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Verb Argument Structure Deficits in Spanish-Speaking Preschoolers with Specific Language Impairment who are English Language Learners

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy

in

Language and Communicative Disorders

by

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Professor Vera Gutiérrez-Clellen, Chair
Professor Julie Evans

2009

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The Dissertation of Gabriela Simon-Cereijido is approved, and it is acceptable in quality and form for publication on microfilm:

Chair

University of California, San Diego

San Diego State University

2009

DEDICATION

This dissertation is dedicated to *mis viajeros:* my immigrant grandparents, parents, husband, children, siblings, and in-laws and to the future generations of emigrants and immigrants for sure to come.

EPIGRAPH

I believe that we learn by practice.
Whether it means to learn to dance by practicing dancing
or to learn to live by practicing living,
the principles are the same.

Martha Graham

Did you notice that you are always doing a verb?
You are always doing a verb.

Lucas C., age 8

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LIST OF ABBREVIATIONS

ANOVA:	Analysis of variance
ASHA:	American Speech-Language-Hearing Association
BESA:	Bilingual English Spanish Assessment
DAS:	Differential Abilities Scale
DO:	Direct object
ELL:	English language learner
E-MST:	English morphosyntax test
ENWRT:	English nonword repetition task
EOI:	Extended optional infinitive
E-ST:	English semantics test
EOWPVT:	Expressive One Word Picture Vocabulary Test
IDEA:	Individuals with Disabilities Education Act
IEP:	Individualized educational plan
IO:	Indirect object
KABC-II:	Kaufman Assessment Battery for Children, Second Edition
MLU:	Mean length of utterance
N:	Number
NDV:	Number of different verbs
PPVT:	Peabody Picture Vocabulary Test
S:	Subject
SD:	Standard deviation

SLI:	Specific language impairment
S-MST:	Spanish morphosyntax test
SNWRT:	Spanish nonword repetition task
S-ST:	Spanish semantics test
TLD:	Typical language development
TLD-3:	Language-matched child with typical language development
TLD-4:	Age-matched child with typical language development
TVAS:	Total verb argument score
TVIP:	Test of Vocabulario de Imágenes Peabody
V:	Verb

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ACKNOWLEDGEMENTS

I would like to acknowledge Professor Vera Gutiérrez-Clellen for her support as the chair of my committee. She is a wonderful mentor; her intellect, passion, commitment, and liveliness are contagious. I would also like to thank my committee members whose different perspectives confirmed the importance of interdisciplinary thinking.

In addition, I must thank Dr. Wulfeck for her support and enthusiasm. She has given me great advice on multiple situations. I also thank the generous funding of two training grants: San Diego State University Minority Biomedical Research Support (MBRS) Program, funded by the National Institute of General Medical Sciences (NIGMS), National Institutes of Health (NIH) and University of California, San Diego - Center for Research on Language (CRL) Training Grant, funded by the National Institutes of Health (NIH) as well. I greatly appreciate the support I received from Michelle Lopez and Dr. Emilio Ulloa from SDSU.

This work could not have been done without the support of the New Century Scholars Doctoral Scholarship from the American Speech-Language-Hearing Foundation, the Sylvia Chavez Memorial Scholarship Award from MANA de San Diego, the Bamford-Lahey Children's Foundation Scholar Award, and UCSD San Diego Diversity Award. In addition, the U.S. Department of Health & Human Services, Administration for Children and Families, Head Start Graduate Student Research Program has provided the funding to collect data in the Neighborhood House Association centers.

Over the years, I learned to rely on another important source of education, the annual Symposium on Research in Child Language Disorders (SCRLD) in Madison, WI. Their travel awards allowed me to attend the meetings on a regular basis, present my work, and meet researchers from other parts of the country. I truly appreciate their generosity.

Moreover, special thanks to the Bilingual Child Language Laboratory assistants: Lorena Cataño, Evelyn Rosales, Elizabeth Escobar, Maria Adargas, Meghan Fillipp, Itzel García, Juana Vaquero, Annette García Van Sickle, Jenny Bosma, Karen Zagurskly, Sarah Downing, Rebeca Joseph, Lorena Hernandez, and Verónica Ehrlich. I extend my gratitude to the teachers and families of the participating children.

Next, I say “muchas gracias” to my family. They have accompanied me with love, trust, laughs and tears, resources, and patience through this journey. First and foremost, to my husband Fabian and my children, Antonia and Lucas, thank you! Then to each one of you: Mami, Nona and Pirincho, Javier and his family, Leandro and his family, and Margarita and her family, muchas gracias!

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Gutiérrez-Clellen, V.F., Simon-Cereijido, G., & Leone, A. (accepted for publication) Codeswitching in bilingual children with specific language impairment.

Gutiérrez-Clellen, V.F., & Simon-Cereijido, G. (submitted). Nonword repetition in Latino children at risk of language impairment.

FIELDS OF STUDY

Major Field: Language and Communicative Disorders (Child Language and Bilingualism)

Grammatical development and verb production of bilingual (Spanish-English) preschool and school age children with and without language impairments

Preschool language intervention for English Language Learners with and without language disorders: development, feasibility, assessment

ABSTRACT OF THE DISSERTATION

Verb Argument Structure Deficits in Spanish-Speaking Preschoolers with Specific Language Impairment who are English Language Learners

by

Gabriela Simon-Cereijido

Doctor of Philosophy in Language and Communicative Disorders

University of California, San Diego, 2009
San Diego State University, 2009

Professor Vera Gutiérrez-Clellen, Chair

This research project evaluated a deficit observed in children with specific language impairment (SLI) across multiple languages: limitations in the production of verbs and arguments. A total of 100 Spanish-speaking preschoolers participated in this project. In the first study, children with SLI (n=20) were compared to age peers (n=20) and to younger language peers (n=20) in the production of target verbs and arguments in elicited tasks that manipulated verb argument structure complexity. Participants were asked to

describe pictures and to repeat sentences with increasing number of arguments. In addition, they named pictures of common nouns and verbs and told two stories based on wordless picture books. Children with SLI had significantly lower scores than both control groups for the picture description and the sentence repetition tasks. Verb argument structure complexity played a significant role in the picture description task, indicating that all children omitted more target sentence constituents as complexity increased. This was more pronounced for children with SLI when producing sentences with three arguments. Verb argument structure complexity was not a significant factor for the sentence repetition task. Task and methodological differences partly explain this discrepancy. In addition, although both noun and verb naming scores were comparable between the affected children and their language peers, children with SLI used a lower number of lexical verbs in their spontaneous language.

The second study participants were English language learners. There were 20 children with SLI and 20 age peers, with comparable levels of English vocabulary. Children responded to the Spanish picture description and sentence repetition tasks used in study 1 and to the English versions of the same tasks. In both Spanish and English, children with SLI had significantly lower scores than age peers. In addition, verb argument structure complexity was a significant factor for the picture description task in Spanish but not for the other tasks.

These findings suggest that measures of production of verbs and arguments might help in the identification of SLI in the first and second

language of young children. Results are discussed in terms of cross-linguistic differences and potential use in assessment.

1. Introduction

In the United States, the caseloads of speech-language pathologists working with the pediatric population frequently include children with language impairments whose first language is Spanish. Limited availability of Spanish and bilingual developmental data, valid and reliable assessment tools, and evidence-based intervention guidelines adversely impact the quantity and quality of services that these children receive. The urge to better understand Latino Spanish- and English-speaking children's language development and to better serve the needs of those with language disabilities motivates this dissertation.

This research project will evaluate an area of language posited to be affected in children across SLI in multiple languages: the production of sentences with increasing number of arguments. In particular, it will evaluate the role of verb argument structure complexity in the languages of Latino Spanish-speaking preschoolers with and without specific language impairment (SLI) who are English Language Learners (ELLs).

Studies of SLI have discovered several language-specific deficits in monolingual children. For example, in English, preschoolers with SLI fail to mark verb tense in a consistent manner (Bedore & Leonard, 1998; Leonard, Bedore, & Grela, 1997; Rice & Wexler, 1996). In French, affected children have difficulties with clitic pronouns and articles in addition to finite verb morphology (Lenormand, Leonard, & McGregor, 1993; Paradis & Crago, 2001; Paradis,

Crago, & Genesee, 2003). Spanish- and Italian-speaking children with SLI have few problems with tense marking but omit and substitute clitic pronouns (Bortolini, Caselli, & Leonard, 1997; Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006; Leonard, Bortolini, Caselli, & McGregor, 1992; Sanz Torrent, 2002; Simon-Cereijido & Gutiérrez-Clellen, 2007). However, in Spanish SLI, in contrast to Italian, article production is also affected (Anderson & Souto, 2005; Restrepo & Gutiérrez-Clellen, 2001). Young Hebrew speakers with SLI do not have major difficulties with verb inflection, but appear to omit major sentence constituents (Dromi, Leonard, Adam, & Zadunaisky-Ehrlich, 1999; Kenan, 2008). A common denominator is not easily found, although language-specific morphosyntax appears to be an area of vulnerability.

Interestingly, some of these linguistic difficulties overlap with the errors observed in early second language development and in first language attrition or loss. Differentiating a language disorder (e.g., due to a disability) from a language difference (e.g., due to limited language exposure and input) makes assessment of English language learners with language impairments difficult (Caesar & Kohler, 2007; Genesee, Paradis, & Crago, 2004; Laing & Kamhi, 2003). Previous research has examined relevant language-specific deficits observed in Latino children with language impairments. For example, investigations of the Spanish grammatical features (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006; Restrepo, 1998; Bedore & Leonard, 2001, 2005), English grammatical features (Gutiérrez-Clellen & Simon-Cereijido, 2007; Gutiérrez-Clellen, Simon-Cereijido, & Wagner, 2008), word learning abilities

(Peña, Iglesias, & Lidz, 2001), and semantics (Gutiérrez-Clellen & DeCurtis, 1999; Peña, Quinn, & Iglesias, 1992) of young Spanish-English speakers with and without SLI are available. Most studies underscore the need to analyze every language used by the children because proficiency in one language may not be the same or may not be related to proficiency in the other language.

This project, in turn, aims to tackle the problem of identification of language impairments in Latino bilingual children by investigating an aspect of language that appears to be deficient in children with SLI across different languages: the production of sentences with increasing number of arguments.

Arguments (such as subjects and objects) are the phrases that accompany verbs in clauses. Studies of both English and Spanish SLI describe incomplete production of predicates and difficulties in the use of verbs with three or more arguments in spontaneous language (Ebbels, 2005; Sanz Torrent, 2002; Simon-Cereijido & Gutiérrez-Clellen, 2007; Thordardottir & Weismer, 2002). These difficulties may arise from limitations in semantic verb representations and/or in the linking of arguments to grammatical functions in real time. Moreover, increasing number of arguments appears to augment demands on language processing, resulting in ungrammaticality in children with SLI.

This project consists of two main studies. The first study assesses the role of verb argument structure complexity in the language production of Latino Spanish-speaking young children with and without SLI. The second study examines how typical and atypical Latino ELLs produce sentences with

increasing number of arguments in both Spanish and English. Elicited sentence production tasks and lexical measures will be evaluated in both studies.

This project aims to shed light on the shared and unshared features of SLI across Spanish and English and on the development of English as a second language in typical and atypical children. In addition, from a clinical perspective, it aims to elucidate whether verb argument structure deficits have the potential to function as markers of SLI in the first and second language of Latino preschoolers.

This dissertation is structured as follows. In addition to this introductory section, it includes three background sections with a summary discussing the relevance of cross-linguistic studies of language disorders (section 2), language production and verb argument structure (section 3), and empirical findings related to verb use and verb argument structure complexity in specific language impairment (section 4). Section 5 states the general research questions and hypotheses of the dissertation studies. Study 1 (exploring verb argument structure in the language of Spanish-speaking preschoolers with and without SLI) is divided in two sections, 6 and 7. Section 6 reports methods and results and ends with a discussion of the Spanish elicited tasks findings. Section 7 details methods and results of verb lexical measures followed by a discussion of the study findings. Section 9 provides the information related to study 2 (assessing verb argument structure in the language of ELLs). The last section, 9, integrates the findings of the two studies with the existing literature

and their implications for assessment and treatment of specific language impairment.

2. The relevance of cross-linguistic studies of language disorders

A. Latino children and language disabilities in the United States

More than one in six people in the United States are of Latino origin (U.S. Census Bureau, 2007). Among Latinos, two-thirds are of Mexican descent and most of them live in the West and South of the United States (U.S. Department of Commerce, 2001). In fact, 21.0 million Spanish speakers reside in these regions (U.S. Department of Commerce, 2003). The rest of the Latino population is from Central and South America (14.3%), Puerto Rico (8.6%), Cuba (3.7%), and other origins (6.5%) (U.S. Department of Commerce, 2001).

The Latino population is quite young. Thirty-four percent of Latinos are under 18, compared with 22.8% of non-Hispanic Whites (U.S. Department of Commerce, 2001). Recent immigrants constitute 40.2% of the Hispanic population in the United States (U.S. Department of Commerce, 2001). Thus, many Latino children are brought up in communities of native Spanish speakers. Regarding educational attainment, more than two in five Hispanics aged 25 and older have not graduated from high school, 27% have less than a ninth grade education and only 11% have a bachelor's degree (U.S. Department of Commerce, 2001). In addition, unemployment and poverty are more prevalent in the Latino population in comparison to non-Hispanic Whites (U.S. Department of Commerce, 2001). Thirty percent of all children in poverty in the United States are Latinos (U.S. Department of Commerce, 2001). The social and demographic characteristics of Latino children in the United States

suggest that they are at risk for language delays. Income level and maternal education are risk factors for language development (Dollaghan, Campbell, Paradise, Feldman, Janosky, Pitcairn et al., 1999; Jewkes, 2005; Payne, Whitehurst, & Angell, 1994). Thus, socio-economic and educational factors need to be controlled in every study of these children.

In the American public education system, 8% of all students are English language learners (ELLs) (Keller-Allen, 2006) and about 77% of all ELLs have Spanish as their native language (Zehler, Fleischman, Hopstock, Stephenson, Pendzick, & Sapru, 2003). Latino children often grow up in communities where Spanish is in the process of being replaced by English over a period of a few generations (Oller & Eilers, 2002). Most children eventually become English dominant or even monolingual in English (Wong Fillmore, 2000). In 2005, 30% of Latinos age 18 and under reportedly speak English only (Hakimzadeh, 2006). Levels of English proficiency vary greatly: about 50% speak English very well and approximately 20% speak English less than very well (Hakimzadeh, 2006; Ong & Sanchez, 2002).

The language shift in the community affects children's Spanish linguistic environment and prevents researchers and clinicians from making direct comparisons of the Spanish abilities of these children to the abilities of monolingual Spanish-speaking children from other countries without controlling for sociolinguistic variables. It is also important to consider that Latino children's bilingual status is most often a necessity and not a choice, as it is to practically every bilingual person in the world (De Houwer, 1999).

There is great variability in levels of proficiency and use of both English and Spanish among Latino children. This variability is observable in the schools. Latino children may enter the school system at all ages and grade levels and with different proficiency levels of English and Spanish. They may be candidates for gifted and talented programs or may be in need of special education services. Currently, the situation of bilingual children with special needs is below optimal. Most local education agencies do not have mechanisms in place for linking ELLs and special education data or for collaboration across ELL and special education programs (Zehler, Fleischman, Hopstock, Pendzick, & Stephenson, 2003). Many state officials reported significant challenges in distinguishing language acquisition difficulties from language disabilities in ELLs. In other words, school districts find it difficult to differentiate between language learning difficulties due to disabilities such as specific language impairment (SLI) and those due to second language (English) acquisition and first language (e.g., Spanish) attrition. School staff members with expertise and knowledge in both special education and second language acquisition are scarce (Zehler et al., 2003). Educational outcome data for this population are also difficult to disaggregate. Many districts combine counts of ELL with disabilities with either the ELLs or special education category, rather than counting them as a subgroup (Zehler, Fleischman, Hopstock, Pendzick, & Stephenson, 2003).

Bilingual children are both under- and over-represented in special education (Zehler *et al*., 2003b). Nationwide, there is underrepresentation. Nine

percent of ELLs are eligible for special education services compared to 13.5% of all students. However, in districts with 99 or fewer ELL students, there is a pattern of over-referrals, where about 16% of students are referred to special education. In contrast, in districts with 100 or more ELLs, 9% of students are identified for special education (Zehler *et al*., 2003a). In California, ELLs in English immersion programs and with less Spanish support in their educational programs are more likely to be overrepresented in special education (Artiles, Rueda, Salazar, & Higareda, 2002).

In 2008, 55% of school speech-language pathologists had ELLs in their caseloads, according to a survey conducted by the American Speech-Language- Association (ASHA) (American Speech-Language- Association, 2008). However, only 8% of the survey responders provided bilingual services and 42% provided services in English only, without the assistance of bilingual assistants and/or interpreters, even when ASHA recommends the use of translators or interpreters and assessment in the child's native language "unless it is clearly not feasible to do so" (as it is also required by the Individuals With Disabilities Education Act (IDEA) (Caesar & Kohler, 2007). A practical concern is that there is a deficit of professionals who are sufficiently proficient in the languages spoken by ELLs. A significant number of speech-language pathologists are not proficient in a language other than English (American Speech-Language- Association, 2004; Roseberry-Mckibbin, Brice, & O'Hanlon, 2005) and have not received specific training on bilingual issues (Hammer, Detwiler, Detwiler, Blood, & Qualls, 2004; Kritikos, 2003).

