concepts in the Linguistic Concepts task in English than in Spanish. The finding that they performed better on this task in English than in Spanish provides support for the idea that the language of input influences performance.

The between-languages comparison of the Predominantly English- and Predominantly Spanish-Speaking groups revealed significant main effects for the Analogies task and the Similarities and Differences task. The Predominantly English-speaking group performed better on both tasks. These differences may be attributed

to socialization patterns and strategy use issues. On average, the children in the Predominantly English-Speaking group were from families who had been in the U.S. longer than those in the Predominantly Spanish-Speaking Group. Thus, as noted above, they may receive more academic-like input at home because their parents are familiar with the expectations of the U.S. school system. As these two tasks, are academic in nature, it is not surprising that the Predominantly English-Speaking group demonstrated superior performance as compared to the Spanish-Speaking group. From a strategy use perspective, it is more likely that the Predominantly Spanish-Speaking group would undergo shifts in strategy use attributed to dual language exposure because of their exposure to English at school. Additionally, language proficiency group by age interactions were found between these two groups. On the Categorization, Characteristic Properties, and Linguistic Concepts tasks, the 4-year-old Predominantly English-Speaking group outperformed the 4-year-old Predominantly Spanish-Speaking group, while the opposite pattern was seen for the Functions task. The 5-year-old Predominantly Spanish-Speaking group performed better than the 5-year-old Predominantly English-Speaking group. These differential trajectory patterns speak to the issue of school readiness and differences in socialization patterns between the language proficiency groups (discussed in more detail below).

To summarize, there were a number of between-language differences found, both in the two languages of the Bilingual group and in the respective languages of the Predominantly English-Speaking and Predominantly Spanish-Speaking groups. Small within-language variations were noted as well.

WITHIN LANGUAGE EFFECTS

Differences between language proficiency groups in the same language can also be explained by the amount and types of input over time. Performance on the Categorization task differed between the Predominantly Spanish-Speaking and Bilingual groups. It is important to consider variations in input that drive performance on particular tasks such as socialization practices and the content of situations typically encountered in each language

The finding that the Bilingual group performed significantly better than the Predominantly Spanish-Speaking group on the Spanish Categorization task may be explained by experience. Research on category generation performance suggests that that experience plays a large role in word learning (Peña et al., 2002). Bilingual children learn to participate in two different cultures, which may add to the breadth of their vocabulary. Recall that Peña and colleagues (Peña, et al., 2002) found that in a category generation task bilinguals named prototypical items that corresponded to the language of testing, with a relatively small (31%) amount of overlap across languages. Thus, bilingual children might produce more category items than monolinguals as a result of broader cultural experiences.

DEVELOPMENT

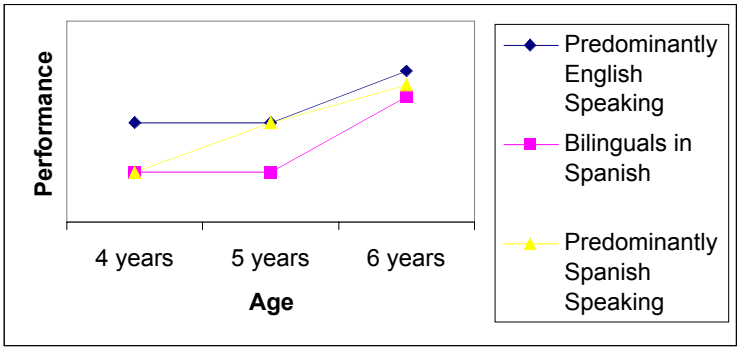
General upward age trends were seen for all language proficiency groups across the different language tasks, as well as for performance as a whole, indicating an increase in semantic language skills with age and experience. Three predominant patterns were seen in the performance across age groups within each language proficiency group (see Figure 5). The trends were flat followed by a moderate increase, flat followed by a steep increase, and a steady moderate increase across

