THE UNDERSTANDING OF IMPLIED MEANING IN MONOLINGUAL AND BILINGUAL CHILDREN

KENAH REY LINGER

Master's Program in Linguistics

APPROVED:

Carla Contemori, Ph.D., Chair

Charles Elerick, Ph.D.

Ana Schwartz, Ph.D.

Charles Ambler, Ph.D.
Dean of the Graduate School

THE UNDERSTANDING OF IMPLIED MEANING IN MONOLINGUAL AND BILINGUAL CHILDREN

by

KENAH REY LINGER, Bachelor of Arts, Linguistics

THESIS

Presented to the Faculty of the Graduate School of

The University of Texas at El Paso

in Partial Fulfillment

of the Requirements

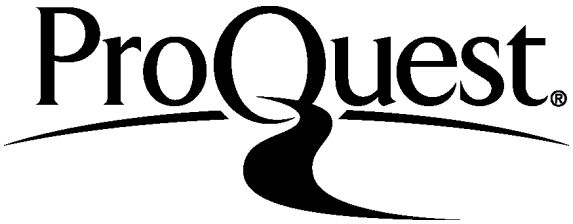
for the Degree of

MASTER OF ARTS

Department of Languages and Linguistics

THE UNIVERSITY OF TEXAS AT EL PASO

May 2016



Abstract

The development of pragmatic language and how it is treated cognitively in monolingual and bilingual speakers is a topic of debate. Language pragmatic skills can include: knowing that you have to answer a question that is being asked, being able to participate in conversation by taking turns, and the ability to maintain a topic. Furthermore, the study of pragmatics has also focused on understanding how we comprehend language that is not explicit. For example, comprehending the sentence," We'd love to have you over for dinner" involves deciding whether this is an invitation, a statement of desire, or even an empty social nicety (Ylvisaker, 2008). Previous research that explored the understanding of implied meaning in conversations has found that children have difficulties interpreting certain pragmatic elements in language, such as implied meaning (Speer & Ito, 2009). Based on these findings, researchers have hypothesized that general cognitive abilities such as working memory and inhibition may play a role in how early children are able to interpret pragmatic language (Speer & Ito, 2009). The present research looks at prosody and how it is acquired and used in preschool-aged monolingual and bilingual children. Prosody aids to the literal interpretation of speech because it enunciates on the pronunciation of the utterance. Previous work has found that young children, age 4 and below, have a difficult time drawing inference from prosodic elements in speech utterances. By using a sentence comprehension test that manipulates prosody, the present study tests if preschool-aged bilingual children comprehend the implications of sentences more accurately than monolingual peers. We hypothesize that because of earlier pragmatic development observed in previous studies (e.g., Siegal, M., Iozzi, L. and Surian, L. 2009; Yow & Markman, 2011), bilingualism may give young speakers an advantage in interpreting the implications of pragmatic development in speech. Additionally, in the present study we look at nonlinguistic factors, such as working

memory and inhibition, to observe if there is a correlation between cognitive function and pragmatic development in monolingual and bilingual children.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Prosody encompasses a wide array of timing, tune, and emphasis that are all used to interpret and convey information from speaker to speaker (Speer & Ito, 2009). Prosodic intonation or lack there of can completely change the meaning of a sentence, as illustrated below in two types of relative clauses that can be distinguished by intonation:

a) My brother / who's abroad / has written to me.

   (I have only one brother, and he's abroad)

b) My brother who's abroad / has written to me.

   (I have more than one brother, only one of whom lives abroad)

By slightly changing the intonation of the above sentences we can derive two different interpretations of the meaning of the sentences. The ability of interpreting intonation that signals contrast is said to develop late in monolingual children, after age six (Speer & Ito, 2009; Ito, Jincho et al., 2012; Ito, Bibyk et al., 2012). With comprehension of prosodic features and their implications for the comprehension of meaning being possibly a difficult aspect of language pragmatics to master, we chose to look at how monolingual and bilingual children interpret noun-focus and verb-focus prosody in speech utterances. Previous work (e.g., Bialystok, 2001; Bialystok & Martin, 2004) has shown that bilingualism has a positive effect on children's ability to judge grammar, to substitute symbols, and to 'inhibit' a prepotent response in executive functioning. The increased need to monitor the communicative situation may lead to a heightened sensitivity in bilingual children to the social, pragmatic, and communicative contexts surrounding language use. Bilingual children have been shown to be better than monolingual

children at taking the perspective of a listener into account and picking up on feedback and prompts from their communicative partner, and have a greater level of pragmatic awareness (Yow & Markmann, 2011). This heightened sensitivity to communicative cues may transfer to how bilinguals interpret prosody in speech. For this reason, we chose specifically to target monolingual and bilingual language learners to pinpoint differences in interpreting intonational meaning and if differences do arise, if they are a result of advanced executive functioning.

Using the material designed by (Kurmada & Clark, under review), we look at whether bilingual children show a similar or different pattern of interpretation of noun-focus and verb-focus prosody in sentences. (Kurmada & Clark, under review) compared young monolingual children to adults to see if children exhibited a sensitivity, that is, were they able to interpret intonational differences in utterances. In the study, children were presented with sentences that can have different meanings depending on the speaker's intonation. The authors investigated if the child was able to identify the correct referent for the noun "zebra" in two conditions: (a) a sentence like "It LOOKS like a zebra…" (but it is not actually one) with verb-focus prosody, and (b) a sentence like "It looks like a ZEBRA" (and it is one) with noun-focus prosody), when two pictures of animals were presented, such as the ones presented in Figure 1.

