ANALYSIS OF THE DEVELOPMENT OF READING PROSODY AS AN ELEMENT OF

CHILDREN'S DEVELOPING READING FLUENCY

by

MATTHEW WESTMORELAND

(Under the Direction of Paula Schwanenflugel)

ABSTRACT

This study examines the development of reading prosody, specifically, linguistic focus prosody as an element of reading by recording the readings of 120 third grade students from Georgia and New Jersey. Spectrographs were used to examine how the students marked linguistic through the use of pitch, duration, and amplitude. The linguistic focus features being examined were exclamation, quotations, contrastive stress, and parentheticals. More fluent readers marked contrastive stress and exclamations with higher pitch and increased amplitude, which was expected based on the previous research. Fluent readers also used higher pitch as a marker of quotations. Longer duration was only used as a marker for exclamations and even showed an unexpected directionality where unmarked words had a longer duration. The participants generally did not understand parentheticals, and a majority of the parentheticals had to be recorded as missing and a statistical analysis could not be performed.

Key words: Reading Prosody; Reading Fluency

ANALYSIS OF THE DEVELOPMENT OF READING PROSODY AS AN ELEMENT OF

CHILDREN'S DEVELOPING READING FLUENCY

Matthew Westmoreland

B.S. Georgia College and State University, 2011

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment

of the Requirements for the Degree

Master of Arts

Athens, Georgia

2013

ANALYSIS OF THE DEVELOPMENT OF READING PROSODY AS AN ELEMENT OF

CHILDREN'S DEVELOPING READING FLUENCY

By

MATTHEW ROBERT WESTMORELAND

Major Professor: Paula Schwanenflugel

Committee: Paula Schwanenflugel

Nancy Knapp

April Galyardt

TABLE OF CONTENTS

Chapter 1

Introduction

What is Reading Prosody?

Reading prosody is the ability to read aloud with proper expression, tone, and inflection. Good reading prosody is shown by reading with the proper pitch (both rising and falling), rhythm, amplitude, pauses, as well as placing stress on some syllables while limiting the stress on other syllables (Hirschberg, 2001**;** Benjamin, Schwanenflugel, Meisinger, Groff, Kuhn, & Steiner, 2012). Only recently have we learned much about the development of reading prosody in young children. Prosody is what forms the basis of the perceived expressiveness of the speaker/reader. There has been limited research with regards to reading prosody and children. This paper hopes to help answer the question as to whether or children develop prosody during the time in which reading fluency is also being developed. Secondly, this paper attempts to answer the question as to whether or not more fluent readers display better reading prosody than less fluent readers. This paper refers to marked words as those that should be stressed when reading aloud while unmarked words refer to those that should not receive any stress.

Changes in prosody can be used to draw the listener's attention to certain pieces of information. Prosody acts as a guide for both the reader and listener with regards to what information is important. By drawing attention to what is important, good prosody also helps to increase comprehension by informing the reader of what information should remain in the working memory as important for understanding the meaning of the text or speech and what information merely serves as additional information (Schwanenflugel & Benjamin, 2012). It is likely this occurs because the listener is able to discern the important parts of the speech and link

it to the newer incoming information by using the prosodic cues of the speaker (Schwanenflugel & Benjamin, 2012). Readings completed with good prosody have been demonstrated to help enhance the reading comprehension among children when dealing with more complex texts (Schwanenflugel & Benjamin, 2012). Thus, it has been theorized that good prosody can increase the understanding of a message by supporting the retention of key information in working memory (Hirschberg, 2002; Schwanenflugel & Benjamin, 2012).

There are a number of features that are measureable in reading prosody. Among these is pausing. Pausing is indicated by silence, hesitations, and stammering during the speech or oral reading (Schwanenflugel & Benjamin, 2012). Typically, those who speak and read slowly will pause more frequently both to catch their breath and/or to determine the message (Krivokapic, 2007; Schwanenflugel & Benjamin, 2012). Pausing before or even after a word can indicate the child is having difficulty decoding the word (Miller & Schwanenflugel, 2008). However, a well-placed pause during a complex sentence does not necessarily mark a pausing error (Schwanenflugel & Benjamin, 2012).

Unnatural pauses break the rhythm and flow of the reader and make it difficult to understand of the text (Benjamin, 2012; Miller, 2006). Adults sometimes pause after non-listing commas for a short-time and after end of sentence punctuation (Benjamin, et. al., 2012; Miller & Schwanenflugel, 2006). These pauses are short and do not occur without punctuation in the middle of sentences. Readers who use good prosody use punctuation to dictate when and how long to pause, while non-fluent readers often pause lengthily at commas, end of sentences, or pause too frequently at improper times within sentences (Benjamin, et. al, 2012; Miller & Schwanenflugel, 2006; Schwanenflugel, et. al, 2011).

Fundamental frequency F_0, or pitch is another prosodic feature that can be measured in reading prosody. Those who demonstrate wide ranges and variability of speech pitch are considered to be more expressive, and thus speaking with expressive prosody (Schwanenflugel & Benjamin, 2012; Cowie, Douglas-Cowie, & Wichmann, 2002). The variability and range of pitch change is relative to the speaker's own voice, in that someone with a deep voice would not be expected to reach higher pitch levels that someone with a more naturally higher voice and vice-versa (Schwanenflugel & Benjamin, 2012).

Similarly, amplitude, another prosodic feature, is what most would consider synonymous with loudness, and it too should be measured relative to the speaker's voice. Variability in amplitude generally follows a pattern similar to pitch, in that speaking in wide ranges of amplitude often signals good reading prosody (Schwanenflugel & Benjamin, 2012) and changes in amplitude usually cause increases or decreases in pitch.

Finally, duration is another prosodic feature that can be used to signal reading expression. Vowels are usually measured to indicate changes in duration, particularly phrase-final vowels, which could display phrase-final lengthening (Schwanenflugel & Benjamin, 2012). Duration, like pitch and amplitude, must be examined within the context of the individual speaker/reader, in that faster speakers/readers may properly demonstrate phrase-final lengthening, but ultimately still have a shorter duration than that of slower readers (Schwanenflugel & Benjamin, 2012).

The three features of pitch, amplitude, and duration work together to form the impression of having stressed particular segments of information. Stress refers to making a syllable in a word more prominent than those to which it is adjacent (Schawanenflugel & Benjamin, 2012 Himmelmann & Ladd, 2008, p. 248). Speakers often indicate stressed syllables through an increase in amplitude, duration, and higher pitch (Schwanenflugel & Benjamin, 2012).

Yoonsook (2010) draws attention to the fact that the reader does not need to draw attention to the prosodic focus element through the use of all three acoustic features, but rather choose one. Often more than one acoustic feature will be used to indicate the prosodic focus elements, but Yoonsook (2010) indicates that often readers will choose one of the acoustic features and draw attention to the linguistic focus feature. By using mostly one acoustic feature when reading aloud, it becomes important for the listener to pick up on which acoustic feature is being utilized in order to understand completely what is being read (Yoonsook, 2010). It is also important with regards to examining prosody and reading fluency, in that perhaps only one of the acoustic features needs to be properly utilized to demonstrate good prosody.

When a child is told to read a passage as quickly as he/she can, then there will be fewer elements of good prosody. Children racing through a text may have difficulty comprehending, not only because they are reading faster than is natural for them, but because the reading may have poor prosody. This is one reason why when measuring for reading fluency not only should reading accuracy and speed be measured, but also prosody (Schwanenflugel & Benjamin, 2012).

Sentence Prosody

Different sentence forms can have different patterns of reading (or speaking) prosody. Declarative sentences, or statements such as "He wanted to go to practice", are marked by an initial rising pitch, followed by a progressively falling pitch, also known as pitch declination. When declarative sentences are long (such as in "He wanted to go to practice, even on the bleakest winter mornings.), there is usually a plateauing of pitch (Schwanenflugel & Benjamin, 2012). Declination will plateau as the sentences become more complex in both adults and children, regardless of the reader's fluency. However, those with better fluency do tend to read with better prosody, even in these long sentences, so their pitch variability will increase. This

pitch variability seems to help with comprehension (Schwanenflugel & Benjamin, 2012). Longer pauses are generally found between more complex phrases as opposed to simpler ones (Schwanenflugel & Benjamin, 2012; Krivokapic, 2007**;** Strangert, 1997). Whether the pauses occur in complex or simple sentences, they should only happen at proper grammatical junctions (Schwanenflugel & Benjamin, 2012**;** Krivokapic, 2007). Pausing that occurs within the sentence, or intrasentential pausing, should be shorter that the pausing that occurs between sentences, or inter-sentential pausing (Schwanenflugel & Benjamin, 2012**).** Children's handling of complex sentences continues to change throughout childhood and fluent readers appear to be more adept at pausing only at relevant grammatical junctions when compared to less fluent readers (Benjamin & Schwanenflugel, 2010).

The spectrogram below depicts a typical declarative sentence as read by a fluent child. The sentence is from the *Frog and Toad Passage* (see Appendix) states, "They did all kinds of activities in the forest." In the spectrogram, there is a visible drop-off in both amplitude (yellow) and pitch (blue) toward the end of sentence, which as previously discussed is expected as a result of end-sentence declination that is evident in fluent readers (Benjamin, et. al., 2012).