Identifying language disabilities in bilingual children is complex. There is limited research proving that specific models of assessment and identification of SLI are effective at every age and grade level, and thus it is not known what professional development should be provided. As recommended by representatives of the United States Department of Education and the National Institutes of Health (McCardle, Mele-McCarthy, & Leos, 2005), we must build upon what we know about identification, assessment, and intervention of monolingual English children with SLI to inform the identification and assessment of language disabilities in ELLs, such as Latino bilingual children. However, studies of English development are not sufficient. Cross-linguistic studies are desperately needed to complete the developmental profile of Latino children with SLI.

B. Significance of cross-linguistic studies of specific language impairment

Cross-linguistic studies of children with specific language impairment (SLI) help us identify the shared and unshared features of this disorder across languages. SLI is a developmental disorder characterized by language deficits in the absence of frank neurological abnormalities, impairment or other cognitive and/or socio-emotional deficits (Leonard, 1998). Children with SLI exhibit problems in several language domains such as the lexicon, semantics, syntax, and discourse (Leonard, 1998). Close analyses of universal and language-specific characteristics of SLI enrich our understanding of language learning and of language disorders.

SLI may be best understood from a social systems and multidimensional perspective on learning disabilities (Wagner, Francis, & Morris, 2005). In this type of framework, a learning disability results from an interaction between an individual's abilities and the demands of the environment (Wagner *et al*., 2005). Thus, a language disorder will be manifested differently depending on the particular child's skills and the conventions and uses of the child's target language(s) (e.g., English only, Spanish only or bilingual English and Spanish environments). In other words, children with language impairments who are exposed to and use different language(s) will present both similar and different symptoms across languages throughout their development.

In addition, from a clinical perspective, cross-linguistic studies address the language needs of bilingual children with SLI. More research with Latino bilingual children is required in the areas of identification, assessment, understanding of developmental trajectories, individual and contextual factors affecting language development, and intervention (McCardle, Mele-McCarthy, & Leos, 2005). Teachers and clinicians need guidelines for the assessment of these children and for the design of effective language interventions. It is still not clear in what language(s) a particular bilingual child should be assessed and what specific language domain(s) should be targeted in what language(s). To inform these recommendations appropriately, empirical knowledge of the shared and unshared features of language disorders across languages is fundamental.

Investigating a shared feature of SLI across languages may result in effective and efficient assessment of bilingual children. This effort parallels the interest in processing measures such as nonword repetition tasks (Dollaghan & Campbell, 1998; Ellis Weismer, Tomblin, Zhang, Buckwalter, Chynoweth, & Jones, 2000; Girbau & Schwartz, 2008; Gutiérrez-Clellen & Simon-Cereijido, submitted; Kohnert, Windsor, & Yim, 2006), visual processing tasks (Kohnert & Windsor, 2004), and auditory processing tasks (Bishop & Mcarthur, 2005; Kohnert & Windsor, 2004; Uwer, Albrecht, & Von Suchodoletz, 2002) as potential non-biased markers of SLI. These types of measures, although important, may not be easily applicable, as off-line language measures are, to young children such as preschoolers. In addition, investigating a shared deficit across languages may provide insights into the interactions between languages in bilingual children. From these insights, we may be able to find potential treatment targets to assist the rehabilitation of the two languages of bilingual children with SLI.

The first question to be answered, however, is whether the production of verbs and arguments is disproportionately difficult for the population of interest, Latino preschoolers with SLI, in Spanish and English.

The next section will provide an overview of the process of language production and the role of verbs and verb argument structure from a psycholinguistic perspective.

3. Language production, verbs, and verb argument structure

A. Language production

Formulating a sentence is a complex process (Ferreira & Slevc, 2007; Levelt, 1989; Levelt, 2001; Poulisse, 1997). In this process, preverbal messages activate the corresponding lexical units or words. These units are then selected and retrieved. Verbs are lexical entries with important features such as argument structure (Levelt, 1989; Shapiro, 1997). In a sentence, lexical units are arranged in a sequential combination with hierarchical relations. These arrangements result from grammatical encoding, the process that gives the sentence syntactic structure. After grammatical encoding, the sentence is phonologically encoded and finally articulated by the oral apparatus.

An activated verb licenses its arguments or accompanying phrases which are then linked to the appropriate syntactic frame in the process of grammatical encoding (Levelt, 1989). For example, to simplify, a speaker goes through these steps in order to produce a sentence such as "*John eats spaghetti*". First, the preverbal message is encoded. Then the specific lexical entries are selected along with their class of word (e.g., the noun *John*, the verb *eat* with its argument structure, the noun *spaghetti*). Grammatical constructions or frames that are aligned with the preverbal message are selected (in this case, subject-verb-object). The necessary morphology and phonology of the entries are then retrieved and the lexical entries are assembled into a sentence with the appropriate word order or case marking (Ferreira & Slevc, 2007).

Importantly, verbs play critical roles regulating the noun and prepositional phrases associated with them. Studies with bilingual individuals indicate that although the lexicon is not shared by the two languages, grammatical encoding and syntactic constructions from one language may influence grammatical encoding in the other language. For example, fluent bilingual adults tended to produce prepositional datives in English, after being primed with the parallel construction in German. In contrast, cross-linguistic priming was not observed for passive sentences, because the forms have different structures in English and German (Loebell & Bock, 2003). Cross-linguistic priming was also reported for other language pairs such as Greek and English (Salamoura & Williams, 2007), Spanish and English (Meijer & Tree, 2003), and Dutch and English (Desmet & Declercq, 2006). Another study showed that second language learners do not have parsing difficulties in the second language when the verb argument structure of target verbs in their first and second languages match (Dussias & Cramer, 2006). These findings provide evidence for “continuity in the processes of language use and learning in bilinguals and monolinguals alike” (p.808, Loebell & Bock, 2003).

B. Verbs and accompanying phrases

Verbs have different number and types of arguments. This is referred to as valency. Transitivity is a related concept that refers to the number of obligatory core arguments of the verb. For example, monovalent verbs such as “sleep” take a subject but cannot take a direct object and thus they are

intransitive verbs. In contrast, trivalent verbs such as “give” take a subject, a direct object, and an indirect object, and are referred to as ditransitive verbs. Arguments may be obligatory or optional and differ in the degree of co-occurrence with the verb. For example, the verb “eat” may be used with or without a direct object (e.g., *they eat*, *they eat spaghetti*). In this case, the subject occurs more frequently than the direct object. Information about the argument structure of each verb (e.g., whether a verb requires a subject and a direct object or only a subject) is presumed to be stored in the lexicon (Levelt, 1989; Shapiro, 1997). There is no consensus regarding the way speakers link verb arguments to syntactic frames.

It has been proposed that the number of arguments licensed by the verb indicates the level of complexity of a verb (McClure, Pine, & Lieven, 2006; Shapiro & Levine, 1990). Transitive verbs are considered to be more complex than intransitive verbs because they require both a subject and a direct object, while intransitive verbs only require a subject. Argument structure complexity has been associated with increased cognitive demand in studies of adults using different methodologies such as electrophysiology, computational modeling and behavioral measures (Collina, Marangolo, & Tabossi, 2001; Haarmann, Just, & Carpenter, 1997; Rubin, Newhoff, Peach, & Shapiro; Shapiro, Zurif, & Grimshaw, 1987; Thompson, Shapiro, Li, & Schendel, 1995).

The metric system of verb complexity is controversial. Studies of adults and aphasics in English suggested that all of the verb’s possible argument structures are activated during verb processing resulting in an increased

processing load with verbs that have more than one argument structure (Shapiro & Levine, 1990; Shapiro, Zurif, & Grimshaw, 1987). Verbs with a large repertoire of argument structures had longer reaction times than the ones with smaller ones. However, this type of syntactic metric presents problems. First, there is no agreement regarding the precise number of possible argument structures of a given verb in a given language and second, it is unknown how and when an individual's lexicon acquires all of the possible argument structures.

In child language research, verb argument complexity is typically measured by the number of arguments licensed by the verb in a sentence. By definition, children are in the process of learning language and, most likely, have not been exposed to every possible argument structure for a given verb. As detailed in the following chapter, recent studies of children with SLI found an effect of verb argument structure complexity in English and French using this complexity metric. The studies in this dissertation will manipulate verb argument complexity in this same fashion.

4. Verb use and verb argument structure complexity in specific language impairment

Difficulties with verb argument structure may arise from limitations in semantic verb representations affecting the linking of arguments to grammatical functions. In addition, limitations in general processing capacity may adversely affect the accurate and grammatical production of verbs and arguments. The following sections summarize relevant research on these verb-related limitations in specific language impairment (SLI).

A. Limitations in verb knowledge and in verb use

Children with SLI demonstrate limited verb diversity and reduced use of verbs with three arguments in spontaneous language in English (Conti-Ramsden & Jones, 1997; Rice & Bode, 1993; Thordardottir & Weismer, 2002) and Spanish (Sanz Torrent, 2002; Simon-Cereijido & Gutiérrez-Clellen, 2007). Verb and argument use may be related to the child's overall lexicon and to the verb lexicon in particular. Verb argument structures are supposed to be stored with the specific lexical entry of each verb and experience with a variety of lexical items is critical for the development of verb argument structure (Bates & Goodman, 1999; Tomasello, 2003).

Most studies indicate that children with SLI demonstrate a slow learning rate and decreased retention of new verbs compared to age and language

peers (Rice, Buhr, & Nemeth, 1990; Windfuhr, Faragher, & Conti-Ramsden, 2002). These findings were replicated with different methodologies such as fast-mapping, Quick Incidental Learning (QUIL) and supported learning contexts (SLC) (Gray, 2004; Oetting, Rice, & Swank, 1995). For example, in a study by Windfuhr et al. (2002), typical 3-year-old and affected 5-year-old children were matched by verb lexicon size and presence of verb over-generalizations. This study design aimed to level the knowledge base of the two groups and to reveal learning limitations. Children were exposed to 4 novel nouns and 4 novel verbs in 8 play sessions during a period of 4 weeks. Correct spontaneous productions of the novel nouns and verbs were quantified. Children with SLI needed increased exposure to the new verbs before they could learn the items. The younger controls started to use the novel verbs in the second session while the SLI group barely reached that level of use in the fourth session. In addition, children with SLI learned more nouns than verbs. Interestingly, an accompanying study of the same spontaneous utterances revealed that children with SLI were conservative in their use of argument structures (Skipp, Windfuhr, & Conti-Ramsden, 2002). They rarely generalized an unheard argument structure to a new verb. In addition, they used novel nouns in a lower number of sentence positions than the typically developing children. These two studies suggest that children with SLI have disproportionate difficulties learning verbs.

The verb lexicon of children with SLI may have weak representations, both quantitatively and qualitatively. Lexical verb production was studied in the

spontaneous language of English-speaking preschoolers with SLI, three-year old language-matched children and five-year old age-matched controls (Watkins, Rice, & Moltz, 1993). Type-token ratio was calculated for each child as a measure of overall lexicon diversity. Verb diversity, measured by verb type-token ration, was explored as well. Although the overall type-token ratio was similar for the three groups, children with SLI relied on a less diverse verb lexicon than both control groups. No differences were found in the proportional use of general all-purpose verbs (such as to get or to go) in these 100-utterances language samples. Another study of three children with SLI, ages 4-5, collected language samples consisting of more than 1,000 utterances from each child (Rice & Bode, 1993). Verb diversity and verb semantic errors were carefully analyzed. On average, these children used 10-15 verbs for every 100 verb phrases, indicating limitations in the number of possible meanings and syntactic frames to be used. Because the number of analyzed utterances was large enough, reliance on general all-purpose verbs was clearly observed. General all-purpose verbs constituted about 8-10% of the children's verb lexicon and were used in 40-50% of the language samples. The most common semantic verb error was the substitution of a lexical verb by a general all-purpose verb. This finding in conjunction with the frequent use of general all-purpose verbs suggests that targeted lexical verbs were not readily retrieved or that lexical verbs had weakened mental representations. Verb omission was also observed, as was argument omission in transitive environments. The authors proposed that children with SLI appear to present "a certain optionality"

in the coordination of verb semantics and syntax (Rice & Bode, 1993). That is, affected children did not consistently access, retrieve, and use their full verb knowledge.

Verb use was also investigated in a longitudinal study of three preschoolers with SLI (Conti-Ramsden & Jones, 1997). Verb type-token ratio and number of total verbs were similar to normative samples matched on mean length of utterance (MLU); however, the affected children used a significantly smaller number of verb types than MLU peers. However, other studies did not replicate this finding (Grela & Leonard, 1997; Leonard & Owen, 2002; Thordardottir & Weismer, 2001). Several factors such as severity of the impairment and context and length of the language samples, among others, may affect verb diversity results in typical and atypical children.

In addition, verb diversity in SLI may vary cross-linguistically. A study of 196 preschool and school-aged Latino children with different levels of English and Spanish proficiencies and different language abilities investigated lexical diversity measures derived from narrative samples produced in Spanish, English, or both languages (Simon-Cereijido & Gutiérrez-Clellen, 2009). It was found that children with language delays had lower means than the typical group for number of different words, number of different verbs, and use of ditransitive predicates in Spanish. In contrast, for English, the atypical group had lower means than the typical group for all the measures with the exception of verb diversity. It was also noted that the children in this sample used a smaller number of English verbs than Spanish verbs, a surprising finding in

comparison to previous cross-linguistic research conducted by Slobin (1996) using a similar methodology. This research suggested that English speakers use a larger variety of verbs than Spanish speakers (Slobin, 1996). In Simon-Cereijido and Gutiérrez-Clellen (2009), Latino children produced a smaller variety of English verbs than of Spanish verbs, even when the majority of the participants was dominant in English. The English verb diversity findings may be related to the sociolinguistic characteristics of the studies' participants. In contrast to Slobin's middle class sample, the Latino participants had a greater representation of children from lower socioeducational background, a variable repeatedly associated to low vocabulary (Hart & Risley, 1995; Jewkes, 2005; Qi, 2005; Restrepo, Schwanenflugel, Blake, Neuharth-Pritchett, Cramer, & Ruston, 2006). In addition, educational research has shown that Latino children from low socioeconomic status backgrounds in the United States tend to start school with language skills, including vocabulary, below age expectations (St. Pierre, Ricciuti, Tao, Creps, Kumagawa, & Ross, 2001; St. Pierre, Ricciuti, Tao, Creps, Swartz, Lee et al., 2003; Zill, Resnick, Kim, O'donnell, Sorongon, Mckey et al., 2003; Zill, Resnick, Mckey, Clark, Pai-Sarmant, Connell et al., 2001). Limited access to quality day care and preschools and insufficient professional training of the educational staff caring for this population also impact the development of lexical skills in these children (Herzenberg, Price, & Bradley, 2005; National Task Force on Early Childhood Education for Hispanics, 2007). Thus, these differences should be interpreted with caution, in particular, for

Latino children in the United States who may systematically represent a particular socioeducational level (Werker & Byers-Heinlein, 2008).

In a small study of Spanish- and Catalan-speaking children, children with SLI produced significantly less verb tokens than their age- and language-matched peers while verb type-token ratio and use of general all-purpose verbs were similar for the SLI and control groups in spontaneous language samples (Sanz-Torrent, 2002). Ditransitive verbs were rarely used by the SLI group. This type of verbs represented less than 5% of the SLI verb types and about 10% of the control groups' verbs. In addition, the affected children used significantly more one-argument verbs than controls, and more transitive than ditransitive verbs. Moreover, studies of Dutch-speaking children with SLI additionally demonstrated reduced verb diversity compared to typically developing children matched on noun vocabulary (De Jong, 1999). Greek-speaking children with SLI were also found to have a limited verb lexicon comprising a large number of general all-purpose verbs (Stavrakaki, 2000). However, verb diversity was not found to be different in the language of Cantonese-speaking children with and without SLI (Stokes & Fletcher, 2000). After controlling for number of tokens and length of the language samples, analysis indicated that there was no significant difference in verb type-token ratio, verb tokens and verb types between the affected children, the younger language-matched children and the age-matched.

The reported cross-linguistic limitations in verb use and diversity indicate that verb lexicon deficits may be a shared feature of SLI across languages.

During preschool and early childhood and across different languages, children with SLI tend to demonstrate a smaller number of lexical verbs than age peers in their spontaneous language. Most of the previous studies did not manipulate verb argument structure in order to fully investigate the effect of verb argument structure complexity on the verb representations of these children. One exception is a study of French-speaking children with SLI (age 8;1 to 13;0) that examined single-verb comprehension and production of intransitive and transitive verbs (Pizzioli & Schelstraete, 2008). The affected children's scores were not significantly different than younger language-matched controls and there was no significant effect of verb argument structure complexity. That is, both groups named and identified intransitive and transitive verbs with comparable accuracy. In this study, ditransitive verbs were not examined.