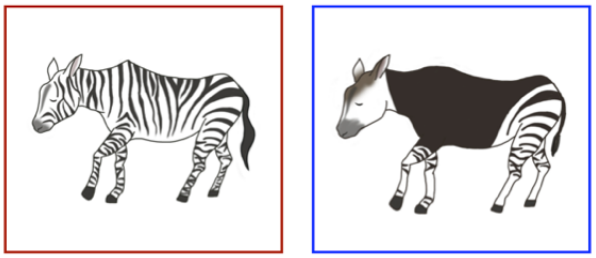


Figure 1: **Prosody.** Examples of two choice options: a mentioned animal (zebra) on the left and the unmentioned animal (okapi) on the right.

The authors found that while the adult participants initially showed uncertainty in interpretations of verb-focused prosody, they readily converged on the intended associations of the prosodic features (Kurmada & Clark, under review). Furthermore, their findings showed that 3-5 years-old children could not make pragmatic inferences based on prosody, unless the context provided enough support for them to do so. To explain why children did not show an adult-like performance in interpreting contrast-marking prosody, they proposed that at that age children may present an undeveloped phonology, their discourse understanding may be not adult-like, or their cognitive or executive-control skills may be immature (Kurmada & Clark, under review). An underdeveloped phonology in the children participants would mean that the children had not yet been exposed to the amount of speech prosodic patterns that adults have been exposed to, leading children to have less phonological material to reference in their interpretations of the prosodic utterances. The child's discourse understanding could also not be comparable to that of the adult participants. Discourse understanding refers to the ability of a participant to understand the text or dialogue that they are exposed to. The last factor that could possibly contribute to children's performance in (Kurumada & Clark, under review) is executive control. In interpreting prosody, you have to be able to override the literal interpretation of a sentence to comprehend what the prosody implies about the sentence. If children have a limited memory

size, or an undeveloped executive control, they may not be able to process and integrate the prosodic information as quickly as an adult. (Kurmada & Clark, under review) bring up these points to pose possible reasons as to why the children in their research were unable to show an adult-like performance in interpreting contrast-marking prosody. In the present research we use the testing design and material of (Kuramada & Clark, under review) to explore if bilingual and monolingual children interpret verb-versus noun-focus prosody comparably.

Though the focus of our research is how prosodic elements are interpreted, it is necessary to also look at the non-linguistics factors that could play a role in how the children would interpret intonational differences in noun-focus and verb-focus prosody. Thus, children's executive control is tested through a series of tasks: day and night and card sorting, to observe if inhibition influences the comprehension of implied meaning. We use these tasks to highlight one of the predictions by (Kurmada & Clarke, under review) that children did not show an adult-like performance in interpreting contrast-marking prosody because of a gap in executive control.

To summarize, previous research suggests that children aged four and below do not show an adult-like interpretation of the implication of messages (Kurmada & Clark, under review). We look at the development of this ability in monolingual and bilingual children to bridge the gap of what we know about bilingual language and cognitive development, that is, that bilingualism may have an impact on the child's pragmatic (Siegal, M., Iozzi, L. and Surian, L., 2009), and general cognitive development (e.g., Fan et al., 2015).

1.1 Development of Prosody in Monolingual Children

When children acquire their language, any input they receive is vital to the output that they will later produce. Their perceptions of patterns of speech serve as a vessel for their language processes. It has been demonstrated that infants as young as two months old are sensitive to prosodic phrase boundaries such as pitch (Hirsh-Pasek, 1987; Mandel et al., 1994). As they mature to six months, their prosodic sensitivity aids in word segmentation (Nazzi, 2000; Shukla et al. 2011). At the nine month mark, infants can use metrical information, such as word stress, as a cue to word boundaries (Thiessen & Saffran, 2003). At age two, young children can use prosodic stress to identify certain grammatical structures in speech (Clark, Gelman, & Lane, 1985). This information would lead us to believe that because of a child's increased sensibilities to speech patterns, they should be able to all uses of prosodic elements of speech at a young age. However, to derive pragmatic information from prosody, listeners need to be able to simultaneously process a chunk of spoken input while accessing and updating the discourse status of specific referents. This may be cognitively taxing for children with limited memory size and attention control ability (Ito, Bibyk et al., 2012).

The cognitive functions hypothesis is not the only one that has been proposed. Another hypothesis that accounts for these findings is that children's difficulty may also stem from their limited understanding of the discourse relevance of contrasts signaled by prosody (Cutler & Swinney, 1987; Hurewitz, 2001; Snedeker & Yuan, 2008). For example, (Ito and colleagues, 2012) showed that Japanese-speaking six-year-olds could identify a color contrast, marked by contrastive prosody, when the color properties were mentioned in the preceding context. When they added an initial utterance (e.g., "Where's the blue lion?" "Now, where's the YELLOW..."), children looked faster to an object of the same type (lion) but with the pertinent color just

mentioned. Adults are generally swift at taking discourse context into account and attending to visual features that distinguish otherwise confusable referents (Snedeker & Trueswell, 2003; 2004; Sedivy et al., 1999; Tanenhaus et al., 1995). Children, though, seem to require more explicit information in the form of linguistic cues to the dimensions of contrast (Trueswell et al., 1999; Sekerina & Trueswell, 2013).