"They did all kinds of activities in the forest."
Figure 1: Declarative sentence as read by a fluent reader
Blue represents pitch. Yellow represents amplitude.

Yes-no questions (i.e., questions that can be answered by a simple "yes" or "no") tend to be marked by a constant rising pitch (as in, "Did he want to go to practice?"). It also includes declarative questions in which the rising pitch is the main prosodic feature (Schwanenflugel & Benjamin, 2012). An example of a declarative question is, "He wanted to go to practice?" Without the rising pitch, there is nothing to distinguish a declarative question as a question rather than a simple statement. Patel and Grigos (2006) suggest that a child's understanding of declarative questions is still in the process of developing as he/she learns to read. Fluent readers do tend to emphasize the rising pitch during their reading of yes-no questions more than less-fluent readers (Miller & Schwanenflugel, 2006); however, not all questions are read with a constant rising pitch and as such it would be incorrect to teach a child to simply read all questions with a rising pitch.

Essentially, then good readers readily provide the prosodic patterning appropriate for each sentence type. Less fluent readers struggle to provide the appropriate prosodic patterns for sentences because their attention is focused on identifying words as the come up in the sentence.

How is reading prosody measured?

Generally, reading prosody has been measured informally in schools mostly through the use of reading fluency rating scales (Schwanenflugel & Benjamin, 2012), which are, by definition, subjective measures of reading fluency. Currently, there are only a few scales that measure reading fluency: the Multidimensional Fluency Guide designed by Rasinski (2004) and colleagues, the National Assessment of Educational Progress scale (NAEP, **2002)**. These scales attempt to incorporate reading prosody while also measuring reading accuracy and rate descriptively, rather than objectively. Most recently, the Comprehensive Oral Reading Fluency Scale (Benjamin, Schwanenflugel, Meisinger, Groff, Kuhn, & Steiner, 2013) was developed to provide separate scales for reading rate and accuracy (called Automaticity, which pegs word read correctly per minute directly to national norms of fluency) and another for reading prosody (called Expression, which is comprised of indicators for Natural Pausing and Appropriate Intonation). Incorporating reading prosody into the measurement of reading fluency makes sense given the literature on reading fluency because reading prosody itself can help account for more variance in reading fluency than simply word recognition and reading rate when measured alone (Benjamin, et al., 2013; Kochanski, 2006; Miller & Schwanenflugel, 2006; Schwanenflugel & Benjamin, 2010**)**. However, rating scales, no matter how well constructed, can have limitations too since they are subjective measures of fluency.

The current study differs from studies using subjective rating scales of reading prosody by carrying out direct spectrographic measures to more accurately determine the acoustic

features of reading prosody. Spectrograms take digital recordings of speech and display the acoustic information visually over time. Being able to map the acoustical features of a reader's speech visually allows us to more accurately identify developing features of reading prosody. As noted earlier, the speech features that are usually measured to indicate reading prosody are pitch, amplitude (loudness), duration (of word and syllable length), as well as pause patterns of the reader (Miller, 2006; Plag, Kunter, & Schramm, 2011; Wagner & Watson, 2010, Wilson & Wharton, 2006).

Discourse Features of Reading Prosody

Language, as pointed out by Wharton and Wilson (2006), is essentially ambiguous in nature. By highlighting specific words, parts of words, and/or phrases in spoken language, the listener can better understand what parts of the speech are the most relevant. This allows for the listener to better disambiguate what is being said and for the speaker to better communicate his/her intent (Schwanenflugel & Benjamin, 2012; Wharton & Wilson, 2006).

Discourse-level prosody refers to prosody that signals how elements are related to each other in the overall discourse representation of the text. Important information is often pointed out in discourse-level prosody, and as such, special prosodic attention must be given to this information in order for the reader/listener to understand the text (Schwanenflugel & Benjamin, 2012; Den Ouden, Noordman, & Terken, 2009; Smith, 2004). Adults tend to "bracket" the important information by having longer pauses both before and after the phrase (Schwanenflugel & Benjamin, 2012; den Ouden, Noordman, & Terken, 2009; Smith, 2004). Adult readers also tend to use a higher pitch when reading text segments which contain important information (Schwanenflugel & Benjamin, 2012). When the discourse passage includes mostly segments that

are causally related, then adults use shorter pauses and quicker articulation between the related segments (Schwanenflugel & Benjamin, 2012).

Also included in discourse level prosody is the introduction of new concepts, or a piece of information the listener is not believed to possess in their knowledge base. The introduction of new information appears to follow a pattern similar to that of the key segments mentioned in the previous paragraph, in that adults use a higher pitch when introducing new information (Schwanenflugel & Benjamin, 2012; Ayers, 1994; Brown, 1983). When referring to information previously mentioned or simply that the reader already possesses, a lower pitch is used (Schwanenflugel & Benjamin, 2012). Similarly, when a speaker is shifting topics, he/she will slow down and display greater sentence-final lengthening as opposed to when the speaker is merely elaborating on information the listener has already been introduced to (Schwanenflugel & Benjamin, 2012; Smith, 2004). It should be noted that it is unclear whether or not young readers demonstrate good prosody when introducing new information and highlighting key pieces of information when learning to read fluently (Schwanenflugel & Benjamin, 2012).

Among the ways that readers can highlight information in the building of a discourse representation while reading aloud is through the use of linguistic focus. Below I describe various types of sentences that focus information linguistically.

Types of Linguistic Focus

Linguistic focus prosody mostly takes into account phonological and acoustic features. By understanding and properly utilizing linguistic focus prosody, both the reader and listener can better comprehend what the true meaning of the passage by properly accenting the important words or phrases within the passage (Benjamin, 2012; Schwanenflugel, 2012; Wagner, 2012). This accenting can be done through changes in pitch, amplitude, or duration (Schwanenflugel,

2012; Benjamin, 2012). Recognizing the changes in pitch, amplitude, and duration, and understanding how they affect the meaning of the sentence will allow a child to better comprehend the passage (Schwanenflugel & Benjamin, 2012; Miller & Schwanenflugel, 2006; Schwanenflugel, et. al., 2013**).** The following will describe some of the common types of sentences that engage linguistic focus: quotations vs. reported speech, contrastive speech, exclamations and parentheticals.

Directly quoted speech refers to speech that is placed within quotations. Quoted speech is designated as important because the particulars of the speech have been preserved within quotes. Basically, one wouldn't bother to capture the direct quote if it was not important. An example of quoted speech is: *Tom said, "Come home early tonight."* On the other hand, reported speech refers to speech that is shared in a second-hand way, without using quotations. For example: *Tom said to come home early tonight.* Reported speech is thought to be less important because the speech itself has been backgrounded by the lack of quotation. In the first quoted example, there should be linguistic focus prosody placed on the quoted speech. Whether or not children understand that such an emphasis should be placed is still unclear.

Directly quoted speech should receive special prosodic attention from the child when compared to reported speech. This attention can be observed in one or more of the three of the following acoustic features: pitch, amplitude, and duration. When reading with correct prosody, a child should use a higher pitch when starting to read the quoted speech, or as in our example, there should be a change of pitch (going from lower to higher) (Jansen, Gregory, & Brenier, 2001). An example of a child reading can be seen in the following example from this study.
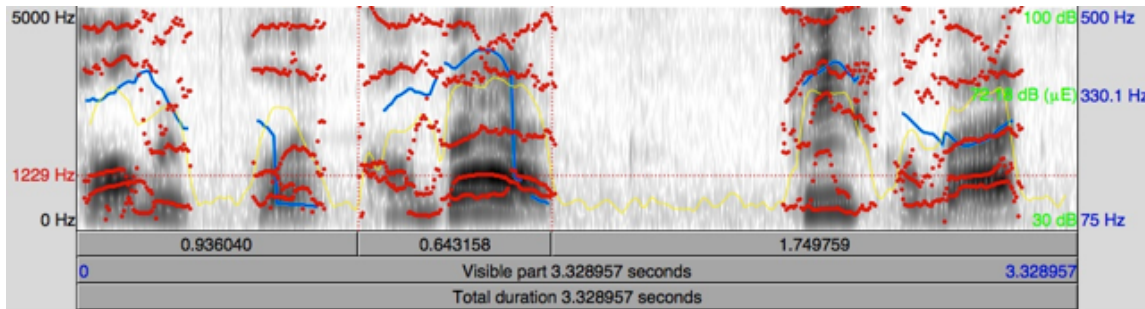
"*Frog   re-   plied,*   '*Come   back.'*"
Figure 2: Quotation read by a fluent reader
Blue represents pitch. Yellow represents amplitude.

This segment is taken from one of the participant's reading of the Frog and Toad Passage. The segment was designed to examine whether or not children mark directly quoted speech with proper prosody by having the child read, "*Frog replied, 'Come back.'*" The selected portion of the text is the quoted speech. The blue lines represent the pitch, while the yellow lines represent amplitude. The rise in both pitch and amplitude, which can be seen in the spectrograph, occurs after *"replied"* and during the quoted speech. This indicates the child is reading with good prosody.