B. Omissions of arguments

Children with SLI occasionally omit arguments as well (Grela & Leonard, 1997; King & Fletcher, 1993; Sanz Torrent, 2002; Simon-Cereijido & Gutiérrez-Clellen, 2007; Thordardottir & Weismer, 2002). Objects are omitted more frequently than subjects in English and Spanish SLI (Rice and Bode, 1993). In another study, subject omission was increased in phrases with unacussative verbs (that is, verbs having a theme argument as a subject) (Grela & Leonard, 1997). The overall omission rate, in general, was low. For example, in Rice and Bode (1993) study, only 3% of the total verbs presented argument errors. Thordardottir and Ellis Weismer (2002) analyzed the rate of argument

omissions in spontaneous language samples by children with SLI, age 5;5-9;8. Ninety-three percent of the verbs were used with all obligatory arguments included. Among the 7% of verbs with argument omissions, subject argument omissions were the most frequent (82%), followed by theme object omissions (8%), copula complement omissions (4%), and goal omissions (3%). Thus, omission of agent and theme arguments appears to be most frequent in English-speaking children with SLI. The impoverished argument structure use in SLI cannot be merely attributed to limitations in utterance length, as mean length of utterance (MLU) was comparable between affected children and controls in these studies.

In Sanz Torrent (2002), omissions of theme arguments were significantly more numerous in the language of the children with SLI than in their peers. Moreover, clitic omission in children with SLI who speak Romance languages may be related to verb argument structure deficits. French and Italian language samples from children with SLI typically demonstrate clitic omissions (Leonard & Bortolini, 1998; Paradis, Crago, & Genesee, 2005/2006); Spanish samples present both omissions and substitutions (Restrepo & Gutiérrez-Clellen, 2004; Simon-Cereijido & Gutiérrez-Clellen, 2007). Object clitics typically function as direct objects of transitive verbs. Thus, clitic errors may be interpreted as deficits of verb argument structure.

A study of three children with SLI who speak Brazilian Portuguese, ages 5;3, 5;6, and 6;4, found that they omit more subjects than direct objects (Fernandes Haeusler & Corrêa, 2005). Null subject is allowed in Brazilian

Portuguese; however, native speakers produce overt subjects (both lexical phrases and pronouns) at a higher rate than other null subject languages, such as Italian (Fernandes Haeusler & Corrêa, 2005). Thus, subject omission in this study was considered an error. In addition, the children with SLI had a larger number of "unexpected responses" compared to children with typical language development ages 3 and 5. The deficits observed in the children with SLI evidenced difficulties with the computations of increasingly longer sentence formulation (e.g., sentences with more arguments) (Fernandes Haeusler & Corrêa, 2005).

Hebrew-speaking children with SLI were also found to omit arguments with ditransitive sentences in a sentence generation task (Kenan, 2008). They produced the incorrect argument at times and refused to generate a sentence with the target verb by saying "I don't know" more frequently than typical age controls. Thus, argument omissions and errors have been observed in SLI across several languages.

C. Verb argument structure alternations and linking

Thordardottir and Ellis Weismer (2002) found that children with SLI produced significantly fewer argument types, argument structure types and verb alternations than age-matched controls. Verb alternation was measured by counting the number of verbs used with two or more different argument structures. Decreased flexibility of argument structure types was also found in young language peers, although their deficits were less pronounced than the

SLI group's deficits. These results not only provide evidence for deficits in complex argument structure in affected children but also for continued acquisition of argument structure during school years (Naigles, Fowler, & Helm, 1995) in conjunction with continued lexical learning (Messer, Dockrell, & Murphy, 2004).

In addition, studies have shown problems in the linking of arguments to grammatical functions. Although studies typically report few errors of this type (e.g., "*the lady is filling the sweets in the jar*"), preschoolers and school-age children with SLI occasionally show this deficit (Ebbels, 2005; Rice & Bode, 1993). Certain types of verbs appear to be more vulnerable to linking errors. For example, in English, these errors are reportedly more frequent with change of state verbs (e.g., *cover*) than with change of location verbs (e.g., *put*). English verbs with causative alternations (e.g., *roll*) are also problematic (Loeb, Pye, Richardson, & Redmond, 1998). Children learning English need to figure out what and how lexical verbs are causative alternates. That is, children need to coordinate semantic and lexical knowledge with syntax. In a study looking at these verbs, 7 children with SLI avoided complex argument manipulations, such as passive voice, and relied on simpler constructions (Loeb, Pye, Richardson, & Redmond, 1998). For example, they avoided the use of passive voice in phrases such as "*The floor was swept*" by saying "*The floor was clean*". The affected children may not have had complete and available argument structure representations of the targeted verbs.

In another study, school-aged children with SLI were also found to link arguments to incorrect positions with change of state verbs such as "*fill*" and "*cover*" on 22% of the opportunities for these verbs (Ebbels, 2005). In contrast, age and language controls showed these errors on 5% of the opportunities. These errors were observed in sentences such as "*the lady is covering the scarf on her head*".

Hebrew-speaking children with SLI also demonstrated deficits in the linking of arguments to syntactic positions in comprehension tasks. They had increased difficulties interpreting and paraphrasing object relative sentences, that is, sentences that do not have a canonical order and involve phrasal movement (Friedmann & Novogrodsky, 2007). This was interpreted as an inability to integrate lexical knowledge to noncanonical syntactic phrases.

The deficits observed in sentences with more arguments suggest that verb argument complexity places an increased burden on the language production process, resulting in omissions, errors, and simplifications.

D. Verb argument structure and increased processing load

Argument structure complexity has been postulated to be a stress factor during production of verbal phrases for children with SLI. The studies to be reported below manipulate or observe argument structure complexity as a variable that increases processing load resulting in observable grammatical errors. In Grela and Leonard (2000), the measure hypothetically affected by argument structure is production of auxiliary "*be*". The authors predicted that

auxiliary omissions might be more likely to occur when verbs are more complex and have more obligatory arguments. The authors constructed an elicitation task for intransitive, transitive and ditransitive verb forms. Because sentence length increases with complexity of argument structure, the authors controlled for sentence length effects by adding adjuncts in some of the items and maintaining a similar number of words in the targeted responses. Children with SLI omitted auxiliaries more frequently than MLU-matched controls and increased errors were observed with ditransitive verbs rather than with intransitive or transitive verbs. Sentence length (in terms of presence or absence of adjuncts) did not appear to affect auxiliary production. The difference in the mean number of auxiliary omissions for ditransitive verbs between SLI children and MLU controls was large (54% vs 16.5%, respectively), but it did not prove to be significant. The authors concluded that complex verbs increase processing load, although it is unclear whether verb complexity affects children with SLI in a non-developmental manner (Grela & Leonard, 2000).

In French SLI, the increased processing load imposed by verb argument complexity was thought to affect the production of articles and auxiliaries in obligatory contexts. Ten children with SLI, 10 age controls and 10 younger language-matched children participated in the study (Pizzioli & Schelstraete, 2008). Intransitive and transitive sentences were used to study verb argument structure complexity. Children were asked to describe a picture using the target lexical items. The words were orally presented by the evaluator and children

had to repeat the words before the presentation of the picture. Although children's verb comprehension and production at the word level was comparable across groups, children with SLI omitted articles and auxiliaries significantly more frequently than both control groups. In addition, the omissions were significantly more pronounced for transitive than intransitive sentences.

These two studies support the hypothesis that verb argument structure complexity increases language processing load resulting in decreased grammaticality.

E. Interventions targeting verb argument structure in specific language impairment

In response to the observed deficits in verb argument structure, a few treatment studies of English-speaking children with SLI have been conducted. Two case studies of argument structure treatments were reported but did not include experimental controls (Spooner, 2002). The treatments utilized materials targeting verbs of increasing complexity, from one argument to four arguments. Pre- and post-treatment measurements indicated improvements in arguments inclusion and length of utterance. In addition, finite verb morphology though not explicitly targeted, demonstrated improvement.

Positive outcomes for a verb argument structure preliminary intervention with middle school children have been reported (Ebbels, Dockrell, Van Der Lely, & Frazier Norbury, 2004). Children received explicit instruction about grammatical use of change of location and change of state verbs accompanied

by visual cues and semantic information. The children who received the argument structure intervention demonstrated gains after treatment and maintained progress 3-4 months after completion of therapy. Interestingly, the children with the initial higher receptive vocabulary demonstrated more progress.

A randomized control treatment study targeting verb argument structure in children with SLI demonstrated the effectiveness of both a semantic treatment and a syntactic-semantic treatment (Ebbels, Van Der Lely, & Dockrell, 2007). Children were randomly assigned to any of the treatment groups or a control group. The treatment lasted 9 weekly individual sessions. Children in the 2 treatment groups demonstrated improvement in sentence formulation and production of arguments post-therapy and at follow-up, while no changes were observed in the control group. Interventions produced slightly different outcomes. The semantic intervention had better results for the linking of arguments to syntactic positions, while the syntactic-semantic treatment was more effective in the production of optional arguments. These results indicate that enriching verb semantic representations has a positive effect on sentence formulation.

In summary, limited verb use, diversity, and full control of verb phrases appear to be a common denominator in several languages. A possible explanation for these different manifestations involves weakened verb representations and limitations in processing capacity resulting in errors during sentence formulation.

5. General research questions and hypotheses

As mentioned earlier, this dissertation evaluates the production of verbs and arguments, an aspect of language that is problematic for children with specific language impairment (SLI) across several languages. Two studies were designed to determine whether the production of verbs and arguments in elicited tasks is disproportionately limited in children with SLI in comparison to age and language controls with typical language development that speak Spanish and are English language learners. In addition, the studies will evaluate whether verb argument structure complexity plays a role in the two languages (Spanish and English) of affected children.

The first study will evaluate: 1) whether Spanish-speaking children with SLI have more omissions of verbs and arguments than age- and language-matched controls across tasks and 2) whether children with SLI are less accurate with ditransitive sentences than with transitive and intransitive constructions. If children with SLI omit more verbs and arguments than language-matched controls, this may indicate that these deficits are not fully explained by their language level and this shortfall may have potential as a clinical measure of Spanish SLI. In addition, if children with SLI have disproportionately more errors with ditransitive sentences than with the other types compared to the control groups, this may suggest that processing capacity limitations hinder their performance in response to increased processing load. Alternatively, if their omission rates are not more pronounced

with sentences with more arguments, this may point to limitations in the overall verb system. A third question investigates whether lexical measures related to verb diversity can explain the verb argument structure deficits in children with SLI.

The second study will examine whether ELLs with SLI have verb argument structure deficits in both Spanish and English. Typical ELLs are expected to produce more verbs and arguments than children with SLI in both their first and second languages. This hypothesis is based on two sources of evidence. First, deficits in verb argument structure, in contrast to specific morphological deficits, were observed in both Spanish and English as reviewed in section 4. Second, research on sentence comprehension and production in bilingual adults indicate that there is continuity in bilingual language, in particular when sentence frames are shared by two languages although the lexical items differ. It is predicted that after controlling for English proficiency level and English exposure, Latino children with SLI will show more omissions of verbs and arguments than age controls in English as well as in Spanish. The effect of verb argument complexity will also be evaluated in this study. In Spanish, results are expected to replicate the findings in study 1. Predictions for English are not clear cut. Verb argument complexity is expected to play a role in both ability groups. However, because these children have limited English proficiency, their English verb system may not be sufficiently established to be affected by a stress factor such as verb argument structure complexity. English

data on the effect of verb argument structure complexity across tasks will also shed light on the process of learning English as a second language.

Clinically, this research project aims to explore whether measures of verb argument structure in the first and second languages have potential as identifiers of SLI in Latino Spanish-English speaking children.

6. Study 1: Verb argument structure in the language of Spanish-speaking children with and without specific language impairment

Previous research has indicated that Spanish-speaking children with specific language impairment (SLI) have difficulties using predicates with increased number of arguments in spontaneous language. This first study will evaluate the production of verbs and arguments in structured tasks by Spanish-speaking children with SLI, age-matched controls, and language-matched peers. The following sections will discuss the general research questions and predictions of this study, methods, results, and a discussion of the findings.

A. General research questions and predictions

The specific goals of this study are: 1) to examine whether children with SLI have a lower production of verbs and arguments than age- and language-matched controls across elicited tasks, and 2) to examine whether children with SLI have more omissions of verbs and arguments in ditransitive contexts than in transitive and intransitive contexts.

Children with SLI are predicted to produce fewer target verbs and arguments than typical peers. If their scores are significantly lower than their language-matched peers, it may indicate that this task (formulating sentences with required constituents) is disproportionately hard for them, regardless of their language level. This deficit may result from limited verb semantic knowledge (although vocabulary is the matching variable between affected

children and younger language-matched children) and/or from deficient linking of lexical items to grammatical functions in a sentence.

In addition, it is expected that sentences with a more complex argument structure, such as ditransitive sentences, will be more difficult for all children. However, if those ditransitive contexts are disproportionately more problematic for children with SLI than for peers, it may indicate that the affected children's language processing capacity is particularly vulnerable to the increased cognitive load of processing sentences with complex verb argument structures.

B. Participants

A total sample of 60 preschoolers was recruited from Head Start centers and preschools in San Diego, California. In this county, 35% of the children speak some other language than English at home and 69% of these children speak Spanish as their first language (Berestein & Cervantes, 2008). There were three groups of children: 20 children with SLI (6 girls and 14 boys), 20 age-matched peers with typical language development (TLD-4) (9 girls and 11 boys), and 20 younger children with TLD matched by vocabulary level (TLD-3) (12 girls and 8 boys). Age matching was done on an individual manner, +/- 3 months. The children with SLI had a mean age of 4;3 years (*SD* = 2.6 months) and the age control group's mean age was 4;5 years (*SD* = 3.73 months). The mean age of the language-matched group age was 3;6 years (*SD* = 3 months). Parental consent for each of the participants was obtained following the

regulations outlined by the Institutional Review Board at the University of California, San Diego and San Diego State University.

Income level and maternal education were controlled. There is evidence that these variables are risk factors for language development (Dollaghan et al., 1999; Jewkes, 2005; Payne, Whitehurst, & Angell, 1994). School lunch program status was used as a metric for income level. Each school independently determined lunch program qualification status, which was ascertained by family income and the number of occupants in the household. Most of the children (95%) qualified for free lunch. The education level in the home was comparable between groups ($\chi^2(4, N = 58) = 4.206$, $p = .379$). The 60 children were of Mexican-American descent. See Tables 1 for demographic information.

Table 1. Percentage of Families of the Children with Specific Language Impairment (SLI), Age-Matched Peers with Typical Language Development (TLD-4), and Language-Matched Peers with Typical Language Development (TLD-3) in Each Category of Educational Level and Eligibility to Lunch Program

Characteristic	SLI N = 20	TLD-4 n = 20	TLD-3 n =20
Educational level in the home			
Primary or some secondary education	5% (1/20)	10% (2/20)	15% (3/20)
High school graduate	70% (14/20)	75% (15/20)	75% (15/20)
Some college experience or college graduate	25% (5/20)	10% (2/20)	5% (1/20)
No report	0	5% (1/20)	5% (1/20)

Table 1. (cont.)

Characteristic	SLI N = 20	TLD-4 n = 20	TLD-3 n =20
School Lunch Eligibility			
Regular	15% (3/20)	0	0
Reduced or Free	70% (14/20)	90% (18/20)	100% (20/20)
No report	15% (3/20)	10% (2/20)	0

Procedures for establishing Spanish and English exposure, proficiency, and use.

All children met the following criteria: (a) speak Spanish as their first language measured by parent interview and teacher report, and (b) speak no English or minimal English, verified by parent interview, teacher report, and child conversational sample. English and Spanish exposure, proficiency, and use were determined using parent and teacher reports based on previous research with these measures (Gutiérrez-Clellen & Kreiter, 2003). Parents were asked to rate the spoken English and Spanish receptive and expressive language skills of the children using a 5-point rating scale for each measure (1 representing no comprehension and no use and 5 representing native-like comprehension and use all the time). They also reported the amount of time the child interacted with his/her mother, father and other family members in Spanish and English using a 4-point rating scale for each language (1 representing never and 4 representing all the time). Table 2 describes the

Spanish and English receptive and expressive language proficiency rates and exposure of the children based on the parent questionnaire data.

Table 2. Means and Standard Deviations of Parents' Ratings of the Participants' Spanish and English Receptive and Expressive Language Skills and Ratings of Language Exposure at Home by Group

Parents' ratings	SLI n = 20		TLD-4 n = 20		TLD-3 n =20		*p*
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Spanish							
Receptive language	4.45	1.15	4.75	0.56	4.63	0.50	.494
Expressive language	4.25	1.02	4.53	0.63	4.74	0.56	.152
Exposure at home	3.42	0.60	3.43	0.38	3.54	0.39	.691
English							
Receptive language	2.95	1.10	3.29	0.77	2.84	1.12	.392
Expressive language	2.25	0.64	2.71	0.59	2.53	1.02	.206
Exposure at home	1.97	0.49	2.01	0.37	2.04	0.55	.903

Note: Four parent questionnaires had incomplete data.

The children's teachers were also given a questionnaire to rate the participants' Spanish and English proficiency using a 5-point scale (1 representing that the child cannot speak and/or understand the language and 5 representing that child speaks like a native speaker and understands all what is said). Appendices A and B include a copy of the parent questionnaire and the teacher rating scales. Table 3 lists the average proficiency level of the groups based on the teacher questionnaire data.

Table 3. Means and Standard Deviations of Teachers' Ratings of the Participants' Spanish and English Proficiency Levels by Group

Teachers' ratings	SLI n = 20		TLD-4 n = 20		TLD-3 n =20		*p*
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	
Spanish Proficiency	3.79	0.89	4.68	0.48	4.65	0.61	.001
English Proficiency	2.26	0.87	2.84	1.04	2.55	1.25	.284

Note: Three teacher questionnaires had incomplete data.