An earlier study involved children aged 3;8-4;7 that were studying English as their first language in a nursery school in California and adult speakers that were recruited using an online server, Amazon Turk (Kurmada & Clark, under review). The aim was to examine whether young children have an understanding of the contrastive-function of prosody that they can use in their pragmatic inferences. To do this, they first embedded 16 high-frequency animal names in the sentence frame "It looks like an X" (e.g., It looks like a zebra). Half of these items were recorded with noun-focus prosody (e.g. "It looks like a ZEBRA") and the other half were recorded with verb-focus prosody (e.g. "It LOOKS like a zebra…"). Then 16 animal pictures were chosen to form pairs in which the animals resembled each other in visual features (e.g., a zebra and an okapi, see Figure 1). In each pair, the target named in the input sentence (e.g., *It looks like a zebra*) was the more common of the two and was more familiar to the children being tested. Hereafter, the target named in a sentence (e.g., a zebra) is referred to as the animal *mentioned* and the paired animal (e.g., an okapi) is the *unmentioned* animal. The animals in each pair served as possible referents for one or the other of the two prosodic contours used in the task (e.g., a zebra as the target referent for "It looks like a ZEBRA" [and it is] and an okapi for "It LOOKS like a zebra..." [but it's not one]). The results of the study matched those by (Ito and colleagues, 2012) on Japanese-speaking children, showing that unless additional context was provided (e.g. "Where is the pink cat" versus "Where is the GREEN cat?", where the children were given more

context than previous studies to interpret the utterances), the children could not interpret the sentences as adults did. To investigate further on the results of (Ito and colleagues, 2012) and (Kurmada & Clark, under review), the current study looked at monolingual and bilingual children to find differences in interpreting prosody in speech. The following section is meant to elaborate on child bilingualism and how pragmatic development in bilingualism is relevant to understanding pragmatics as a whole.

1.2 Pragmatic Development in Bilinguals

Previous research on child bilingualism has shown that bilinguals show advantages in the executive function abilities in comparison to monolingual children (e.g., Bialistock, 2001; Bialistock & Martin, 2004). Executive function handles time management, planning, organization, and flexible thinking in the brain (Morin & Tagilareni, 2014). Interestingly, bilingual children may present executive function differences compared to monolinguals depending on the degree of exposure to the two languages (Rueda et. al., 2005; Bialystok, 2001). (Bialystok, 2001) comprehensively reviewed the research on cognitive differences between bilingual and monolingual children and concluded that the experimental evidence supports the enhancement for a set of specific intellectual abilities in bilingual children compared to age-matched monolingual children. One aspect of cognitive functioning, namely inhibitory control seems to develop more rapidly in children with extensive bilingual experience. Investigating the relationship between executive functioning and language pragmatic development in bilingual children is highly informative both for theories of general cognitive development and theories of child pragmatic development (e.g., Fan et al., 2015), as explained below.

The correlation between pragmatic competence and bilingual language development is an under researched topic. Despite this, it is necessary to look at the cognitive abilities of bilinguals

to explore if there is a relation with what they are able to interpret pragmatically. Previous research shows that bilingual children have constant practice in considering the linguistic knowledge of people that they are interacting with (Goetz, P. J., (2003). With this is mind, we know that bilingual children have enhanced sensitivity to a speaker's intent. Concerning bilinguals' pragmatic abilities, previous studies have observed that early bilingualism can be associated with advanced pragmatic skills. By comparing monolingual and bilingual children matched on executive function abilities, (Siegal et al., (2009) found that bilingual children excelled more generally in their sensitivity to conversational maxims compared to their monolingual counterparts. Conversational maxims refer to Grice's Maxims where the speaker tries to be as informative as possible without additional information, as truthful as possible without information that is false, as relevant as possible, and as clear or brief as possible.
Executive function is important because it has been hypothesized that executive function may be linked to pragmatic development in that it helps manage working memory and organization that could aid in pragmatic interpretation.

Another hypothesis is that executive function is not critical for interpreting pragmatics, however, being able to take into account the other speaker is.

To get an idea of how bilingual children interpret prosody, we look comparatively at monolingual and bilingual language development. Is there a positive or negative correlation between bilingualism and interpreting prosody in speech? If bilingual children show an earlier development of pragmatic abilities compared to monolingual (i.e., interpretation of contrastive prosody), is that related to an advantage in cognitive development?