In comparison, the spectrogram below demonstrates reported. The text is from the same Frog and Toad passage and is from the sentence "*Frog asked him to come back,*" although only "*to come back"* is visible in the spectrogram. One can see that the amplitude (yellow) and pitch (blue) remain the same or show less variability than the quoted speech spectrogram.
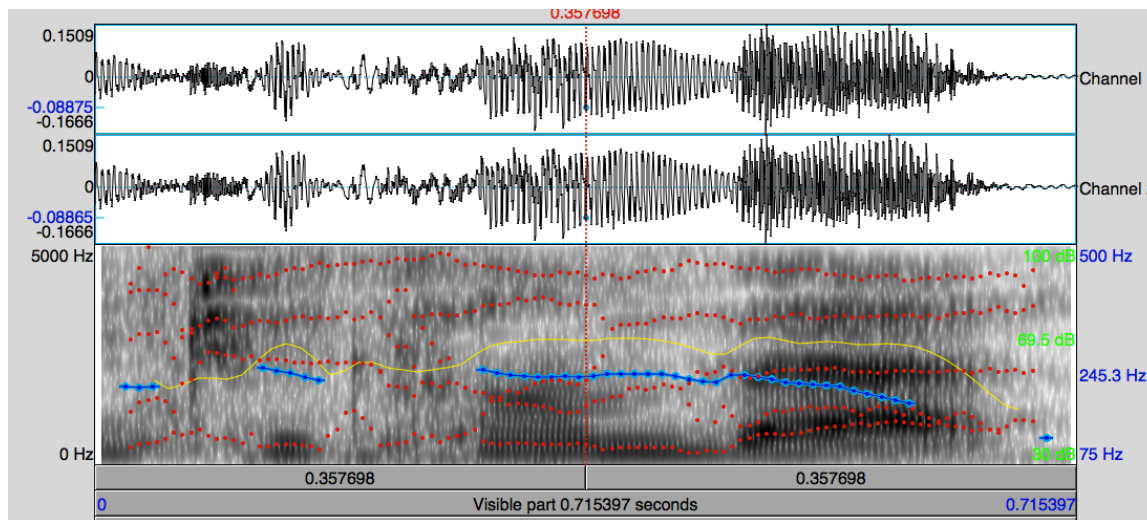
"to   come   back"
Figure 3: Fluent reader reading reported speech
Blue represents pitch. Yellow represents amplitude.

Duration can refer to just the vowel length or word length. Since this study measures the duration of the word, not just vowels, the word "*Come*" should be longer than the duration of the word in "*replied* (Wagner & Watson, 2010)." This change in pitch, amplitude, and/or duration draws the reader's and listener's attention to the quoted speech, informing them that this information is important should be focused on. By contrast, reported speech simply does just that, reports the speech. Because there is no particular significance placed on the phrase, the phrase remains in the background acoustically and there may be no particular prosodic marking notable in pitch, amplitude, or duration (Miller & Schwanenflugel, 2006; Schwanenflugel, et. al., 2010).

Exclamatory prosody is signaled or prompted by an exclamation mark at the end of the sentence, such as in the sentence*, I was really surprised*! Exclamations bring attention to the meaning of the sentence by marking the end of the sentence with special punctuation (Schwanenflugel, et. al., 2011). As a result of the punctuation occurring at the end of the

sentence, it is possible for the child not to recognize the uniqueness of the sentence and thus fail to read with good linguistic focus prosody (Kral, Kleckova, & Cerisara, 2007). A study conducted by Kral, Kleckova, and Cerisara (2007) found that questions are more easily recognized than exclamative sentences when only using pitch to highlight the sentence. Their study examined the French language and had the ultimate goal of helping creating an interactive A.I. for a classroom setting. Of further relevance to this study, they found that when accounting for both pitch and amplitude, exclamative sentences became more easily recognized, which could mean that amplitude is a more important acoustic feature of exclamative sentences than questions (Kral, et. al., 2007).

A study conducted Elena Sakkalou and Merideth Gattis (2012) demonstrated that infants as young as 14 months can interpret prosody indicating surprise, through the use of exclamations. Their study revolved around having parents showing their children how to properly play with toys by acting surprised when they did something wrong and normal when they played with it correctly. This was done by having the parents speak a Greek word (none of the families spoke Greek) in a normal prosodic tone when playing correctly, or exclamative prosody when surprised. The results showed that the kids were more likely to copy the intentional behavior and not the accidental behavior (Sakkalou & Gattis, 2012). Since, it appears infants as young as 14 months old can pick up on exclamative prosody marked by a rising pitch, I would expect the participants of this study to understand how exclamations are suppose to be read.

Based on the similarity between pitch and amplitude in measuring other linguistic focus features, I expect to see a similar overall increase in amplitude in exclamatory sentences (Plagg,

Kunter, & Schramm, 2011; Schwanenflugel, et. al, 2012; Wagner, 2006**),** as we do in the oral

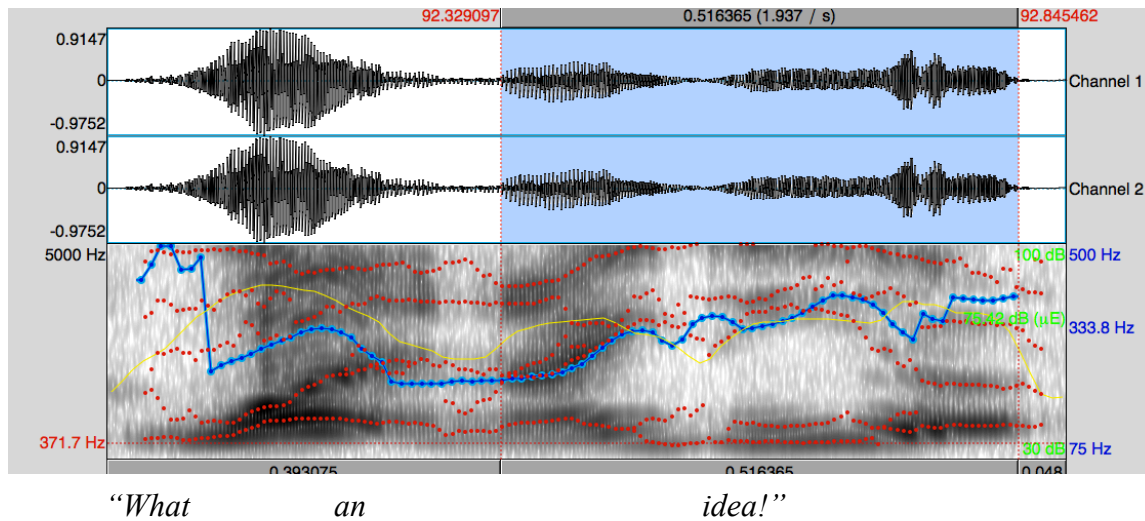reading of a fluent child below.

"What_____an_____idea!"
Figure 4: Fluent reader reading an exclamatory sentence.
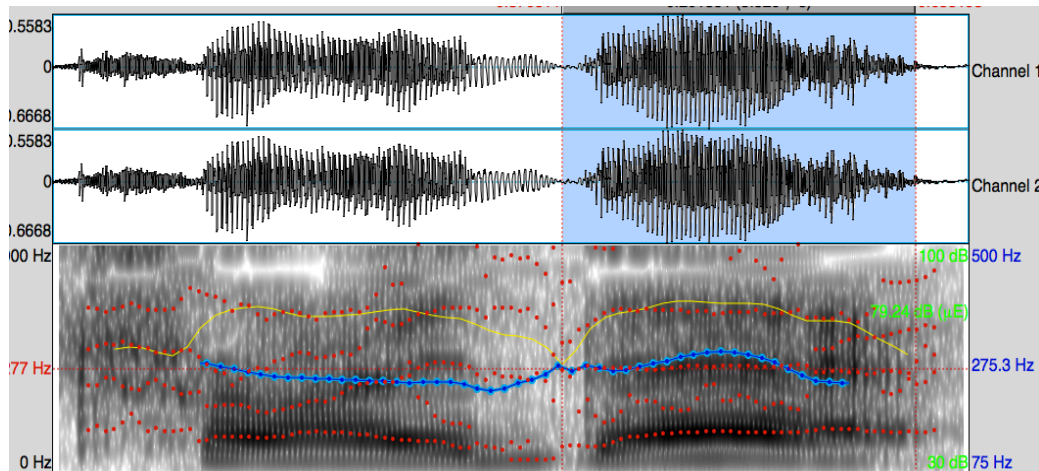Blue represents pitch. Yellow represents amplitude.

This spectrograph demonstrates the end of sentence pitch (blue) and amplitude (yellow)

in exclamatory sentences. In declarative sentences, there should be a sentence-declination with

regards to both pitch and amplitude. However, in exclamatory sentences, the pitch and amplitude

should increase, which is evident in the above spectrogram (Benjamin, et. al., 2012;

Schwanenflugel, et. al., 2011).

There is clearly something unique about these sentences, but it is unclear whether or not

children recognize and know how to place the correct prosodic emphasis when reading the

sentence for the first time (Schwanenflugel, et. al, 2011). This is not completely unique to

exclamatory sentences, but is the problem is represented well by the exclamatory sentences.