The expressive and receptive language skills ratings were conceptualized as continuously distributed variables, and thus parametric univariate analyses of variance (ANOVAs) were used to compare groups. One-way ANOVAs indicated no significant group differences for parents' ratings of Spanish receptive language skills ($F(2,53) = .714$, $p = .494$), Spanish expressive language skills ($F(2,53) = 1.95$, $p = .152$), English receptive language skills ($F(2,53) = .952$, $p = .392$), and English expressive language skills ($F(2,53) = 1.627$, $p = .206$). Parents' ratings of Spanish and English exposure revealed no significant differences between groups (Spanish, $F(2,55) = .373$, $p = .691$; English, $F(2,55) = .102$, $p = .903$).

Since the ratings of receptive and expressive language skills could also be conceived as discrete categories, group comparisons were additionally made using nonparametric statistics. Kruskal-Wallis *H* tests between the TLD and SLI groups on the parent ratings of English and Spanish receptive and expressive language skills showed no statistically significant differences between the groups on any of the scores. Results for group differences in

parent ratings were as follows: Spanish receptive language: $H(2)= 1.20$, $p = .549$; English receptive language: $H(2) =2.35$, $p = .309$; Spanish expressive language: $H(2) = 3.64$, $p = .162$; and English expressive language, $H(2) = 4.6$, $p = .125$. Spanish and English exposure at home was not significantly different across groups: Spanish: $H(2) = .598$, $p = .742$; English: $H(2) = .115$, $p = .944$.

The teacher questionnaire data indicated no significant differences in English proficiency level across groups ($F(2,53) = 1.290$, $p = .284$). In contrast, according to the teachers, Spanish proficiency levels were significantly different across groups ($F(2,55) = 10.692$, $p < .001$). A planned comparison revealed that children with SLI had, as expected, a significantly lower proficiency level than both groups with TLD ($t(24.83) = -3.963$, $p = .001$). Of note, teachers were considered to be good informants due to their teaching experience and their proficient use of Spanish and English.

Procedure to determine language ability status.

The children with SLI were identified based on the following criteria:

(1) evidence of parent concern and/or teacher concern (Restrepo, 1998);

(2) clinical judgment based on observations of trained bilingual speech-language pathologists (e.g., reported evidence of limited responsiveness in conversational samples, modifiability, etc); and

(3) below cutoff scores on 2 out of 3 of the following measures:

a. the Spanish Morphosyntax Test (S-MST) of the Bilingual English Spanish Assessment (BESA) (Peña, Gutiérrez-Clellen, Iglesias,

Goldstein, & Bedore, n.d.) as determined by previous research with these measures (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006),

b. the Spanish Semantics Test (S-ST) of the BESA (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, n.d.), and/or

c. the Spanish nonword repetition task (SNWRT) (Gutiérrez-Clellen & Simon-Cereijido, submitted).

The age controls met criteria based on the same measures as the children with SLI. Due to the lack of valid and reliable measures for Latino Spanish-speaking children under age 4 (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006; Laing & Kamhi, 2003), the language-matched group was identified as with TLD based on parent and teacher report (Restrepo, 1998) and clinical judgment based on observations of trained bilingual speech-language pathologists (e.g., reported evidence of limited responsiveness in conversational samples, modifiability, etc). Please see Tables 4 for a list of the identification measures, skill they assess, and validity and reliability information.

Table 4. List of Measures for Identification and Selection of Participants – Skills, Validity, and Reliability

Skill and Measure	Validity	Reliability
Language Ability and Proficiency		
Parent questionnaire	N = 62, 90% accuracy in identifying children with TLD and SLI (Restrepo, 1998)	Over 90% agreement in scoring
Teacher questionnaire	Valid to identify target language (Gutiérrez-Clellen & Kreiter, 2003)	Over 90% agreement in scoring
Spanish Morphosyntax Test (S-MST)	N = 163 Latino children (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006)	90% agreement in scoring
Spanish Semantics Test (S-ST)	N = 185 Latino children (Bedore, Peña, Garcia, & Cortez, 2005; Kester, 2002; Peña, 2007)	95% interrater
Spanish Nonword Repetition Task (SNWRT)	N = 144 Latino children (Gutiérrez-Clellen & Simon-Cereijido, submitted)	Over 90% agreement in scoring
Cognitive Ability		
Differential Abilities Scale (DAS)	High *r* with nonverbal reasoning and conceptual ability composites from other batteries	Internal = .88, test-retest = .79
Kaufman Assessment Battery for Children, Second Edition (KABC-II)	N = 3,025 children; internal consistency from .62 to .93, little cultural content (Kaufman, Lichtenberger, Fletcher-Janzen, & Kaufman, 2005)	Test-retest = .86 to .91
Lexical Ability		
Expressive One Word Picture Vocabulary Test (EOWPVT – Spanish and English)	N = 2,327 children Concurrent *r* = .67 to .90, corrected *r* with other vocabulary tests with median .79, construct *r* = .84 between age and raw score for expressive language (Brownell, 2000)	Internal =.93 to .98, split half = median of .98, retest =.87 to .97 for different age groups, high interrater

Table 5 lists the means and standard deviations of the identification measures of the children with SLI and the age-matched controls. Independent *t*-tests revealed significant differences between the affected children and their age peers in S-MST, $t(38) = 11.548$, $p < .001$, $d = 3.65$; in S-ST, $t(38) = 6.701$, $p < .001$, $d = 2.12$; and in SNWRT, $t(37) = 6.171$, $p < .001$, $d = 1.98$.

Table 5. Means and Standard Deviations of the Identification Measures of the SLI and TLD-4 Groups.

	SLI		TLD-4		*p*	*d*
	Mean	*SD*	*Mean*	*SD*		
S-MST	20.35	12.59	69.68	14.37	.001	3.65
S-ST	5.65	2.50	10.60	2.16	.001	2.12
SNWRT	50.54	10.94	72.95	11.70	.001	1.98

Note: One child in the SLI group did not complete the Spanish NWRT.

None of the children had impairments, mental retardation, emotional disturbances, motor difficulties, or neurological deficits, according to parent report and school records. All children passed a bilateral screening that consisted in a pure-tone screening at 25 dB (HL) at 1000, 2000, 3000, and 4000 Hz administered by the schools. They also demonstrated nonverbal cognitive development within the normal range based on scores obtained with the Differential Assessment Scales (DAS) (Elliot, 1983) or the Kaufman Assessment Battery for Children, Second Edition (KABC-II) (Kaufman & Kaufman, 2004) and no evidence of other special needs based on parent report, teacher report, and school records. A total of 26 children received the

DAS and 34 received the KABC II. Both tests are judged to be culturally appropriate for non-mainstream populations (Elliot, 1983; Kaufman, Lichtenberger, Fletcher-Janzen, & Kaufman, 2005). Nonverbal scores were comparable across groups, $F(2,57) = 2.301$, $p = .109$, $r = .27$. The older children with TLD (TLD-4) had a mean standard score of 103.85 ($SD = 16.20$). The SLI and TLD-3 groups' nonverbal cognitive standard scores were 95.3 (16.42) and 95.0 (10.90) respectively.

Twenty-five % of the children with SLI had a written Individualized Educational Plan (IEP) in place at the beginning of the study. The rest of the children had no IEP.

Procedure to establish language matching.

Because verb argument structure is thought to be part of the lexical verb entry, a lexical measure was considered to be the most appropriate language matching measure. However, it is known that commonly used vocabulary measures in English and Spanish, such as the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1981) or its Spanish version - Test de Vocabulario de Imágenes Peabody (TVIP) (Dunn, Padilla, Lugo, & Dunn, 1986) - have insufficient psychometric validity for the Latino population in the United States (Pearson, Fernández, & Kimbrough Oller, 1993; Peña, Iglesias, & Lidz, 2001). The Expressive One Word Picture Vocabulary Test (EOWPVT) (Brownell, 2000) was thought to be an appropriate alternative. It has adequate psychometric characteristics and it can be administered bilingually. Raw scores

were used because all participants responded to the same set of stimuli, regardless of their age. The group scores of the children with SLI and the language-matched children were not significantly different, $t(38) = 0.00$, $p = 1.00$, $d = 0.00$. Children with SLI had a mean raw score of 21.50 (7.54) while the language control group's mean was 21.50 (8.53). As expected, the mean raw score of the age-matched controls (*mean* = 32.05, *SD* = 5.41) was significantly higher than the other two groups, $F(2,57) = 13.991$, $p < .001$.

C. Procedures

Procedures, data collection and reliability.

Bilingual research assistants tested children in quiet rooms in the preschools. They were trained and supervised by the experimenter. Spontaneous narrative samples and responses of the experimental measures were digitally recorded using an Olympus DS-2200 digital voice recorder. A separate group of highly trained bilingual assistants transcribed the children's responses. Approximately 15% of the children's responses on the experimental tasks were checked for transcription and scoring reliability achieving 99% and 90% agreement respectively. Code-switching responses were excluded from data analysis. Approximately 1% of the responses included code-switches to English words. Data on code-switching responses were saved for further analysis in future studies.

Elicited experimental measures.

Verb argument structure complexity was manipulated experimentally in a picture description task and a sentence repetition task. Overall, target verbs were selected after consideration of several studies of Spanish-speaking preschoolers (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006; Gutiérrez-Clellen & Simon-Cereijido, 2004; Jackson-Maldonado, Thal, Marchman, Bates, & Gutiérrez-Clellen, 1993; Sanz Torrent, 2002), bilingual children in the United States (Kan & Kohnert, 2005; Kohnert, Bates, & Hernandez, 1999), and Spanish frequency tables (Justicia, 1995). Words were selected based on high imageability ratings from object and action naming norming studies (Szekely, D'amico, Devescovi, Federmeier, Herron, Iyer et al., 2005), use in previous studies with preschoolers (Kan & Kohnert, 2005; Pellowski & Conture, 2005) and inclusion in the McArthur-Bates Communicative Development Inventories (CDIs) for Spanish-speaking children (Jackson-Maldonado, Thal, Marchman, Newton, Fenson & Conboy, 2003). The majority of the words are typically acquired between ages 1 and 3. Every effort was made to ensure that the verbs and nouns were frequent and familiar to all children. Transitivity was determined by the following criteria: 1) description of verb transitivity in the Real Academia Española dictionary (Real Academia Española, 2004), and 2) agreement by two bilingual researchers. Transitive verbs that allow ditransitive predicates (i.e., dar/give, mandar/send) were identified and used for the ditransitive predicate targets.

The following sections describe the experimental tasks (see Appendices C and D for examples of the task stimuli). The picture description task included visual stimuli that were designed and selected taking into consideration the children's cultural background. A pilot study confirmed the appropriateness of both the visual and linguistic stimuli.

Picture Description Task

Twenty-one pictures and sentences were created for this task. It included 7 intransitive, 7 transitive and 7 ditransitive predicates (see Appendix C and E). Lexical verbs were selected following the criteria stated above. Subjects and indirect objects consisted of animate objects and direct objects were always inanimate objects. Children were presented with a blank page while the experimenter stated that "*X is going to 'Target verb + argument structure"* (e.g., "*El perro va a brincar*" – the dog is going to jump, "*Ana va a comer un pan*" – Ana is going to eat bread). Then, the child was shown a picture depicting the target sentence while the evaluator asked what was happening (e.g., "*¿Y aquí, qué está pasando?"* – and here, what's happening?). This phrase was chosen in order to avoid pragmatically correct omissions of the subject or the inflected auxiliary in response to a question such as "*what is she doing?*" The children's responses were scored based on the presence of the target verbs and arguments.

Sentence Repetition Task

Twenty-one sentences were constructed with the same number of syllables to control for sentence length. Every sentence is composed of 12

syllables. Syllable length was selected because it is known that syllable length affects memory for words and nonwords (Miranda & Valencia, 1997). Every sentence had the Spanish canonical order: Subject Verb (Object). All subject and indirect objects were animate noun phrases while direct objects were always inanimate objects. The task included 7 intransitive, 7 transitive, and 7 ditransitive predicates (see Appendix D and E). Lexical verbs were selected following the criteria stated above. Children were asked to repeat exactly what the evaluator said. Responses were written online and recorded. Evaluators then listened to the recorded responses and transcribed what the child said. The children's responses were scored based on the presence of the target verb and target arguments.

Scoring of measures.

Picture Description Task

Two different scores were obtained from this task. The first score is a global score that calculated the proportion of target verbs and arguments produced by the children. The second score, more specific, was a proportion of target verbs and arguments by type of argument structure. Grammatical errors (e.g., omission of articles in noun phrases, overgeneralization of verb conjugation, etc.) were not penalized, as long as the children produced a form of the target verb and the corresponding noun or pronoun. For example, the phrase *"*Juan toca guitarra*" – Juan plays guitar – obtained the three target points even when the direct object has no article and the verb is in the present

tense but not in progressive aspect (the target was "*Juan está tocando la guitarra*" – Juan is playing the guitar). An example of verb overgeneralization is the following: *"*El muchacho va a trajer el perrito que estaba afuera a la niña*" - the young man is going to bring the little dog that was outside to the girl. In this case, the target verb is "*traer*" – to bring. "*Trajer*" is an overgeneralization from the third person singular in the past tense "*trajo*" – (he) brought.

The following section describes the two scores:

a. Proportion of Total Verbs and Arguments: the proportion of target verbs and arguments across contexts. The maximum score was calculated by adding to total number of target verbs and arguments and dividing that sum by 63 (21 verbs plus 21 subjects, 14 direct objects and 7 indirect objects), regardless of morphological errors. Because Spanish is a null subject language, if the verb was marked for 3rd person singular, the subject was counted as present (e.g., the response "*duerme*" – (s/he) sleeps – was considered to have a subject and a verb). This scoring rule was judged to be suitable because children were asked to answer a question (e.g., what's happening?) in the presence of a visual stimulus depicting the doer and the action and it was pragmatically appropriate to answer without an overt subject. If the verb was in the infinitive or not marked for 3rd person singular, the subject was considered absent (e.g., the response "*comer pan*" – to eat bread – was considered to have a verb and a direct object, but no subject).

b. Scores by Verb Argument Structure Complexity (Intransitive, Transitive, and Ditransitive Scores): the proportion of target verbs and

arguments used in the responses by verb argument structure complexity regardless of morphological errors. There is a score for intransitive, transitive, and ditransitive contexts. The intransitive score was calculated by counting the number of target subjects and verbs produced by the children and dividing the sum by 14. The transitive score was calculated by counting the number of target subjects and verbs and dividing the sum by 21; and for the ditransitive score, the sum of target verbs and arguments was divided by 28.

Sentence Repetition Task

Two scores were obtained from this task following procedures similar to the ones used for the picture description task. Scores included:

a. Proportion of Total Verbs and Arguments: the proportion of target verbs and arguments across contexts. The maximum score was calculated by adding to total number of target verbs and arguments and dividing that sum by 63 (21 verbs plus 21 subjects, 14 direct objects and 7 indirect objects), regardless of morphological errors. For this task, children were required to produce the overt subject as they were explicitly asked to repeat every word the evaluator said. Children were given practice items and test items were not administered before children demonstrated understanding of the task. For example, the response "*el pájaro vuela sobre los árboles*" – the bird flies over the trees – obtained 2 points: one for subject and one for verb. If a child would have said "*vuela sobre los árboles*" – * flies over the trees, the response would have obtained only a point for verb. A repetition such as "*el pájaro se va con los árboles*" – the bird is going with the trees – obtained only a point for the subject.

b. Scores by Verb Argument Structure Complexity (Intransitive, Transitive, and Ditransitive Scores): the proportion of target verbs and arguments used in the responses by verb argument structure complexity regardless of morphological errors. There is a score for intransitive, transitive, and ditransitive contexts. The intransitive score was calculated by counting the number of target subjects and verbs produced by the children and dividing the sum by 14. The transitive score was calculated by counting the number of target subjects and verbs and dividing the sum by 21; and for the ditransitive score, the sum of target verbs and arguments was divided by 28.

D. Data analyses

Both descriptive and inferential quantitative methods were utilized to analyze the data. The descriptive analysis examined the observed means and standard deviations of all outcome measures.

For the experimental tasks, one-way mixed analyses of variance (ANOVAs) were conducted to determine whether children with SLI differ from peers with TLD in the production of target verbs and arguments. It was expected that children with SLI would have lower verb and argument scores than both control groups in the picture description task and the sentence repetition task. If so, this may indicate that these tasks are disproportionately difficult for children with SLI. If SLI scores are similar to the language-matched group, deficits related to verbs and arguments may be attributed to delayed language development. These predictions were evaluated by 2 planned

contrasts; the first one evaluated the scores of the affected group against the scores of the age control group, and the second contrast assessed the performance of the affected group against the performance of the younger language-matched controls.

In addition, two-way ANOVAs evaluated whether children with SLI have a lower production of verbs and arguments with increasing verb argument structure complexity when compared to age- and language-matched controls. Language ability group (SLI, TLD-4, and TLD-3) was the between-subjects variable and verb argument structure complexity (whether sentences are intransitive, transitive or ditransitive) was the within-subjects variable. Planned contrasts compared performance on ditransitive versus intransitive contexts and ditransitive versus transitive contexts for the different ability groups.