Chapter 2: Methodology

2.1 Participants

Twenty-two children participated in the study, ranging in age from 42 months to 78 months. They were divided into two language groups: 11 English monolinguals (M = 52 months, SD = 7) and 11 Spanish-English bilinguals (M= 61 months, SD = 10). The English monolinguals were recruited from a private preschool on Ft. Bliss, a military base in El Paso, Texas. The Spanish-English bilinguals were recruited from private preschools in other areas of the city. One of the two preschools provided instruction in Spanish and English, while in the other two instruction was exclusively in English. For the bilingual children who were not receiving instruction in Spanish, they acquired Spanish from their caregivers. All children tested were tested in English. The children were from different areas of El Paso with differing levels of socioeconomic status, SES. Monolingual and bilingual children were comparable on the basis of age, as no significant difference was found between the two groups. All participants were asked to complete a background questionnaire prior to their involvement in the study. The information on the questionnaire assessed their age of acquisition, exposure of participant and family to Spanish and other languages, and the education of their parents. The Socioeconomic Status (SES) of the family was calculated by scaling the education of the mother on a 6-point scale. 1 point was awarded if the mother had completed high school, 2 for some college/trade school, 3 for the completion of a Bachelor's degree, 4 for some grad school, 5 for the completion of grad school, and 6 for a PhD. Since some parents did not return the background questionnaire we were not able to assess SES in all participants. We assume that the SES is comparable between groups, however, future research should assess this.

2.2 Tasks

2.2.1 Prosody

For the prosody task, we used the testing material previously used in the Kurmada & Clark (under review) research. This material consisted of 16 high-frequency animal names that were embedded in the sentence frame "It looks like an X" (e.g. *It looks like a zebra).* Half of the items were produced and recorded with a noun-focus prosody (e.g. It looks like a ZEBRA) and the other half were produced and recorded with a verb-focus prosody (e.g. It LOOKS like a zebra). We counter-balanced the stimuli across four experimental lists: items pronounced with a noun-focus prosody in List 1 had a verb-focus prosody in List 2 and vice versa, we then organized these lists in reverse order to create four lists in total. The 16-high frequency animals were paired with 16 more animal pictures in which the animals resembled each other. The animals in each pair served as possible referents to each other. Participants took part in a two-alternative forced choice task with an experimenter who was a native speaker of American English. The task comprised 16 trials (two practice trials and 14 critical trials) and lasted approximately fifteen minutes. The testing material was organized on a PowerPoint that had the audio recordings linked to the corresponding slides.

Children first took part in a picture-naming task, where they named 8 animals, one-by-one to ensure that they knew the name of each animal mentioned in the experimental audio stimuli. If the child was unfamiliar with the animal, the experimenter would provide feedback to assist the child. Then the child and a puppet took part in a guessing game where they were first presented with a box and told that it contained pictures of many different animals. In each trial, the child was shown two pictures—the target and a distractor (e.g., a zebra versus an okapi).

These pictures were displayed on a PowerPoint presentation. Then the puppet was allowed to peek inside the box and give the child a clue in the form of "It looks like an X" vs. "It LOOKS like an X...". Following the puppet's clue, the child was asked to point at the picture of whichever animal was hidden inside the box. After the child pointed to a picture, the experimenter took a picture card from the box and showed it to the child. This served as feedback about which animal the puppet speaker had intended to identify. After the first eight trials (two practice trials and six test trials), the child named another eight animals and then took part in another eight trials of the guessing game. The child's responses were scored by accuracy, 1 was awarded for correct responses, 0 was given for an incorrect response.

In order to equate children's initial experience with the task, they all received an identical set of example items. The first practice trial contained pictures of a horse and a donkey as choice options and they heard an utterance with noun-focus prosody ("It looks like a horse"). The second practice trial contained pictures of a butterfly and a moth and they heard an utterance with verb-focus prosody ("It LOOKS like a butterfly..."). The experimenter would provide feedback to the participants at the conclusion of each trial.

2.2.2 Card Sort

For the card sort task, we used the testing material previously used by Siegal et al. (2009). This material consisted of two sets of cards: 3 pink birds and 3 blue cars as well as 2 sample cards: one pink car and one blue bird, as illustrated in Figure 2.

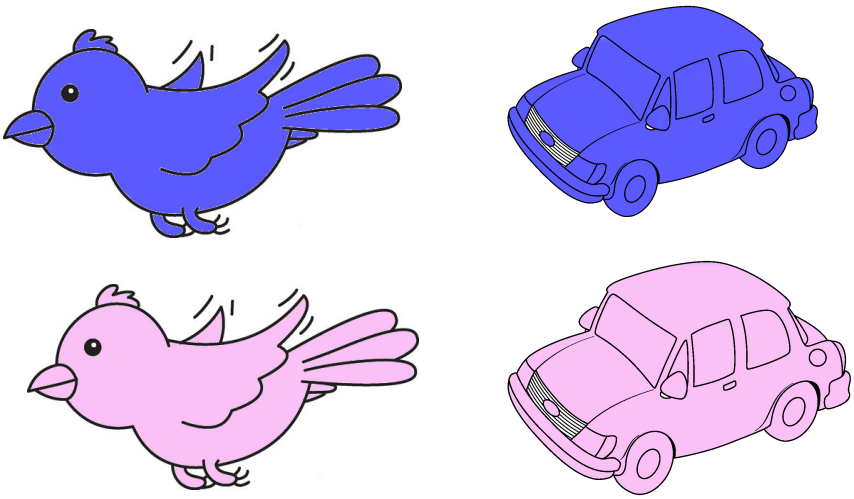


Figure 2: **Card Sort.** Sample of pictures of pink and blue bird & pink and blue car that were used in the card sort task.