While exclamation marks do act as a clear indicator of the uniqueness of the sentence from a

linguistic focus point of view, punctuation does not always signal the best way to represent this

focus using prosody, which can also make mastering reading prosody difficult for children

(Miller & Schwanenflugel, 2006). So, while children can recognize that there is something

special with regards to exclamatory sentences, it is not clear whether or not children recognize and know how to read and properly emphasize exclamatory sentences, as well as other linguistic focus features of prosody (Schwanenflugel, et. al., 2012).

Contrastive speech prosody refers to bringing the attention of the reader/listener to a particular subsequent object often through words such as "this" or "that". An example of this can be seen in a sentence such as, *"Take this one"* (Schwanenflugel, 2011). This sentence draws attention to the face that the author clearly meant for that specific "one" to be taken and through the use correct contrastive speech prosody the reader and listener should be able to understand what is meant (Benjamin, et. al., 2012; Schwanenflugel, et. al., 2012). The acoustic measurements of contrastive prosody should follow the same pattern as quoted speech. In our example, the word "*this*" should receive the special attention and have a higher pitch, greater amplitude, and longer duration than the word "*take*" in order to bring the reader and listener's attention to the word and subsequent information (Benjamin, et. al., 2012; Schwanenflugel & Benjamin, 2012**).**

Contrastive prosody seems to be understood by age 5 (Schwanenflugel & Benjamin, 2012), and Patel and Brayton (2008) conducted a study to see if 4, 7, and 11 year-old children could identify contrastive prosody. Their results found that the 7 and 11 year-old children were capable of recognizing the contrastive prosody of adult readers (Patel & Brayton, 2008). It should also be noted that contrastive prosody is also the only of the 4 prosodic features measured in the current study that was not signaled or prompted by punctuation of some kind (Schwanenflugel & Benjamin, 2012), although contrastive prosody can be indicated by italics, underlining, or other features such as complete capitalization

"Let's…_____*try*_____*that"*
Figure 5: Fluent reader displaying contrastive stress.
Blue represents pitch. Yellow represents amplitude.

In the above spectrogram of a marked contrastive stress word, "that," proper pitch (depicted in blue) and amplitude (depicted in yellow) can be seen. The highlighted portion of the spectrograph, there is a visible rise in both the pitch and amplitude of the reader's voice, which draws attention to "that" and allows the listener to understand there is an emphasis and importance being placed on that word (Schwanenflugel & Benjamin, 2012).

New information and contrastive focus presented in a discourse sentence must be compared to their respective surrounding words, and when this is done words with contrastive focus will generally be designated by a higher pitch, longer duration, and greater amplitude (Katz & Selkirk, 2011). This is relevant, particularly in establishing the apparent importance readers place in contrastive focus, in conveying the meaning of the text.

Contrastive stress is used to highlight important information by accenting certain words (Wilson & Wharton, 2006). The usefulness or validity of contrastive stress has been questioned because it doesn't necessarily translate across every language. However, since the English

language has enough variability in the intonation contour of someone's speech that measuring contrastive stress in this study makes sense (Wilson & Wharton, 2006).

Parentheticals, unlike the other forms of linguistic focus prosody examined in this study do not bring words, or more often phrases, to the forefront but instead acts to move or keep some information in the background (Schwanenflugel, et. al., 2012). An example of this can be seen in this example: *He wanted to play soccer (the most popular game in the world) this weekend.* In this example, the fact that soccer is the most popular game in the world is merely anecdotal or ancillary information and not the main point of the sentence. Since the parenthetical is not the focus or even the focus or even essential to the sentence it is generally marked by adults and fluent readers by dropping the pitch and lowering their amplitude when reading the parenthetical aloud (Schwanenflugel, et. al., 2012; Schwanenflugel, et. al., 2011).

Marta Paya (2003) conducted a study in which she examined digital recordings of conversations, specifically looking at how the participants prosodically handled parentheticals. The results of this study showed that the participants used much lower amplitude when speaking parentheticals as compared to the rest of the sentence. The pitch was similarly lower for the parenthetical segment when compared to the average pitch tone of the participant in non-parenthetical segments (Paya, 2003). This study did not examine the duration of the words within the parenthetical specifically, as our current study did, but Paya (2003) did notice that the speaker usually sped up during parentheticals, keeping them short, which would seem to indicate that we could expect to notice shorter word duration when examining parentheticals.

Reading Prosody and Fluency

Reading fluency is demonstrated when a child can read aloud with the appropriate use of word recognition, phrasing, and intonation, which can affect comprehension positively (Schwanenflugel, et. al., 2011). The connection between reading fluency and prosody can be seen by examining the differences between readers that are not fluent and those that are. Examples of these differences were explained by Schwanenflugel et. al. (2011) where fluent readers are: less likely to pause during sentences extraneously, more likely to demonstrate the marked "end-of-sentence pitch changes" expected in both declarative and yes-no questions, more likely to demonstrate more "adult-like" intonation contours and variable pitch, and lastly more likely to best understand which words to accent/stress in a sentence (Schwanenflugel, 2011). Recent studies have demonstrated another reason to focus more attention on reading prosody; measuring reading prosody can help predict the comprehension of a child beyond the point of simply using reading fluency scales (Schwanenflugel, et. al., 2011). Rebekah Benjamin (2012) cites her research and is substantiated by past research of Miller and Schwanenflugel (2008) that children who demonstrate proper reading prosody also tend to have higher comprehension than would be estimated by using the reading rates of the students alone.

Miller and Schwanenflugel (2008) also bring up the idea that different prosody problems may signal other problems with reading skills. For instance, long pauses may indicate decoding problems. They found that the development of word reading skills significantly predicted reading comprehension and fluency at later ages. The greater control the reader has over his/her prosody, the more likely the child will have shown automaticity in their reading skills and thus read more fluently (Miller & Schwanenflugel, 2008).

Punctuation can signal reading prosody, but understanding how to interact with the punctuation seems to differ between children and adults (Miller, 2006**).** Examples of interpreting punctuation in the context of reading prosody include commas and questions. Adults only tended to pause at commas during phrase-final commas and quotations. In this example of a sentence with a phrase-final comma, *They wanted to play video games, but couldn't,* it is not unusual for adults to pause at the comma break between *games* and *but.* In this example of a sentence containing a quotation comma, *He asked, "Can we play video games?"* adults often pause after the word *asked*. However adults do not seem to pause when they commas are used simply to list adjectives, such as in *He had a red, blue, and green car.* While adults do not pause for these commas, children seem to pause more often (Miller, 2006**)**. Not understanding when to pause or pausing sporadically within sentences may hurt the reader's/listener's ability to fully comprehend or convey the information. To demonstrate complete control of reading prosody, the child must be able to use punctuation correctly as cues of pausing as well as tonal changes (Miller, 2006**).**

Children better understand passages, especially longer and more complex passages, better when being read to by someone demonstrating good reading prosody (Goldman, Meyerson & Cote, 2006; Mira & Schwanenflugel, 2013). However, it is still unclear if this connection remains for the child reading aloud to themselves and whether this is related to children's fluency.

By marking or not marking linguistic focus prosody when reading aloud, the intended meaning of text can be misinterpreted or missed (Wharton & Wilson). For example, the sentence "*Take this one"* can change to some degree based on how the sentence is read aloud. If an emphasis is placed "this" then it becomes clear that the reader understands that the one taken was

significant. However, if no emphasis is placed, then the reader can assume the one that was taken was not significant (Wilson & Wharton, 2006; Schwanenflugel, et. al., 2010). So, by reading with good prosody and marking linguistic focus, the meaning of the sentence is changed.

Statement of problem

Past research on the development of reading prosody as a function of reading fluency has only looked at basic features of reading prosody. Past research has not yet examined how or if linguistic focus prosody is marked by children as they read aloud. It is unclear whether marking linguistic focus prosody is linked to the development of reading fluency as other aspects of reading prosody are. This study examines whether third grade students mark linguistic focus prosody when reading aloud, and if linguistic focus prosody is marked by third graders, then the next question that needs answering is whether or not fluent readers mark linguistic focus with greater variability and in a more adult-like manner than non-fluent children.

Chapter 2

Method

Participants

Participants participated in this study as part of a larger study regarding the development of reading prosody. Participants were 120 third graders who attend public schools in Georgia and New Jersey. 92 of the children were attending schools in Georgia and 28 were attending schools in New Jersey. The average age of the children was 9 years, 4 months (SD =4.8 mo.). The racial breakdown of the children was as follows: 64% European American, 21% African American, 9% Hispanic, 3% Asian and 3% other. Free or reduced lunches were received by 42% of the kids. Children currently receiving English language support classes were not included in the study. As an incentive to facilitate testing and parental consent procedures, children's teachers received six children's books for their class libraries.

General assessments and procedures

Formal reading assessments were carried out at the end of the third grade's spring term for all children. They were also administered a grade-level passage from an informal reading inventory and tested for their comprehension of it. Sight word reading efficiency assessments were also administered. The informal reading inventory passage was given first, followed by the Frog & Toad passage, the standardized word reading efficiency. Trained testers administered each assessment individually at a quiet location in the child's school. All test sessions were recorded so that prosody and reliability analyses could be later carried out.

