

2009-01-01

Reanalysis Of Some Effects Of The Mutual Exclusivity Constraint And Their Operation In Bilingual Children

Marina Kalashnikova

University of Texas at El Paso, marina_russa@hotmail.com

Follow this and additional works at: https://digitalcommons.utep.edu/open_etd



Part of the [Developmental Psychology Commons](#), and the [Linguistics Commons](#)

Recommended Citation

Kalashnikova, Marina, "Reanalysis Of Some Effects Of The Mutual Exclusivity Constraint And Their Operation In Bilingual Children" (2009). *Open Access Theses & Dissertations*. 2712.

https://digitalcommons.utep.edu/open_etd/2712

REANALYSIS OF SOME EFFECTS OF THE MUTUAL EXCLUSIVITY
CONSTRAINT AND THEIR OPERATION IN
BILINGUAL CHILDREN

MARINA KALASHNIKOVA

Department of Languages and Linguistics

APPROVED:

Ellen Courtney, Ph.D., Chair

María Blume, Ph.D.

Ana Schwartz, Ph.D.

Patricia D. Witherspoon, Ph.D.
Dean of the Graduate School

Copyright ©
By
Marina Kalashnikova
2009

DEDICATION

I dedicate this thesis to my parents Anatoly Kalashnikov and Liudmila Kalashnikova and my sister Anna Kriuchkova who have provided me their unconditional support in every step of my professional and personal life.

REANALYSIS OF SOME EFFECTS OF THE MUTUAL EXCLUSIVITY
CONSTRAINT AND THEIR OPERATION IN
BILINGUAL CHILDREN

By

MARINA KALASHNIKOVA, B.A.

THESIS

Presented to the Faculty of the Graduate School of
the University of Texas at El Paso

in partial fulfillment

of the requirements

for the degree of

MASTER OF ARTS

Department of Languages and Linguistics

UNIVERSITY OF TEXAS AT EL PASO

December 2009

ACKNOWLEDGEMENTS

I am grateful to my thesis director, Dr. Ellen Courtney, who awoke my passion to psycholinguistics and first language acquisition, has been a source of inspiration during my studies, and who has patiently guided me through all the process of creation of this work. I am also thankful to my thesis committee members, Dr. María Blume and Dr. Ana Schwartz for their valuable advice on methodology and analyses undertaken in this study.

I am particularly thankful to Dr. Christina Sobin who provided me her help and expertise in statistical analyses for this study. In addition, I am grateful to Liliana Alvarado who created some of the stimuli used in the experimental tasks.

This work would not have been possible without the collaboration of the day care administrators, adult participants, parents, and preschoolers who accepted to participate in the study. I am especially thankful to my fellow members of the UTEP Language Research Lab who provided their insights on the creation of this study and helped me in the process of data collection.

I am indebted to the Department of Languages and Linguistics of the University of Texas at El Paso, and especially, to all its faculty members who participated in my formation as a professional and who provided me with the knowledge and motivation that have brought me to this point in my career.

ABSTRACT

This study investigates the operation of the Mutual Exclusivity constraint in two groups of three-year-old children: monolingual Spanish speakers and bilingual Spanish-English speakers. Previous research has yielded controversial findings regarding the differences in the intra-lingual level operation of the constraint in monolingual and bilingual children. This investigation sheds light on the conflicting outcomes of previous studies by proposing that non-linguistic cognitive and processing abilities may account for the effects attributed to the constraint and that there may be observable differences in monolingual and bilingual children in the development of some—but not all—of these abilities. Although, this study yielded no significant differences attributable to bilingualism, it was found that children’s performance varies in the tasks designed to test different Mutual Exclusivity effects. Accordingly, Mutual Exclusivity effects should be related to both linguistic and cognitive development. Finally, methodological implications for future research on this issue are discussed.

TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS.....	v
ABSTARCT.....	vi
LIST OF TABLES.....	x
1. INTRODUCTION.....	1
2. BACKGROUND REVIEW.....	5
2.1. The Mutual Exclusivity Constraint.....	5
2.2. Experimental Evidence for Mutual Exclusivity in Monolingual Children.....	7
2.3. Speculations on the Nature of Mutual Exclusivity.....	9
2.4. Mutual Exclusivity in Bilinguals.....	10
2.5. Issues Observed in Research on Mutual Exclusivity in Bilinguals.....	11
2.6. Alternative Accounts for the Mutual Exclusivity Effects.....	15
2.6.1. Understanding of Intentionality.....	16
2.6.2. The Ability to Follow Sociopragmatic Cues.....	17
2.6.3. Intentionality and Theory of Mind.....	18
2.6.4. Metalinguistic Awareness and Attentional Control.....	20
2.7. Research Questions.....	23
2.8. Cognitive and Processing abilities.....	23
2.9. Differences in the Operation of ME in Bilingual and Monolingual Children.....	25
3. METHOD	27
3.1. Participants.....	28

3.2. Language Proficiency.....	29
3.3. Tasks and Procedures.....	30
3.3.1. The Disambiguation Task.....	30
3.3.1.1. Disambiguation Task A (Label condition).....	31
3.3.1.2. Disambiguation Task B (Fact Condition).....	33
3.3.2. Word Manipulation Task.....	35
3.4. Experimental Settings.....	39
4. ANALYSIS AND RESULTS.....	40
4.1. Study Design.....	40
4.2. Disambiguation	40
4.2.1. Disambiguation Task A.....	40
4.2.2. Disambiguation Task B.....	41
4.3. Word Manipulation.....	42
4.3.1. Novel Condition	43
4.3.2. Switched Condition.....	44
4.4. Discussion.....	44
4.4.1. PPVT and Language Proficiency.....	44
4.4.2. Disambiguation Task.....	45
4.4.3. Word Manipulation Task.....	47
5. CONCLUSIONS.....	51
REFERENCES.....	54
APPENDIX A: MATERIALS.....	60
APPENDIX B: TASK PROTOCOLS.....	64

APPENDIX C: CHILD AND ADULT LANGUAGE QUESTIONNAIRES.....69
APPENDIX D: INSTITUTIONAL REVIEW BOARD APPROVAL.....75
CURRICULUM VITA.....78

LIST OF TABLES

	Page
1. PPVT Form A and Form B Mean Scores.....	29
2. Mean Scores Indicating Adult Proficiency in Spanish and English.....	30
3. Experimental Design.....	40
4. Summary of the Participants' Performance in the Disambiguation Task.....	41
5. Mean Scores for the Word Manipulation Task.....	43
6. Summary of the Participants' Performance in the Word Manipulation Task.....	43

CHAPTER 1

INTRODUCTION

Every child faces the challenging task of learning the words of his or her language. Babies start producing their first words around the age of one. They start naming some of the objects that surround them and then learn words to talk about other people, actions, places, and abstract ideas. In fact, infants are such successful word learners that by the age of three they have learned enough words to talk about almost everything in their environment. Parents, especially in the Western cultures, try to facilitate the task for their babies by explicitly pointing to objects and naming them. However, most often, parents do not speak directly to their babies, and if they do, they usually do not talk about the here and now (Bloom, 2000). Even in these circumstances, children map words to their correct meanings, since most three-year-olds are able to use the correct words to refer to objects, and even though they make mistakes such as calling a sheep “doggie”, these are rare, and rapidly corrected. Linguists, philosophers, and psychologists have been puzzled as they have tried to explain how such young children are able to succeed in such a challenging cognitive task.

The reason that the process of word mapping (i.e., matching word form to word meaning) is considered so challenging is that there can be hundreds of possible meanings for every word, and children have to select the correct one. For instance, when a person looks at an object and pronounces a word, that word can be the object’s name, but it can also refer to its shape, material, appearance, location, and so forth (Quine, 1960). It has been proposed and supported by experimental evidence (Markman, 1992) that there are certain constraints on which children rely in order to limit the number of possible meanings for every word. One of these constraints is *mutual exclusivity*, which biases young language learners to assume that all word forms

contrast in meaning. However, recent research has failed to confirm whether such biases also operate in children who acquire more than one language simultaneously. Bilingual children learn more than one word for almost every referent. While the nature of bilingual lexical acquisition seems to contradict mutual exclusivity, no clear evidence showing that the constraint fails to operate among bilinguals has been found.

Even though bilingual and monolingual language acquisition processes do differ in several aspects, there is not enough evidence to assume that word learning occurs through completely different mechanisms, and that the constraints that operate in monolinguals do not do so in bilingual children. Therefore, extensive research has been conducted to investigate the operation of the mutual exclusivity constraint in bilingual children in order to account for the differences that exist in its operation in bilinguals and monolinguals. However, no conclusive results have been obtained. Alternative accounts for lexical acquisition have been proposed claiming that children rely on more general sociocognitive abilities instead of being biased by a language specific constraint. These accounts have also proposed explanations for the process of word learning in bilingual children.

In this thesis, I propose to associate the mutual exclusivity constraint to general sociocognitive and processing abilities such as the understanding of intentionality and attentional control. I investigate the operation of the mutual exclusivity constraint in monolingual and bilingual three- and four-year-old children in order to fulfill the two main aims of this study, which are:

(1) to reinterpret the mutual exclusivity effects according to the cognitive abilities that underlie them,

(2) to inform the controversy about the intra-linguistic operation of mutual exclusivity in bilingual children by showing that they are more successful than monolinguals in the tasks that require them to activate high levels of attentional control.

I begin with a discussion of the role of the mutual exclusivity constraint in early lexical acquisition (Golinkoff, Mervis, & Hirsh-Pasek, 1994; Markman, 1992) in Chapter 2. Subsequently, I present a discussion of the four effects through which mutual exclusivity is manifested in children's behavior, along with the experimental studies that have investigated these effects in monolingual children (Merriman & Bowman, 1989; Merriman & Schuster, 1991; Merriman & Stevenson, 1997) Also, I present a review of the previous research on the operation of the mutual exclusivity constraint in monolingual and bilingual children. I review work by Ellen Markman and colleagues (Liittschwager & Markman, 1991; Markman & Wachtel, 1988; Markman, Wasow & Hansen, 2003) who have investigated the operation of lexical constraints in infants and young monolingual children. In addition, I present a summary of studies that have investigated the operation of the constraint among bilingual children at the intra-lingual level (Au & Glusman, 1990; Davidson & Tell, 2005; Merriman & Kutlesic, 1993, among others). This is followed by a discussion of cognitive abilities such as the understanding of sociopragmatic cues (Tomasello, 2000), theory of mind (Bloom, 2000; Disendruck & Markson, 2001), metalinguistic ability (Bialystok, 2001) and attentional control (Byalistok, 1999) which are discussed as they relate to alternative accounts for lexical acquisition which reject the proposal of the operation of a lexical constraint.

In Chapter 3, I proceed to discuss the details of this study and the experimental tasks that were completed by the participants. Chapter 4 presents a discussion of the analyses undertaken for this study and a discussion of the results in light of the background studies reviewed in

Chapter 2. Chapter 5 presents a general discussion of this study's findings in conjunction with an examination of its limitations and insights on the direction for further research on the issue.

CHAPTER 2

BACKGROUND REVIEW

2.1. The Mutual Exclusivity Constraint

The process of mapping or assigning words to their correct referents is challenging because of the referential ambiguity that exists when a child is faced with a novel word. As noted in Quine (1960), there is an infinite number of possible referents that an unfamiliar word can have. When a child hears a novel word, she forms hypotheses about its possible meanings and relies on input in order to select the correct hypothesis. Without help, this process would be extremely lengthy and difficult. However, since children acquire words rapidly and easily, and we do not see adults often correcting them for labeling objects in the wrong way, it has been proposed that several constraints operate in order to restrict the number of hypotheses and facilitate the inferential process of word learning (Golinkoff, Mervis, & Hirsh-Pasek, 1994; Markman, 1992). Some of these constraints are the Whole Object constraint, the Taxonomic constraint and the Mutual Exclusivity constraint. The Whole Object constraint biases children to assume that a novel word refers to an object as a whole rather than to one of its parts. The Taxonomic constraint biases children to assume that a novel word refers to a particular object and other instances of its kind. The Mutual Exclusivity constraint is the bias that leads children to reject more than one label for each referent (see Markman, 1992 for a detailed discussion of the constraints). This last constraint is the focus of this study.

Mutual Exclusivity, herein referred to as ME, is the constraint that biases young word learners to reject more than one label for a particular object. In other words, an object cannot have more than one label according to this constraint. This bias presents several advantages for children. First, in a situation in which a child hears an unfamiliar name in the presence of an unfamiliar object, she will be biased to map that label to that referent. Also, it helps children

recover from overextensions since when children learn the correct label for an object, they remove that referent from the scope of the overextended label. Lastly, it operates jointly with the other lexical constraints, mentioned above, to guide children in the acquisition of names for categories and parts of objects (Markman, 1994).