ages. Interestingly, within each language proficiency group, one prevalent trajectory was noted with the exception of the Bilingual group in English, which demonstrated different trajectories across tasks. The first trend, flat followed by a moderate increase was prevalent in the Predominantly English-speaking group, indicating that between the ages of 4 and 5 years, before starting school, they demonstrate minimal development in the academic-like semantic tasks presented in the tasks. The second trend, flat followed by a steep increase was prevalent for the Bilingual group in Spanish. It should be noted that these two groups did not start out at the same level of performance. The Predominantly English-Speaking group demonstrated better performance at 4 years of age, thus even though the Bilingual group in Spanish showed steeper development between the ages of 5 and 6, the performance of the Bilingual group in Spanish was still lower than that of the Predominantly English-Speaking groups 6 years of age. The Functions task was the exception, as the Bilingual group in Spanish demonstrated superior performance at 4, 5, and 6 years of age. The Predominantly Spanish-Speaking group demonstrated a steady developmental trajectory from age 4 to age 6, suggesting a steady use of strategies in L1 that did not appear to be affected by the relatively minimal L2 exposure this group had received. The Bilingual group in English demonstrated a mixture of trajectories depending on the task, including a pattern of slight increase from ages 4 to 5 years followed by a slight decrease in performance from 5 to 6 years of age on the Linguistic Concepts task. This mixture of trajectories may be indicative of the strategy changes that are believed to take place as exposure to the L2 increases. It is important to note that at 6 years of age, the Bilingual group performance was slightly lower than the predominantly single language groups on most tasks with the

exception of Functions, on which they were higher, and Analogies, on which their performance was similar to that of the predominantly single language groups. As a whole, these results suggest that the combination of duration and timing of input in each language influences performance, possibly as a result in a shift in the strategies they use to access and produce lexical information. Recall that research on models of lexical access and production has demonstrated that a shift in strategies, referred to as the Developmental Hypothesis (Kroll & deGroot, 1997), occurs as bilinguals become more proficient in their L2. As this shift occurs, lexical access and production are generally less efficient than when a steady use of strategies is exhibited.

Figure 13.

Prevalent Developmental Trajectories by Language Groups



Note: No prevalent pattern was shown by the Bilingual group in English.

IMPLICATIONS FOR TESTING

The findings presented in this study have implications for both language testing practices and test development practices. For testing practices, the results of this study emphasize the importance of testing bilingual children in both of their languages in order to gain a more complete understanding of their skills. Even though the Bilingual group was fluent in English and demonstrated a positive

developmental trend on most tasks, their performance on most tasks in English was lower than that of the Predominantly English-Speaking group across age levels. Even at 6 years of age, the Bilingual group's performance in Spanish was higher than their performance in English. Additionally, the different developmental trajectories seen across language groups highlight the importance of understanding how much exposure children have had in each language. For example, as noted above, the Bilingual group in English appeared to be experiencing a strategy shift in their first year of exposure to academic English (between ages 5 and 6). Thus, understanding exposure may provide insight about their possible stage of strategy use.

From a bilingual test development perspective, it is clear that balancing items by meaning across languages (i.e., translation), balancing the concepts represented in each language, and balancing items by task may yield tests that are not appropriate for the target language group. Instead, balancing items by their difficulty across tasks may result in tests that are appropriately structured given experiences with language and culture that are common to the population for whom the tests will be used. The structure of languages, as well as the cultures that are so closely intertwined with language, call for a broad sampling of items across tasks and languages in order to identify the items in each language that will best differentiate language impaired and typically developing bilingual children.

THEORETICAL IMPLICATIONS

From a theoretical perspective, the differences found between the language proficiency groups on the different tasks and between the two languages of the Bilingual group across tasks provide support for a functionalist model of language acquisition. The language proficiency groups varied in their exposure to Spanish and

English, as well as in their cultural experiences. These differences in input of linguistic structure and sociocultural experiences provide explanations for specific patterns of performance that differed within languages across the language proficiency group and across languages within the Bilingual group. Clearly, input from the different languages drives language acquisition in ways that shape the two languages differently, and that result in differential performance on language tasks.

LIMITATIONS OF THE STUDY AND FUTURE DIRECTIONS

While this study provides important information about the development of semantic language skills in bilingual children, it does not address differences in receptive versus expressive language skills. Recall that responses were accepted in either language for the Spanish and English tasks. This study did not take into account which language the children used to respond. Rather, their receptive skills (for example, understanding of a question in English) were sufficient for them to earn credit on an expressive task regardless of their language of production. Future studies might differentiate the language used to respond to expressive and receptive tasks in order to gain a better understanding of differences in the developmental patterns for expressive and receptive language skills.

A cross-sectional design was used to explore developmental effects in this study, which provides insight about development over time. However, based on research that has examined bilingual lexical development over time (Kohnert, 2002; Kohnert & Bates, 2002), individual children would be highly likely to change groups as their exposure to L2 increased. In order to better understand true development in bilingual children whose experiences change from year to year, a longitudinal study should be implemented.

SUMMARY

The results from this study demonstrate that input plays an important role in semantic acquisition. Both sociocultural and structural aspects of language influence the use of specific vocabulary, word types, and relations between words, which in turn influence task performance. These results highlight the importance of testing bilinguals children in both of their languages and obtaining information about their exposure to each of their languages in order to obtain the most accurate information in testing situations.