Oral reading rate and accuracy

The Qualitative Reading Inventory, 5th edition (QRI-5; Leslie & Caldwell, 2011)) is an informal reading inventory (IRI). The assessment was used to determine children's oral reading rate and accuracy (indicated here by words correct per minute or WCPM) in reading grade-level text, timing the reading while counting deviations from the print story. Since the standard practice in curriculum-based measures (CBMs) and various fluency-rating scales (e.g, Rasinski, 2004) to measure a child's performance based on reading aloud for one minute, only a part of the passage was used for measuring. Portions from the middle of the passages were chosen because research has shown that choosing the first minute of reading can artificially inflate the child's overall reading rate (Valencia et al., 2010). Only full sentences were selected to make obtaining as much prosodic information as possible on units of text.

The children read the passage entitled "*Where do People Live?"* to obtain the grade level of each child. The test manual lists *Where do People Live?* as having 500 lexiles and 279 words. The interrater agreement between the third and first author for a 15% subsample measuring WCPM was high, r=. 99, p<. 001. WCPM measured through use of the QRI-5 procedures will be referred to as "QRI fluency" for the remainder of this paper.

Word reading efficiency

To obtain an independent estimate of sight word reading fluency, the Test of Word Reading Efficiency (TOWRE) Sight Word Efficiency subtest (1999). The test measures the amount of words correctly read from a list in 45 seconds. TOWRE Form A was administered to the children. TOWRE Form A is a subtest raw score was converted to a standard score using the child's age, which was done by following the directions described in the examiner's manual. According to the manual, the test-retest reliability calculated for children aged 6-9 is .97.

Concurrent validity estimates, as reported in the manual, have a coefficient of .92 for third graders. Inter-scorer reliability between the tester and third author for this sample was determined on a random 15% subsample, and was high also, r=. 99, p<. 001.

Informal passage comprehension

Eight questions associated with each passage in the QRI-5 were utilized to create an informal assessment of children's passage comprehension (Leslie & Cladwell, 2011). The questions were scored as either correct or incorrect according to the QRI-5. The participants were not allowed to look back at the text when answering reading comprehension questions. The test manual reports a very high inter-scorer reliability for comprehension questions, at $\alpha = .98$. Once again, a 15% random subsample of the participants was selected to establish the inter-scorer reliability. Reliability for this sample was only moderate for the passage questions, r =. 81, p<. 001. On average, children answered 4.54 of these eight questions correctly (SD = 1.8, range 0-8).

Target passage

The target passage for measuring the linguistic focus features of the development of reading prosody was an experimenter-constructed passage entitled "*Frog and Toad Have a New Friend*." Readability levels averaged over the Flesch-Kincaid, Smog, Gunning-Fog, and Lexile readability indices indicated an average grade level of 3 for this passage. Children read the passage aloud and then answered nine comprehension questions following their reading of the passage. On average, children answered 8.15 questions correctly (SD = .82, range 5-9).

The passage was only 38 lines long, but contained numerous linguistic focus targets. Each linguistic focus target had two separate phrases, one marked and one unmarked. The marked version of the phrase was designed to receive the emphasis, while the unmarked was

designed to not receive the emphasis. Each marked and unmarked pair of phrases was placed in similar contextual positions within the passage. Controlling for contextual features, such as similar location in the sentence, was important to make sure the reader's measured difference between the marked and unmarked words were for the correct reason and not because of their differing place within their respective sentences. Discourse level prosodic features were measured. The phrases consisted of exclamatory, contrastive, and quoted vs. reported speech.

Target Phrases

 The phrase, "come back" was used to measure the difference between discourse level quoted vs. reported speech. The phrase is first used in line 30 as reported speech contrast, and is thus unmarked. On line 31 the phrase "come back" is marked because it should be read as quoted speech. The duration was measured for each of these phrases in order to determine if more of an emphasis was placed on the marked phrase.

 The "It doesn't seem" was also measured for duration to determine whether or not there was an emphasis placed on the marked or unmarked phrase that could be measured by how long it took the reader to complete the phrase. Line 34 contained the marked discourse level phrase, which was designed to be read as quoted speech, "said, 'It doesn't seem.'" Line 36 was unmarked and contained reported speech, "said it doesn't seem."

 Lines 29 and 44 contained the marked and unmarked "that" respectively. The marked word appeared in quoted speech, "Frog said, 'Let's try that.'" The unmarked word also appears in quoted speech, "Frog said, 'I almost missed that.'" While both appear in quoted speech, the emphasis should only be placed on "that" in the marked sentence.

 The word "this" was also used to measure for duration in a discourse level contrastive speech manner. Line 30, which stated, "… Wasn't sure whether to take this one, " and contained

the unmarked "this." The marked "this" was found in quoted speech in line 57, which stated, "'Here, take this one.'" The emphasis should have been placed on this, and as a result was the only word measured for duration.

Line 47 contains the unmarked smile, because it is not the last word in an exclamatory sentence. The sentence reads, "He smiled a real big smile." On line 60, "smile" is marked and used at the end of an exclamatory sentence. That sentence reads, "Their recall of that day always brought a real big smile!" Again, the word "smile" was measured for duration to see if the read placed emphasis on that word by holding it out longer. The similar sentence structure was intentional and was designed to help control for other variables that may have caused the reader to elongate his/her pronunciation of the target word.

Also examining the exclamation prosody was the word "idea" in lines 39 and 38. Line 39 contained the marked word and reads, "What an idea!'" Line 38 reads, "Frog had an idea." The word "idea was measured to determine whether or not the readers placed an emphasis on the final word in an exclamatory sentence by elongating their pronunciation of the final word.

The phrase, "It doesn't seem" is also used to determine if there is a difference between the how long a reader takes to complete the phrase in a quoted (marked) vs. reported (unmarked) speech setting. The unmarked phrase is in line 38 and reads, "It doesn't seem that there is anyone inside." The marked phrase is in line 36 and says, "'It doesn't seem that there is anyone inside.'" Both phrases are placed in similar locations within their respective sentences.

Any reading that was incoherent, misread, contained an unnatural pause, defined by being 400 milliseconds or more was skipped was marked as not available in the data. However, if the child began as incoherent, but then collected his/her self and began from the beginning, then the reading was included. This was done because the student simply may have skipped over

a word accidentally, but quickly realized his or her mistake and immediately went back and corrected it. If the child did not start over or failed to read the target phrase correctly the second time, the reading was marked as not available in the study.

Duration

When reviewing the participants' readings of the target phrases in the Frog and Toad passage, the duration of their reading was examined to the nearest millisecond using Praat. The duration was measured from the beginning of the first syllable in the phrase until the conclusion of the final syllable of the phrase. Duration was chosen because in order to place emphasis on certain words, readers may elongate the vowels in the target words or phrases. There is a lack of research indicating whether word duration is changed by vowel elongation, but it would seem to make sense that it would (Wagner & Watson 2010). As a result, I chose to measure the duration of the entire phrase. By examining the different linguistic focus prosody elements through their duration, I hope to determine whether or not children place an emphasis on linguistic focus prosody and if they do, determine whether the right emphasis on words and phrases indicate a more fluent reader.

Pitch

Pitch is one prosodic feature that is used to dictate which information has been given local focus and which has been de-emphasized (Bodenbender, 2003; Dehe, 2009; Carlson, Dickey, Frazier, & Clifton, 2009; Jansen, Gregory, & Brenier, 2001), with higher pitch tones indicating that some information has been given local focus. Further, past studies have indicated that better more fluent readers display higher and more variable pitch tones (Benjamin et al., 2012; Bolanos, Cole, Ward, Tindal, & Schwanenflugel, P.J. (2013). Moreover, several studies have shown that better readers are more likely to sharply drop their pitch at the end of declarative

sentences (Benjamin & Schwanenflugel, 2010; Miller & Schwanenflugel 2008; Schwanenflugel et al., 2004). By examining the pitch tones of the participants in this study, it is our goal to determine if there is a significant difference between the reading fluency levels of those who vary his/her pitch levels compared to those who do not.

Amplitude

Amplitude is another acoustic feature used by fluent readers to mark prosodic features, including linguistic focus features, where increased amplitude is used to mark prosodic elements (Cowie, et. al., 2002; Schwanenflugel & Benjamin, 2012; Wagner & Watson, 2010). More fluent readers read with greater amplitude and larger differences between marked and unmarked words (Cowie, et. al., 2002; Schwanenflugel & Benjamin, 2012). Research has also indicated that with a rise in pitch, there is generally an accompanying increase in amplitude (Sluijter, van Heugen, & Pacily, 1997). It is the goal of this study to determine if amplitude is used as an acoustic feature to mark linguistic focus prosody by fluent readers compared to readers who are not fluent.

Chapter 3

Results

Linguistic Focus Analyses

If young readers are sensitive to linguistic focusing in their oral reading, I should be able

to observe this in their reading of the marked, focused text segments with a higher pitch, longer

duration, and louder intensity compared to unmarked text segments. To determine this, I first

averaged across the two marked instances and the two unmarked instances of the targeted

segments for each child for each focus feature (exclamation, quotation, and contrastive stress).