It was expected that the children with SLI would have more difficulties as complexity increases, that is, lower scores for ditransitive sentences than for the other sentences. If a significant language ability group by verb argument structure interaction is found, this may indicate that the more pronounced deficits in children with SLI may be explained by the increased cognitive load exerted on their weak processing capacity. Alternatively, in the absence of a significant interaction, the examination of the main effects would help determine whether children with SLI present more verb and argument omissions than the control groups, suggesting limitations in the verb system. In addition, examination of main effects would indicate whether performance decreases with increased argument structure for all groups, confirming that verb argument

complexity increases processing load in children, as has been observed in adults.

E. Results

Picture description results are presented first, followed by sentence repetition task results. Language ability group effects are reported for the proportion of verbs and arguments. Then, the effects of both language ability and verb argument structure complexity are reported. For every analysis, the scores, which are proportions of use of target verbs and arguments, were arc-sine transformed. Raw scores are reported in the tables of means and standard deviations.

Picture description task

One-way mixed ANOVA on the proportion of total verbs and arguments of the picture description task revealed that children with SLI had significantly lower scores than both control groups (see Table 6 for means and standard deviations). Levene's test indicated that homogeneity of variance could not be assumed, $F(2,57) = 3.502$, $p = .037$. The age control group had less variability in their scores (the standard deviation of the TLD-4 group was .08) than the other two groups (both the TLD-3 and SLI groups' standard deviations were equal to .24).

There was a significant difference between groups, Welch $F(2, 36.287) = 27.269$, $p < .001$, $r = .65$ (large effect size). Planned contrasts showed that the SLI group had a significantly lower score than the age control group, $t(34.70) = -$

7.347, $p < .001$, $r = .78$ (large effect size). In addition, the affected group was significantly different than the younger language control group, $t(57) = -2.995$, $p = .004$, $r = .37$ (moderate effect size).

Table 6. Means and Standard Deviations of the Picture Description Total Verb Argument Scores (TVAS) by Group

	SLI		TLD-4		TLD-3	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
TVAS	.52	.24	.89	.08	.70	.24

Next, the role of verb argument structure complexity was examined. Table 7 illustrates the means and standard deviations of the proportion of target verbs and arguments produced for each verb argument structure condition by each language ability group. It was expected that the children with SLI would have disproportionately more difficulties with the ditransitive sentences than the other groups. Overall, the age control group had a high production of target verbs and arguments in every condition (see Table 7). Both language control groups and SLI groups had a lower proportion of target verbs and arguments.

Table 7. Means and Standard Deviations of the Proportion of Target Verbs and Arguments Produced in the Picture Description Task by Group and by Verb Argument Structure Context

Context	SLI		TLD-4		TLD-3	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Intransitive	.56	.31	.96	.05	.78	.22
Transitive	.61	.28	.86	.12	.70	.25
Ditransitive	.43	.23	.87	.12	.67	.29

A mixed 3 (language ability) x 3 (verb argument structure complexity) ANOVA indicated that there was a significant interaction between language ability and verb argument structure, $F(4, 114) = 3.210$, $p = .015$. This interaction can be clarified using the contrasts specified before the analysis.

The first contrast did not reveal a significant interaction when looking at the scores in intransitive contexts compared to the scores in ditransitive contexts for the three language ability groups, $F(2,57) = .054$, $p = .947$. Inspection of the means indicates that for every language ability group, complete ditransitive sentences were more difficult to generate than intransitive sentences.

The second contrast evaluated the scores in transitive contexts compared to the scores in ditransitive contexts for the three language ability groups. This contrast's interaction is significant, $F(2,57) = 5.425$, $p = .007$. Although the proportion of target verbs and arguments in ditransitive contexts is lower than in transitive contexts for all groups, children with SLI appear to have disproportionally more difficulties with ditransitive sentences than their peers. So, as verb argument structure increases (from 2 arguments to 3 arguments), the decrease in the scores is more pronounced for children with SLI than for typical controls.

There was a significant main effect of verb argument structure, $F(2,114) = 13.719$, $p < .001$, which indicates that as verb argument structure complexity

increases, children's production of target verbs and arguments decreases. This type of result provides evidence for the assumption that language processing load increases with verb argument complexity.

As expected, there was a significant difference between the language ability groups, $F(1,57) = 19.955$, $p < .001$. Post-hoc pairwise comparisons indicated that children with SLI had a significantly lower score than the language-matched group (SLI < TLD-4) and the age-matched group (SLI < TLD-3). In addition, the language-matched group's score was significantly lower than the age controls' group (TLD-3 < TLD-4).

In summary, results of the picture description task indicated that children with SLI omit more target verbs and arguments than both age- and language-matched controls when producing sentences with increasing verb argument structure complexity. The picture description task appears to be disproportionately harder for children with SLI than for language-matched peers, even when they have comparable vocabularies. In addition, verb argument structure complexity plays a role in the children's generation of sentences. As the number of arguments increases, children's productions are less complete. This difficulty is more pronounced for children with SLI, in particular, for ditransitive contexts.

Sentence repetition task

One-way mixed ANOVA on results of the sentence repetition task revealed that children with SLI had significantly lower total verb argument

scores than both control groups (See Table 8 for means and standard deviations). Homogeneity of variance could not be assumed, (Levene's test: $F(2,57) = 6.630$, $p = .003$). As observed in the picture description task, the age control group had a smaller variability (TLD-4 *SD* = .06) than the other two groups (TLD-3 *SD* = .27, SLI *SD* = .28).

There was a significant difference between groups, Welch $F(2,25.08) = 33.929$, $p < .001$, $r = .83$ (large effect size). Planned contrasts revealed that the SLI group had a significantly lower score than the age-matched control group, $t(57) = -5.888$, $p < .001$, $r = .61$ (large effect size). The affected group was also significantly different than the language control group, $t(57) = -2.934$, $p = .005$, $r = .36$ (moderate effect size).

Table 8. Means and Standard Deviations of the Sentence Repetition Total Verb Argument Scores (TVAS) by Group

	SLI		TLD-4		TLD-3	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
TVAS	.52	.28	.91	.06	.71	.27

The next analysis examined the role of verb argument structure complexity. Table 9 illustrates the means and standard deviations of the proportion of target verbs and arguments produced for each verb argument structure condition by each language ability group. Overall, the age control group had a high production of target verbs and arguments in every condition (see Table 9). Both language control groups and SLI groups had a lower number of correct verbs. Inspection of the data indicated that the age control

group's performance was close to ceiling in every condition, and thus the homogeneity of variance between groups could not be assumed. A comparison between the language group and the impaired groups was done separately.

Table 9. Means and Standard Deviations of the Proportion of Target Verbs and Arguments Produced in the Sentence Repetition Task by Group and by Verb Argument Structure Context

Context	SLI		TLD-4		TLD-3	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Intransitive	.45	.36	.90	.09	.67	.33
Transitive	.51	.32	.92	.08	.71	.27
Ditransitive	.55	.23	.91	.08	.74	.27

A mixed 2 (language ability) x 3 (verb argument structure complexity) ANOVA revealed that there was no significant interaction between language ability and verb argument structure, $F(2,76) = 1.751$, $p = .435$, and no significant main effect of verb argument structure complexity, $F(2,76) = 1.488$, $p = .232$. That is, in the sentence repetition task, children appear to repeat a comparable proportion of required verbs and arguments in every context, regardless of the increases in verb argument structure complexity from one argument to three arguments.

There was a significant difference between the two groups, $F(1,38) = 5.889$, $p = .020$, $r = .37$ (moderate effect size). Children with SLI produced approximately half of the required targets in every context, a significantly lower proportion that their language-matched peers.

In summary, children with SLI, once again, demonstrated a significantly lower production of target verbs and arguments than their age and language peers. Omissions of target verbs and arguments in a sentence repetition task appear to have potential as clinical indicators of SLI. However, in contrast to the results in the picture description task, verb argument structure complexity was not a significant factor.

F. Discussion

The first prediction of this study was that Spanish-speaking children with SLI would have a lower production of verbs and arguments than age- and language-matched controls in elicited tasks. Results for the picture description task and the sentence repetition task confirmed this prediction. Inspection of the means of the proportion of target verbs and arguments across groups indicates that the groups performed similarly in the two tasks (see Tables 6 and 8). Children with SLI produced approximately half of the target verbs and arguments, language-matched children approximately a third of the targets and the age control group performed near ceiling. Performance on the two tasks was highly correlated, $r = .796$, $p < .001$. In sum, children with SLI demonstrated pronounced difficulties with the production of verbs and arguments when generating and repeating sentences. Their performance was inferior to the performance of younger children with typical language development who had similar lexical abilities.

This finding adds to the literature on Spanish SLI. Affected children not only omit arguments in their spontaneous language but also in elicited tasks. In addition, these results are aligned with studies of SLI in other languages. English-speaking, Portuguese-speaking and Hebrew-speaking children with SLI have been found to omit arguments in both spontaneous language and elicited tasks. The proportion of verbs and arguments omissions in this study's SLI group is somewhat large (48% in both tasks) in comparison to other reports with other languages (10-25%). This group of Spanish-speaking children is younger than the participants in the previous studies. It is possible that the verb and argument omission frequency decreases with age following a pattern observed in studies looking at other markers of SLI such as morphological errors (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006). For example, school-age children with SLI do not exhibit a high frequency of article and clitic pronoun errors and thus, those measures have limited sensitivity for older children. Difficulties with verb argument structure in SLI may have a developmental trajectory, from a high frequency of verb and argument omissions at an early age to, for example, difficulties in thematic role assignment resulting in errors in comprehension of object relatives or passive sentences during the school years. Future studies should carefully investigate these areas of deficits at different ages. In addition, the differences in the rates of omission found in the present study may be related to differences in methodology across studies. In Pizzioli and Schelstraete (2008)'s study, intransitive and transitive contexts were evaluated; in the present study, ditransitive contexts were included. As a

result, disparities in the studies' methodologies do not allow for a direct comparison of the omission rates. In addition, a closer look at the performance of the individual children in the affected group may reveal different patterns of deficits, as was observed in the study of Portuguese-speaking children with SLI.

The second prediction was that Spanish-speaking children with SLI would have disproportionately more difficulties with ditransitive sentences than with the other types of sentences. This prediction was confirmed for the picture description task. Children with SLI had significantly more omissions in ditransitive contexts than in the others, compared to the control groups. However, the interaction between verb argument structure complexity and language ability disappeared in the sentence repetition task. In fact, the effect of verb argument structure complexity differed across tasks. This variable was significant for the picture description task, indicating that the three groups had more omissions in ditransitive sentences. Intransitive sentences had the highest scores. That is, children were more successful in formulating complete sentences when the target verb argument structure was simple. Performance limitations increased with the number of arguments. This was more pronounced for children with SLI.

In contrast, verb argument structure complexity was not a significant factor in the sentence repetition task. The age control group performed at ceiling in the three transitivity conditions. The other two groups of children had lower scores than the age group but the scores did not vary across contexts.

Task differences may partly explain this discrepancy. The two tasks were developed to elicit sentences with increasing number of arguments and had similar characteristics. Importantly, both tasks' target verbs and arguments were high frequency lexical items, typically acquired by age 3, and familiar to young children. A large proportion of the lexical items were used in the two tasks (see Appendix E). In addition, all the sentences had the canonical SV(DO/IO) order in the active voice.

However, there were methodological differences across tasks. To begin, the presentation of the task items differed. For the picture description task, items were blocked by verb argument structure complexity. Children responded to the intransitive items first, followed by the transitive items, and lastly the ditransitive sentences. The low performance with ditransitive contexts may be the result of fatigue or loss of interest by the end of the task. Items were not blocked for the sentence repetition task.

In addition, the tasks required children to behave differently. For the picture description task, children were asked to formulate sentences assisted by visual cues. The lexical items that constituted the target sentence were orally presented to them by the examiner who alerted them about what was going to happen in the picture (e.g., "*Mira, el perro va a brincar*" – Look, the dog is going to jump). This prompt intended to ease lexical access and to orient the young children to the expected behavior. Thus, children were assisted by oral language cues, visual cues, and a gradual increase in verb argument structure complexity. In terms of memory demands, children had to maintain the lexical

targets in their short term memory. However, they were not penalized if they, for example, produced null subjects (e.g., "*está brincando*" – (it) is jumping) rather than overt subjects (e.g., "*el perro está brincando*" – the dog is jumping).

In contrast, for the sentence repetition task, children did not have visual assistance and the sentences were not blocked by verb argument structure complexity. In this task, children were expected to maintain the representation of the whole sentence in their short term memory and to repeat the full sentence immediately after. To maintain the same sentence length across targets, all sentences had the same number of syllables, regardless of the verb argument structure complexity. Of note, all ditransitive sentences ended with the indirect object phrase (e.g., "*él le escribe una carta a su maestra*" – he writes a letter to his teacher), while the intransitive and transitive sentences ended with adjuncts or direct object modifiers (e.g., "*la señora camina por el mercado*" – the lady walks in the market; "*la niña toma la leche con popote*" – the girl drinks milk with a straw).

Inspection of the children's repetitions demonstrates that they frequently produced the first words of the sentence and/or the last words, whose syntactic function varied in relation to the type of sentence. In sentences with ditransitive predicates, the last words are indirect objects; in intransitive predicates, they are phrases that do not affect the final scoring. For example, a few children said "*carta a una maestra*" – letter to a teacher – obtaining 2 points (1 for the direct object and 1 for the indirect object) out of the 4 possible points for the ditransitive sentence: "*he writes a letter to his teacher*". For the intransitive

sentence "*the lady walks in the market*", some children said "*mercado*" – market –obtaining 0 points. That is, children with SLI usually omitted middle words, which on many occasions were the verbs and direct objects of the sentences. For example, one child with SLI responded "*la niña toma con popote*" – the girl drinks with a straw – omitting the direct object "*leche*" - milk, and another one said "*popote leche*" – straw milk – omitting the subject and the verb.

As a consequence of the tasks' differences, the scores of ditransitive sentences were higher for sentence repetition than for the picture description task. This can be observed in Table 10 that lists the number of subjects, verbs, direct objects and indirect objects produced in each task by the groups.

Table 10. Mean Number of Subjects, Verbs, Direct Objects, and Indirect Objects Produced by Children across Tasks

	Picture description task				Sentence repetition task			
	S	V	DO	IO	S	V	DO	IO
SLI								
Intransitive	3.65	4.25			3.45	2.90		
Transitive	4.40	3.95	4.50		3.25	2.95	4.55	
Ditransitive	2.70	2.75	3.75	2.85	2.75	2.35	4.90	5.55
TLD-4								
Intransitive	6.75	6.70			6.50	6.10		
Transitive	6.25	6.15	5.70		6.70	6.35	6.35	
Ditransitive	6.15	6.35	6.20	5.80	6.05	5.95	6.80	6.65
TLD-3								
Intransitive	5.40	5.50			5.05	4.40		
Transitive	5.40	4.80	4.55		5.20	4.60	5.10	
Ditransitive	5.15	4.65	5.10	3.75	4.90	4.60	5.55	5.70

Every group produced the indirect object in the sentence repetition task more frequently than in the picture description task. Of note, intransitive sentences were more complete in the picture description task than in the sentence repetition task. This is explained by the fact that the sentence length of the intransitive sentences in the picture description task was shorter than in the sentence repetition task. For example, for the picture description task, in order to obtain 2 points for the intransitive sentence using the verb "*dormir*" – sleep, a child had to say "*está durmiendo*" – (he) is sleeping – or "*duerme*" – (he) sleeps. For the sentence repetition task, the child had to repeat the subject and verb of the sentence "*el niño duerme mucho todas las noches*" – the child sleeps a lot every night. A considerable number of children, faced with the sentence repetition challenge, only repeated the last part of the sentence, omitting the subject and the verb.

It is not possible to separate the effect of verb argument structure complexity from sentence length using these two tasks. Future studies should investigate whether these factors independently affect the language of Spanish-speaking children with SLI. Previous studies did not find an independent effect of sentence length on grammaticality (Grela & Leonard, 2000; Pizzioli & Schelstraete, 2008). However, there are no studies looking at the effect of sentence length on the omission of verbs and arguments. In addition, the previous studies used sentence generation tasks which are similar to the picture description task. Sentence repetition tasks were not investigated.

The picture description task was relatively open-ended and, although the targeted lexical items were modeled by the evaluator, children formulated a new phrase for each item, opening a window into their ability to link lexical items to grammatical functions. In this task, verb argument structure complexity affected children's sentence formulation. In contrast, the sentence repetition task was less open, and perhaps it did not engage the children's ability to formulate sentences. It is not possible to measure this difference based on these data.

These findings need to be replicated with a larger sample size in the future. Although the sample size of this study provided sufficient power to find statistically significant differences across language ability groups, the study had insufficient power to find statistical differences in the interactions between language ability and verb argument structure complexity. Moreover, the lexical items in the tasks were early-acquired and highly frequent words; however, a potential effect of age of acquisition (e.g., words learned at age 1 versus age 3) should be further explored.

In summary, Spanish-speaking children with SLI omit more target verbs and arguments than both age and language peers in elicited tasks. Limitations in the production of verbs and arguments in a picture description task are related to the increased load exerted by verb argument structure complexity on sentence formulation. However, this effect was not observed in a sentence repetition task. Methodological differences partly explain these differing results. Omissions of target verbs and arguments may also relate to limitations in verb representations. The next chapter will further investigate differences in verb

knowledge and verb use across the same three groups: children with SLI, language peers and age controls.