Appendix

LANGUAGE PROFICIENCY AND USE RATING SCALE

Use refers to how much the child uses and hears each language. Circle the appropriate rank for each language.

Spanish	English	
0	0	Never uses the indicated language. Never hears it.
1	1	Never uses the indicated language. Hears it very little.
2	2	Uses the indicated language a little. Hears it sometimes.
3	3	Uses the indicated language sometimes. Hears it most of the time.
4	4	Uses the indicated language all of the time. Hears it all of the time.
DK-	DK	Do not know

Proficiency refers to how well the child speaks and understands each language. Circle the appropriate rank for each language.

0	0	Cannot speak the indicated language, has few words or phrases, cannot produce sentences, only understands a few words.
1	1	Cannot speak the indicated language, has few words or phrases, understands the general idea of what is being said.
2	2	Limited proficiency with grammatical errors, limited vocabulary, understands the general idea of what is being said.
3	3	Good proficiency with some grammatical errors, some social and academic vocabulary, understands most of what is said.
4	4	Native-like proficiency with few grammatical errors, good vocabulary, understands most of what is said.
DK	DK	Do not know

From Gutierrez-Clellen & Kreiter, in press.

References

Altarriba, J., & Mathis, K. M. (1997). Conceptual and Lexical Development in Second Language Acquisition. Journal of Memory and Language, 36, 550-568.

Bates, E. & MacWhinney, B., (1982). Functionalist approaches to grammar. In E. Wanner & L. Gleitman (Eds.), Language acquisition: The state of the art. New York: Cambridge University Press.

Bates, E. & MacWhinney, B., (1987). Competition, variation and language learning. In B. MacWhinney (Ed.), Mechanisms of language acquisition. Hillsdale, NJ: Erlbaum.

Bates, E. & MacWhinney, B., (1989). Functionalism and the competition model. In B. MacWhinney & E. Bates (Eds.), The Cross-linguistic study of sentence processing (pp. 3-73). New York: Cambridge University Press.

Bowerman, M. (1996). Learning how to structure space for language: A crosslinguistic perspective. In P. Bloom, M. A. Peterson, L. Nadel, and M. F. Garrett (Eds.), Language and Space. Cambridge, MA: MIT Press.

Case, R. (1985). Intellectual development: Birth to adulthood. New York: Academic Press.

Choi, S. (2000). Caregiver input in English and Korean: Use of Nouns and Verbs in book-reading and toy-play contexts. Journal of Child Language, 27(1), 69-96.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.

Crystal, D. (1998). Sense: The final frontier. Child Language Teaching and Therapy, 14(1), 1-27.

Dufour, R., & Kroll, J. F. (1995). Matching words to concepts in two languages: A test of the concept mediation model of bilingual representation. Memory & Cognition, 23, 166-80.

Dufour, R., Kroll, J. F., & Sholl, A. (1996). Bilingual naming and translation: Accessing lexical and conceptual knowledge in two language. Manuscript in preparation, Swarthmore College.

Dunn, L. M. (1959). Peabody Picture Vocabulary Test. Circle Pines, MN: American Guidance Services.

Dunn, L. M. (1986). Test de Vocabulario en Imágenes Peabody: Adaptación Española. Madrid, Spain: MEPSA.

Dunn, L. M. (1988). Bilingual Hispanic Children on the U. S. Mainland: A Review of Research on Their Cognitive, Linguistic and Scholastic Development. Monograph. Honolulu: Dunn Educational Services. (ERIC Document Reproduction No. ED 304 274)

Dunn, L. M., & Dunn, L. M. (1981). Peabody Picture Vocabulary Test—Revised. Circle Pines, MN: American Guidance Service.

Dunn, L., Padilla, E., Lugo, D., & Dunn, L., (1986). Test de vocabulario en Imágenes Peabody. Circle Pines, MN: American Guidance Service.

Duran, R. (1988). Assessment and instruction of at-risk Hispanic students: Knowledge gaps and regulations. Exceptional Children, 56, 145-152.

Fenson, L., Dale, P.S., Reznick, J.S., Thal, D., Bates, E., Hartung, J.P., et al. (1993) The MacArthur Communicative Development Inventories: User's guide and technical manual. San Diego: Singular Publishing Group.

Gathercole, V. M., Sebastian, E., and Soto, P. (1999). The early acquisition of Spanish verbal morphology: Across-the-board or piecemeal knowledge? International Journal of Bilingualism, 3(2-3), 133-82.

Goldfield, B. A., & Reznick, J. S. (1990). Early lexical acquisition: Rate, content, and the vocabulary spurt. Journal of Child Language, 17, 171-183.