After determining that there were no interactions between the markedness effects reported below

and location (all $p > .10$), I ignored site as a variable in the remainder of the analyses and

averaged across the two instances for each linguistic focus feature examined.

I carried out one-way ANOVAs comparing marked against the unmarked text segments

for pitch and amplitude for each linguistic focus feature. The means and standard deviations as a

function of prosodic and linguistic focus features can be found in Table 1. The means were

determined by averaging the two marked phrases with each other and the two unmarked phrases,

which were the respective averages were then compared. These analyses indicated that children

read the first word within a direct quote with a 15.14 Hz higher pitch than the same word when

presented within reported speech, $F(1,119) = 18.48$, $p < .001$, partial $\eta^2 = .134$, although it was

read with similar intensity in both contexts, $F(1, 119) = 1.70$, $p = .195$, partial $\eta^2 = .014$.

Duration yielded a significant difference between marked and unmarked direct quote segments;

however, it was the unmarked words that had a longer duration, an unexpected result. The

difference between the average unmarked word and marked word was .029 sec. longer for the

unmarked word, where $F(1,119) = 20.48$, p < .001, partial $\eta^2 = .147$. These results are depicted

in Table 1.

As seen in Table 1, children read the marked words within a contrastive context with

29.97 Hz higher pitch, $F(1, 119) = 60.43$, $p < .001$, partial $\eta^2 = .337$; and 1.71 db greater

intensity, $F(1, 119) = 25.61$, $p < .001$, partial $\eta^2 = .177$, compared to those same words when

presented in a non-contrastive context. Again, analysis of duration did not yield the expected

results, as the unmarked word had a greater average of duration of .007 sec., where $F(1, 119) =$

1.44, p = .232, partial $\eta^2 = .012$.

Children read words presented in an exclamatory context (i.e., followed by exclamation

point) with 17.52 Hz higher pitch, $F(1, 119) = 40.39$, p < .001, partial $h^2 = .253$; and 2.69 db

greater amplitude, $F(1, 119) = 102.85$, $p < .001$, partial $\eta^2 = .464$, compared to the same words

presented in a non-exclamatory context. The children marked compared to unmarked words in an

exclamatory context with a statistically significantly longer duration as well with a difference

of .118, $F(1,119) = 86.01$, p < .001, partial $\eta^2 = .420$. These results can be found in Table 1.

Thus, children do seem to construct the prosody related to linguistic focusing embedded within

the text in their ongoing construction of reading prosody.

The duration variable did not show the anticipated effects based on past research on

linguistic focus prosody. Two of the three acoustic features showed the wrong directionality,

with only exclamatory prosody demonstrating a significant difference with the correct

directionality. It is possible that third graders simply do not use duration to mark linguistic focus

prosody. Possible reasons for the unexpected results for duration are discussed at greater length

in the discussion section. However, since duration did not appear to serve as an acoustic feature marker of linguistic focus prosody, duration was dropped for subsequent analyses

Fluency and Linguistic Focus Prosody

Benjamin and Schwanenflugel (2010) have assessed that children who are more fluent readers should read with greater reading expression than other children. If so, it seems likely that children with good reading fluency should show larger linguistic focusing effects than children who do not. To determine this, I first needed to calculate the prosodic linguistic focusing effects for each child. For the linguistic focusing effects, I subtracted the prosody of the unmarked text segments from the analyses above from their respective marked segments for pitch and amplitude. The resulting measures represented the quotation, contrastive stress, and exclamation effects for each child, respectively. These calculations were carried out for each linguistic focusing feature for pitch and intensity separately. These pitch and amplitude changes served as the indicators for the linguistic focusing effects in the analysis below that examined reading fluency.

To evaluate whether fluent readers showed larger linguistic focusing effects than less fluent children, I needed to create a traditional indicator of reading fluency for each child. The reading rate and accuracy aspect of reading fluency was measured by children's scores on the TOWRE 2 – Sight Word Efficiency subtest (Torgesen et al., 2012) and the QRI-5 (Leslie & Caldwell, 2011). I wished to have a single composite for reading fluency and the scores yielded by these assessments were on different metrics (i.e., TOWRE standard score determined by words correct per 45 seconds from list; QRI words correct per minute from text). Therefore, I conducted an exploratory principal components factor analysis to reduce these assessments to a single fluency score from the children's two scores. This analysis yielded a single factor

accounting for 89.1% of the variance. Z-scores for each child yielded from this analysis constituted our measure of the reading rate and accuracy aspect of reading fluency.

To determine whether fluent children showed larger pitch changes for linguistic focusing variables than less fluent children did. The effects for pitch and amplitude were determined by averaging the two marked and two unmarked linguistic focus elements by measuring their respective target phrases. The unmarked averages were then subtracted from the marked averages to determine the overall effects for each student. A multivariate analysis of covariance was then carried out with pitch changes for exclamation, quotation, and contrastive stress serving as the three dependent variables and fluency as the continuous covariate. This analysis found a significant covariate for fluency and indicated that fluent children showed larger pitch changes for linguistic focusing than less fluent children did, $F(3, 116)=2.77$, $p = .045$, partial $h^2 = .067$.

I also carried out a similar analysis for amplitude. This analysis also found a significant covariate for fluency and showed a positive relationship between fluency and the degree of linguistic focusing, $F (3, 116) = 4.42$, $p = .006$, partial $h^2 = .102$. Thus, fluent children emphasized focused elements by reading those segments louder than less fluent children.

Chapter 4

General Discussion

The driving issue behind this study was to determine whether children display linguistic focus prosody when reading aloud during the period in which children are learning to read fluently. I found that children do indeed mark linguistic focus features when reading aloud. Specifically, children marked contrastive, exclamation, and direct quote prosody with changes in pitch. The children also marked contrastive words and exclamation with greater intensity. The only linguistic focus element the children failed to mark properly when reading aloud was parentheticals. The children seemed to fail to understand the function of a parenthesis and thus did not read them aloud with the proper expression. This could very well be a result of limited exposure to parentheses in texts and thus, the children simply did not understand their function, which is to send information to the background prosodically. Further, linguistic focus did not appear in any systematic way in the duration of focused elements. However, the study generally shows that young readers use their knowledge speech prosody related to linguistic focus to mark focused elements while reading aloud.

A second objective of this paper was to determine whether or not the children who are fluent readers are more likely to demonstrate good reading prosody, specifically linguistic focus prosody. Past research has demonstrated that reading expressively is part of the process of learning to read fluently. However, past research failed to examine distinctions between sentence-level and discourse-level prosody and focused solely on sentence level effects. This study examines the discourse-level prosody effects, in particular, linguistic focus prosody. The results of this study showed that, in general, children who read with good speed and accuracy

demonstrated larger pitch changes and greater amplitude on focused segments compared to children who were less fluent. Therefore, the current study extends prior research on reading fluency by showing that good reading fluency is associated with stronger linguistic focusing prosody.

Reading expressively and with correct prosody is a complex and important aspect of reading aloud well. The ability to read expressively well requires the reader to quickly and correctly decode the text while simultaneously providing the correct expression and phrasing required to correctly portray the meaning of the sentence (Cowie et al., 2002; Miller & Schwanenflugel, 2006; Schwanenflugel, Hamilton, Kuhn, Wisenbaker, & Stahl, 2004). Research has shown that children are capable of bringing most of this required knowledge gained from their knowledge and experiences with spontaneous speech into their oral readings as they improve their reading fluency. While sometimes this prosodic direction can be signaled by punctuation (periods, quotation marks, exclamation points, and question marks), it should be noted that contrastive stress in this study was not signaled by punctuation, so punctuation is not necessary for children to correctly use linguistic focus prosody. Further, Miller and Schwanenflugel (2006) found that not all adults and fluent readers mark all question marks and commas. The commas that go unmarked are usually those found within complex adjective phrases. This would seem to suggest that children who read fluently use appropriate reading prosody by communicating the overall meaning of the text while reading aloud. If a child has not yet acquired automaticity in decoding words that appear in a text, then the child would likely be unable to coordinate their understanding of linguistic focus prosody with his/her cognitive resources dedicated to oral reading. This seems to support the view that skilled fluent reading is reading that is not only quick and accurate, but also having correct expression (Kuhn et al., 2010).

While this paper argues that children use their knowledge of speech prosody to help understand and produce proper prosody when reading aloud, it is important to understand that speech and reading prosody are not identical. Spontaneous speech has been found to have more end-of-sentences rises as well as greater pitch variability that mark more minor syntactic boundaries (Esser & Polomski, 1988; Blaauw, 1994). Howell and Kadi-Hanifi (1991) go further in their research and found that adults tend to pause more, display less consistent stress, and overall display prosodically irregular speech, when compared to speech, while reading. Findings such as these help bring attention to the fact that bringing prosodic knowledge from spontaneous speech and listening to oral reading has limits. As a result, it would probably be wise not to expect children to be as expressive when reading aloud as he/she is during everyday speech. Esser and Polomski (1998) suggest that in order to be able to display the same expressiveness when reading aloud as in everyday speech, special training might be required, such as the training received by newscasters and storytellers. Moreover, a child may choose one acoustic feature when reading aloud and mark linguistic focus features only through the use of that one feature (Yoonsook, 2010). If this is the case, then a child who only marks linguistic focus features through, for instance, pitch could be reading with the same good prosody that a child who marks linguistic focus features with multiple acoustic features, such as pitch and amplitude.