Along with the testing cards, two additional cards were printed, one pink car and one blue bird to be mounted on two plastic boxes. The cards were laminated for practicality reasons. The stimuli were organized into two lists, each list was broken down into two phases: one where the child was asked to sort by shape then color, and one where the child was asked to sort by color then shape.

The experimenter would shuffle the first set of cards, (3 blue cars and 3 pink birds) and ask the child to help the experimenter put the cards in the correct box. The child was told to either start sorting the cards by shape or to start sorting the cards by color depending on the experimental list. The experimenter used the two sample trials to provide feedback to the child. After the two sample trials, no feedback was given. The experimenter would show the child the cards and ask where the card would belong. If the child placed the card correctly, they were

scored a 1 for accuracy. If they sorted incorrectly, they were scored a 0 for accuracy. If the child sorted 5/6 cards correctly in the first phase of sort, then the experiment would change the game to sort by the opposite feature. If the child scored less than 5/6 on the first sorting phase, then the experimenter would stop the game. The second phase of sorting replicated the first phase in scoring, 1 for a correct response, 0 for incorrect. Once the game was complete, the child was given an overall accuracy score. If the children only passed phase one, they were given a 1. If they passed both phases, they were given a 2, if they passed neither phase then they were given a 0.

2.2.3 Day and Night

For the day and night task we used the testing material previously used in the by Siegal et al. (2009). This material consisted of 2 training cards and 16 testing cards. Half of the cards were a picture of a sun, the other half was a picture of a moon, as illustrated in Figure 3.

Figure 3: **Day and Night.** Sample of picture of sun and moon that were used in the day and night task.

The cards were laminated for practicality reasons. The stimuli were organized into one list, with a pseudorandom order. The experimenter would show each child a card with a moon

and say, “We’re going to play a funny game. When you see this card, I want you to say *day*.” The experimenter would then ask the child to repeat the word *day*. Next, the experimenter would show the child a card with a sun and say, “When you see this card, I want you to say *night*.” The child was then asked to repeat the word *night*. Following this demonstration, the child was shown a card with the sun and asked, “What do you say when you see this card?” The correct response, *night* was praised and the child was shown a card with a moon and asked, “What do you say when you see this card?”. A second correct response was met further praise and the testing phase proceeded in the same format as the practice trails. No feedback was given during the testing phase. If the child got the first two trials wrong, the experimenter would repeat the practice trials with feedback two additional times. If the child continued to answer incorrectly or failed to respond, the experimenter would continue with the testing phase. The child’s responses for each trial were noted in a blank space on the scoring sheet and they were also scored for accuracy, 1 for a correct response and 0 for an incorrect response.

Chapter 3: Procedure

The participants were tested individually by an English-speaking research assistant in two 30-minute sessions. The research was carried out in a quiet room located at the different preschools where the children attended. Prior to being testing, the parents of the participants completed a language background questionnaire that assessed their use of English, Spanish, and other language influence, as well as background information on the mother and father of the participant. The tasks tested in the sessions included the tasks described above as well as other tasks that are not relevant to this specific research.

Chapter 4: Results

4.1.1 Prosody

For the statistical analysis, a Repeated Measures ANOVA was used where the dependent variable was the proportion of correct responses on the Prosody Task. The independent variable within subjects was Prosody Type, with two levels (Noun Prosody, Verb Prosody) and the between subjects' variable was Group, with two levels (Monolinguals, Bilinguals). The analysis was conducted by subject and by item. For the by subject ANOVA, the analysis revealed that a main effect of Group is approaching significance, ($F1(1,20)=3.399$; $p=.080$)). Though this result is not statistically significant, our p value of .080 is approaching significance, and shows a trend with bilingual children being more accurate on both prosody conditions compared to monolingual children. Notice that at this stage of the project the groups are rather small in terms of participants' number, and we expect that the result may be significant as our participant pool grows in size. The main effect of Prosody Type and the interaction between Group and Prosody Type was not statistically significant (Prosody Type: ($F1(1,20)= 0.300$; $p=0.590$)) and Group by Prosody Type: ($F2(1,20)=0.002$; $p=0.967$)). In Figure 4 we see our bilingual group displaying higher accuracy scores on the prosody task compared to monolinguals. We expect as our number of participants grow, for the pattern of to continue, and display even more significant results.