Merriman and Bowman (1989) proposed four effects that illustrate the operation of ME. These four effects describe the behaviors observed in children as a consequence of the ME constraint:

- *Disambiguation* is the tendency to select a novel object rather than a familiar object as the referent of an unfamiliar name in the situations where the referent of that name is ambiguous. For example, children tend to select a palette instead of a cup when asked to select a “pilson” because they already know the label for a cup (Merriman & Bowman, 1989).
- *Rejection* refers to children’s resistance to learning a novel label for something that they can already name. For instance, if a child knows what “dog” refers to, and an adult points to a dog and says: “Poodle”, the child might answer, “No, dog”, thus rejecting the novel name introduced by the adult.
- *Restriction* refers to children’s tendency to avoid extending a familiar name to a referent that they can already label. In other words, children manifest this effect by assuming that an object cannot be referred to by two familiar names of the same level (e.g., the same object being referred to as “glass” and “cup”).
- *Correction* is manifested when children stop referring to an object by a name after hearing it called by a different name. Children mainly exhibit correction when they

overcome overgeneralizations. A child will stop calling a wolf “dog” after learning the name “wolf” (Merriman & Stevenson, 1997). While correction and rejection seem to be contradictory effects, they have been both observed in children. Extensive input containing the new label provided by the adults can lead the child to learn the new label instead of rejecting it (Merriman & Bowman, 1989). Furthermore, it has been proposed that linguistic experience and cognitive development lead children to acquire the Expert Principle (Mervis, 1987 as cited in Merriman & Bowman, 1989) according to which they acknowledge adult’s expertise in labeling and categorization issues. Therefore, children learn to adopt the new label provided by an adult instead of immediately rejecting it.

These four manifestations of the ME constraint have been analyzed separately in various experimental studies to be discussed below. The present study concentrates on analyzing three of the effects: disambiguation, restriction, and rejection. The correction effect is not considered in this design. The analysis of this effect is better achieved in longitudinal studies in which child participants can recognize the experimenter as an authority in naming objects, and in which they can receive extensive input containing the novel label.

2.2. Experimental Evidence for Mutual Exclusivity in Monolingual Children

Extensive experimental evidence has supported the operation of ME. Markman and Wachtel (1988) conducted six studies to observe how monolingual English-speaking 3-year-olds behave when they are presented with second labels for familiar objects. They found that children reject second labels, instead, assigning them to objects they cannot already name. In the case where the only object presented to them is familiar, they reject the second label as referring to the whole object, instead assigning the label to one of the object’s parts, its substance or attribute. They concluded that ME is a constraint that enables children to learn labels for novel

objects, their parts, and their attributes. In later research, Merriman and Bowman (1989) conducted multiple studies to investigate the four effects through which the constraint is manifested. Their findings were similar to those of Markman and Wachtel (1988). Monolingual English-speaking children older than 2 years assigned novel labels to unfamiliar objects and refused to extend a familiar label to novel referents. These findings led them to conclude that the ME constraint guides children in the process of acquiring object labels.

Merriman and colleagues have conducted a variety of studies to test the four ME effects separately in English-speaking young children. They have found that children between the ages of 2 and 4 years manifest the disambiguation effect when presented with two objects, one of which is unfamiliar (Merriman & Schuster, 1991). Two-year-olds were also found to exhibit the restriction effect. After they have learned a novel label for a novel object, they avoided selecting that object as one of the referents of a familiar name, instead selecting unnamed exemplars for that label (Merriman & Stevenson, 1997). The rejection effect was also observed in young children. Two and four-year olds were presented with novel labels for objects that were unfamiliar to them. When presented with a second novel label for each object, they showed a preference for the first label that they were taught, therefore rejecting the new one (Merriman & Bowman, 1989). The same study also looked at the correction effect in young monolingual children. If instead of rejecting the novel label, children assigned it to the experimental object, it was considered evidence for the correction effect. In these cases, children did accept the second novel label and suppressed the name that they had been taught before. However, this outcome is questionable since children did not receive much input with the two labels. Therefore, they might have accepted the second label merely because they had forgotten the first one. However, the

findings regarding the other effects are evidence for the operation of the ME bias in children older than 2 years of age.

Most evidence for ME has showed that the constraint operates following the naming explosion or word spurt that takes place at around the age of 2;0. This has led several researchers to claim that ME is a heuristic that children acquire after they have had enough experience with language (Merriman & Kutlesic, 1993). This is supported by Merriman and Bowman's (1989) finding that children are not biased by ME before the age of 2;0. However, later studies have shown that this might have been a matter of methodology. When presented with tasks appropriate to their age, babies as young as 16 months of age show that they are already constrained by ME (Liittschwager & Markman, 1991; Markman, Wasow, & Hansen, 2003). Older children may be able to learn more than one label for an object when presented with the right input, but these studies show that ME helps children interpret new words even before the word spurt.

2.3. Speculations on the Nature of Mutual Exclusivity

The contradictory findings regarding the age at which ME begins to operate motivate questions about the nature of ME. Is it an innate constraint specific to language acquisition, an acquired heuristic useful for word learning, or a cognitive constraint that is not language specific and that operates in other domains? Several other principles such as the Principle of Contrast (Clark, 1993), the Novel Name – Nameless Category Principle (Golinkoff, et al., 1994), the One-to-One Mapping Principle (Slobin, 1973), and the Uniqueness Principle (Pinker, 1984) have been proposed to account for children's resistance to accepting multiple forms for particular meanings in the acquisition of the lexicon, morphology and syntax. A clear relationship of ME to these principles has not been established, but recent studies suggest that this constraint and others

are products of both cognitive and linguistic development (Golinkoff et al., 1994). This possibility will be discussed in the following sections.

2.4. Mutual Exclusivity in Bilinguals

Bilingual lexical acquisition seems to challenge the notion of ME. Every bilingual speaker knows that more than one word can refer to the same concept or referent. Most information concerning bilingual language acquisition comes from several early case studies (Leopold, 1939-49; Vihman, 1985; Volterra & Taeschner, 1978, among others). These studies provide evidence for the existence of cross-linguistic synonyms in the lexicons of young bilingual children. Vihman (1985) pointed out that her son Raivo, who was acquiring English and Estonian, had a 76 percent overlap between his two vocabularies by the age of two. Leopold (1939-49) mentioned that his daughter Hildelgard showed evidence of understanding doublets (two words from different languages that share the same meaning, also known as cross-linguistic synonyms), but she chose to use only one word of each pair because of pronunciation difficulties.

The fact that cross-language synonyms, or doublets, do exist in the early bilingual lexicon challenges the notion that a single object cannot be referred to by more than one word. However, this apparent challenge has been accounted for by claiming that ME does not operate across lexicons (Clark, 1993; Markman & Wachtel, 1988). In other words, ME prevents lexical overlap within each lexicon but allows for doublets across the two lexicons. Volterra and Taeschner (1978) found few doublets in the early bilingual lexicons of their subjects, which led them to conclude that children's lexicons are not yet differentiated during the earliest stages of acquisition. Later, around the age of 2;0, when the lexicons are differentiated, doublets start appearing. Based on this evidence, it has been proposed (Clark, 1993; Markman & Wachtel,

1988) that children do not have doublets at the early stages because ME is operating within their unitary bilingual lexicon. Later, after lexical separation, ME cannot block the doublets anymore, but it continues operating within each lexicon (Clark, 1993). However, this claim has not been confirmed by experimental evidence. Pearson and colleagues (Pearson, Fernandez, & Oller, 1995) found that bilingual children produce doublets among their first words, at around eighteen months of age. Because of this, the extent to which ME operates cross-linguistically in bilinguals remains an issue.

2.5. Issues Observed in Research on Mutual Exclusivity in Bilinguals

During the last several decades, many researchers have been concerned with investigating the operation of ME in bilingual children in order to explain two issues: (1) bilingual children's violations of ME, and (2) ME differences in monolingual and bilingual children. The highlights of the different studies are presented below.

One of the first studies concerned with comparing the operation of ME among monolingual and bilingual children was conducted by Merriman and Kutlesic (1993). They assessed 5- to 6- and 7- to 8- year-old monolingual English-speaking and bilingual Serbian-English speaking children on tasks designed to elicit the correction and restriction effects. They investigated whether bilingual and monolingual children would manifest the restriction and correction effects when presented with novel labels. The novel labels that they used came from two conditions. The labels of the first condition were novel words following English phonotactics. The labels of the second condition were French words (none of the children spoke French). The purpose of including two conditions was to observe whether children would treat novel labels differently if they knew that they came from the same or from a different language. In both conditions (English and foreign language), children were presented with a group of

objects that shared similar physical features. Then, they were taught a novel word for one of the objects, and asked to find other instances of it. After that phase, children were taught a second novel word for a different object and asked the child to find other instances of it. The intention was to observe whether or not children would allow both labels to overlap, and therefore would select different referents for every novel label. Other studies used similar procedures to investigate the issue. An earlier study by Au and Glusman (1990) also investigated how children would treat novel labels if they came from a different language (Spanish in their case). Davidson and colleagues (Davidson, Jergovic, Imami, & Theodos, 1997) assessed the intra-lingual operation of ME through observation of the disambiguation, rejection, and restriction effects. They replicated the study conducted by Merriman and Bowman, but only the first condition where the novel labels followed English phonotactics. A discussion of the findings of these studies follows, along with the findings of the studies that investigated bilingual performance in word manipulation tasks and the differences between the operation of the ME constraint in bilingual and monolingual children.

1. The effect of age on the mutual exclusivity constraint within the languages of a bilingual has been disputed. Merriman and Kutlesic (1993) did not observe any effect of bilingualism on the operation of the constraint in their first experimental condition (where English novel labels were used). However, they did find significant developmental differences. Older bilingual and monolingual children manifested the ME effects more than the younger participants of the study. The results obtained by Davidson and colleagues (1997), on the other hand, slightly differed from those of Merriman and Kutlesic (1993). Monolingual youngsters from their study also relied on ME more heavily as they grew older, but the same difference was not found among bilinguals. Younger and older

bilinguals showed similar results in this study. The findings of increasing reliance on the bias with age contradict the studies on monolingual infants who show the ME effects by 16 months (Liittschwager & Markman, 1991; Markman 1994; Markman et.al., 2003). They also challenge the proposal that ME is a probabilistic bias that can be overridden through greater linguistic exposure (Markman, 1992).

2. *The effect of using two languages in mutual exclusivity tasks has yielded contradictory findings.* The second condition (foreign language condition) from the study by Merriman and Kutlesic (1993) showed that bilingual children corrected and restricted to a lesser extent than their monolingual peers when they realized that the novel labels came from a foreign language. In other words, bilinguals treat labels differently when they realize that they are cross-linguistic synonyms. However, the researchers acknowledged that their results did not converge with those of an earlier study by Au and Glusman (1990). The results of this study showed that both monolingual and bilingual children were less constrained by ME when they realized that the labels came from different languages. Merriman and Kutlesic (1993) claimed that the discrepancies between the two similar studies might have been attributable to methodological issues. However, they accounted for their findings by explaining that bilingual children are more susceptible to sociolinguistic factors, and they are more familiar with situations where ME is overridden because the two labels for the same referent come from different languages.

3. *Studies have yielded conflicting findings regarding bilingual advantages in overcoming the constraint in tasks involving word substitution.* These are the tasks that require children to change the labels of familiar objects and use the new labels in sentences, usually as part of a word game. Ben-Zeev (1977) created a task where children were required to

substitute a familiar word for another familiar word and use it in a sentence (e.g., If the word for “we” is “spaghetti”, how would you say, “we are good children?”). She found that 4- to 9-year-old bilingual children were more successful in this task than their monolingual counterparts. Pinker and Rosenblum (1983) assessed the same ability in monolingual and bilingual 4-year-olds using the Sun-Moon task (Piaget, 1929). In this task, children are told that the name of one object will be changed to the name of another, and they are then asked questions about the object (e.g., If the “sun” is called “moon”, what will come out in the sky at night?) Contrary to Ben-Zeev, they did not find a significant bilingual advantage. Another study that used the same task did find a significant advantage in bilinguals (Cummins, 1978, as cited in Bialystok, 2001). However, all these researchers observed that bilingual children are more attentive to the sociolinguistic aspects of labeling than monolinguals because they know that different names can be used for the same object in distinct situations.

4. The extent to which the constraint operates separately in each of the lexicons of a bilingual remains to be seen. Despite the vast evidence supporting the operation of ME in monolingual children, and the findings that it fails to operate across languages in bilinguals, no conclusive findings have revealed to what extent bilingual children rely on this bias intra-linguistically. In other words, research has not shown if the constraint operates to the same extent in bilinguals as in monolinguals. The study by Merriman and Kutlesic (1993) mentioned above is one of the main investigations of the issue. Aside from the developmental differences outlined earlier, they did not find significant differences related to children’s bilingualism, i.e., bilingual children’s correction and restriction behaviors patterned with those of monolingual children. Most of the later

studies that investigated the ME effects in bilinguals (Au & Glusman, 1990; Campbell, 2007; Davidson & Tell, 2005, among others) have found that the constraint does not operate intra-linguistically in bilinguals to the same extent as it does in monolinguals. Furthermore, Davidson and Tell (2005) proposed that bilinguals might be less susceptible to this and other lexical constraints based on their evidence that bilingual children are more successful than monolinguals in overcoming ME in tasks that involve naming whole objects. Differences found among bilinguals and monolinguals have been attributed to the bilinguals' more extensive exposure to language and their experience of having to overcome the constraint when two labels for the same referent come from two different languages. However, it must be taken into consideration that most of the studies referred to above investigated different age groups (ranging from 3 to 8 years), different languages (Greek, Urdu, English, Serbian), and different ME effects using a variety of testing procedures. These differences might account for the conflicting findings. For this reason, more evidence is needed in order to establish the nature of the performance differences that occur among bilingual and monolingual children when they participate in tasks that elicit the ME effects.