This study did yield one counter-intuitive result: the effects of linguistic focusing occurred for pitch and amplitude but not duration. There has been some discussion in the literature on linguistic focus prosody regarding which prosodic features might be most sensitive to linguistic focusing. However, it is important to note up front here that none of these studies used children as participants.

A study conducted to determine whether or not amplitude and high frequency (highest pitch point) could be used to identify focus words in speakers when reading aloud found that those two acoustic features could be used with some success, especially amplitude (Heldner, Strangert, & Deschamps, 1999). Their study examined both the effectiveness of using the maximum amplitude and mean amplitude of the segment when attempting to identify the focus feature, where the maximum amplitude was effective 72% of the time and the mean segment was effective 70% of the time (Heldner, etc., 2009). I compared the mean amplitude of target words/segments, and this method seems to be supported by the current study. Heldner (1999) concluded, however, that amplitude and high frequency, or the peak of the pitch in the marked word or phrase, are probably not as effective in identifying focus features as F_0 and duration, but they can be used to help detect focus features, especially when accompanied by other acoustic features. This further supports how I measured the linguistic focus features and the need to use more than one acoustic feature when doing so.

Sluijter, van Heuven, and Pacily (1997) conducted a study to examine amplitude as a measurement of stress (which would be engaged in contrastive stress, among other types of stress). It seems to have implications for this study, in that Sluijter et al. (1997) examined whether amplitude can be as effective as pitch change in examining stressed syllables. Their studies concluded that increased pitch was often accompanied by greater amplitude. The fact that stressed syllables marked by an increase in pitch are also accompanied by an increase in amplitude, supports the idea of including amplitude when measuring the differences between marked and unmarked linguistic focus features.

Pell (2001) conducted a study that examined acoustic correlations for linguistic focus. The two main acoustic features he examined were duration and F_0. Pell reported that durational

effects are seen in longer utterances, which are defined as 10-12 syllables, but not as often in shorter utterances, defined as 5-7 syllables. Pell concluded that there could possibly be syntactic and semantic attributes of the utterances that affect the duration as opposed to simply the length of the utterance. Pell concluded that these syntactic and semantic elements might have a greater impact in longer utterances. This could explain why the durational measures in my study were not as anticipated, as the utterances tended to be short, which might limit the durational effects observed in the readers.

Chen (2009) conducted a study on focus features and used pitch and duration as acoustic features to examine potential differences between focus words and topic words in a sentence. Chen (2009) compared several methods for determining duration measurements as a marker of linguistic focus prosody (focused and topic): syllable duration, whole word duration (monosyllabic an multi-syllabic), and vowel duration. These are three methods often discussed in measuring duration with regards to linguistic focus. Chen's experiment results support the method used in this study, that is, measuring the whole word. Linguistic focusing effects were larger when measuring whole words than when measuring syllables or merely vowel duration. These findings support our decision to measure the difference between the target phrase and not simply just measure the duration of the vowel or syllable. It should be noted that in all cases the differences, while significant, were small. Yet, having selected the best measure of duration, it is reasonable to conclude that third grade children may not use duration to mark linguistic focus. Moreover, given that even the differences between the duration of focused and unfocused elements in adults were small, it could be that detecting changes in duration could simply be more difficult.

There are several implications for instructional practice as a result of this study. Firstly, this study supports prosody as a tool to help measure reading fluency and comprehension in children, as prosody helps account for more variance when predicting a child's comprehension than when solely using current reading fluency scales. While teachers should use it as a tool to help assess reading fluency, this study does not provide evidence that prosody should be explicitly taught. More research is needed to know whether or not explicitly teaching reading prosody in the classroom would help improve a child's understanding of prosody and in-turn increase his/her fluency or whether prosody is a tacitly learned skill that develops as reading fluency is achieved.

A limitation of the current study is that I have assumed that the individual differences displayed in this study are similar to developmental changes in reading expression because I examined the subjects' reading prosody at an age where reading fluency is being developed. It is known that some of the individual differences in reading prosody might persist over the long-term. Rasinski et al. (2009) states that the issue of learning to read fluently and with good expression is not unique to early elementary school children and as such, it can be reasonably expected that some children would continue to struggle. This limitation does not hinder the contribution of this research to extend the current knowledge of the development of reading prosody to include linguistic focus. Thus, this study has demonstrated that when children become more fluent readers, they also read focused elements with noticeable pitch changes and louder volume.

References

Ashby, J., & Clifton, Jr., C. (2005). The prosodic property of lexical stress affects eye

movements during silent reading. *Cognition*, *96*(3), 89-11. doi:

10.1016/j.cognition.2004.12.006

Ayers, G. (1994). Discourse functions of pitch range in spontaneous and read speech. OSU

Working Papers in Linguistics, 44, 1-49.

Bell, A., Brenier, J. M., Gregory, M., Girand, C., & Jurafsky, D. (2009). Predictability effects on

durations of content and function words in conversational english. *Journal of Memory

and Language*, *60*, 92-11. Retrieved from

https://www.hlp.rochester.edu/resources/workshop_materials/EVELIN12/BellETAL09.p

df

Benjamin, R., Schwanenflugel, P., Meisinger, E., Groff, C., Kuhn, M., & Steiner, L. (2012). *A

spetrographically grounded scale for evaluating reading prosody*. (Unpublished doctoral

dissertation).

Blaauw, E. (1994). The contribution of prosodic boundary markers to the perceptual difference

between read and spontaneous speech. *Speech Communication*, *14*(4), 359–

375.doi:10.1016/0167-6393(94)90028-0

Bodenbender, C. (1999). The punctuation and intonation of parentheticals. Unpublished masters

thesis, University of Victoria, Canada

Bolanos, D., Cole, R.A., Ward, W.H., Tindal, G.A., Hasbrouck, J., & Schwanenflugel, P. J. (in

    press). Human and Automated Assessment of Oral Reading Fluency. *Journal of*

    Educational Psychology.

Breen, M., & Clifton, Jr. , C. (2011). Stress matters: effects of anticipated lexical stress on silent

    reading.*Memory Language*, *64*(2), 153-170. doi: 10.1016/j.jml.2010.11.001

Brown, G. (1983). Prosodic structure and the given/new distinction. In Prosody, models and

    measurements (pp. 67-77). New York: Springer-Verlag.

Chen, Aoju. "The phonetics of sentence-initial topic and focus in adult and child Dutch."

    Phonetics and Phonology: Interactions and interrelations 306 (2009): 91.

Cowie, R., Douglas-Cowie, E., & Wichmann, A. (2002). Prosodic characteristics of skilled

    reading: Fluency and expressiveness in 8-10-year-old readers. *Language and Speech*,

    45(1), 47-82. doi:10.1177/00238309020450010301.

Dehe, N. (2009). Clausal parentheticals, intonational phrasing, and prosodic theory. *Journal of*

    Linguistics, 45, 569-615.

Den Ouden, H., Noordman, L., & Terken, J. (2009). Prosodic realizations of global and local

    structure and rhetorical relations in read aloud news reports.*Speech*

    Communication, *51*(2), 116-129. doi: 10.1016/j .specom . 2008.06.003

Esser, J., & Polomski, A. (1988). *Comparing reading and speaking intonation*. Amsterdam:

    Rodopi.

Heldner, M., Strangert, E., & Deschamps, T. (1999). A focus detector using overall intensity and high frequency emphasis. In *Proceedings of the International Congress of Phonetic Sciences (ICPhS)* (Vol. 2, pp. 1491-1493)

Himmelmann, N. P., & Ladd, D. R. (2008). Prosodic description: An introduction for fieldworkers.*Language Documentation and Conservation*, *2*(2), 244-274. Retrieved from http://scholarspace.manoa.hawaii.edu/bitstream/handle/10125/4345/himmelmann.pdf?sequence=62

Hirschberg, J. (2002, 04). *The pragmatics of intonational meaning*. Presented at International Speech Communication Association conference Speech prosody, Aix-en Provence, France. Retrieved from http://www1.cs.columbia.edu/~julia/papers/pragmatics_sp02_065.pdf

Howell, P., & Kadi-Hanifi, K. (1991). Comparison of prosodic properties between read and spontaneous speech material. *Speech Communication*,10(2), 163-169.

Jansen, W., Gregory, M.L., & Brenier, J.M. (2001). Prosodic correlates of directly reported speech: Evidence from conversational speech. In Proceedings of the ISCA Workshop on Prosody in Speech Recognition and Understanding (pp. 77-80). Redbank, NJ.

Katz, J., & Selkirk, E.O. (2011). Contrastive focus vs. discourse-new: Evidence from phonetic prominence in English. *Language*, 87(4), 771-816.