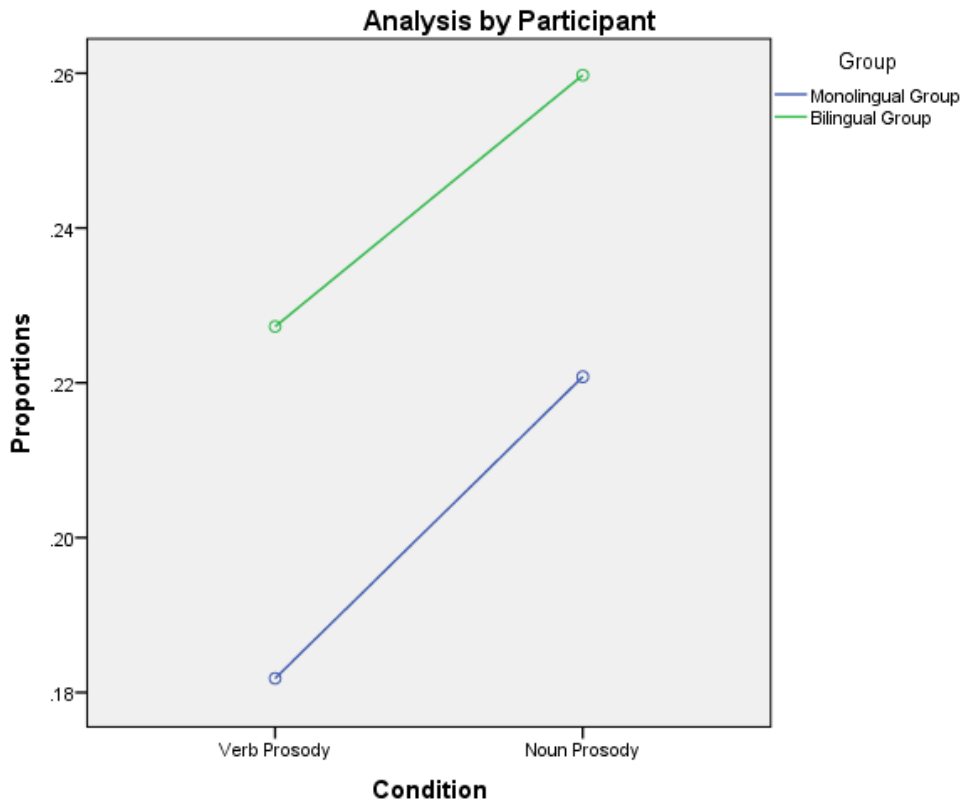


Figure 4: **Analysis.** Proportion of correct answers given by the monolingual and bilingual groups in the two prosody conditions.

In the by item analysis, we found similar results as in the by subject analysis. A main effect of Group is marginally significant, ($F2(1,26)=3.958$; $p=.057$)), with bilingual children performing more accurately than monolingual children in both prosody conditions. The main effect of Prosody Type and the interaction between Group and Prosody Type was not statistically significant (Prosody Type: ($F2(1,26)=0.911$; $p= 0.349$)) and Group by Prosody Type: ($F2(1,26)=0.006$; $p=0.938$)). Despite a small sample group, the results support the hypothesis that bilingualism may play a role in interpreting prosodic elements in speech by displaying a marginal difference between testing groups.

4.1.2 Executive Functioning Tasks

The card sort, day and night, verb prosody, and noun prosody scores are shown in Table 1. To observe if there is a relationship between the prosody conditions and performance on the inhibition tasks, we ran a Correlation analysis. We transformed our data from all tasks in to z scores prior to running a correlation analysis to get a better idea of their relation to the mean results.

Table 1: **Correlations.** *P Correlation values for verb prosody, noun prosody, day and night, and card sort tasks.*

		VerbProsody	NounProsody	DayNight	CardSort
VerbProsody	Pearson Correlation	1	-.865**	.134	.248
	N	22	22	22	22
NounProsody	Pearson Correlation	-.865**	1	-.291	-.218
	N	22	22	22	22
DayNight	Pearson Correlation	.134	-.291	1	.021
	N	22	22	22	22
CardSort	Pearson Correlation	.248	-.218	.021	1
	N	22	22	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 1, we interestingly do not see any correlation between the executive function tasks and the prosody task.

Correlations at the $p < .01$ level, two-tailed, showed that p values on the executive tasks were not significantly related to p values of the prosody task. Additionally, we also see that there was no correlation between the day and night task and the card sort task which test similar abilities.

Chapter 5: Discussion

This study examined aspects of pragmatic language development, specifically, the interpretation of sentences where prosodic information is provided in a group of monolingual and a group of bilingual pre-school aged children. I looked at how the two groups interpret contrastive-prosody and correlated the performance with their executive function abilities to see if one group would outperform the other.

The development of pragmatic language and how it is treated cognitively in monolingual and bilingual speakers is a topic of debate. I hypothesized that because of earlier pragmatic development, bilingual speakers may show an advantage in interpreting the implication conveyed by contrastive prosody in speech. I examined how 3-5 year old monolingual and bilingual children interpret the construction "It LOOKS like an X", in a picture comprehension task, to see whether the presence of a picture that resembled the audio stimuli could influence their interpretation of the utterance. I also tested children's inhibition with a day and night task and a card sort task to explore if inhibition could be related to how prosodic elements are interpreted in monolingual and bilingual children.

In the prosody task, I found no significant difference between monolingual and bilingual speakers and how they interpreted contrastive-prosody. Though no significant difference was found, I did see that our bilingual testing group was beginning to display a result that was approaching significance. Looking at the results, one assumption is that the bilinguals were beginning to pick up on the patterns of the task, allowing them to outperform the monolinguals. Since feedback was given to all participants in all trials, it is possible that the bilingual group was able to better respond to the feedback and adjust their answer. I hypothesize that, if I expanded our numbers in participants, this pattern may increase and the bilinguals may begin to show a

significant difference in comprehension.