Gray, S., Plante, E., Vance, R., & Henrichsen, M. (1999). The diagnostic accuracy of four vocabulary tests administered to preschool-age children. Language, Speech, and Hearing Services in Schools, 20(2), 196-206.

Grosjean, F., (1989). Neurolinguists, Beware! The Bilingual is Not Two Monolinguals in One Person. Brain and Language, 36, 3-15.

Gutierrez-Clellen, V., & Kreiter, J. (in press). Understanding child bilingual acquisition using parent and teacher reports. *Applied Psycholinguistics*.

Hakuta, K., Ferdman, B. M., & Diaz, R. M. (1986). Bilingualism and Cognitive Development: Three Perspectives and Methodological Implications. Los

Angeles: University of California, Los Angeles. Center for Language Education and Research.

Hakuta, K., & Garcia, E. E. (1989). Bilingualism and education. American Psychologist, 44, 374-379.

Hernandez, A. E., Bates, E., & Avila, L. X., (1994). On-line sentence interpretation in Spanish-English bilinguals: What does it mean to be "in between"? Applied Psycholinguistics, 15(4), 417-46.

Horgan, D. (1981). Rate of language acquisition and noun emphasis. Journal of Psycholinguistic Research, 10, 629-640.

Hulit, L. M. & Howard, M. R. (2002). Born To Talk. New York: Allyn & Bacon.

Jackson-Maldonado, D., Thal, D., Marchman, V., Bates, E., & Gutierrez Clellen, V. (1993). Early lexical development in Spanish-speaking infants and toddlers. Journal of Child Language, 20(3), 523-549.

Jensen, A. R. (1974). How biased are culture-loaded tests? Genetic Psychology Monographs, 90, 195-244.

Kohnert, K. (2002). Picture naming in early sequential bilinguals: A 1-year follow-up. Journal of Speech, Language, and Hearing Research, 45, 759-771.

Kohnert, K., & Bates, E. (2002). Balancing bilinguals II: Lexical Comprehension and Cognitive Processing in Children Learning Spanish and English. Journal of Speech, Language, and Hearing Research, 45, 347-359.

Kohnert, K. J., Bates, E., & Hernandez, A. E. (1999). Balancing bilinguals: Lexical-semantic production and cognitive processing in children learning Spanish and English. Journal of Speech, Language, and Hearing Research, 42(6), 1400-1413.

Kroll, J. F., & de Groot, A. M. B. (1997). Lexical and Conceptual Memory in the Bilingual: Mapping Form to Meaning in Two Languages. In A. M. B. de Groot & J. F. Kroll (Eds.), Tutorials in Bilingualism: Psycholinguistic Perspectives. (p. 169-99). Mahwah, NJ: Lawrence Erlbaum.

Lewelling, V. W. (1991). Academic Achievement in a Second Language. (Report No. EDL-FL-91-01). Washington, D. C.: Office of Educational Research and Improvement.

Liu, H., E. Bates, Li, H. (1992). "Sentence interpretation in bilingual speakers of English and Chinese." Applied Psycholinguistics **13**: 451-484.

MacWhinney, B., (1987). Applying the competition model to bilingualism. Applied Psychometrics, 8(4), 315-27.

MacWhinney, B. (1997). Second language acquisition and the competition model. In A. M. B. de Groot & J. Kroll (Eds.), Tutorials in Bilingualism: Psychological perspectives (pp. 169-199). Mahwah, NJ: Lawrence Erlbaum.

McDonald, J. L., (1987). Sentence interpretation in bilingual speakers of English and Dutch. Applied Psycholinguistics, 8, 379-413.

McLeod, B., & McLaughlin, B. (1986). Restructuring or automaticity? Reading in a second language. Language Learning, 36, 106-123.

Meyer, G., & Patton, J. M. (2001). On the Nexus of Race, Disability, and Overrepresentation: What Do We Know? Where Do We Go? On Point…Brief Discussions of Critical Issues in Urban Education. (Report No. H086C970005-98). Newton, MA: National Institute for Urban School Improvement. (ERIC Document Reproduction Service No. ED 462 487)

Nelson, K. (1973). Structure and strategy in learning to talk. Monographs of the Society for Research in Child Development, 38(1-2), 1-135.

Pearson, B. Z., & Fernández, S. C. (1994). Patterns of interaction in the lexical growth in two languages of bilingual infants and toddlers. Language Learning, 44(4), 617-653.

Pearson, B. Z., Fernandez, M. C., & Oller, D. K., (1992). Measuring bilingual children's receptive vocabularies. Child Development, 63, 1012-1221.