7. Study 1: Lexical measures and production of verbs and arguments

A. Introduction

It was posited that difficulties with the production of verbs and arguments may be related to deficits in processing capacity and linguistic deficits, such as incomplete verb representations. In the previous chapters, it was shown that children with SLI produced fewer target verbs and arguments than their age-matched and language-matched typical peers. These deficits appeared to be related to difficulties formulating sentences, even when the lexical items were frequent, familiar, and previously provided by the evaluator in both the picture description task and the sentence repetition task. Verb argument structure played a role in a picture description task that required children to formulate sentences with increasing number of arguments. In the sentence repetition task, verb argument structure complexity had no significant effect and methodological issues may partly explain the lack of effect.

In this chapter, lexical measures related to verb diversity will help elucidate whether the low production of verbs and arguments in SLI may be related to verb semantic knowledge differences across groups.

B. Method

Participants

One child from this study (a TLD-3 child) was excluded from the analysis of verb diversity in spontaneous language, because the language sample could

not be transcribed due to technical problems with the recording. The other 59 participants had complete datasets.

Procedures

The following sections describe the two lexical measures used in this study and the procedures for data collection and scoring.

Picture naming task

Stimuli include 20 high frequency nouns and 20 high frequency verbs. Words were selected based on high imageability ratings based on object and action naming norming studies (Szekely, D'amico, Devescovi, Federmeier, Herron, Iyer et al., 2005), on use in previous studies with preschoolers (Kan & Kohnert, 2005; Pellowski & Conture, 2005) and on inclusion in the Spanish version of the McArthur-Bates Communicative Development Inventories (CDIs) (Jackson-Maldonado, Thal, Marchman, Newton, Fenson, & Conboy, 2003).There were 10 intransitive verbs and 10 transitive verbs. Children were asked to name the pictures answering the questions *"¿Qué es?* / What is it?" or *"¿Qué está haciendo?/* What is s/he doing?". Nouns and verbs were blocked. Approximately half of the children (n = 28) named nouns before verbs while the rest (n = 32) named the items in the opposite order. Intransitive and transitive verbs were randomly distributed. See Appendix F for examples of the target words.

Picture naming accuracy scores were obtained by adding the number of correct nouns and verbs labeled in Spanish. Responses in English were

excluded. For a few words, synonyms were accepted as correct labels, such as "*brincar*" and "*saltar*" (to jump). There was a score for nouns and one for verbs.

Verb diversity (Number of different verbs).

In order to obtain a spontaneous measure of verb lexical diversity, children produced narratives based on two different wordless picture books: Frog Goes to Dinner (Mayer, 1974) and Frog on his Own (Mayer, 1973). A bilingual research assistant first told Frog on His Own and the child was encouraged to retell the story with assistance of the book illustrations. The second sample was a spontaneous narration of the second book. Children were encouraged to produce at least one utterance per picture.

Only spontaneous utterances were included in the narrative samples. Word roots were coded to obtain the verb diversity measure: number of different lexical verbs (NDV). This score was obtained as follows. First, a list of verbs was extracted using the SALT Explore command. Then, the number of different verbs used by each individual was calculated manually. Neither the copula verbs "*ser*" and "*estar*" nor the auxiliary "*haber*" were included in the total count of different verbs. In Spanish infinitival phrases such as "*va a X*" ("is going to X"), the auxiliary "*go*" was not counted (coded as auxir) and the X was counted as a verb. Verbs were counted when used as main verbs and when used as modifiers. This is frequent in Spanish, e.g.,"*va corriendo*/ *(he) goes running". The raw number of lexical verbs was used as verb diversity measure.

C. Data Analyses

First, a descriptive analysis examined the observed means and standard deviations of the lexical measures. One-way ANOVAs were conducted to determine whether children with SLI differ from typical peers in the measures. Language ability group was the between-subjects variable. Planned contrasts evaluated whether the affected group was significantly different than the age controls and than the language controls.

D. Results

Overall, children with SLI were less accurate than typical peers. Table 11 lists the means and standard deviations for the lexical measures across groups.

Table 11. Means and Standard Deviations of Noun Naming, Verb Naming and Number of Different Verbs (NDV) by Group

Measure	SLI		TLD-4		TLD-3	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Noun	12.10	5.07	15.30	4.08	12.95	2.88
Verb	9.35	4.57	14.75	2.45	10.21	2.74
NDV	12.15	7.71	24.35	6.26	18.26	7.69

One-way analysis of variance (ANOVA) revealed a significant difference in noun naming across groups, $F(2,57) = 3.132$, $p = .051$. Planned contrasts indicated that children with SLI had noun scores significantly different from the age control group, $t(57) = 2.455$, $p = .017$, but not from the language-matched children, $t(57) = .876$, $p = .424$. The verb naming variable did not meet the

homogeneity of variance assumptions. There was a significant difference of scores across groups, Wech F (2, 36.292) = 18.448, p < .001. There was no significant difference between the affected children and the language-matched children (t(36.904) =.876, p = .387) but the age controls had significantly higher scores than the SLI group (t(29.072) = 4.660, p < .001).

In addition, verb diversity in narratives (number of different verbs) was also significantly different across groups, F(2,56) = 14.181, p < .001. In this case, planned contrasts indicated that children with SLI performed significantly lower than both the age controls (t(56) = 5.326, p < .001) and the language-matched controls (t(56) = 2.634, p = .011).

E. Discussion

As expected, children with SLI had significantly lower scores than age peers for all the lexical verb measures. Noun naming was not significantly different across the affected children and the language controls. This may be due to the fact that the selected items were high frequency nouns. Affected children and language peers also had comparable lexical skills in the verb naming task. That is, at the word level, children with SLI performed at the same level as their young typical peers. However, when verbs were used in sentences, differences emerged. In spontaneous narratives, children with SLI produced a significantly lower number of lexical verbs than the younger language controls. Recall that they also omitted more verbs and arguments in the elicited experimental tasks. These deficits seem to indicate that the process

of sentence formulation is disproportionately difficult to Spanish-speaking children with SLI.

In summary, we can conclude that the production of verbs and arguments is an area of disproportionate difficulty for Spanish-speaking preschoolers with SLI. Although these children demonstrate a similar level of lexical skills at the word level for both nouns and verbs than younger children with TLD, they present with omissions or limitations when they need to use these lexical items in a sentence. It is unclear from these findings whether these deficits emerge from weakened semantic representations. Picture naming does not reveal information about word knowledge depth. These findings replicate the results of verb lexical measures from the study of verb argument structure in French-speaking children with SLI (Pizzioli & Schelstraete, 2008). In French, language controls did not significantly differ from children with SLI in verb naming accuracy, verb naming reaction times and verb comprehension at the word level. Verb lexical diversity in spontaneous language was not assessed.

In the current study, the children's verb comprehension was not tested, but it should be investigated in a future study. In addition, verb comprehension at the sentence level should be explored. Difficulties with the linking of arguments to syntactic functions may become apparent in sentence comprehension. Children with SLI have been shown to have difficulties with passive sentence and object relatives comprehension, and wh- questions (Friedmann & Novogrodsky, 2007; Van Der Lely, 1994; Van Der Lely & Battell,

2003). This language deficit has not been thoroughly investigated in Spanish SLI.

On-line verb naming or verb identification tasks may reveal important language processing dissimilarities across groups. Although there were no significant differences between the French-speaking children with SLI and the language controls, reaction times may show potential differences in the children's lexical access and retrieval in Spanish. Electrophysiological studies may find subtle discrepancies in lexical access and retrieval between typical and atypical groups. For example, using event-related potentials (ERP), the neural bases of picture naming deficits were investigated in 34 English-speaking children with and without SLI, ages 7 to 17 (Simon-Cereijido, Bates, Wulfeck, Cummings, Townsend, Williams et al., 2006). The SLI group showed impoverished ERP indices of word production (diminished N4 peak over the left lateral frontal regions) and greater recruitment of processing resources (larger N2 peak over the fronto-central midline). In this study, picture naming appeared to be more effortful in the SLI population.

Potential weaknesses in the depth of the semantic representation of verbs in SLI are also in tune with the positive effects of a semantic intervention on the production of verbs and arguments in comparison to an explicit syntactic-semantic intervention for English-speaking children with SLI (Ebbels, Van Der Lely, & Dockrell, 2007). Learning detailed information about the meaning of the target verbs, developing a definition of the verbs, and enacting the actions had

a positive effect on the children's post-treatment linking of arguments to grammatical functions.

Overall, this study's lexical findings are aligned with previous studies and assist in the interpretation of the elicited tasks' results. At the word level, Spanish-speaking preschoolers with SLI performed at the level of younger language controls. However, this resemblance is lost at the sentence level. In the process of spontaneous speech production, children with SLI failed to use a variety of lexical verbs and when they were prompted to use specific verbs and nouns, they fail to produce complete sentences.

This study has not analyzed an aspect of language that is specific to Spanish. Rather, it has looked at sentence components that occur in every language. Although the children's responses merit a language-specific morphological analysis in future studies, it was found that by looking at the mere presence or absence of target verbs and arguments, children with SLI revealed marked deficits. The observed deficits were more frequent in the SLI group than in the age and language control groups.

These findings promisingly suggest that similar results might be found in preschoolers with SLI who speak other languages. In addition, these deficits may also become apparent in the second language of bilingual children with SLI. This last hypothesis will be investigated in the next study.

8. Study 2: Verb argument structure in the languages of English language learners with and without specific language impairment

A. Introduction

In contrast to language specific morphological markers of specific language impairment (SLI), deficits in the production of verbs and arguments have been observed in children with specific language impairment (SLI) who speak typologically different languages, such as Hebrew, English, and Spanish. This observation prompts the question of whether these same deficits would be observed in children with SLI who speak more than one language. This study will examine verb argument structure deficits in the languages of Latino preschoolers with and without SLI who are English Language Learners (ELLs). It aims to investigate how ELLs with and without SLI produce predicates with increasing number of arguments across different tasks in both Spanish and English. It is expected that children with SLI will omit more verbs and arguments than children with typical language development (TLD) in both their first and second languages. This prediction is supported by research on bilingual language processing suggesting interactions between the two language systems. In addition, children with SLI are expected to omit more target verbs and arguments in sentences with increasing number of arguments in the two languages due to increased processing load.

However, as discussed in the previous chapter, weakened verb representations may affect the production of verbs and arguments. Verb

representations in a second language may not be sufficiently developed in both typical and atypical learners. Thus, these verb lexical entries may not have "mature" verb argument structures. If so, children with SLI may not omit significantly more English arguments and verbs than their typical peers.

This study aims to evaluate whether ELLs with and without SLI demonstrate verb and argument omissions in their two languages (Spanish and English) and whether verb argument structure complexity plays a role in the processing of their first and second languages.

B. Participants

A total sample of 40 participants was recruited from preschools in San Diego, California. Participants attended the same schools as children from the previous study. There are 20 children with SLI and 20 age-matched controls with typical language development (TLD) and similar English exposure. The affected group included 9 girls and 11 boys and there were 12 girls and 8 boys in the unaffected group. Age matching was done on an individual manner, +/- 3 months. The children with SLI had a mean age of 4;5 years (*SD* = 4.1 months) and the TLD group's mean age was 4;4 years. Parental consent was obtained for each of the participants, according to University of California, San Diego's and San Diego State University's Institutional Review Board.

The groups did not appear to differ in maternal education and in income level of the families, measured by school lunch eligibility. They could not be quantitatively compared because some cells have less than 5 data points. The

40 children were of Mexican-American descent. See Table 12 for demographic information.

Table 12. Percentage of Families of the Children With Typical Language Development (TLD), Specific Language Impairment (SLI), and Language Matches In Each Category Of Educational Level and Eligibility To Lunch Program

Characteristic	SLI n = 20	TLD n = 20
Educational level in the home		
Primary or some secondary education	0	30% (6/20)
High school graduate	60% (12/20)	30% (6/20)
Some college experience or college graduate	30% (6/20)	15% (3/20)
Not reported	10% (2/20)	25% (5/20)
School Lunch Eligibility		
Regular	15% (3/20)	15% (3/20)
Reduced or Free	60% (12/20)	80% (16/20)
Not reported	25% (5/20)	5% (1/20)

Procedures for establishing English and Spanish exposure and use

Participants were identified as English Language Learners, that is, having minimal to moderate English proficiency and use as reported by parent and teacher questionnaires, clinical observation and individual responses. In addition, they met the following criteria: (a) speak both Spanish and English as measured by parent interview and teacher report, (b) speak more than minimal

English as verified by parent interview, teacher report, and child conversational sample, and (c) participate in English testing tasks.

English and Spanish exposure and use were determined using the same parent and teacher reports used in the previous study (see Appendices A and B). Table 18 describes the children's Spanish and English receptive and expressive language proficiency rates and language exposure at home based on the questionnaire data.

Table 13. Means and Standard Deviations of Amount of Language Input, and Ratings of Use and Proficiency of the Participants by Language Ability

	SLI		TLD		*p*
	Mean	*SD*	*Mean*	*SD*	
Spanish					
Receptive language	4.41	.87	4.50	.89	.776
Expressive language	3.78	1.06	4.53	.80	.025
Exposure at home	3.19	.83	2.71	1.05	.156
English					
Receptive language	3.24	.97	3.00	1.15	.530
Expressive language	2.61	.85	2.65	1.11	.915
Exposure at home	2.25	.93	2.44	1.15	.616

Note: Seven parent questionnaires had incomplete data.

As in the previous study, teachers completed a questionnaire and rated the participants' English and Spanish proficiency (1 representing that the child cannot speak and/or understand the language and 5 representing that child speaks like a native speaker and understands all what is said) (see Appendix

A). The following table lists the average proficiency level of the groups based on the teacher questionnaire data.

Table 14. Means and Standard Deviations of Teachers' Ratings of the Participants' Spanish and English Proficiency Levels by Group

Teachers' ratings	SLI		TLD		*p*
	Mean	*SD*	*Mean*	*SD*	
Spanish proficiency	4.03	1.00	4.80	.38	.010
English Proficiency	2.59	1.27	3.62	1.00	.010

Overall, children's English proficiency skills ratings indicated that they could say phrases, have a simple conversation, and understand simple commands. In terms of exposure, the ratings showed that they were exposed to English more than "at times" but less than most of the time. Independent t-test indicated no significant group differences for parents' ratings of Spanish receptive language skills ($t(31) = .287$, p = .776, d = .10), English receptive language skills ($t(31) = -.635$, $p = .530$, $d = .23$), and English expressive language skills ($t(33) = .108$, $p = .915$, $d = .04$). Parent ratings of Spanish expressive language skills were significantly higher for the children with TLD, $t(33) = 2.357$, $p = .025$, $d = .80$. Previous research has shown that parents are more reliable in estimating Spanish proficiency than English proficiency (Gutiérrez-Clellen & Kreiter, 2003).

Teachers' ratings, as expected, revealed significant differences in Spanish proficiency, t(18.364) = 2.894, p = .010, d = 1.06, and in English proficiency, t(34) = 2.734, p = .010, d = .92.

Since ratings of receptive and expressive language skills could also be conceived as discrete categories, non-parametric group comparisons were additionally made. Mann-Whitney *U* tests between the TLD and SLI group on the parent ratings of English and Spanish use and proficiency scores showed no statistically significant differences between the groups on Spanish receptive skills, $U = 124.50$, $p = .683$; Spanish exposure at home, $U = 100.50$, $p = .204$; English expressive skills, $U = 135.00$, $p = .568$; English receptive skills, $U = 126.50$, $p = .736$; and English exposure at home, $U = 110.500$, $p = .515$. As observed previously, there was a significant group difference in the parents' ratings of Spanish expressive skills, $U = 90.00$, $p = .025$, and in the teachers' ratings of Spanish proficiency, $U = 85.00$, $p = .010$, and English proficiency, $U = 80.50$, $p = .010$.

The Woodcock-Johnson III Picture Vocabulary test (Woodcock, 1991) was used as an external estimate of English proficiency. Children with SLI had a mean of 12.55 ($SD = 4.57$) which was not significantly different than the TLD group mean ($mean = 14.80$, $SD = 3.94$), $t(38) = 1.667$, $p = .104$, $d = .53$.

Procedure to determine language ability status.

The children with SLI were identified based on the same procedures as for study 1:

(1) evidence of parent concern and/or teacher concern (Restrepo, 1998);

(2) clinical judgment based on observations of trained bilingual speech-language pathologists (e.g., reported evidence of limited responsiveness in conversational samples, modifiability, etc); and

(3) below cutoff scores on 2 out of 3 of the following measures: the Spanish Morphosyntax Test (S-MST) of the Bilingual English Spanish Assessment (BESA) (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, n.d.) as determined by previous research with these measures (Gutiérrez-Clellen, Restrepo, & Simon-Cereijido, 2006), the Spanish Semantics Test (S-ST) of the Bilingual English Spanish Assessment (BESA) (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, n.d.), and/or the Spanish nonword repetition task (SNWRT) (Gutiérrez-Clellen & Simon-Cereijido, submitted).

When children failed the Spanish identification measures and were observed to present a preference to speak English, the English S-MST of the Bilingual English Spanish Assessment (BESA) (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, n.d.) was administered. A cut score based on previous research with a similar population was used to identify children (Gutiérrez-Clellen & Simon-Cereijido, 2007). In the SLI group, 5 children were tested in English and only 1 child with TLD received the E-MST. In addition, 4 children with SLI and 1 child with TLD received the E-ST of the BESA (Peña, Gutiérrez-Clellen, Iglesias, Goldstein, & Bedore, n.d.). The children with TLD met criteria based on the same measures as the children with SLI.