To support my claim of accustomization and for future study, I could look at the data by the order of which the participants answered the stimuli. With this I could understand if the child performance changes from the beginning until the end of the task, and based on the order in which the trials were presented allows us to see a progress in the task. With that being said, I do report that the participants as a whole were statistically performing below chance. This means the participants could have been simply preferring a certain interpretation of the trials or that they were simply guessing which answer they thought was correct.

A factor that could have attributed to the marginal difference found in our analysis could be the socioeconomic status (SES) of the participants. I was unable to analyze the SES in this study because I was missing data for several monolingual participants. For future research, it will be necessary to analyze the SES of participants as a possible attributing factor.

In the executive function tasks, I found no significant relation between the tasks measuring inhibition and the performance on the prosody task. Additionally, I did not find a correlation between the card sorting task and the day and night task which test a similar ability, inhibition. A few explanations could be made about the lack of correlation between the data. First, a lack of correlation could mean, contrary to my initial hypothesis, that prosody and executive functions are not related. With no significant result reported, it could be assumed that the tasks do not influence each other and therefore are not comparable. Another explanation for the lack of correlation could be that the testing material for the executive function tasks is not sensitive enough to indicate a correlation or compare to one another. This is not to say that the participates performed poorly on the tasks in particular, but rather, that I could not find a link

between their performance on the cognitive tasks and their performance on the prosody task. Facilitating these tasks further by providing more feedback could reveal heightened sensitivity to the material that had was not found in this research. A third possible explanation could be that the correlation statistics that were run were a rough analysis of the interactions, and for further indications I would find a significant value by running additional analysis. Since the correlation was a rough analysis, I hypothesize that, if I ran a further statistical analysis (e.g., regression analysis), I may find different results. A final explanation could be that if I test more participants, then my values would expand and show a significant correlation. With my research being a pilot study, I expect that the growth of the effects may increase with more participants.

In conclusion, this study examined the differences in acquisition of prosody in monolingual and bilingual children. We pinpointed bilingualism to shed light on relationships between pragmatic skills and the development of general cognitive abilities. As noted by (Siegal, 2009) bilinguals have a capacity for flexibility in the representation of language, leading to advanced pragmatic skills. Though my research did not produce highly significant results, it seems that bilingual children show some advantage in pragmatics that is not related to their executive function abilities. This advantage can be attributed to the language experience of the children and the ability of the bilingual children to take the perspective of the listener into account. To support this, I also note (Bialystok, 2004) and the conclusions made about the cognitive development in bilinguals. She states in her 2004 study that bilinguals develop control over attention more efficiently than monolinguals. Their advantages in attentional control can be tied to their language experience and ability to take the perspective of listener into account. I am confident that by increasing the number of participants, I would see the bilingual group produce more accurate results on the prosody tasks, and I would observe a correlation with the executive

functions tasks. There are several directions in which I could expand my research. It would be interesting to retest our participants with more of a facilitated task that provides more contextual cues on the prosody task, as implemented in one of the experiments in (Kurumada, C., & Clark, E. V., under review), and (Ito et al., 2012). Under this facilitation I would expect both groups to display more accuracy on the prosody task. To further analyze our data, and to reveal more about the trends of interpretation, we could also use eye tracking as a method to see how our participants were interpreting the stimuli. By using this method, I could reveal more about how the participants arrive to their interpretations. Using these approaches can improve our understanding of bilingualism and the advantages it plays in pragmatic speech.

References

Bialystok, Ellen, and Michelle M. Martin. Attention and inhibition in bilingual children: Evidence from the dimensional change card sort task. *Developmental science* 7.3 (2004): 325-339.

Clark, E. V., Gelman, S. A., & Lane, N. M. (1985). Compound nouns and category structure in young children. *Child Development*, 84-94.

Cutler, A., & Swinney, D. A. (1987). Prosody and the development of comprehension. *Journal of Child Language*, *14*(01), 145-167.

Goetz, P. J. (2003). The effects of bilingualism on theory of mind development. *Bilingualism: Language and Cognition*, *6*(01), 1-15.

Ito, K., Jincho, N., Minai, U., Yamane, N., & Mazuka, R. (2012). Intonation facilitates contrast resolution: Evidence from Japanese adults and 6-year olds. *Journal of Memory and Language*, *66*(1), 265-284.

Kurumada, C., & Clark, E. V. (under review). *Pragmatic inferences in context: Learning to interpret contrastive prosody*.

Mandel, D. R., Jusczyk, P. W., & Nelson, D. G. K. (1994). Does sentential prosody help infants organize and remember speech information?. *Cognition*, *53*(2), 155-180.

Morin, A., & Tagilareni, L. (2014). Understanding Executive Functioning Issues. Retrieved April, 2016, from understood.com.

Nazzi, T., Nelson, D. G., Jusczyk, P. W., & Jusczyk, A. M. (2000). Six-Month-Olds' Detection of Clauses Embedded in Continuous Speech: Effects of Prosodic Well-Formedness. *Infancy*, *1*(1), 123-147.

Rueda, M. R., Rothbart, M. K., McCandliss, B. D., Saccomanno, L., & Posner, M. I. (2005). Training, maturation, and genetic influences on the development of executive attention. *Proceedings of the national Academy of Sciences of the United States of America*, *102*(41), 14931-14936.