It must be mentioned that the various studies discussed above have all viewed ME as a phenomenon specific to the word-learning process in language acquisition. However, the discrepancies observed in the findings of these studies and the controversies that these discrepancies have originated have led other researchers to propose alternative explanations for the behaviors associated with ME. These alternative accounts are discussed in the following section.

2.6. Alternative Accounts for the Mutual Exclusivity Effects

The various controversies outlined above reveal a lack of consensus on the nature of the operation of ME in bilingual children. While previous research has clearly failed to show that bilingual children do not rely on ME, it is evident that bilinguals are more successful in overcoming some of the effects attributable to the ME constraint. The observed violations of the constraint and the discrepancies in the research findings might be used as evidence that this specifically linguistic constraint does not really exist (Nelson, 1988). The following discussion presents insights from previous studies that suggest that the ME effects can be explained without resorting to linguistic constraints on word learning. These alternative accounts also shed light on the apparent “violations” of the constraint observed in bilinguals, which may be attributable to bilingual children’s having particular cognitive advantages.

2.6.1. Understanding of Intentionality

Unlike other species, humans have the unique ability of assessing their own state of mind as well as that of other people. Infants acquire this ability at early stages of development and become sensitive to the thoughts of other people and their referential intentions (Sodian, 2005). This ability has been tightly linked to the word learning process since it has been suggested that children use this sensitivity to intentionality in order to figure out the correct meanings of words. The following discussion presents the two main approaches that support this account. These approaches are not contradictory since they both support the notion that word learning can be explained in terms of more general sociocognitive abilities that are developed early in infants instead of having to introduce specific constraints on word learning. However, the first account, whose chief proponent is Tomasello (2000), links the understanding of intentionality to children’s general understanding of communicative actions. The second account proposes that

the understanding of intentionality is an aspect of children's Theory of Mind (Bloom, 2000).

Both accounts are discussed below.

2.6.2. The Ability to Follow Sociopragmatic Cues

Sensitivity to sociopragmatic cues is an ability that has been proposed to account for the word learning process without the need for language specific constraints. This idea is embodied in the social-pragmatic approach, which views words or linguistic symbols as a medium through which humans invite others to experience situations and try to influence the interest and attention of other members of their speech community (Tomasello, 2000). According to this view, children follow social cues in order to interpret the communicative intentions in the use of words by adults in certain situations, and subsequently, use the same words when they wish others to experience a similar situation in the same way. In other words, it is the children's socio-pragmatic abilities, and not language specific constraints, that allow them to succeed in the word-learning process.

Supporters of this approach (Houston-Price, Plunkett, & Duffy, 2006; Tomasello, 2000) have claimed that the test of the disambiguation effect commonly used in research on ME does not involve much social interaction. Therefore, experimental studies have been conducted that include tasks that require children to rely on various socio-pragmatic skills.

For instance, Baldwin and colleagues (Baldwin, Markman, Bill, Desjardins, & Tidball, 1996) found that 18-month-old infants avoid assigning a label to a novel object when the referential intent of the adult who said it was unclear (the adult said the word in a telephone conversation while the child was looking at the object, for example). This shows that at a very young age children perceive the speaker's referential intent when establishing reference. In a different study, it was shown that children are also sensitive to their interlocutors' perceptions of

novelty (Akhtar, Carpenter, & Tomasello, 1996). In this study a child and several adults played with toys, none of which were labeled for the child. One adult left the room for a short period of time. The other adult introduced a new toy to the child at that time. When the first adult came back, he exclaimed “Look, there is a toma”. In a comprehension test, children showed that they had assigned this novel word to the object that was introduced when the adult was absent. This showed that children understood that the adult would not show excitement and comment about an object that was not novel to him.

In a set of studies conducted by Tomasello and colleagues (discussed in Tomasello, 2000), it has been demonstrated that children are highly sensitive to adults’ communicative intentions. For instance, in one of the studies conducted with 24-month-olds (Tomasello & Barton, 1994), a researcher took the child to see five buckets and announced that they would look for the “toma”. The experimenter took objects one by one out of the buckets and showed disappointment until she had reached the correct bucket and exclaimed “Ah!”. In a comprehension and production task, children showed that they had assigned the novel label to the correct referent. This also shows that children understood the adult’s intention of finding the object, and that they were able to keep track of the adult’s emotional state until the correct object was found (Tomasello, 2000).

2.6.3. Intentionality and Theory of Mind

Theory of Mind is a term used in psychology to describe the speakers’ ability to attribute mental states to others (Wilde & Baird, 2005). Some of the abilities that have been attributed to Theory of Mind are appropriate interpretations of non-literal language and successful performance on the false-belief task. In both, success relies on making inferences about the thoughts of other people. Of interest in this discussion is the proposal that Theory of Mind may

explain the process of word learning. On this view, when children learn new words, they are learning something about the thoughts of other people, that is, they must understand people's referential intentions in order to determine the meaning of a new word. Accordingly, Theory of Mind underlies children's ability to figure out which entities words refer to and to understand the relationships between words and their nature as communicative signs (Bloom, 2000, p.56). If these abilities related to Theory of Mind are what children rely on when they are learning the words of their language, then there is no need to propose linguistic constraints or biases in word learning (Diesendruck & Markson, 2001).

This approach also accounts for children's preference for one-to-one mappings. The following example, adopted from Bloom's discussion on the issue, illustrates a situation in which a child is presented with a novel word that has an ambiguous referent:

1. A child sees a spoon and a whisk. Then, an adult says: "Give me the whisk".
2. The child thinks: "If the adult wanted the spoon, he would say: 'Give me the spoon' because we both know that it is the name for that object. Therefore, the adult wants the other object that I do not have a name for".
3. The child picks up the whisk and gives it to the adult. (Bloom, 2000, p.68)

In step 1, the child is presented with a novel label whose meaning is ambiguous. Step 2 illustrates how the child makes inferences about the adult's thought and intention in order to map the novel word successfully. In step 3, the child solves the labeling problem.

It might be argued that the same reasoning is followed when a child is constrained by ME, as exhibited in the disambiguation effect. In order to prove the opposite, Diesendruck and Markson (2001) designed a study to investigate whether 3-year old children would successfully perform fast mapping when objects were presented with labels or with facts. In a disambiguation

task, commonly used in ME research (Markman & Wachtel, 1988), they included a label and a fact condition. In the label condition, the child was presented with two objects. The experimenter named one of them with a novel name (e.g., “This is a zev”). Then, the experimenter asked for one of the objects by using a different name (e.g., “Give me the jop”). In the fact condition, the same procedure was followed, except that instead of labels, general referential facts were used (e.g., “This one is from Mexico” and “Give me the one that my sister gave me”). Their prediction was that if children showed disambiguation only in the label condition, it would be evidence for a constraint unique to word learning. However, if they also showed disambiguation in the fact condition, one could conclude that children are guided by their sensitivity to the referential intentions of others, as illustrated in the example above. They found the second outcome. Other studies have replicated these procedures by testing 2- and 3-year-olds with different results (Scofield & Behrend, 2007). They proposed that their findings supported the ME approach instead of what was proposed by Diesendruck and Markson.

Up to this point, the discussion has mainly focused on the sociopragmatic and cognitive abilities that facilitate the word learning process; abilities which appear to account for the behavior described as the disambiguation effect of the ME constraint. The following section addresses the ability that underlies the behaviors exhibited in the restriction and rejection effects of ME.

2.6.4. Metalinguistic Awareness and Attentional Control

The term *metalinguistic* refers to the unconscious knowledge that speakers have about language in general. Besides possessing this knowledge, speakers also have the ability of activating metalinguistic awareness. This is the most contradictory aspect of metalinguistic ability since the presence of the term “awareness” seems contradictory to the unconscious nature

of this knowledge. However, metalinguistic awareness is only momentarily achieved when a speaker needs to pay attention to specific language forms or explicit properties of language (see Bialystok, 2001 for a discussion).

According to Bialystok (2001), two main processing components underlie the ability to activate metalinguistic awareness momentarily: *analysis* and *attentional control*. Analysis is the ability to represent explicit and abstract structures, i.e., to relate semantic representations to the formal or symbolic aspects of language. For example, this processing component is activated when a speaker must assess the grammaticality of a string. Attentional control, on the other hand, refers to the ability to selectively attend to specific aspects of a representation (Bialystok, 1991). It is the process of selecting the part of the representation to pay attention to (consciously or unconsciously) (Bialystok, 1999). An example of a task where high levels of attentional control are activated is the Stroop Task, in which participants are required to direct their attention away from the word form in order to focus on the color in which the word is printed. While analysis and attentional control operate together when a speaker engages in metalinguistic tasks, several experiments have been designed to make the speaker activate higher levels of one or the other of the processing components.

Studies conducted to assess metalinguistic ability in monolingual and bilingual children have found a significant difference related to bilingualism when children performed tasks that activated only one of the processing components. While monolingual and bilingual children performed equally well in tasks that required higher reliance on analysis, bilinguals outperformed monolinguals in tasks involving attentional control (Bialystok, 1999, 2001). For instance, these differences have been demonstrated in grammaticality judgment experiments. When bilingual and monolingual children were presented with an ungrammatical sentence such

as **The dog bark*, both groups were equally successful in judging the sentence as ill formed. However, when presented with a grammatical but implausible sentence such as *The cat barks*, bilingual children more successfully determined that the sentence was grammatical. That is, the monolingual children judged the sentence as ungrammatical because they were misled by the meaning of the string. According to Bialystok (2001), bilingual children are better able than monolingual children to divert their attention from the anomalous meaning of the sentence, focusing exclusively on grammaticality (Bialystok, 1999).

Another kind of task that requires the speaker to activate high levels of attentional control is the word substitution task. In this task, a child is asked to substitute a familiar label for another familiar label and to use the new label in a sentence. While monolinguals struggle in these tasks, bilinguals have been found to manipulate labels successfully (see Bialystok, 2001 for a summary). It could be proposed that bilinguals outperform monolinguals in this task because the ME constraint does not operate in bilingual children. However, it has been discovered that in order to succeed in these tasks, children must be able to direct their attention to the form and not the meaning of a word because the form is changed, but the meaning remains unaffected (Bialystok, 1999). Attentional control is responsible for this ability. Monolingual children are unsuccessful in these tasks since they are not able to activate high levels of attentional control that would allow them to divert their attention from the meaning of a word to its form.

Researchers seek to understand why bilinguals are more successful in activating higher levels of attentional control than monolinguals. It has been proposed that this difference can be attributed to the unique nature of the bilingual experience. Bilingual children, from early on, have to pay attention to abstract aspects of language (Bialystok, 1999). For instance, they realize that different language forms can be used in different situations and that the relationship between

meaning and form is arbitrary and conventional. Also, they must activate attentional control in order to constantly suppress one of their languages in speech production (Kroll & Tokowicz, 2001). This linguistic experience allows bilingual children to develop their ability to direct attention to only specific aspects of language. Monolinguals develop this later, after they have acquired more extensive linguistic experience (Bialystok, 2001).

2.7. *Research Questions*

The studies on the ME constraint summarized and analyzed in the previous sections have all yielded evidence that young children are unwilling to accept overlapping reference. They have also shown that children demonstrate four effects through which the constraint operates. However, the studies that were concerned with examining the intra-linguistic operation of ME in bilingual children have failed to produce conclusive results. They yielded conflicting findings because they failed to determine the exact nature of the differences in the operation of ME in bilingual and monolingual children. In light of these unresolved issues, I will consider two possibilities for the present study:

(a) non-linguistic cognitive and processing abilities may account for the effects attributed to the ME constraint, and

(b) there may be observable differences in monolingual and bilingual children in the development of some—but not all—of these abilities.

2.8. *Cognitive and Processing Abilities*

The four effects proposed as manifestations of the ME constraint on word learning have previously been classified in two categories based on whether the child exhibits the effects when presented with novel or with already familiar labels. *Disambiguation* and *Rejection* group together because they relate to the child's interpretation of novel words. The child who manifests

these effects either learns a novel name for a novel object (disambiguation) or rejects a novel name for an already named object (rejection). *Restriction* and *Correction*, by contrast, relate to the child's interpretation of familiar words. Here, the child can restrict a familiar name for one specific category (restriction) or stop calling an object by a familiar name when presented with a different name for it (correction).