None of the children had impairments, mental retardation, emotional disturbance, motor difficulties, or neurological deficits, according to parent report and school records. All children passed a bilateral screening. They also demonstrated nonverbal cognitive development within the normal range based on scores obtained with the Differential Assessment Scales (DAS) (Elliot, 1983) and the Kaufmann Abilities B C-II and no evidence of other special needs based on parent report, teacher report, and school records. A total of 28 children received the DAS and 12 received the K-ABC II. Children with TLD had a mean standard score of 108.05 (SD = 13.11). The SLI nonverbal cognitive standard score mean was 97.60 (SD = 12.05). The affected group had significantly lower scores than the typical group, $t(38) = 2.624$, $p = .012$, $d = .83$, as observed in other studies of children with SLI. Only one child in SLI group had a written Individualized Educational Plan (IEP) in place at the beginning of the study.

Table 15. Means and standard deviations of the identification measures of the SLI and TLD groups

	SLI			TLD			p	d
	n	*Mean*	*SD*	*n*	*Mean*	*SD*		
S-MST	19	23.77	13.11	19	71.90	13.99	.001	3.55
S-ST	19	5.47	3.45	19	10.58	2.04	.001	1.80
SNWRT	19	54.28	15.17	20	78.81	10.01	.001	1.92
E-MST	5	6.98	3.53	1	12.70	0		
E-ST	4	7.25	3.09	1	11	0		

Note: S-MST: Spanish morphosyntax task, S-ST: Spanish semantics task, SNWRT: Spanish nonword repetition task, E-MST: English morphosyntax task, E-ST: English semantics task.

C. Procedures

Procedures, data collection and reliability

Bilingual research assistants and the experimenter tested children in quiet rooms in preschools. Test responses were digitally recorded using a Olympus DS-2200 digital voice recorder. Highly trained bilingual transcribers transcribed the children's responses. Approximately 15% of the children's responses on the experimental tasks were checked for transcription reliability and achieved 98% agreement. Code-switching responses were excluded from data analysis. About 4% of the responses included Spanish words or were uttered in Spanish. However, data on code-switching responses were saved for further analysis in future studies. Scoring was checked for reliability to achieve 90% agreement.

Experimental elicited measures

Verb argument structure was manipulated experimentally. Overall, target verbs were selected after consideration of several studies of bilingual children in the United States (Kan & Kohnert, 2005; Kohnert, Bates, & Hernandez, 1999), and English frequency tables (Moe, Hopkins, & Rush, 1982). As in study 1, every effort was made to ensure that the verbs had high imageability, early age of acquisition, and were familiar to all children. Transitivity was determined by the following criteria: 1) description of verb transitivity in the Cambridge English dictionary (Walter, 2005), and 2) agreement by 2 bilingual researchers. Transitive verbs that allow ditransitive predicates (i.e., give, send) were identified and used for the ditransitive predicate targets. The following sections describe what type of verb argument structure complexity was selected for each task. Appendices G, H, and I list the target verbs by task and have examples of the tasks' targets.

When typical Latino ELLs know a verb in Spanish and English, they are expected to produce the verb with its arguments accurately in both languages. This prediction may be more accurate for verbs that have a matching verb argument structure in Spanish and English. The tasks were parallel to the Spanish tasks. There was a picture description task and a sentence repetition task. Number of items, presentation, and scoring followed similar rules. Differences are described next.

For the picture description task, in contrast to Spanish, subjects had to be overt in order to receive a point (e.g., "*running*" obtained only 1 point, "**the*

dog running" obtained 2 points). In addition, verb morphology errors were not penalized. Children, as other English language learners, frequently omitted verb finite morphology. If the target lexical verb was produced, a point was given. These are examples of children's responses: "*sleep*", "*is sleeping*", "*he sleeping*", "*she eating a bread*", "*Ana eat toast*", among other examples.

Similar coding rules were applied to the sentence repetition task. Morphological errors were not penalized. Production of the target words (with or without bound morphemes) obtained points. For example, children said "*the baby crying*", "*the mom she gives a present to daughter*", "*her daughter*", "*the mom daughter*", among other responses.

The Spanish tasks, picture description and sentence repetition, were administered and scored as in study 1.

D. Data analyses

Both descriptive and inferential quantitative methods were utilized to analyze the data. Analyses of covariance (ANCOVAs) were conducted to examine differences between groups. The analysis was run controlling for differences in nonverbal cognitive development using the nonverbal cognitive score as the covariate. It was expected that children with SLI would have lower scores than the age peers for both Spanish and English scores. It was also examined whether verb argument structure complexity plays a significant role in both Spanish and English. A mixed 2 (language ability group) x 3 (verb argument structure complexity) ANCOVA was conducted for the tasks in both

languages with nonverbal cognitive development as a covariate. Language ability was the between-subjects factor and verb argument structure complexity was the within-subjects factor. Scores were arc-sine transformed for the analyses. Raw scores are reported in the tables of means and standard deviations.

E. Results

Children with SLI had lower scores for all the tasks. Table 16 lists the means and standard deviations for the two groups and the four tasks.

Table 16. Means and Standard Deviations of the Proportion of Target Verbs and Arguments for the Spanish Picture Description, Spanish Sentence Repetition, English Picture Description, and English Sentence Repetition Tasks by Group.

Task	SLI		TLD-4		*p*
	Mean	*SD*	*Mean*	*SD*	
Spanish picture description	.52	.29	.88	.07	.001
Spanish sentence repetition	.60	.23	.93	.07	.001
English picture description	.36	.26	.63	.25	.009
English sentence repetition	.38	.30	.74	.37	.001

As found in study 1, age controls perform close to ceiling level in Spanish. There was a significant difference between groups, $F(1,37) = 24.012$,

$p < .001$. The nonverbal cognitive covariate was not significant, $F(1,37) = .479$, $p = .493$. The Spanish sentence repetition task revealed similar significant differences across groups, $F(1,37) = 39.174$, $p < .001$, and the covariate was not significant, $F(1,37) = 1.661$, $p = .205$.

In English, there was also a significant language ability group difference on the picture description scores, $F(1,37) = 5.344$, $p = .03$, and on the sentence repetition task, $F(1,37) = 9.004$, $p = .005$. The nonverbal cognitive covariate was significant for the English picture description task, $F(1,37) = 5.595$, $p = .023$, but not for the English sentence repetition task, $F(1,37) = 3.540$, $p = .068$.

Overall, the four measures revealed significant differences between children with SLI and age controls. Scores in the English task were lower than in Spanish for both groups, reflecting their developing English proficiency. In addition, the covariate, nonverbal cognitive score, was only significant for the English picture description task.

Next, the role of verb argument structure was examined. Table 17 lists the means and standard deviations of the Spanish and English scores by argument structure complexity for each group and task.

Given the fact that the covariate was not significant for the Spanish measures, the analysis of verb argument complexity was run using ANOVA. For the Spanish picture description task, a mixed 2 (language ability) x 3 (verb argument structure) ANOVA indicated that there was no significant interaction, $F(2,76) = .165$, $p = .848$. There was a main effect of verb argument structure regardless of language ability, $F(2, 76) = 25.248$, $p < .001$. Post-hoc

comparisons revealed that ditransitive contexts were more difficult than transitive which were more difficult than intransitive. Language group was a significant main factor as well, $F(1,38) = 33.615$, $p < .001$. For Spanish sentence repetition, a mixed 2 (language ability) x 3 (verb argument structure) ANOVA indicated that there was no significant interaction between language ability and verb argument structure, $F(2, 76) = 1.272$, $p = .286$. A significant difference was found for the main factor language ability, $F(1,38) = 55.911$, $p < .001$. Verb argument structure was not significant, $F(2, 76) = .209$, $p = .812$. The Spanish results in study 2 paralleled the study 1 results.

Table 17. Means and Standard Deviations of the Proportion of Spanish and English Target Verbs and Arguments by Argument Structure Complexity by Group

Task and	SLI		TLD-4	
Context	*Mean*	*SD*	*Mean*	*SD*
Spanish				
Picture description				
Intransitive	.69	.29	.95	.11
Transitive	.57	.29	.92	.08
Ditransitive	.39	.35	.83	.12
Sentence repetition				
Intransitive	.55	.28	.94	.09
Transitive	.59	.27	.94	.09
Ditransitive	.63	.21	.92	.09

Table 17 (cont.)

English				
Picture description				
Intransitive	.41	.29	.66	.27
Transitive	.39	.29	.67	.25
Ditransitive	.30	.25	.58	.30
Sentence repetition				
Intransitive	.28	.27	.65	.25
Transitive	.29	.21	.56	.26
Ditransitive	.35	.22	.67	.23

For the English picture description task, a mixed 2 (language ability) x 3 (verb argument structure complexity) ANCOVA did not reveal a significant interaction between the two factors, $F(2,74) = .064$, $p = .938$. The nonverbal cognitive covariate was significant, $F(1,37) = 4.843$, $p = .034$ as was language ability group, $F(1,37) = 5.336$, $p = .027$. There was no significant main effect of verb argument structure complexity, $F(2,74) = 1.063$, $p = .351$. The interaction between the covariate and verb argument structure complexity was not significant, $F(2,74) = .544$, $p = .583$.

For the English sentence repetition, there was a significant interaction between language ability and verb argument structure complexity, $F(2,74) = 3.507$, $p = .035$. The control group produced fewer targets in transitive than in ditransitive contexts. Language ability group was a significant factor, $F(1,37) =$

8.964, $p = .005$. Verb argument structure complexity was not significant, $F(2,74) = 1.520$, $p = .225$ nor were the covariate, $F(1,37) = 3.035$, $p = .090$ or the interaction between these two factors, $F(2,74) = 1.033$, $p = .361$.

F. Discussion

As predicted, English language learners with SLI omitted more target verbs and arguments in both their first and second languages, in comparison to their peers with TLD. For Spanish, results replicated study 1. Children with SLI performed significantly worse than age peers in each language. The total scores in Spanish were higher than the English scores, reflecting the children's lower proficiency in English. Although English vocabulary was not significantly different between the two groups, the affected children produced significantly less complete sentences in English. The nonverbal cognitive covariate was only significant for the English picture description task and does not appear to influence the other tasks.

Verb argument structure complexity was found to be a significant factor only for the Spanish picture description task. Both groups of children tended to omit more target verbs and arguments with ditransitive sentences on that task. In contrast to Study 1, a significant interaction between language ability and Spanish verb argument structure complexity was not found in study 2. The absence of a language control group might have reduced the current study's power to find a significant interaction. In addition, study 2 replicated the lack of effect of verb argument structure complexity in Spanish sentence repetition.

Task differences, both in terms of the stimuli and scoring procedures, explain this difference. As observed in the previous study, children produced a larger number of ditransitive objects in the sentence repetition task than when describing the pictures probably because these phrases were at the end of the ditransitive sentences (see Table 19).

In English, verb argument structure complexity was not a significant factor. Table 18 lists the mean number of targets produced by the groups for each task in the two languages.

Table 18. Mean Number of Subjects, Verbs, Direct Objects, and Indirect Objects Produced by Children across Tasks

	Task							
	Picture description				Sentence repetition			
Spanish	S	V	DO	IO	S	V	DO	IO
SLI								
Intransitive	4.45	5.20			4.10	3.55		
Transitive	4.20	3.55	4.30		4.30	3.45	4.60	
Ditransitive	2.90	2.50	3.05	2.45	3.85	2.95	5.80	5.20
TLD								
Intransitive	6.70	6.60			6.85	6.30		
Transitive	6.85	6.45	5.95		6.75	6.55	6.40	
Ditransitive	5.90	5.85	5.60	5.80	6.25	6.15	6.70	6.80

Table 18 (cont.)

English	S	V	DO	IO	S	V	DO	IO
SLI								
Intransitive	1.95	3.85			2.55	1.40		
Transitive	2.05	3.05	3.10		2.00	1.00	3.10	
Ditransitive	1.80	1.55	3.10	2.00	2.35	0.70	2.25	4.65
TLD								
Intransitive	3.85	5.45			4.90	4.25		
Transitive	3.95	5.00	5.20		4.95	3.50	3.35	
Ditransitive	3.70	3.95	4.20	4.30	5.50	3.65	4.05	5.60

Note: S = subject, V = verb, DO = direct object, and IO = indirect object

The control group had a very homogenous performance across targets in Spanish; in contrast, production of targets in English was more variable. For example, in the picture description task, subject production appears to be relatively low in comparison to verbs and objects (e.g., subjects range from 3.70 to 3.95, verbs from 3.95 to 5.45, and objects from 4.20 to 5.20). Inspection of the individual responses demonstrates that a number of children omitted subjects (e.g., "*is dancing*", "*bringing chocolates to my mom*"). A similar pattern was observed in the children with SLI (e.g., "*run*", "*read a book*"). In addition, these children produced a low number of ditransitive verbs, as in "*dog to Ana*" (for "*he is bringing her a dog*") or "*Ana present mom*" (for "*Ana is bringing her a present*"). Although cross-linguistic transfer was not purposefully investigated in this study, it should be noted that subject omissions in English have been

occasionally observed in the language of Spanish speakers who are learning English as a second language (Phinney, 1987), but not in every study (Gutiérrez-Clellen, Simon-Cereijido, & Wagner, 2008). In the current study the limited production of English subjects may be explained by crosslinguistic influence from Spanish.

English subject omissions in the sentence repetition task were less frequent. For example, a child with TLD said "*the mother to the teacher*" when attempting to repeat "*The mother writes a letter to the teacher*". This utterance exemplifies a common strategy: memorization of the first and the last phrases. The same strategy was used by children with SLI (e.g., "*a mom teacher*"). This last example also reveals comprehension of the meaning of at least some of the English words: the child appropriately changed the word "*mother*" for "*mom*". On a few occasions, children in both groups were observed to translate a few words into Spanish, such as "*the dog runs muy fast around white fence*" instead of "*very fast*".

In both languages, the effect of verb argument structure complexity was absent in the sentence repetition tasks. However, there was a significant interaction between verb argument structure complexity and language ability group in English. In particular, children with TLD omitted more target verbs and arguments in transitive contexts in comparison to intransitive and ditransitive ones. These differences do not seem related to differences between the two languages but to differences between the two tasks. Performance on sentence repetition in English appeared to be affected by an artifact of the way the

sentences were constructed. Although syllable length was controlled, the total number of words was not controlled across languages. The English sentence repetition task had 186 words and the Spanish version had 151 words. These differences may have made the performance on English transitive sentences more difficult, because the verbs and direct objects were buried in the middle of the sentence. Future research should also control for word length. A cross-linguistic difference to consider is the complexity of English ditransitive sentences (e.g., double datives versus prepositional objects). For example, the sentence “The mother writes a letter to the teacher” is marked, while “the mother writes the teacher a letter” or “the mother writes her a letter” is more frequent. In this study, the order of the sentence constituents was maintained across languages. It is unclear whether children would have had fewer difficulties with English double datives (e.g., “she gave him an apple”) compared to prepositional objects (e.g., “she gave an apple to him”). Further research should investigate this cross-linguistic difference more carefully.

As in study 1, the study had adequate power to find statistically significant differences between the language ability groups but insufficient power for the interactions between language ability and verb argument structure complexity. Larger sample sizes should be planned for future studies.

In sum, omissions of verbs and arguments are significantly higher in ELLs with SLI than age controls. In Spanish, children with SLI demonstrate these deficits in the picture description and the sentence repetition tasks and verb argument structure appears to be a stress factor in sentence formulation,

not in sentence repetition. In English, a similar pattern emerged. However, verb argument structure complexity was not a significant factor.

Methodological differences partly explain discrepancies across tasks and across languages. Further studies should be conducted in order to pinpoint the vulnerable step(s) or process(es) in sentence formulation for children with SLI. In addition, cross-linguistic differences should be explored using diverse stimuli in order to control for a variety of factors such as sentence length measured by words and sentence length measured by phrase complexity (nominal phrases with or without adjectives, with or without pronouns, etc.). These levels of complexity may affect sentence formulation and memory differently across languages. Comprehension tasks should be included as well.

This study was not designed to investigate morphological errors; however, it should be noted that many children with SLI presented with substitution errors in both languages and across tasks. The control group exhibited a high proportion of morphological errors in English also. As stated in the introductory chapters, the tasks and in particular the scoring procedures aimed to measure the presence of the main lexical items without penalizing errors in morphology. Future studies should explore whether the relationship between morphological errors and sentence complexity in Spanish.

Overall, this study confirmed that preschoolers with SLI present omissions of target verbs and arguments in their first and second languages. Discrepancies between typical and atypical children were observed in English even when the groups did not significantly differ in English vocabulary. This

result parallels the previous study findings regarding the fact that children with SLI may have limited production of target verbs and arguments in spite of comparable levels of overall vocabulary, noun naming, and verb naming in Spanish.

9. Verb argument structure deficits in SLI in the first and second languages: Implications for assessment

This dissertation aimed to evaluate a potential cross-linguistic marker of SLI, the omission of verbs and arguments in sentences with increasing number of arguments. The empirical results from this sample of 100 preschoolers with SLI are promising. In Spanish, children with SLI had significantly lower scores than both age and younger language controls. In English, English language learners (ELLs) with SLI had significantly lower scores than age controls. Across study 1 and study 2, children with SLI omitted more target verbs and arguments than age and language peers. This difference was observed when there were no significant differences in overall vocabulary and verb naming between children with SLI and language peers in study 1. The same disparity was evident in study 2 although there was no significant difference in English vocabulary between children with SLI and age controls.