Siegal, M., Iozzi, L., & Surian, L. (2009). Bilingualism and conversational understanding in young children. *Cognition*, *110*(1), 115-122.

Snedeker, J., & Trueswell, J. C. (2004). The developing constraints on parsing decisions: The role of lexical-biases and referential scenes in child and adult sentence processing. *Cognitive psychology*, *49*(3), 238-299.

Speer, S. R., & Ito, K. (2009). Prosody in first language acquisition–Acquiring intonation as a tool to organize information in conversation. *Language and Linguistics Compass*, *3*(1), 90-110.

Thiessen, E. D., & Saffran, J. R. (2003). When cues collide: use of stress and statistical cues to word boundaries by 7-to 9-month-old infants. *Developmental psychology*, *39*(4), 706.

Trueswell, J. C., Sekerina, I., Hill, N. M., & Logrip, M. L. (1999). The kindergarten-path effect: Studying on-line sentence processing in young children. *Cognition*, *73*(2), 89-134.

Appendix

The questionnaire used to gather some of the data that has been presented in this thesis can be found below.

Questionnaire for Parents/Caregivers of Bilingual Children

General Information about the Child

1.1 Name: _____

1. 2 Birth Date: _____

1.3 If place of birth is not country of residence, date of arrival in country of residence: _____

1.4 What languages does your child speak now? Please circle "yes" or "no". If a language other than Spanish or English is spoken, please specify what language it is.

Spanish	**English**	**Other Language (specify)**
YES / NO	YES / NO	

1.5 Which language do you think your child feels the most at home in? _____

2. Child's early history

2. 1 How old was your child when he/she spoke his/her first word?_____

2.2 How old was your child when he/she first put words together to make short sentences? _____
Example: *more water*; *more milk* ; etc.

2.3 Before your child was three or four years old, were you ever concerned about his/her language?
NO or YES

2.4 Has your child ever had any hearing problems or frequent ear infections?
NO or YES

2.5 At what age was your child first in contact with each of his/her languages?

	Age (months if possible)		**Age** (months if possible)
Spanish		Other language	
English		Other language	

2.6 In general, before your child was four years old, was he/she exposed to:

	0 Never	1 Rarely	2 Sometimes	3 Usually	4 Very Often/Always
Spanish					

English					
Other Language (specify)					

2.7 In what context and at what age did this exposure (before age 4) begin?
(Put age in all appropriate cells)

	Spanish	**English**	**Other Language**
a. Mother			
b. Father			
c. Grandparents			
d. Babysitter / child minder			
e. Other adults (specify)			
f. Siblings			
g. Nursery school/day care			
h. Kindergarten			

2.8 How often parents/caregivers speak each of the languages to the child

	Mother/Caregiver ↔ Child					**Father/Caregiver ↔ Child**				
	0 Never	1 Rarely	2 Some times	3 Usually	4 Very Ofte n	0 Never	1 Rarely	2 Somet imes	3 Usually	4 Very Often /Always
Spanish										
English										
Other Language										

2.9 Is there another adult who regularly takes care of your child? (grandparent, babysitter, etc.):
YES or NO

	Other Adult ↔ Child				
	0 Never	1 Rarely	2 Sometimes	3 Usually	4 Very Often /Always
Spanish					
English					
Other Language					

2.10 With siblings (brothers and sisters):

Siblings ↔ Child					
	0 Never	1 Rarely	2 Sometimes	3 Usually	4 Very Often /Always
Spanish					
English					
Other Language					

3. Information about parents/caregivers

3.1 Information about the mother/caregiver

3.2 In which country were you born?

3.3 If you are currently working, what is the language you use at your work place?

3.4 Mother/caregiver's education:

		Number of years	**Further information**
Primary school	Yes / No		
Secondary school	Yes / No		
University	Yes / No		
Other professional training	Yes / No		

3.5 In your opinion, how well do you speak the following languages?

	0 Only a few words	**1 Gets along, but with difficulty**	**2 Basic abilities (gets along)**	**3 Well**	**4 Very well**
Spanish					
English					
Other Language					

4. Information about the father/caregiver

4.1 In which country were you born? _____

4.2 If you are currently working, what is the language you use at your work place? _____

4.3 In your opinion, how well do you speak the following languages?

	0 Only a few words	**1 Gets along, but with difficulty**	**2 Basic abilities (gets along)**	**3 Well**	**4 Very well**
Spanish					
English					
Other Language					

4.4 Father/caregiver's education:

		Number of years	**Further information**
Primary school	Yes / No		
Secondary school	Yes / No		
University	Yes / No		
Other professional training	Yes / No		

Curriculum Vita

Kenah Linger was born in Dallas, Texas. First born of Kenneth Linger and Lori Linger, she graduated from John Horn High School in Mesquite, Texas in 2010. She entered the University of Texas at El Paso in July of 2010 on an athletic scholarship. Choosing to major in linguistics, she received her Bachelor of Arts degree in May of 2014 in linguistics with a minor in speech-language pathology. In the Fall of 2014, she entered the Graduate School at the University of Texas at El Paso, majoring in applied linguistics.

Permanent email address: kenahlinger@gmail.com

This thesis/dissertation was typed by Kenah Rey Linger.