As previously discussed, studies based on this classification of the ME effects have failed to achieve clarity and consensus on the process of word learning. In the present study, I propose that a reinterpretation of the effects will be more effective in capturing the cognitive processes that generate these behaviors. In order to address proposal (a) above, I reinterpret and regroup three of the effects attributed to the ME constraint according to the cognitive processes that underlie them. I propose two new categories. The first category isolates the disambiguation effect, while the second includes both the restriction and rejection effects.

1. Category#1: Disambiguation effect

This effect describes children's tendency to assign an unfamiliar label to an object that they cannot name. It will be analyzed as the manifestation of the child's socio-pragmatic abilities instead of being treated as the outcome of a linguistic constraint. It is therefore proposed that in a situation where children have to disambiguate the meaning of a novel word, they rely on their understanding about the referential intentions of their interlocutors and about the nature of the communication process (Bloom, 2000; Disendruck & Markson, 2001; Tomasello, 2000). This understanding helps them achieve the correct and fast mapping of novel forms to their meanings without having to rely on a linguistic bias.

2. Category#2: Restriction and Rejection effects

These two effects are collapsed into one category because both describe children's behavior when they are presented with a second label for an object that they can already name. In the case of restriction, that label is familiar, and children avoid extending the familiar label to a new referent. In the case of rejection, that label is novel, and children avoid assigning a novel label to an object that they can already name since that would lead to two labels sharing the same referent. As illustrated in the discussion above, adults do not manifest the same behaviors and children can overcome these tendencies as they acquire more extensive linguistic experience (e.g., the word substitution tasks). I propose that both behaviors are linked to a processing component, namely attentional control, which allows speakers to focus their attention on a specific aspect of a representation, a cognitive processing ability that develops with age and linguistic experience. By activating higher levels of attentional control, speakers become more successful in tasks that require them to manipulate labels thus overriding the restriction and rejection effects.

2.9. Differences in the Operation of ME in Bilingual and Monolingual Children

This new classification of the ME effects allows us to address proposal (b), thus informing the controversy related to the operation of ME in monolingual and bilingual children. Previous research has shown that bilingual children are more successful than monolingual children in just some tasks related to ME. In light of the research findings discussed in this section, and in accordance with this reclassification, I predict that bilingual and monolingual children will be equally successful in disambiguation (Category #1) because this effect is a manifestation of the children's ability to attribute mental states to others and to perceive socio-pragmatic cues in the communication process. By contrast, bilingual children will outperform monolingual children in tasks related to Category #2 (restriction/rejection) because of their

ability to activate high levels of attentional control at earlier stages in the development than monolingual children. The goal of the present study is to present evidence supporting these predictions.

CHAPTER 3

METHOD

As discussed in the previous chapter, extensive research conducted on monolingual and bilingual children to investigate the effects of the ME constraint has left several questions unanswered. Mainly, it is still unclear whether the constraint operates differently in monolingual and bilingual children intra-linguistically. Furthermore, if such differences between the two groups do exist, neither the nature nor the source of the difference has been determined. We have seen that some researchers have suggested that the behaviors related to ME can be explained in terms of different cognitive and processing abilities not unique to language, and that the differences between monolinguals and bilinguals can be explained in terms of these abilities. This leads to the main goals pursued in this study, which are (1) to identify the cognitive and processing abilities that account for the effects attributed to the ME constraint in both monolingual and bilingual children, and (2) to investigate the differences in the operation of the constraint in bilingual and monolingual children.

In order to achieve the goals stated above, I proposed to regroup the ME effects into two categories: (1) disambiguation and (2) rejection and restriction. According to the previous research discussed in Chapter 2, different cognitive abilities are responsible for producing the effects that belong to each category. Three experimental tasks, which are described below, have been developed in order to provide support for the novel classification of the ME effects and to investigate their operation in young monolingual and bilingual children.

The *Disambiguation Task*, adapted from Diesendruck and Markson (2001), and subdivided into *Disambiguation Task A* and *Disambiguation Task B*, was included in the design in order to illustrate that the disambiguation effect is the product of the children's ability to

perceive the referential intentions of their interlocutors, and not a phenomenon specific to word learning. Accordingly, both monolingual and bilingual children should exhibit the effect when presented with general referential facts instead of novel labels. Finally, the purpose of the *Word Manipulation Task* is to observe whether or not bilingual children, compared to monolinguals, activate higher levels of attentional control when presented with tasks that require them to manipulate labels, thus not exhibiting restriction and rejection.

3.1. Participants

This study included three groups of participants: 20 monolingual Spanish-speaking children, 20 bilingual Spanish-English children, and 16 bilingual Spanish-English adults. The group of adults was included merely as a basis of comparison with the children. Across groups, approximately half of the participants were male, and half were female. All the participants were recruited in the Ciudad Juarez-El Paso border region. Spanish is the official language of Ciudad Juarez, and it is the language spoken at home in over 70% of El Paso households (US Census Bureau). Since Spanish monolingualism and Spanish-English bilingualism predominate in the area, these language groups were selected for this study, and Spanish was designated as the main language to be used in the experimental tasks.

Child participants were selected between the ages of 3;6 and 4;6 ($M=4;1$). The average age of the monolingual children was 4;2 and that of bilingual children was 3;9. Both the bilingual and monolingual children were recruited at four daycare centers in Ciudad Juarez and El Paso. Specific information about children's linguistic background was obtained through a questionnaire completed by the parents.

Adult bilingual participants were recruited from the student population of the University of Texas at El Paso.

3.2. Language Proficiency

In order to determine proficiency in English and Spanish, children's receptive vocabulary in both languages was measured through the use of the Peabody Picture Vocabulary Test (PPVT, Dunn & Dunn, 1981). This standardized test was used to select bilingual participants and to make certain that the degree of Spanish proficiency was the same in the monolingual and bilingual groups. In the PPVT test, the experimenter shows the participant a card with four pictures and asks her to select the picture that corresponds to the label she hears. Bilingual children completed the standardized English version of Form A, and all the children (bilingual and monolingual) completed the translated Spanish version of Form B. According to their age range, children were tested from Set 1 (automatic base item = 1) to Set 8 (automatic ceiling item = 96). Testing stopped when the children reached eight incorrect items in a set, or when they reached item 96. Raw scores were computed and converted into standard scores based on the child's age and the test form. Although the PPVT is an instrument that provides only a rough measure of the children's linguistic proficiency in both languages, it has been used successfully in previous research as a means of determining the language proficiencies of monolingual and bilingual children (Bialystok, 1999; Davidson & Tell, 2005, among others).

The mean score obtained in Form B was 82.3 ($SD = 11.6$) for the monolingual children and 81.3 ($SD = 16.1$) for the bilingual children, indicating that the participants' proficiency in Spanish was similar in the two groups. The mean score obtained by bilingual participants in Form A was 80.7 ($SD=17.1$). Table 1 shows that the mean scores were comparable for both language groups and for both languages tested.

Table 1. PPVT Form A and Form B Mean Scores

Group	PPVT A M(SD)	PPVT B M(SD)
Monolingual	-	82.3 (11.6)
Bilingual	80.7(17.1)	81.3(16.1)

Adult participants completed a self-assessment questionnaire regarding their use and proficiency in their two languages. All the participants reported that their first language was Spanish. Half of them had acquired English before puberty, and half after puberty. None of the participants assessed their proficiency in reading, writing, speaking, and oral comprehension in both English and Spanish lower than 6 on a scale from 1 to 10. The average score for English proficiency was 8.4, and 9.7 for Spanish proficiency, which indicates that all the participants considered themselves highly proficient in both languages. Table 2 represents the average ratings for every language skill.

Table 2. Mean Scores Indicating Adult Proficiency in Spanish and English

Language Skill	English <i>M(SD)</i>	Spanish <i>M(SD)</i>
Reading	8.44 (.964)	9.69 (.479)
Writing	8.38 (.957)	9.69 (.479)
Speaking	8.25 (1.065)	9.81 (.403)
Oral Comp.	8.56 (.892)	9.69 (.479)

3.3. Tasks and Procedures

3.3.1. The Disambiguation Task

This task was adopted from Diesendruck and Markson (2001). It combines the task most widely used in experiments that investigate the ME constraint on assigning labels to objects (Davidson et al., 1997; Markman & Wachtell, 1988; Merriman & Bowman, 1989) with a variation proposed by Diesendruck and Markson (2001) to include facts instead of labels in one of the conditions. It was included in the present research design in order to provide evidence for the assumption that children manifest the disambiguation effect because they have the ability to rely on their understanding of the referential intentions of others and not because they are biased by a linguistic constraint such as ME. Therefore, two variations of the task were included, one in

which children were required to assign a novel label to an unfamiliar object, and one in which random referential facts about the objects were used instead of the novel labels. If children show the disambiguation effect only in the label condition, then it might be assumed that label assignment is biased by a specific linguistic constraint, i.e., ME. However, if this behavior is observed in both conditions, then it can be inferred that children rely on something that is not specific to language, that is, on their understanding of the referential intentions of their interlocutors. No differences were predicted with respect to bilingualism since the ability to exploit socio-pragmatic cues such as intentionality is not related to linguistic proficiency. These possible outcomes are reflected in the following experimental hypotheses:

H0.- Children will select objects at random in both tasks, failing to exhibit the disambiguation effect in either condition.

H1 (Main Hypothesis).- Children will exhibit the disambiguation effect in both conditions, i.e., the label condition and the fact condition. This would support the premise that children rely on their ability to understand the referential intentions of their interlocutors when they are presented with referential acts that have ambiguous meanings.

H2 (Alternative Hypothesis).- Children will manifest the disambiguation effect in the label condition but not in the fact condition. This outcome would support the claim that children are biased by a language-specific constraint such as ME.

3.3.1.1. Disambiguation Task A (Label Condition)

Materials

Sixteen objects were used in this task, assigned to two sets. Set A was the “Familiar Objects” set, and it included objects which are familiar to children around the age of three: apple, box, toy hammer, mirror, clock, comb, spoon, bottle, ball, shoe, and cup. Set B, the “Unfamiliar

Objects” set, included the following objects: dumpling maker, garlic press, spanner, a piece of wood, and a funnel. The classification of the objects as familiar and unfamiliar was not based on whether children had ever seen the object or not, since most of the objects can be found in a household. The classification was based on whether or not the children already knew the names for the objects. The size of the objects ranged from 3 to 6 inches in length, and they were controlled for brightness and salient features that might generate a preference in young children. Each experimental trial consisted of one familiar and one unfamiliar object (e.g., the spoon and the dumpling maker).

Procedures

All participants interacted with the same experimenter. During the first five minutes of the task, children underwent a familiarization stage. During this stage, they were presented with all the objects and were encouraged to play with them. This was included to familiarize the children with both familiar and unfamiliar objects, thus eliminating a possible bias in favor of the novel objects. If the children requested the name of any of the objects during this stage, the experimenter would either continue playing without naming it, explain the function of the object to the child (e.g., This one is used to fix things), or promise to tell the name a little later in case that the child was insistent.

All the objects were collected by the experimenter after the familiarization stage. The participants were told that in this game, the experimenter would give them two things and ask for one of them back, and that they would then return to the experimenter the thing that she asked for. Three object pairs were each composed of two familiar objects (apple – box, hammer – mirror, clock – comb), and the experimenter asked for one of the items in each pair using a familiar name. For instance, the experimenter put the apple and the box in front of the child and

said: “*Dame la manzana*” (“Give me the apple”). Since these pairs were included only as distractors to prevent the children from assuming that selecting the unfamiliar object was always the right answer, they were excluded from later analysis. The remaining five pairs each consisted of one familiar object and one unfamiliar object. The experimenter asked for one of the objects by using a novel name (pinda, fusa, pirra, lito, flicta). For instance, the experimenter put the bottle and the garlic press in front of the child and said, “*Dame la fusa*” (“Give me the fusa”).

Object pairs were presented in a random order, different for each participant. The two objects were placed in front of the participant, approximately 4 inches apart from each other. The side where the unfamiliar object was placed was randomly assigned by the experimenter. The novel labels were created following Spanish phonotactics to prevent participants from assuming that they were words from a foreign language. The labels were randomly assigned to the objects with the only constraint that the label for the unfamiliar and the familiar object of each trial had to match in gender (both masculine and both feminine). For instance, the object that was presented in the same pair with the ball, *pelota* (feminine), was *pinda* (feminine) and the object presented with the shoe, *zapato* (masculine), was *lito* (masculine). If a child claimed that he/she did not know the answer, the experimenter would say: “Give me the one you think it is”. If the child was still reluctant to answer, the experimenter continued with the following pair. Identical procedures were followed when administering the test to adult participants.