In addition, verb argument structure complexity proved to be a significant stress factor in sentence formulation. In Spanish, children with SLI appeared to have disproportionately more difficulties with ditransitive sentences than the other groups, as evidenced by a significant interaction between language ability group and verb argument structure complexity for the picture description task. However, this interaction was not replicated for the Spanish picture description in study 2, probably due to differences in the characteristics of the groups.

Verb argument structure complexity was not a significant factor for the Spanish sentence repetition task. Children produced a larger number of ditransitive objects in the sentence repetition task than when describing the pictures probably because these phrases were at the end of the sentences. The significant effect of English verb argument structure complexity on sentence repetition in study 2 can be partly explained by methodological differences between the tasks.

Children's responses across tasks and across languages were consistent across studies. When describing pictures, typical and atypical children omitted more target verbs and arguments with ditransitive sentences. When repeating a sentence, children used a common strategy. They repeated the beginning and end of sentences. This strategy was used in their first and second languages.

The target verb and argument omissions of children with SLI cannot be explained by limitations in verb lexicon or in the general lexicon, because children with SLI had comparable scores than the younger language peers for both noun and verb naming. However, it is not possible to rule out the possibility that the semantic verb representations of the affected children had an effect on their performance compared to their language peers. The affected group utilized a smaller variety of verbs than the language controls in their spontaneous language, suggesting difficulties in the use of the verbs in sentences. Weak verb representations may result in slow lexical access or

retrieval during sentence formulation. Future studies should explore this question in more detail using both comprehension and production tasks.

The children with SLI had pronounced difficulties with ditransitive sentences compared to transitive and intransitive sentences, at least when formulating sentences in their strongest language, Spanish, for the picture description task. These findings underscore the fact that SLI may not be fully described by language-specific morphological errors.

The findings are inconclusive regarding the question of whether children children with SLI are disproportionately affected by verb argument structure complexity. In Spanish, when describing a picture, the affected children performed significantly poorer than language-matched children with ditransitive sentences. On the other hand, the effect was not observed in the sentence repetition tasks. Previous studies looking at the effect of verb argument structure complexity on grammaticality during sentence formulation also found inconsistent results. In French, children with SLI produced a lower number of articles with transitive than intransitive sentences in comparison to language peers while English-speaking children with SLI's production of auxiliaries was as affected as their language peers by increments in the number of arguments (in this case, ditransitive versus transitive and intransitive sentences). In spite of the use of different methodologies, studies suggest that increasing the number of arguments during a sentence formulation task is an effective way of incrementing the language processing load for children with SLI.

This project aimed to examine whether deficits in verb and argument production could be observed across two different languages and tasks. The total scores for the picture description and the sentence repetition were significantly correlated within languages (Spanish picture description and sentence repetition, $r = .796$, $p < .001$ in study 1, $r = .761$, $p < .001$ in study 2; English picture description and sentence repetition $r = .774$, $p < .001$). Both tasks appear to measure the same construct. However, verb argument structure complexity was not a significant factor across tasks. As discussed before, the cognitive computations required from the children across tasks and other methodological differences may in part explain this discrepancy. These results underscore the importance of conducting research with different methodologies in order to find both convergent and divergent information.

From a clinical perspective, these measures appear to have potential as assessment tools. The tasks are fast and easy to administer and might serve as a screening instrument. In addition, because they do not penalize morphological errors, they may have potential as screeners for children who are in the process of learning English as a second language. However, more research needs to be done with the measures on monolingual English-speaking preschoolers with and without SLI and with bilingual children with different levels of English proficiency.

In sum, the production of verbs and arguments was found to be problematic for Spanish-speaking children with SLI and who are learning

English. In Spanish, their strongest language, they omit more sentence constituents than younger language peers and age controls. Using common verbs at the word level is not problematic for the affected children; however, at the sentence level, children with SLI show limitations in comparison to language controls. In English, their emerging language, they also produce few targets, even when their English vocabulary level is comparable to age peers. Increasing the number of arguments is a stress factor, in particular, during sentence formulation and for children with SLI in Spanish. These findings suggest that limitations in the production of verbs and arguments may be a deficit of SLI across languages.

Appendices

Appendix A. Parent questionnaire in Spanish

Habilidades y Prácticas de Lenguaje en el Hogar

Fecha: _____

Nombre del Niño/a: _____ **Fecha de Nacimiento:** _____

Edad: _____

Sexo del niño/a: Masculino / Femenino (circle one)

Tu Nombre: _____

Relación con el Niño/a: madre_____ padre _____ otra _____

Teléfono _____

Información Escolar

Escuela: _____

Maestro/a: _____

¿Asistió preescolar o algún tipo de guardería antes de que entrara a este preescolar?
Sí No

Si marca sí, ¿dónde asistió su niño/a? _____

¿Por cuanto tiempo asistió? _____

¿En que idioma recibió su preescolar o guardería? _____

Programa del almuerzo: Gratis, Rebajado, Regular (circle one)

Su Casa la Renta ó Es Dueño/a (circle one)

I. La opinión de la familia acerca del lenguaje su niño/a

Expresión

1. ¿Le preocupa la manera en que su niño/a habla? SÍ NO

Si SÍ, por favor explique las respuestas

_____

2. ¿Tiene problemas otra gente para entender al niño/a por su dificultad de pronunciar los sonidos? SÍ NO

Si SÍ, por favor explique las respuestas

_____

3. ¿Su niño/a habla tan bien como otros niños de su edad? SÍ NO

Si NO, por favor explique las respuestas

_____

Comprensión

4. ¿Su niño/a entiende la mayoría de lo que dice usted? SÍ NO

Si NO, por favor explique las respuestas

_____

5. ¿Usted tiene que repetir lo que le dice a su niño/a más que a otros niños de la misma edad? SÍ NO

II. Información de la Casa

Por favor llene la siguiente información sobre su familia o las personas que viven en la casa con su niño/a.

Adulto #1

Nombre: _____ Parentesco: _____ Edad: _____

Nivel de Educación: _____ Primaria

_____ Secundaría/ High School/ GED

_____ Técnico/ Licenciatura/ College Graduate

_____ Postgraduado/ Profesional/ Carrera o certificado

En que lenguaje estudió: _____

Tiempo en EEUU_____, de dónde es su familia:_____

¿Qué idioma HABLA su niño/a con esta persona?

___español__ inglés__ español e inglés

Adulto #2

Nombre: _____ Parentesco: _____ Edad: _____

Nivel de Educación: _____ Primaria

_____ Secundaría/ High School/ GED

_____ Técnico/ Licenciatura/ College Graduate

_____ Postgraduado/ Profesional/ Carrera o certificado

En que lenguaje estudió: _____

Tiempo en EEUU_____, de dónde es su familia:_____

¿Qué idioma HABLA su niño/a con esta persona?

___español__ inglés__ español e inglés

Otro/a

Nombre: _____ Parentesco: _____ Edad: _____

Nivel de Educación: _____ Primaria

_____ Secundaría/ High School/ GED

_____ Técnico/ Licenciatura/ College Graduate

_____ Postgraduado/ Profesional/ Carrera o certificado

En que lenguaje estudió: _____

Tiempo en EEUU_____, de dónde es su familia:_____

¿Qué idioma HABLA su niño/a con esta persona?

___español__ inglés__ español e inglés

III. Perfil Linguístico del Hogar

Por favor lea las siguientes preguntas sobre que tan bien habla, que tan bien entiende y cuanto oye su niño/a inglés y español.

(a)¿Qué tanto habla y entiende su niño/a inglés? **Marque una en cada lado.**

Habla Inglés	Entiende Inglés
1. _____ no habla nada	1. _____ no entiende nada
2. _____ dice algunas palabras o frases	2. _____ entiende unas pocas palabras o frases
3. _____ puede tener una conversación sencilla	3. _____ entiende órdenes y mandados básicos
4. _____ lo habla mucho	4. _____ entiende la mayoría de lo que se le dice
5. _____ lo habla todo el tiempo	5. _____ entiende todo lo que se le dice

(b)¿Qué tanto habla y entiende su niño/a español? **Marque una en cada lado.**

Habla Español	Entiende Español
1. _____ no habla nada	1. _____ no entiende nada
2. _____ tiene algunas palabras o frases	2. _____ entiende unas pocas palabras o frases
3. _____ puede tener una conversación sencilla	3. _____ entiende órdenes y mandados básicos
4. _____ lo habla mucho	4. _____ entiende la mayoría de lo que se le dice
5. _____ lo habla todo el tiempo	5. _____ entiende todo lo que se le dice

(c) ¿Qué tanto español OYE el niño/a en casa durante la semana? **Marque una para cada persona.**

De su mamá	De su papá	De sus hermanos/otros miembros de la familia
1. _____ nunca	1. _____ nunca	1. _____ nunca
2. _____ a veces	2. _____ a veces	2. _____ a veces
3. _____ la mayoría del tiempo	3. _____ la mayoría del tiempo	3. _____ la mayoría del tiempo
4. _____ todo el tiempo	4. _____ todo el tiempo	4. _____ todo el tiempo

(d) ¿Qué tanto inglés OYE el niño/a en casa durante la semana? **Marque una para cada persona.**

De su mamá	De su papá	De sus hermanos/otros miembros de la familia
1. _____ nunca	1. _____ nunca	1. _____ nunca
2. _____ a veces	2. _____ a veces	2. _____ a veces
3. _____ la mayoría del tiempo	3. _____ la mayoría del tiempo	3. _____ la mayoría del tiempo
4. _____ todo el tiempo	4. _____ todo el tiempo	4. _____ todo el tiempo

Appendix B. Teacher questionnaire

Teacher's Questionnaire about the Child's Language at School

Name of Child: _____ School: _____

Age of the Child: _____ Grade: _____ Teacher: _____

Proficiency refers to how well the child speaks each language. Circle the appropriate rank/category for each language (Spanish and English).

0-Cannot speak the indicated language, has a few words or phrases, cannot produce sentences, only understands a few words.

1-Cannot speak the indicated language, has a few words or phrases, understands only a few words of what is being said.

2-Limited proficiency with grammatical errors, limited vocabulary, understands the general idea of what is being said.

3-Good proficiency with some grammatical errors, some social and academic vocabulary, understands most of what is said.

4-Native-like proficiency with few grammatical errors, good vocabulary, understands everything that is said.

DK-Don't Know

Questions	Spanish					
1. Speaks with you in class.	0	1	2	3	4	DK

Questions	English					
1. Speaks with you in class.	0	1	2	3	4	DK

Appendix C. Spanish picture description task

Spanish Picture Description Task

ID # _____

Examiner's Prompt: Vamos a jugar un juego. Te voy a decir algo y luego tú me dices lo que está pasando en el dibujo, sí?

Item	Responses	Please circle if present
Pablo va a dormir en el piso. (Picture) Mira, ¿aquí qué está pasando? Aquí….	□ Other: _____ □ durmiendo □ **está durmiendo**	S: Pablo / Él / 3rd p.s. V: dormir
Ana va a bailar. (Picture) ¿Aquí qué está pasando? Aquí …	□ Other: _____ □ bailando □ **está bailando**	S: Ana / Ella / 3rd p.s. V: bailar
Item	Responses	Please circle if present
Ana va a mirar la televisión. (Picture) ¿Aquí qué está pasando? Aquí …	□ Other: _____ □ **está mirando la tele** □ **la está mirando**	S: Ana / Ella / 3rd p.s. V: mirar O: la / la tele

Pablo va a tomar la leche. (Picture) ¿Aquí qué está pasando? Aquí …	□ Other: _____ □ **está tomando la leche** □ **la está tomando**	S: Pablo / Él / 3rd p.s. V: tomar O: la / la leche
Item	Responses	Please circle if present
Pablo le va a aventar la pelota a su hermana. (Picture) ¿Aquí qué está pasando? Aquí …	□ Other:_____ □ **le está aventando la pelota** □ **se la está aventando**	S: Pablo / Él / 3rd p.s. V: aventar DO: la / la pelota IO: le / se / su hermana
La mamá le va a traer unas muñecas a su hija. (Picture) ¿Aquí qué está pasando? Aquí …	□ Other: _____ □ **le está trayendo las muñecas** □ **se las está trayendo**	S: La mamá / Ella / 3rd p.s. V: traer DO: las / las muñecas IO: le / se / su hija

Appendix D. Spanish sentence repetition task

Spanish Sentence Repetition Task

ID #: _____ DOE: _____

Examiner's Prompt: Ahora vamos a jugar este juego. Yo digo algo y tú me copias. Dilo igualito que yo. A ver, di:

- El gato brinca. _____
- La muñeca se rompió. _____

Muy bien! Sigamos:

1. El señor corta la carne con cuchillo.

TOTAL Words _____ of 7

SUBJECT	*señor*	Y N
VERB	*corta*	Y N
DIRECT OBJECT	*carne*	Y N

2. El papá le manda un regalo a él.

TOTAL Words _____ of 8

SUBJECT	*papá*	Y N
VERB	*manda*	Y N
DIRECT OBJECT	*regalo*	Y N
INDIRECT OBJECT	*él*	Y N

Appendix E. List of target Spanish verbs by verb argument structure complexity and task

Intransitive	Picture description task	Sentence repetition task
bailar	√	√
brincar	√	
caminar	√	√
correr	√	√
dormir	√	√
jugar		√
llorar		√
trabajar	√	
volar	√	√
Transitive		
abrazar	√	√
cocinar	√	
comer	√	√
cortar		√
leer	√	
mirar	√	√
querer		√
tirar/aventar		√
tocar	√	
tomar	√	√

Appendix E (cont.)

Ditransitive		
aventar	√√	
comprar		√
dar	√	√
escribir		√
leer		√
llevar	√√	
mandar		√
poner		√
traer	√√	√

Note: Every check (√) indicates that the verb was used once.

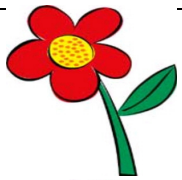
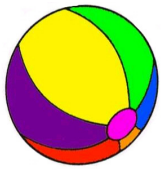
Appendix F. Spanish picture verb naming task

Spanish Picture Verb Naming

Name: _____ Date of evaluation: _____

Empezar con: Te voy a enseñar algunos dibujos. Dime qué ves.

Preguntas: ¿Qué pasa? *then* ¿Qué es?

	PALABRA	+	-	OTRO
1.	Bailar 			
2.	Comer 			
3.	Flor 			
4.	Pelota 			
	TOTALS:			

Appendix G. List of target English verbs by verb argument structure complexity and task

Intransitive	Picture description task	Sentence repetition task
Cry		√
Dance	√	√
Fly	√	√
Jump	√	
Play		√
Run	√	√
Sleep	√	√
Walk	√	√
Work	√	
Transitive		
Buy		√
Cut		√
Drink	√	√
Eat	√	√
Hug	√	
Kick	√	
Play [an instrument]	√	
Read	√	
Watch	√	√
Ditransitive		
Bring	√√	√
Give	√√	√√
Read		√
Send	√	√
Throw	√√√	√
Write		√

Note: Every check (√) indicates that the verb was used once.

Appendix H. English picture description task

English Picture Description Task

ID # _____

Examiner's prompt: Let's play a game. I'm going to say something and you tell me what's happening in the picture, ready?

Item	Responses	Please circle if present
The plane is going to fly. (Picture) Look, what is happening here? Here ……	□ Other: _____ □ flying □ **it is flying**	S: The plane / It V: fly
Pablo is going to walk in the park. (Picture) Look, what is happening here? Here ……	□ Other: _____ □ walking □ **he is walking**	S: Pablo / He V: walk
Item	**Responses**	**Please circle if present**
Ana is going to eat toast/bread. (Picture) Look, what is happening here? Here ……	□ Other: _____ □ **she is eating it** □ **she is eating toast**	S: Ana / She V: eat O: it / toast/bread
Dad is going to hug Ana. (Picture) Look, what is happening here? Here ……	□ Other: _____ □ **he is hugging Ana** □ **he is hugging her**	S: Dad/ He V: hug O: her / Ana

Appendix H (cont.)

Item	Responses	Please circle if present
D.6 Ana is going to bring a present for Mom (Picture) Look, what is happening here? Here ……	□ Other: _____ □ **she is bringing a present for Mom** □ **she is bringing her a present**	S: Ana / She V: bring DO: it / a present IO: her / Mom
D.7 Pablo is going to give a boat to Ana. (Picture) Look, what is happening here? Here ……	□ Other: _____ □ **he is giving a boat to Ana** □ **he is giving Ana a boat**	S: Pablo / He V: give DO: it / a boat IO: her / Ana

Appendix I. English sentence repetition task

English Sentence Repetition Task

ID # _____

Examiner's prompt: Let's play this game now. I will say something and you will copy me. Say it just like I do. Ready? Say:

- The cat is jumping. _____
- I am hungry. _____

Great! Good job! Now say:

1. The boy throws a ball to his sister at school.

TOTAL Words _____ of 10

SUBJECT	*boy*	Y N
VERB	*throws*	Y N
DIRECT OBJECT	*ball*	Y N
INDIRECT OBJECT	*sister*	Y N

2. The girl dances in her bedroom all day long.

TOTAL Words _____ of 9

SUBJECT	*girl*	Y N
VERB	*dances*	Y N

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