Kral, P., Keckova, J., & Cerisara, C. (2007). Sentence modality recognition in french based on prosody.*World Academy of Science, Engineering and Technology*, *8*, 677-680. Retrieved from http://www.waset.org/journals/waset/v8/v8-118.pdf

Kochanski, G., Grabe, E., Coleman, J., & Roser, B. (2005). Loudness predicts prominence:

    Fundamental frequency lends little. *Journal of the Acoustical Society of America, 118*,

    1038–1051.

Krivokapic, J. (2007). Prosodic planning: Effects of phrasal length and complexity on pause

    duration. *Journal of Phonetics*, *35*(2), 162-179.

Leslie, L., & Caldwell, J. (2011). *Qualitative reading inventory-5 (QRI-5)*. Boston, MA:

    Pearson.

Miller, J., & Schwanenflugel, P.J. (2006). Prosody of syntactically complex sentences in the oral

    reading of young children. *Journal of Educational Psychology*, *98*(4), 839–853.

    doi:10.1037/0022-0663.98.4.839

Mira, W.A., & Schwanenflugel, P. J. (in press). The impact of reading expressiveness on the

    listening comprehension of storybooks by prekindergarten children. *Language, Speech,*

    and Hearing Services in Schools.

Naep oral reading fluency scale. (2005, 10 26). Retrieved from

    http://nces.ed.gov/nationsreportcard/studies/ors/scale.aspx

Nichols, W.D., Rupley, W. H., & Rasinski, T. Patel, R., Piel, J., & Grigos, M. (2005). Acoustics

    of contrastive prosody in children. Journal of the Acoustical Society of America, 117(4),

    2429-2429.

Pell, Marc D. "Influence of emotion and focus location on prosody in matched statements and

    questions." *The Journal of the Acoustical Society of America* 109 (2001): 1668.

Patel, R., & Grigos, M. I. (2006). Acoustic characterization of the question-statement contrast in

    4, 7 and 11 year-old children. *Speech Communication*, *48*, 1308-1318. Retrieved from

    http://www.cadlab.neu.edu/publications/patel_grigos_2006.pdf

Patel, R. & Brayton, J. T. (2009). Identifying Prosodic Contrasts in Utterances Produced by 4-, 7-, and 11-Year-Old Children. *Journal of Speech, Language, and Hearing Research*, 52, 790-801.

Paya, M. (2003). Prosody and pragmatics in parenthetical inserstions in catalan. *Catalan Journal of Linguistics*, *2*, 207-227. doi: http://prosodia.upf.edu/home/arxiu/publicacions/recursosatles/paya_prosody-pragmatics-parenthetical.pdf

Pikulski, J. J., & Chard, D. J. (2005). Fluency: Bridge between decoding and reading comprehension. *Reading Teacher, 58,* 510–519

Plag, I., Kunter, G., & Schramm, M. (2011). Acoustic correlates of primary and secondary stress in north american english. *Journal of Phonetics*, *39*, 362-374.

Rasinski, T. (2004). Creating fluent readers. *Educational Leadership*, Retrieved from http://www.ltl.appstate.edu/reading_resources/RASINSKI_04.pdf

Sakkalou, E., & Gattis, M. (2012). Infants infer intentions from prosody. *Cognitive Development*, *27*, 1-16. Retrieved from http://psych.cf.ac.uk/home2/gattis/Sakkalou&Gattis_12.pdf

Schwanenflugel, P., Benjamin, R., Groff, C., Steiner, L., & Lai, S. (2011). *Reading fluency skill and the prosodic marking of linguistic focus*. Informally published manuscript, Applied Cognitive and Development, University of Georgia, Athens, Ga, .

Schwanenflugel, P.J., & Benjamin, R.G. (2012). Reading expressiveness: The neglected aspect of reading fluency. In Rasinski, Blachowicz, and Lems (Eds.), *Fluency Instruction (2nd ed.)*. NY, NY: Gilford.

Schwanenflugel, P. J., Kuhn, M. R., & Ash, G. (2010). Sharing the stage: Using oral and silent reading to develop proficient reading in the early grades. In E. Hiebert (Ed.), *Revisiting Silent Reading: New Directions for Teachers and Researchers (pp. 181-197)*. Newark, DE: International Reading Association.

Schwanenflugel, P. J., Meisinger, E., Wisenbaker, J.M., Kuhn, M.R., Strauss, G.P. & Morris, R.D. (2006). Becoming a fluent and automatic reader in the early elementary school years. *Reading Research Quarterly.41,* 496-522.

Sluijter, A. M. C., van Heuven, V., & Pacilly, J. J. A. (1997). Spectral balance as a cue in the perception of linguistic stress. *Acoustical Society of America*,*101*(1), 503-513. Retrieved from

https://openaccess.leidenuniv.nl/bitstream/handle/1887/11174/5_167_119.pdf?sequence=1

Smith, C.L. (2004). Topic transitions and durational prosody in reading aloud: Production and modeling. Speech Communication, 42, 247-270.

Strangert, Eva. "Relating prosody to syntax: boundary signalling in Swedish."*EUROSPEECH*. 1997.

Torgesen, J. K., Wagner, R. K., & Rashotte, C. A. (2012). Test of word reading efficiency - 2[Assessment kit]. Austin, TX: Pro-Ed.

Wagner, M., & Watson, D. (2010). Experimental and theoretical advances in prosody: A review. *Language and Cognitive Processes*, *25*, 905-945.

Wilson, D., & Wharton, T. (2006). Relevance and prosody. *Journal of Pragmatics, 38,* 1559-1579.

Whalley, K., & Hansen, J. (2006). The role of prosodic sensitivity in children's reading

    development. *Journal of Research in Reading, 29*(3), 288-303.

Yoonsook, Mo. *Prosody production and perception with conversational speech*. Diss. University

    of Illinois, 2011.

Appendix

Frog and Toad have a New Friend

Frog and Toad were good, happy funny friends. They did all kinds of activities in the forest. They would like to walk slowly together at first and then have an increase in their speed. Then, Frog would run with Toad from the woods. They liked to recall all the lovely times they had playing in the forest.

One day, Toad found two paths ahead (PI1-U) *and* he was not clear where they went. (DS-1) *They considered both*. Pointing down hill, Frog said, "Let's try (CS1-M) *that*." But Toad wasn't sure whether to take (CS2-U) this one. It was on this path that Frog (PI1-M) *(who* can get himself into trouble sometimes) set out anyway.

Toad asked him to (QS1-U) <u>come back</u>. But Frog was gone. Toad repeated, "Please (QS1-M) *come back*."

Frog came upon a small green house. It looked empty. There were neat, pretty, colorful flowers growing along a fence. Maybe an artist lived there.

Soon, Toad gave up and followed him. Toad said, "(QS2-M) *It doesn't seem* that there is anyone inside. (Y-NQ1 *Is anyone inside*?"

Frog said (QS2-U) *it doesn't seem* that there is. (QS2) *Frog had an* (EP1-U) *idea*. Frog said, "We should go and look." What an (EP1-M) *idea*!

"We should go and look? I don't know," replied Toad. It looked like somebody might live there. "Let's wait to see if anyone comes home."

They waited and waited. They watched the animals. Bunnies were jumping. Cats were sleeping in the grass. Mice were making nests under old logs. A blackbird flew by. Frog said, "I almost missed (CS1-U) *that*." All the animals were active.

Then, a tall man walked over to them (PI2-M) (*and* he took them by surprise).

"Hi, I am Toad and this is Frog. What's your name?" asked Toad. He smiled a (EP-2 U) *real big smile*.

"I am Big John," said the man. He saw them gazing at his garden. (Y-NQ-2) *"Would you like to see my garden?"*

Frog said, "We would like that very much."

Big John decided which path to take. Big John decided against the path by the garden fence. He didn't walk on this path. It was wet. In fact, a black bird was taking a bath by the garden fence. So, he chose the path that went through a small greenhouse.

There were many neat, pretty colorful flowers in the garden. It was very artistic. Big John saw Toad looking at his flowers. "Would you like one?" he asked. Big John held up two, a blue one and a yellow one. He held out one flower that was in his garden and said, "Here, take (CS2-M) *this* one." He gave Toad the blue one. So, it was in his garden that they all became friends.

 "I'm so glad to have new friends," said Big John. Now, they all had an increase in good friends. Their recall of that day always brought a (EP2-M) *real big smile*! To this day, they are still good, happy, funny friends. Frog and Toad (PI1-U) who can now find their way to Big John's house will always visit their friend from the woods.

Table 1: Means and Standard Deviations of Marked and Unmarked words

Linguistic Focus Feature		Pitch (in hz)		Intensity (in db)		Duration (in ms)	
		Marked	Unmarked	Marked	Unmarked	Marked	Unmarked
Quotation	M	257	242	73.55	73.89	0.25	0.28
	SD	41	36	5.77	5.1	0.07	0.07
Contrstive	M	249	219	73.24	71.53	0.28	0.29
	SD	41	36	5.84	6.19	0.06	0.08
Exclamation	M	223	206	72.41	69.72	0.58	0.46
	SD	31	33	5.49	5.74	0.15	0.08