3.3.1.2. Disambiguation Task B (Fact Condition)

Materials

Sixteen objects were used in this task, assigned to two sets. Set A was the “Familiar Objects” set, and it included objects which are familiar to children around the age of three: phone, pear, candy, hair brush, glass, tooth brush, bib, and pencil. Set B, the “Unfamiliar

Objects” set, included: metal palette, massager, ruler, whisk, plastic part detached from a cassette, tongs, piece of pipe, plastic water filter. The classification was based on whether or not the children already knew the names for the objects. The size of the objects ranged from 3 to 6 inches in length, and they were controlled for brightness and salient features that might generate a preference in young children. Three experimental trials were composed by two familiar objects (e.g., the glass and the tooth brush) and three by two unfamiliar objects (e.g., the ruler and the whisk).

Procedures

All the participants interacted with the same experimenter. They completed a familiarization stage identical to that of Disambiguation Task A.

The participants were told that this game would be played the same way as the previous one. The instructions were then repeated for the child participants. The experimenter placed each pair of objects in front of the participant, picked up one of the objects, and mentioned a fact about it. For example: “*Mi perro juega con esta cosa*” (My dog plays with this thing). The fact was repeated twice. This object was designated as “introduced”. Then, the experimenter placed the introduced object next to the second object and asked for an object identified with a different fact: “*Dame la cosa que yo hice*” (Give me the thing that I made). If children selected the second object from the pair, it was designated as the “new fact” object. In two of the pairs, the experimenter did not use a new fact. For instance, she said, “*Yo compré esta cosa*” (I bought this thing) to introduce the first object, and then said, “*Dame la cosa que yo compré*” (Give me the thing that I bought). These pairs were included to prevent children from making biased responses, and they were excluded from later analysis.

Object pairs were presented in a random order, different for each participant. The two objects were placed in front of the participant, approximately 4 inches apart from each other. The side where the “introduced” and the “new fact” objects were placed were randomly assigned by the experimenter. The sentences presenting facts about the objects were controlled for length and content. Only situations familiar to 3-year-olds were used to create the facts. The facts were randomly assigned to the objects with the only constraint that two contradictory facts did not occur in one pair. For example, the facts “My grandma gave me this thing” and “My mom gave me this thing” never occurred in the same pair since they are clearly contradictory and cannot refer to the same object. If a child claimed that he/she did not know the answer, the experimenter would say: “Give me the one you think it is”. If the child was still reluctant to answer, the experimenter continued with the following pair. Identical procedures were followed when administering the test to adult participants.

3.3.2. Word Manipulation Task

This task was designed to test the participants’ ability to activate high levels of attentional control when manipulating object labels. In this task, the subjects were required to substitute unfamiliar names for familiar objects or to switch the labels for two familiar objects. This required them to activate high levels of attentional control in order to focus their attention on the novel label without being misled by the meaning they already knew for that label. The expected outcome of this task is that adults and bilingual children will be more successful than monolingual children because, as shown in previous studies, monolingual children do not develop high levels of metalinguistic awareness and attentional control as early as bilinguals. This is reflected in the following hypotheses:

H0.- Children will select the referents for the novel and switched labels at random. That is, they will not manifest the restriction and rejection effects.

H1 (Main Hypothesis).- Bilingual 4-year-olds will be more successful in assigning novel labels to familiar objects and in switching the labels for two familiar objects than their monolingual counterparts due to their ability to attend selectively to the linguistic form of a specific word and not to its meaning.

H2 (Alternative Hypothesis).- Bilingual and monolingual 4-year-olds will be unsuccessful in assigning novel labels to familiar objects and in switching the labels for two familiar objects. In other words, they will exhibit two behaviors, both manifestations of the ME constraint, rejecting novel labels for objects that they can already name and restricting familiar labels to their usual referents.

As it was previously mentioned, successful performance on this task requires participants to overcome the rejection and restriction effects associated with the ME constraint. The "novel" condition of the task tests children's ability to overcome the rejection effect, while the "switched" condition of the task tests their ability to overcome restriction. It is known that the first condition will be less challenging for both bilingual and monolingual children than the second assuming that switching labels demands a greater processing load than substituting labels. In the "novel" condition, children are expected to substitute a familiar label for a novel label, for which they do not already have a referent. They must therefore assign this novel label to an object that they can already name. In the "switched" condition, on the other hand, the child's task is to change the referents of two familiar labels. In other words, they must not only mentally "block" the usual referents of these labels but also assign them new referents.

Materials

Forty eight laminated 8.5- by 11-inch pictures were prepared for this task and placed in a three-hole binder. The pictures included 12 sets of 4 pictures each, 6 sets for each task condition.

The contents of each set were the following:

Picture A: a picture of an object. (e.g., a ball)

Picture B: a picture of the object in a context. (e.g., a ball on a table)

Picture C: a picture of a novel object (novel condition) or a different object (switched condition) in the same context. (e.g., an unfamiliar object on a table, or a pencil on a table)

Picture D: a picture of the object from Picture A in a different context. (e.g., a boy playing with the ball).

Boy and girl hand puppets were used during the task for the child participants.

Procedures

‘Novel’ condition: The participants interacted with two experimenters. One of them was the main experimenter, and the second one manipulated the puppet. The puppet was introduced to the children, who received the following instructions for the task:

“Este es Paco. Dile hola a Paco. Él viene de muy, muy lejos. En ese lugar, la gente habla un poco diferente. Les ponen nombres diferentes a las cosas. Paco, vino a hablar sobre unas fotos con nosotros, pero yo no le entiendo todo lo que dice. Él me dijo, que tú si le vas a entender. ¿Puedes ayudarme a entender lo que dice y a hablar con él a su manera?” (“This is Paco. Say hi to Paco. He comes from far-far-away. You know, in that place, they speak a little differently. They name things in different ways. So, Paco came to talk about some pictures with us, but I don’t understand all the things he says. He told me, that you will understand him. Can you help me understand what he says and talk to him in his way?”)

After giving the instructions, the experimenter initiated the experimental trials:

- Picture A was shown to the child and the puppet (e.g., the picture of a bike). The experimenter turned to the puppet and asked: “Paco, ¿qué es esto?” (“Paco, what is this?”). The puppet answered using a novel label: “Esta es una bama” (“This is a bama”). The puppet’s answer was repeated twice.
- Comprehension stage: The experimenter showed pictures B (e.g., the picture of a red bike) and C (the picture of an unfamiliar red object), and asked: “Paco, ¿qué foto está más bonita?” (“Paco, which picture is prettier?”). The puppet answered: “La foto donde la bama es roja” (“The picture where the bama is red”). Then, the experimenter turned to the child and asked: “Enséñame la foto que le gustó” (“Show me the picture he liked”). The child was invited to point to one of the pictures.
- Production stage: The experimenter showed the child picture D (e.g., the picture of a blue bike), and asked: “Dile a Paco que ves aquí” (“Tell Paco what you see here”).

“Switched” Condition: In this condition, a second puppet changed the names of an object to that of another familiar object instead of using unfamiliar labels (e.g., calling the book a ‘pencil’ and calling the apple ‘soup’). The same procedures were followed.

The order in which the two conditions were presented was counterbalanced. When the experimenter presented pictures B and C to the participant, one picture was presented on top of the other. The position of the target objects was also counterbalanced, i.e. half of the trials they appeared on the top, and half of the trials on the bottom. The objects depicted in the pictures were selected because they are familiar to three-year-olds. The novel words followed Spanish phonotactics, and they all consisted of two syllables to assure that children would not have pronunciation difficulties in the production stage. The novel labels were randomly assigned to

the pictures with the constraint that they had to match the gender of the real label of the object. For instance, *pelota* (ball) is feminine in Spanish, so the novel label assigned to it was *tuga*, which is also feminine. *Globo*, balloon, is masculine in Spanish, so it was switched for *oso*, bear, which is also masculine. The procedures were slightly altered for the adult participants since puppets were not used. Adults were told that the experimenter would talk in a “different” way to them and that they had to try to understand her and speak in the same way that she did.

3.4. Experimental Settings

All child participants were tested in a private room provided by the daycare centers. Adults were tested in the UTEP Language and Acquisition Research Lab (LARLab). All child participants interacted with the primary experimenter, and with an assistant who manipulated the puppet. A parent or teacher was allowed in the room if they or the child had so requested, but these adults were asked not to intervene by speaking to the child or the experimenter. Since the bilingual children were required to complete both forms of the PPVT test, this test was administered during a separate preliminary session. Monolingual participants completed the PPVT and the three tasks in the same session. Adults completed the self-assessment questionnaire and the three experimental tasks in one session. Each session lasted approximately 20 to 25 minutes and all the experimental sessions were video recorded.

CHAPTER 4

ANALYSIS AND RESULTS

4.1. Study Design

The factorial design adopted for this study included two independent variables: (1) linguality, and (2) task. Linguality was treated as a quasi between-subjects variable with two levels: monolingual and bilingual. The second independent variable, task, was treated as a within-subjects variable subdivided in two: disambiguation and word manipulation. Disambiguation comprised three levels: labels, facts-familiar and facts-unfamiliar. Word manipulation comprised two levels: familiar labels and novel labels. Each level included two modalities: comprehension and production. Age was not included in the analysis as a variable. Adult participants were analyzed separately, and their results were only used as a basis for comparison. Preliminary analyses revealed no significant effects of gender or test version (i.e., order of presentation of tasks). The dependent variables were the scores obtained in each of the tasks. Table 3 provides a summary of this study's design including the number of experimental trials in each task:

Table 3. Experimental Design

Participants	Disambiguation Task A	Disambiguation Task B		Word Manipulation			
		Familiar	Unfamiliar	Novel		Switched	
				Compr.	Product.	Compr.	Product.
Child Monolingual N=20	5	3	3	6	6	6	6
Child Bilingual N=20	5	3	3	6	6	6	6
Adult Bilingual N=16	5	3	3	6	6	6	6

4.2. Disambiguation

4.2.1. Disambiguation Task A

All participants completed eight test trials, three of which were distractors later excluded from the analysis. Since the number of trials was small and the range of possible scores was small and discontinuous, chi-square tests were adopted for the analysis. For this purpose, each participant's performance was analyzed as successful or unsuccessful. Success was determined if the participant selected the correct object at an above-chance level (on three or more trials out of five). As predicted for this task, the analysis showed no significant difference in performance between bilingual and monolingual children, $\chi^2(1, N=40)=0.31, p>0.05$.

4.2.2. Disambiguation Task B

All participants completed a total of eight test trials, two of which were included as distractors and excluded from the analysis. The six experimental trials were divided equally into two conditions: familiar and unfamiliar. Preliminary analysis revealed no significant effects of condition. Since the number of trials was small and the range of possible scores was small and discontinuous, chi-square tests were adopted for the analysis. Each participant's performance was analyzed as successful or unsuccessful. Success was determined if the participant selected the correct object at an above-chance level (on more than three trials out of six). The response was considered correct when the participant selected the object that was not initially introduced by the experimenter with a fact. In line with the prediction for this task, there was no significant difference in performance for bilingual and monolingual children, $\chi^2(1, N=40)=0.14, p>0.05$.

Children's scores for both tasks A and B were collapsed to analyze their performance in the disambiguation task overall. As expected, there was no significant difference related to the children's linguality, $\chi^2(1, N=40)=0.14, p>0.05$. Table 4 presents the numbers of participants who were successful in the disambiguation tasks.

Table 4. Summary of the Participants' Performance in the Disambiguation Task*

Participants	Task A	Task B	Disambiguation (A and B)
--------------	--------	--------	-----------------------------

Monolingual (N=20)	20 (100%)	3 (15%)	3 (15%)
Bilingual (N=20)	19 (95%)	7 (35%)	7 (35%)
Adults (N=16)	16 (100%)	11 (69%)	11 (69%)

*numbers represent the number and percentage of participants who performed successfully

The initial prediction for the disambiguation task was that both monolingual and bilingual children would perform with equal success in both tasks A and B. Since the number of experimental trials in each task differed, children's scores were converted to percentages, and a multivariate analysis of variance, more suitable for the analysis of data with percentages, was conducted. Contrary to the prediction, there was a significant effect of task, ($F(1,38)=93.6$, $p<0.05$), showing that the scores obtained by monolingual and bilingual child participants on Disambiguation Task A were significantly higher than those obtained on Disambiguation Task B.

Adult data was analyzed separately for both tasks. All the adult participants were successful in Task A. On task B, 11 adults obtained successful scores, while 5 adults were unsuccessful. The comparison of child to adult scores only showed a significant effect of age group for Task B, $\chi^2(1, N=56)=0.01$, $p<0.05$, showing that adults and children performed equally in Task A, but adults outperformed children in Task B.

4.3. Word Manipulation

All participants completed a total of twelve experimental trials, equally divided in two conditions, novel and switched. Additionally, each trial consisted of a comprehension and a production stage, with each modality scored separately. An answer was considered correct if the child pointed to the familiar object and used the novel/switched word in the production trial. Therefore, the maximum score for each trial was 2 (success in both comprehension and

production), and the minimum was 0 (lack of success in both comprehension and production).

The mean scores are presented in Table 5.