Pearson, B. Z., Fernández, S. C., & Oller, D. K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. Language Learning, 43(1), 93-120.

Pearson, B. Z., Fernández, S. C., & Oller, D. K. (1995). Cross-language synonyms in the lexicons of bilingual infants: one language or two? Journal of Child Language, 22, 345-368.

Pearson, B. Z., Fernández, S. C., Lewedeg, V., & Oller, D. K. (1997). The relation of input factors to lexical learning by bilingual infants. Applied Psycholinguistics, 18, 41-58.

Peña, E. D., Bedore, L. M. & Rappazzo, C. (in press). Language, Speech, and Hearing Services in the Schools.

Peña, E. D., Bedore, L. M., and Zlatic-Giunta,, R. (2002). Category-Generation Performance of Bilingual Children: The Influence of Condition, Category, and Language. Journal of Speech, Language, and Hearing Research, 45, 938-947.

Peña, E. D., Gutierrez-Clellen, V., and Iglesias, A. (in development). The Bilingual English-Spanish Assessment.

Peña, E., & Quinn, R. (1997). Task familiarity: Effects on the test performance of Puerto Rican and African American children. Language, Speech, and Hearing Services in the Schools, 28(4), 323-332.;

Peña, E. D., Thal, D., Jackson Maldonado & Greenblatt, R. (2001, June). Characteristics of Latino Mother Speech to Children in Mexico and the U.S. Poster session presented at the annual Symposium for Research in Child Language Disorders, Madison, WI.

Potter, M. C., So, K. F, Von Eckardt, B., Feldman, L. B. (1984). Lexical and conceptual representation in beginning and more proficient bilinguals. Journal of Verbal Learning and Verbal Behavior, 23, 23-38.

Rogoff, B. (1990). Apprenticeship in Thinking: Cognitive Development in Social Context. New York: Oxford University Press.

Saville-Troike, M. (1991). Teaching and Testing for Academic Achievement: The Role of Language Development. Occasional Papers in Bilingual Education, Spring 1991, No. 4, 3-15.

Talamas, A., Kroll, J. F., & Dufour, R. (1995). Form-related errors in second language learning: A preliminary stage in the acquisition of L2 vocabulary. Unpublished manuscript, Pennsylvania State University, University Park.

Tamayo, J. (1987). Frequency of use as a measure of word difficulty in bilingual vocabulary test construction and translation. Educational and Psychological Measurement, 47, 893-902.

Texas Education Agency (1997). Texas Essential Knowledge and Skills. Retrieved November 26, 2002, from http://www.tea.state.tx.us/teks/

Thal, D., Jackson-Maldonado, D., & Acosta, D. (2000). Validity of a parent-report measure of vocabulary and grammar for Spanish-speaking toddlers. Journal of Speech, Language, and Hearing Research, 43, 1087-1100.

Valdés, G. & Figueroa, R. A., (1994). Bilingualism and Testing: A Special Case of Bias. Norwood, NJ: Ablex.

Wulfeck, B., Juarez, L., Bates, E., & Kilborn, K. (1986). Sentence interpretation strategies in healthy and aphasic bilingual adults. In J. Vaid (Ed.), Language processing in bilinguals: Psycholinguistics and neurological perspectives. Hillsdale, NJ: Erlbaum.

Vita

Ellen Stubbe Kester was born in Little Rock, Arkansas on December 28, 1969 to Mary Ellen and Donald Carl Stubbe. Ellen started high school at the Singapore American School and graduated from Memorial High School in Houston, Texas. She received her Bachelor of Arts in Spanish and her Master of Arts in Speech-Language Pathology from the University of Texas at Austin in 1993 and 1997, respectively. She completed her clinical fellowship year at the Kennedy Krieger Institute in Baltimore, Maryland prior to returning to Austin to pursue doctoral studies at The University of Texas. Ellen's primary research interests include bilingual language development and assessment of bilingual children. Publications include:

Peña, E. D. & Kester, E. S. (in review). Semantic Development in Spanish-English Bilinguals: Theory, Assessment, and Intervention.

Kester, E. S. & Peña, E. D. (2002). Language ability assessment of Spanish-English bilinguals: Future directions. Practical Assessment, Research, and Evaluation, 8, 4.

Kester, E. S., Peña, E. D., and Gillam, R. B.(2001). A comparison of three dynamic assessment teaching components with Culturally and Linguistically Diverse Preschoolers. Journal of Cognitive Education and Psychology, 2, 42-59.

Permanent address: 3100 French Place, Austin, Texas 78722

This dissertation was typed by the author.