Table 5. Mean Scores for the Word Manipulation Task

Linguality	Novel Compr. <i>M(SD)</i>	Novel Prod. <i>M(SD)</i>	Switched Compr. <i>M(SD)</i>	Switched Prod. <i>M(SD)</i>
Monolingual N=20	3.65(1.87)	0.30(0.57)	2.00(1.71)	0.40(0.99)
Bilingual N=20	4.10(1.65)	0.65(1.53)	1.75(1.86)	0.60(1.57)
Adults N=16	5.9(0.2)	6(0)	5.4(1.5)	5.4(1.5)

The mean scores obtained across tasks and modalities were used to conduct a repeated measures, 2 (linguality) x 2 (task) and 2 (linguality) x 2 (modality) analysis of variance. As expected, there was a significant effect of task, $F(1,38)=23.0$, $p<0.05$, and of modality, $F(1,38)=137.6$, $p<0.05$, showing that all children were more successful in the task and modality that was less cognitively challenging.

Participants' performance was considered successful if they scored above chance (at least four out of six). Table 6 presents the numbers of participants who were successful in the tasks. Because of the small range of the scores, dichotomous variables were computed, and multiple chi-square tests were used for the following analysis.

Table 6. Summary of the Participants' Performance in the Word Manipulation Task*

Participants	Novel Compr.	Novel Prod.	Novel Total	Switched Compr.	Switched Prod.	Switched Total
Monolingual (N=20)	11 (55%)	0 (0%)	2 (10%)	4 (20%)	1 (5%)	2 (10%)
Bilingual (N=20)	13 (65%)	2 (10%)	2 (10%)	4 (20%)	2 (10%)	2 (10%)
Adult (N=16)	16 (100%)	16 (100%)	16(100%)	15 (93.8%)	15 (93.8%)	15 (93.8%)

*numbers represent the number and percentage of participants who performed successfully

4.3.1. Novel Condition

Although bilingual children performed slightly better than monolingual children, the difference was not significant, $\chi^2(1, N=40)=0.96$, $p>0.05$. Only two monolingual and two

bilingual children were successful in the task as a whole. Analyses of children's performance in each modality also yielded no significant differences in the performance of monolingual and bilingual children in comprehension, $\chi^2(1, N=40)=0.52, p>0.05$, and in production, $\chi^2(1, N=40)=0.15, p>0.05$. Thirteen bilingual children and eleven monolingual children were successful in comprehension, while only two bilingual children were successful in production.

4.3.2. Switched Condition

In the switched condition, multiple chi-square analyses showed results similar to those of the novel condition. Once again, bilingual children performed slightly better than monolingual children, but the difference was not significant, $\chi^2(1, N=40)=0.96, p>0.05$. Only two children from each language group were successful in the condition as a whole. Analyses of children's performance in each modality also yielded no significant differences in the performance of monolingual and bilingual children in comprehension, $\chi^2(1, N=40)=0.94, p>0.05$, and in production, $\chi^2(1, N=40)=0.55, p>0.05$. In this condition, four bilingual children and four monolingual children were successful in comprehension, while two bilingual and one monolingual child were successful in production.

As anticipated, the adults' performance in this task was superior to the children's. The adults were successful in both tasks and both modalities as shown in Table 6. However, the mean responses to the switched task among adults are slightly lower than those of the novel task, the same difference found in the performance of the children.

4.4. Discussion

4.4.1 PPVT and Language Proficiency

As discussed in detail in the section on Language Proficiency (Chapter 3, section 3.2), all the child participants of this study completed a Peabody Picture Vocabulary Test (PPVT).

However, the scores of the PPVT were used only to obtain a rough measure of the children's receptive vocabulary in Spanish for the monolinguals, and both Spanish and English for bilinguals, and therefore, were not included in the analysis as an additional factor or covariate. The main reason for excluding the PPVT scores from the analysis was that the Spanish version that was used in the experiment was an unofficial translation of one of the English test forms, and its scores were not normed. Furthermore, although the PPVT has been successfully used to measure vocabulary size in studies on bilingual children (Bialystok, 1999; Davidson & Tell, 2005, among others), this test was not specifically designed to measure bilingual proficiency and to be used in languages other than English (Dunn & Dunn, 1981). For this reason, it must be used cautiously in bilingual research.

4.4.2. Disambiguation Task

Two main predictions were originally constructed for the Disambiguation task. The first stated that monolingual and bilingual children would perform equally in the task overall. This prediction was supported since monolingual and bilingual children performed equally above chance in Disambiguation task A (labels), and they were equally unsuccessful and performed below chance in Disambiguation task B (facts). As discussed in the review of literature, whatever the cognitive or linguistic mechanism that accounts for disambiguation, be it general sociocognitive ability or a language specific constraint, no differences related to the number of languages spoken should be observed in the data. In other words, the disambiguation effect is a manifestation of an ability that is not developed in relation to the number of languages spoken by a child. Adults manifested the disambiguation effect in both tasks, although they outperformed children in the facts task.

The second prediction stated that no differences would be observed in relation to task (labels or facts). The rationale for this prediction was that if the disambiguation effect is generated by the children's general ability to follow sociopragmatic cues in the communication process, then it will be manifested when children are presented with any kind of referential act, either labels or facts. On the other hand, if children manifested disambiguation only in the labels task, it would be evidence for a constraint specific to word-learning that does not operate when children are presented with a different referential act. These predictions and rationale were based on the findings of Diesendruck and Markson (2001), whose subjects performed equally well in both conditions. Surprisingly, the present study has yielded the opposite outcome since children showed a significant preference for assigning two referential facts to the same object in the facts condition.

Even though the results obtained in this study appear to be clearly supporting the alternative prediction, several methodological caveats should be considered before deciding if they are conclusive. During the administration of the task, it was noted that the facts could not be treated exactly like labels because of pragmatic differences. Labels have the property of being mutually exclusive and conventional, meaning that a label refers to a certain category and all the people who speak the language share that knowledge. By contrast, in the real world, the same facts can refer to more than one object or category, and one object or category can be the referent of multiple facts. Additionally, if a fact is assigned to a certain object, it is not part of common knowledge. In other words, if I call a ball, "ball", it is assumed that other English speakers will also call it "ball", and that this will be the label for other round objects used for playing. However, if I see a ball and say, "My grandma gave this one to me", it is not assumed that other speakers will know this information when they see that particular ball, or that anyone can point

at any ball and say that my grandma gave it to me. This was particularly evident among the adult participants of this study, some of whom showed confusion during the task, were hesitant before selecting one of the objects, and made comments like, “And how am I supposed to know which one it is?” (LP000011). The nature of factual information is that two facts actually can be assigned to the same object, and for some participants, this overrode the intentions of the experimenter. The lack of pragmatic clarity, whereby the participants could assume that a referential fact can refer to only one object might have been the reason why the outcomes of both tasks were so different. This goes in line with Bloom’s (2000, p.70) suggestion that while children’s expectations about communicative behavior of others originate their preference for lexical contrast, the latter can be overridden when pragmatic expectations are modified. This lack of pragmatic clarity could also account for the fact that other studies that used similar procedures (Scofield & Behrend, 2007) also failed to replicate Disendruck and Markson’s (2001) findings. However, in a pragmatically clearer fast-mapping study where children were required to identify objects by referring to them with novel labels or facts, children did treat facts in the same manner as labels (Markson & Bloom, 1997, as cited in Bloom, 2000).

4.4.3. Word Manipulation Task

The main prediction initially constructed for the word manipulation task was that bilingual children would be more successful than their monolingual peers because they can activate attentional control. Speakers must activate a high level of attentional control in order to focus their attention on a specific aspect of word representation, in this case, form over meaning. Slight differences between the two linguistic groups were observed in the results, but they should not be interpreted as supporting the prediction since the differences did not reach statistical

significance. However, it must be considered that testing a larger sample of children and using a greater number of experimental trials, might have resulted in an effect of bilingualism.

Another factor that could have interacted with this result is bilingual language proficiency. As it was discussed earlier, the language proficiency measurements used in this test, the PPVT and a language background questionnaire, provided an approximate assessment of the children's bilingual proficiency and their receptive vocabulary in Spanish and English. However, this information was not precise enough to select a homogeneous group of bilingual children. This is a challenging task especially in a border region, such as the area where this research was conducted, since all children are exposed to both languages at different levels, and their linguistic proficiency varies significantly. Research involving bilinguals has suggested that the differences in bilingual proficiency should be carefully considered in bilingual research (Wei, 2007), and that the lack of homogeneity can result in a significant confounding factor (Hua & David, 2008). Therefore, a fine grained classification according to their linguistic proficiency is necessary in the analysis of bilingual children. A more specific test of lexical and syntactic proficiency could be more reliable to identify a more uniform group of balanced bilinguals in this study, and it could lead to a more reliable analysis.

On the other hand, a significant difference was found in the children's performance between the two task conditions, novel and switched. As stipulated in the task description presented in Chapter 3, children were more successful in assigning novel labels to familiar objects than in interchanging two familiar labels. This supports the claim that word manipulation is a challenging task for children on two dimensions of executive function, attentional or inhibitory control and working memory (Zelazo, Müller, Frye, & Marcovitch, 2003). This cognitive component, located in the prefrontal lobe, undergoes rapid development throughout

infancy, but its main developmental changes are observed between ages of 4 and 7 years (Schneider, Lockl, & Fernandez, 2005). This explains why three- and four- year old children still have difficulty performing tasks that require understanding false beliefs, reasoning about physical causality, inferring word meanings, and generating multiple labels for a single object (see Zelazo et al., 2003 for a more detailed discussion). However, their performance improves during the following years due to the maturation of the prefrontal cortex. This finding represents an important insight for the design of future experiments showing that three-year-olds do not succeed in this kind of tasks for developmental reasons. Furthermore, it explains why only those previous studies that included older children (after age 4;6) found a bilingual advantage in tasks designed to observe ME effects in monolingual and bilingual children (Au & Glusman, 1990; Bialystok, 1999; Merriman & Kutlesic, 1993; Oren, 1981; Rosenblum & Pinker, 1985). In summary, all the children in the present study may have been too young to perform the manipulation tasks because of immature executive control.

This finding is also relevant for the interpretation of the ME constraint. If ME is a linguistic constraint that kicks in at early stages of development, its four effects should be equally manifested in children's behavior (Merriman & Bowman, 1989). However, the findings of this study show that children's performance can vary depending on modality and condition since children are more successful in comprehension than in production (Campbell, 2007), and their performance declines in more cognitively challenging tasks. This provides support for a more flexible interpretation of the ME constraint, one which acknowledges the close relationship of the constraint to other more general cognitive and processing abilities. According to this notion, ME should not be isolated as a unique linguistic component; rather, it should be viewed as a product of both cognitive and linguistic development (Golinkoff et.al., 1994). If this

approach to ME is adopted, the controversial findings regarding its operation across different age and linguistic groups can be accounted for in terms of the cognitive and processing functions involved in the ME experimental tasks.

This study has yielded important insights regarding methodological considerations. First, it was shown that the original version of the facts condition of the disambiguation task is not completely reliable because of the lack of pragmatic clarity in the procedures. Furthermore, the discussion above suggests that studies designed to test the different effects of the ME constraint must be also focused on the different cognitive processes that children will activate when performing the experimental tasks. Otherwise, children's performance might be misinterpreted since children can be unsuccessful because of developmental non-linguistic reasons. In the following final chapter, I discuss further implications of this study, weaknesses of the experimental design, and suggestions for future research.

CHAPTER 5

CONCLUSIONS

This study has investigated two issues which were left unresolved in previous investigations of the ME constraint. The goals of this study were twofold: (1) to investigate the non-linguistic cognitive and processing abilities that underlie the behaviors that have been associated to the constraint, and (2) to shed light on the differences that exist in the operation of ME in young bilingual and monolingual children. As a starting point, three ME effects were reinterpreted and reclassified according to the cognitive processes that generate each behavior. This new classification was used to create experimental tasks to illustrate how the different effects are manifested in bilingual and monolingual children. It was predicted that the disambiguation effect would be manifested equally in both linguistic groups since all children rely on their understanding of intentionality when dealing with novel labels presented to them in ambiguous situations (Bloom, 2000; Tomasello, 2000). On the other hand, it was anticipated that the bilingual children would show an advantage in overcoming the restriction and rejection effects since children are required to activate high levels of attentional control in order to overcome their tendency to reject and restrict, and it has been shown that this processing component is developed earlier in bilingual children (Bialystok, 2001).

This study supports the new classification of the effects since the findings show that children behave differently when performing the two types of tasks, i.e., disambiguation and word manipulation. Regardless of their linguistic abilities, all children manifest the disambiguation effect when presented with novel labels. However, children are relatively unsuccessful in the word manipulation task. The difference in performance in this task between monolingual and bilingual children did not reach statistical significance, probably because the

task was cognitively too challenging for both groups of children. However, monolingual and bilingual children's performance varied significantly across modalities and conditions since children performed more successfully in less cognitively challenging tasks. These findings support the notion that the four effects should not be treated as a manifestation of one linguistic constraint and suggest that a more flexible notion of ME should be adopted.

As discussed in the background review of this study (Chapter 2), previous research concerned with the process of early word mapping has accounted for children's tendency to avoid lexical overlap from two perspectives. One side proposed that children were biased by word-learning constraints (Markman & Wachtel, 1988; Markman, 1992; Merriman & Bowman, 1989). The other side proposed that more general social, pragmatic, and processing abilities underlie children's preference for one-to-one mapping. The findings of this study locate it towards the middle between the two positions, along with several other research studies that have shown that a less radical view of word-learning constraints should be adopted (see discussion in Campbell, 2007). This analysis of the operation of ME in bilingual and monolingual children illustrated that while the constraint does operate in young children, its operation is directly related to more general cognitive abilities that are developed at different stages of early childhood. Therefore, the ME effects should not be isolated as aspects unique to lexical acquisition, but they should be viewed as products of both cognitive and linguistic development (Golinkoff et al., 1994). Lexical acquisition is a complex process that has been shown to be directly related to the development of other cognitive abilities and processing components such as theory of mind (Bloom, 2000), sensitivity to socio-pragmatic cues (Tomasello, 2000), development of metalinguistic abilities (Bialystok, 2001) and the maturation of executive function (Schneider et al., 2005).

The findings of this study have also yielded several methodological implications. First, it was found that the use of facts as a kind of referential act similar to labels is ineffective in disambiguation tasks because of the pragmatic differences existent between labels and referential facts. Furthermore, it was shown that several cognitive abilities underlie the behaviors that are commonly attributed to the ME constraint. Therefore, the cognitive implications of the tasks designed to test the ME effects must be considered since young children can be unsuccessful in cognitively challenging tasks for developmental reasons that are not specifically linguistic. In addition, there is a possibility that a significant bilingualism effect was not achieved because of the young age of participants who have not developed the processing components that would allow them to succeed in the experimental tasks used in this design. Experimental tasks more suitable for younger children (Liittschwager & Markman, 1991; Markman et.al, 2003) can be used to investigate this issue further. Alternatively, the protocols of the word manipulation task can be modified by including trials where the children would be taught the novel words and by separating the tests of comprehension and production, and therefore, lowering the processing demands of the task.

These findings and methodological insights indicate a direction for future research on the topic of ME. The working hypothesis presented here is that children's performance on ME tasks is directly related to more general cognitive and processing abilities that are developed during childhood. However, the question of exactly what cognitive abilities underlie each behavior associated with the ME constraint remains to be investigated. Investigations involving children of different ages and linguistic proficiencies can answer this question and lead us to a more precise understanding of ME and other lexical constraints.

REFERENCES

- Akhtar, N., Carpenter, M., & Tomasello, M. (1996). The role of discourse novelty in early word learning. *Child Development, 67*, 635-645.
- Au, T., & Glusman, M. (1990). The principle of mutual exclusivity in word learning: To honor or not to honor? *Child Development, 61*, 1474-1490.
- Baldwin, D., Markman, E., Bill, B., Desjardins, R., & Tidball, G. (1996). Infants' reliance on a social criterion for establishing word-object relations. *Child Development, 67*, 3135-3153.
- Ben-Zeev, S. (1977). Mechanisms by which childhood bilingualism affects understanding of language and cognitive structures. In P. Hornby (Ed.), *Bilingualism, psychological, social, and educational implications* (pp.29-55). New York: Academic Press INC.
- Bialystok, E. (1991). Metalinguistic dimensions of bilingual proficiency. In E. Bialystok (Ed.), *Language processing in bilingual children* (pp.113-140). Cambridge University Press.
- Bialystok, E. (1999). Cognitive complexity and attentional control in the bilingual mind. *Child Development, 70*, 636-344.
- Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. Cambridge: Cambridge University Press.
- Bloom, P. (2000). *How children learn the meanings of words*. Cambridge and London: MIT Press.
- Campbell, M. (2007). *Word learning in preschoolers: Are bilingual three-year-olds less guided by mutual exclusivity than their monolingual counterparts?* Unpublished Master Thesis. University of Edinburgh.
- Clark, E. (1993). *The lexicon in acquisition*. London: Cambridge University Press.

- Cummins, J. (1978). Bilingualism and the development of metalinguistic awareness. *Journal of Cross-Cultural Psychology*, 9, 131-199.
- Davidson, D., & Tell, D. (2005). Monolingual and bilingual children's use of mutual exclusivity in the naming of whole objects. *Experimental Child Psychology*, 92, 25-45.
- Davidson, D., Jergovic, D., Imami, Z., & Theodos, V. (1997). Monolingual and bilingual children's use of the mutual exclusivity constraint. *Journal of Child Language*, 24, 3-24.
- Diesendruck, G., & Markson, L. (2001). Children's avoidance of lexical overlap: A pragmatic account. *Developmental Psychology*, 37, 630-641.
- Dunn, L.M., & Dunn L. (1981). *Peabody Picture Vocabulary Test - Revised*. Circle Pines, MN: American Guidance Service.
- Golinkoff, R.M., Mervis, C. B., & Hirish-Pasek, K. (1994). Early object labels: The case for a developmental lexical principles framework. *Journal of Child Language*, 21, 125-155.
- Houston-Price, C., Plunkett, K., & Duffy, H. (2006). The use of social silence cues in early word learning. *Journal of Experimental Child Psychology*, 95, 27-55.
- Hua, Z., & David, A. (2008). Study design: Cross-sectional, longitudinal, case and group. In L. Wei & M. Moyer (Eds.), *The Blackwell guide to research methods in bilingualism and multilingualism* (pp. 88-107). Oxford: Blackwell Publishing.
- Kroll, J., & Tokowicz, N. (2001). The development of conceptual representations for words in a second language. In J. Nicol (Ed.), *One Mind, two languages: Bilingual language processing* (pp.49-71). Oxford: Blackwell.
- Leopold, W.F. (1939-49). *Speech development of a bilingual child: A linguist's record*. 4 vols. Evanston, IL: Northwestern University Press.

- Liittschwager, J. C., & Markman, E. M. (1991). Sixteen- and 24-month-olds' use of mutual exclusivity as a default assumption in second-label learning. *Developmental Psychology*, 30, 955-968.
- Markman, E. M. (1992). Constraints on word learning: Speculations about their nature, origins, and domain specificity. In M. R. Gunnar, & M. Maratsos (Eds.), *Modularity and constraints in language and cognition. The Minnesota Symposia on Child Psychology*, 25, 59-101.
- Markman, E. M. (1994). Constraints on word meaning in early language acquisition. In L. Gleitman, and B. Landau (Eds.), *The acquisition of the lexicon* (pp.199-227). Amsterdam: Elsevier Science B.V.
- Markman, E. M., & Wachtel, G. F. (1988). Children's use of mutual exclusivity to constrain the meanings of words. *Cognitive Psychology*, 20, 121-157.
- Markman, E. M., Wasow, J. L., & Hansen, M. B. (2003). Use of the mutual exclusivity assumption by young word learners. *Cognitive Psychology*, 47, 241-275.
- Markson, L., & Bloom, P. (1997). Evidence against a dedicated system for word learning in children. *Nature*, 385, 813-815.
- Merriman, W. E., & Schuster, J. M. (1991). Young children's disambiguation of object name reference. *Child Development*, 62, 1288-1302.
- Merriman, W. E., & Stevenson, C. M. (1997). Restricting a familiar name in response to learning a new one: Evidence for the mutual exclusivity bias in young two-year-olds. *Child Development*, 68, 211-228.
- Merriman, W. E., & Bowman, L. L. (1989). The mutual exclusivity bias in children's word learning. *Monographs of the society for research in child development*, 54 (3-4).

- Merriman, W. E., & Kutlesic, V. (1993). Bilingual and monolingual children's use of two lexical acquisition heuristics. *Applied Psycholinguistics*, 14, 229-249.
- Mervis, C.B. (1987). Child basic-object categories and early lexical development. In U. Neisser (Ed.), *Concepts and conceptual development: Ecological and intellectual factors in categorization* (pp.201-233). Cambridge: Cambridge University Press.
- Nelson, K.E. (1988). Constraints in word learning? *Cognitive Development*, 3, 221-246.
- Oren, D. L. (1981). Cognitive advantages of bilingual children related to labeling ability. *Journal of Educational Research*, 74 (31), 163-169.
- Paradis, M. (2004). *A neurolinguistic theory of bilingualism*. Philadelphia: John Benjamins.
- Pearson, B., Fernandez, S., & Oller, D.K. (1995). Cross-language synonyms in the lexicons of bilingual infants: One language or two? *Journal of Child Language*, 22, 345-368.
- Piaget, J. (1929). *The child's conception of the world*. New York: Harcourt, Brace, Jovanovich.
- Pinker, S. (1984). *Language learnability and language development*. Cambridge and London: Harvard University Press.
- Pinker, S., & Rosenblum, T. (1983). Word magic revisited: Monolingual and bilingual children's understanding of the word-object relationship. *Child Development*, 54, 773-780.
- Quine, W.V.O. (1960). *Word and object*. Cambridge: MIT Press.
- Schneider, W., Lockl, K., & Fernandez, O. (2005). Interrelationships among theory of mind, executive control, language development, and working memory in young children: A longitudinal analysis. In W. Schneider, R. Schumann-Hengsteler, & B. Sodian (Eds.), *Young children's cognitive development* (pp.285-300). Mahwah, NJ: Lawrence Erlbaum Associates.

- Scofield, J., & Behrend, D. A. (2007). Two-year-old differentially disambiguate novel words and facts. *Journal of Child Language*, 34, 875-889.
- Slobin, D.I. (1973). Cognitive prerequisites for the development of grammar. In C.A. Ferguson, & D.I. Slobin (Eds.), *Studies of child language development* (pp.45-54). New York: Springer.
- Sodian, B. (2005). Theory of mind- the case for conceptual development. In W. Schneider, R. Schumann-Hengsteler, & B. Sodian (Eds.), *Young children's cognitive development* (pp.95-130). Mahwah, NJ: Lawrence Erlbaum Associates.
- Tomasello, M. (2000). Perceiving intentions and learning words in the second year of life. In M. Bowerman & S. Levinson (Eds.), *Language acquisition and conceptual development* (pp.132-158). Cambridge: Cambridge University Press.
- Tomasello, M., & Barton, M. (1994). Learning words in nonostensive contexts. *Developmental Psychology*, 30, 639-650.
- US Census Bureau (n.d.). State and County QuickFacts. Retrieved September 4, 2009, from <http://www.census.gov>
- Vihman, M. M. (1985). Language differentiation by the bilingual infant. *Journal of Child Language*, 12, 297-324.
- Volterra V., & Taeschner T. (1978). The acquisition and development of language by bilingual children. *Journal of Child Language*, 5, 311-326.
- Wei, L. (2007). Methodological issues in the study of bilingualism. In L. Wei (Ed.), *The bilingualism reader* (pp. 495-504). London: Routledge.
- Wilde A. J., & Baird J. A. (2005) Why language matters. In J. Wilde A. & J.A. Baird (Eds.), *Why language matters for theory of mind* (pp.3-25). Oxford University Press.

Zelazo, P. D., Müller, U., Frye, D., & Marcovitch, S. (2003). The development of executive function in early childhood. *Monographs of the Society for Research in Child Development, 68*(3).

APPENDIX A MATERIALS

Disambiguation Task A



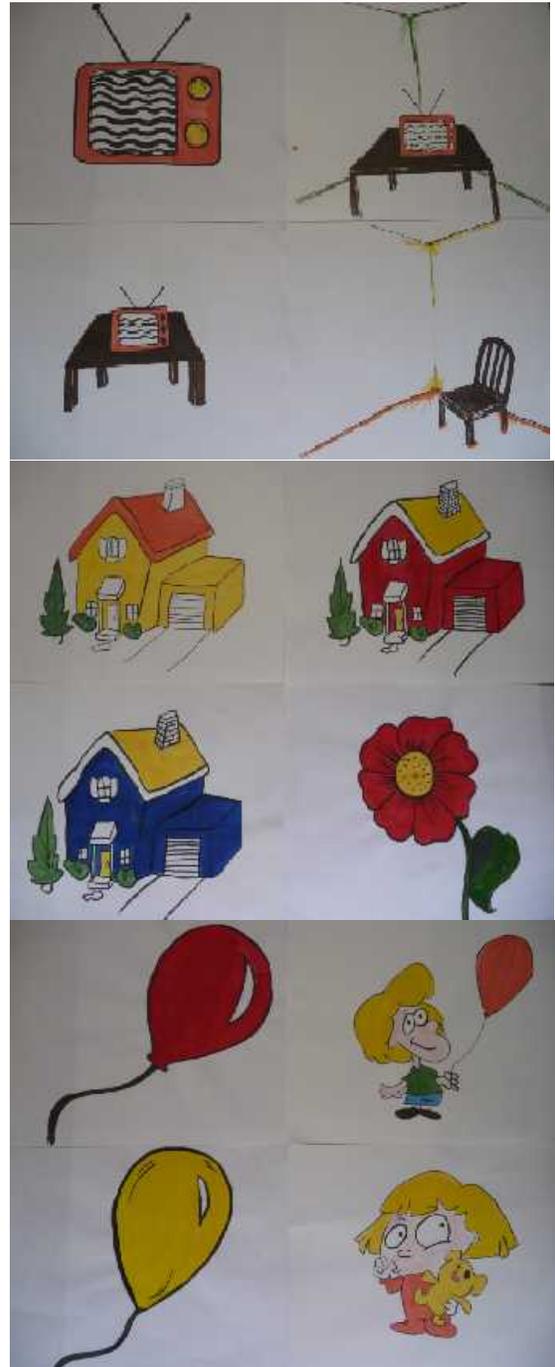
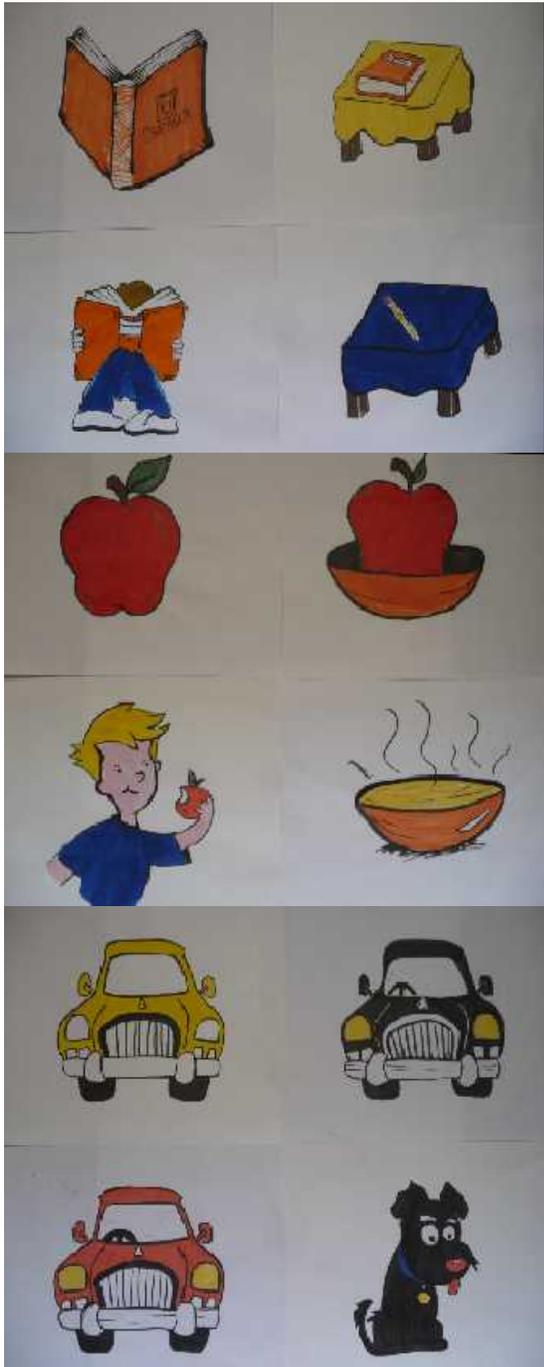
Disambiguation Task B



Word Manipulation: Novel Condition



Word Manipulation: Switched Condition



APPENDIX B
TASK PROTOCOLS

Disambiguation Task A

Familiar¹

Objects	Ask for:
Apple ² – box	Manzana
Hummer – mirror	Espejo
Clock – hair comb	Reloj

Unfamiliar

Objects	Ask for:
Dumpling maker – spoon	Pirra
bottle – Garlic press	Fusa
Spanner – ball	Pinda
shoe – Piece of wood	Lito
Filter – cup	Flicta

¹ The order of administration was random for each participant.

² Items in bold are the correct referents of the words from the “ask for” column.

Disambiguation Task B

Objects	Object 1 – Introduced first	Fact 1 – stated	Fact 2 – Ask for...
³ Phone – pear ⁴	Phone	Mi papá compró esta cosa.	Dame la cosa que compró mi papá.
Candy – hair brush	brush	Esta cosa le gusta a mi mamá.	Dame la cosa que gané en un concurso.
Glass – tooth brush	Glass	Guardo esta cosa en mi cuarto.	Dame la cosa que me dio mi maestra.
Bib – pencil	Bib	Mi mamá me dio esta cosa.	Dame la cosa que saqué de mi casa.
Metal part – massager	Massager	Mi perro juega con esta cosa.	Dame la cosa que yo hice.
Ruler - whisk	whisk	Mi abuela me regaló esta cosa.	Dame la cosa que me regaló mi abuela.
Tongs – cassette part	Cassette part	Esta cosa me gusta mucho.	Dame la cosa que le pedí a Santa.
Pipe – plastic circle	pipe	Yo compré esta cosa.	Dame la cosa que yo compré.

³ The order of administration was random for each participant.

⁴ Items in bold are the correct referents of the facts from the “ask for” column.

Word Manipulation Task Novel Condition

Puppet: Paco

- Model:
- Paco, qué es esto?
 - Paco, qué foto está más bonita?
 - Dile a Paco qué ves aquí.

1. Pelota

Esta es una tuga.

La foto donde la tuga está en una mesa.

2. Bici

Esta es una bama.

La foto donde la bama es roja.

3. Reloj

Este es un freto.

La foto donde el freto está en la pared.

4. Mochila

Esta es una lerma.

La foto donde la lerma es azul.

5. Pastel

Este es un acro.

La foto donde el acro está en una fiesta.

6. Columpio

Esta es un cicto.

La foto donde un niño está en el cicto.

Word Manipulation Task

Switched Condition

Puppet: Gaby

- Model:
- Gaby, qué es esto?
 - Gaby, qué foto está más bonita?
 - Dile a Gaby qué ves aquí.

1. Libro

Este es un lápiz.

La foto donde el lápiz está en la mesa.

2. Manzana

Esta es una sopa.

La foto donde la sopa está en el plato.

3. Carro

Este es un perro.

La foto donde el perro es negro.

4. Tele

Esta es una silla.

La foto donde la silla está en el cuarto.

5. Casa

Esta es una flor.

La foto donde la flor es grande.

6. Globo

Este es un oso.

La foto donde la niña sostiene un oso.

APPENDIX C
CHILD AND ADULT LANGUAGE QUESTIONNAIRES

CHILD LANGUAGE DATA QUESTIONNAIRE

Participant's Name: _____ Date: _____

Parent/Guardian Name: _____

Participant's date of birth: _____

Participant's Age: _____

What is the participant's native language? _____

Is the participant bilingual? Yes / No

Is the participant learning or in contact with another language? Yes / No

If you answered *yes* to any of the questions above, please indicate which languages the participant speaks or is in contact with: _____

What is the participant's nationality?: _____

What is the participant's ethnicity?: _____

Does the participant have any treated or untreated language problem? Yes / No

Does the participant have any treated or untreated learning problem? Yes / No

Has the participant had any treated or untreated hearing problem or ear infection? Yes / No

If you answered *yes* to any of the questions above, please explain: _____

How many siblings does the participant have? _____

What is the participant's position among siblings? _____

How long has subject lived here? _____

Mother / Primary Caretaker Info:

- Occupation _____
- Level of Education _____

Father / Secondary Caretaker Info:

- Occupation _____
- Level of Education _____

CUESTIONARIO SOBRE DATOS DEL LENGUAJE DE LOS NIÑOS

Nombre del/de la Participante: _____ Fecha: _____

Nombre del Padre/Guardián: _____

Fecha de nacimiento del/ de la participante: _____

Edad del/ de la participante: _____

¿Cuál es la lengua materna del/ de la participante? _____

¿Es bilingüe el/la participante? Sí/ No

¿Está el/la participante aprendiendo o en contacto con otra lengua? Sí/ No

Si contestó *sí* a alguna de las preguntas arriba, por favor indique qué lenguas habla el/la participante o con qué lenguas está en contacto: _____

¿Cuál es la nacionalidad del/de la participante?: _____

¿Cuál es la raza/grupo étnico del/de la participante?: _____

¿Tiene el/la participante algún problema de lenguaje (bajo tratamiento o no)? Sí/ No

¿Tiene el/la participante algún problema de aprendizaje (bajo tratamiento o no)? Sí/ No

¿Ha tenido el/la participante algún problema de audición o infección del oído (bajo tratamiento o no)? Sí/ No

Si contestó *sí* a alguna de las preguntas arriba, por favor explique: _____

¿Cuántos hermanos tiene el/la participante? _____

¿Qué número de hijo/a es el/la participante? _____

¿Hace cuánto tiempo que el/la participante vive aquí? _____

Información sobre la Madre/ Cuidador/a principal:

- Ocupación _____
- Nivel de Educación _____

Información sobre el Padre/ Cuidador/a secundario:

- Ocupación _____
- Nivel de Educación _____

LANGUAGE HISTORY QUESTIONNAIRE

Subject # _____ Date _____

Language History Questionnaire

This questionnaire is designed to give us a better understanding of your experience with other languages. We ask that you be as accurate as thorough as possible when answering the following questions.

1. Gender
 - Female
 - Male
2. Age: _____ years
3. Do you have any known visual or hearing problems (corrected or uncorrected)?
 - No
 - Yes [Please explain] _____
4. Native Country
 - United States
 - Other _____
5. What language(s) do you consider your native language(s)

6. What Language(s) are spoken at home (Please check all that apply).
 - English
 - SpanishOther [Please explain]: _____

What Language did you learn first?

- English
- Spanish
- Both at the same time

7. Estimate how often you communicate in English:

- | | |
|--|--|
| <input type="checkbox"/> daily | <input type="checkbox"/> monthly |
| <input type="checkbox"/> several days a week | <input type="checkbox"/> every few months |
| <input type="checkbox"/> weekly | <input type="checkbox"/> once or twice a year |
| <input type="checkbox"/> bi-weekly | <input type="checkbox"/> less than once or twice |

a year

8. In what contexts did you learn English? (check all that apply)

- Home/family
- School
- Friends
- Work
- Media
(tv/radio/internet/newspaper)

9. At what age did you learn English? _____

10. In what contexts do you communicate in English? (check all that apply)

- Home/family
- School
- Friends
- Work
- Media
(tv/radio/internet/newspaper)

11. Please RATE:

a. English reading proficiency. (1=not literate and 10 = very literate)

1 2 3 4 5 6 7 8 9 10

b. English writing proficiency. (1=not literate and 10=very literate)

1 2 3 4 5 6 7 8 9 10

c. English speaking ability. (1=not fluent and 10=very fluent)

1 2 3 4 5 6 7 8 9 10

d. English speech comprehension ability. (1=unable to understand conversation and 10=perfectly able to understand)

1 2 3 4 5 6 7 8 9 10

12. At what age did you start learning Spanish? _____

13. In what context(s) did you learn Spanish? (check all that apply)

- Home/family
- School
- Friends
- Work
- Media
(tv/radio/internet/newspaper)

14. In what context(s) do you currently communicate in Spanish? (check all that apply)

- Home/family
- School
- Friends
- Work
- Media
(tv/radio/internet/newspaper)

15. Estimate how often you communicate in Spanish:

- daily
- several days a week
- weekly
- bi-weekly
- monthly
- every few months
- once or twice a year
- less than once or twice a year

16. Have you ever lived/visited a Spanish speaking country? YES/NO
For how many months or years? _____

17. Please RATE:

a. Spanish reading proficiency. (1=not literate and 10 = very literate)

1 2 3 4 5 6 7 8 9 10

b. Spanish writing proficiency. (1=not literate and 10=very literate)

1 2 3 4 5 6 7 8 9 10

c. Spanish speaking ability. (1=not fluent and 10=very fluent)

1 2 3 4 5 6 7 8 9 10

d. Spanish speech comprehension ability. (1=unable to understand conversation and 10=perfectly able to understand)

1 2 3 4 5 6 7 8 9 10

APPENDIX D

INSTITUTIONAL REVIEW BOARD APPROVAL

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact the Institutional Review Board Office at 915-747-8841 or irb.orsp@utep.edu. Please include your study title and reference number in all correspondence with this office.

CURRICULUM VITA

Marina Kalashnikova was born in Volgograd, Russia. She is the second daughter to Anatoly and Liudmila Kalashnikov. Her family left their birth country in 1998, and moved to Ciudad Juarez, Mexico in 2000 where she graduated from Chamizal High School in 2005. In the fall of 2006, she entered the University of Texas at El Paso to the department of Languages and Linguistics. In the fall 2007, she obtained a Summa Cum Laude bachelor's degree in linguistics, and joined the University of Texas at El Paso graduate program in Languages and Linguistics. While pursuing her graduate degree, she worked for the Virtual Center for Language Acquisition Research. Furthermore, she has been an active member of the UTEP Language Acquisition Research Lab during four years, conducting and participating in research on child language acquisition and early bilingualism.