

TEXT READING PROSODY IN CHILDREN WITH AND WITHOUT PRIMARY  
LANGUAGE IMPAIRMENT

by

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ABSTRACT:

The purpose of this study was to compare the text reading prosody, specifically pausing, of children with and without primary language impairment. The research questions aimed to determine if children with primary language impairment produced (a) more pauses during text reading than children without primary language impairment and (b) pauses of longer duration during text reading than children without primary language impairment. Thirteen children, ten without primary language impairment and three with primary language impairment, were selected from a larger study examining reading errors of school-age children. The children read a third-grade level passage as the text sample for this study. The reading was audio recorded and analyzed using the Praat software (Boersma & Weenink, Praat, Version 6.0.37) to analyze the number and duration of pauses. The results indicated that there was a statistically significant difference in the number of pauses between children with and without primary language impairment but not in the duration of these pauses. The implications of this study are that children with poor text reading prosody experience difficulties in reading comprehension, a lifelong skill needed for educational success. Text reading prosody provides cues that signal the emotional state of the reader, word and sentence level barriers, and grammatical structure. Without intervention, children with primary language impairment will continue to fall behind in their overall language and literacy skills. It is important to consider these implications in the future when determining the most appropriate methods of interventions targeting text reading prosody in the language impaired population.

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TABLE OF CONTENTS:

INTRODUCTION.....	6
LITERATURE REVIEW.....	7
RESEARCH QUESTIONS.....	10
METHODOLOGY.....	10
Participants.....	10
Procedure.....	11
Data Analysis.....	12
RESULTS.....	12
DISCUSSION.....	13
LIMITATIONS AND FUTURE DIRECTIONS.....	15
CONCLUSION.....	16
REFERENCES.....	16

## INTRODUCTION

Prosody is defined as the secondary features of speech and language that impart information across syllables and words (Veenendaal, Groen, & Verhoeven, 2014). The components of prosody include: fundamental frequency, stress, rhythm, pausing, and rate. Prosody serves as a suprasegmental feature of speech that helps listeners better understand what the speaker is saying and their intention behind the message. Listeners use prosody to determine the emotional state of the speaker, sentence and word level barriers, and syntactic structure. There are two kinds of prosody, known as text reading prosody and speech prosody. Text reading prosody is defined as the type of prosody used when an individual is reading from a pre-existing text sample, while speech prosody is elicited during a spontaneous speech production. This study focuses solely on text reading prosody and specifically targets the pausing component of prosody.

Previous research has found that text reading prosody is correlated with reading comprehension in children (Kuhn, Schwanenflugel, Meisinger, Levy & Rasinski, 2010). Reading is fundamental to academic achievement as children advance through school, and it continues to be a lifelong skill. Difficulties with reading comprehension are known to affect children's educational success and without intervention, can delay children's overall language and literacy skills. Text reading prosody helps readers better understand what the text means, therefore, affecting reading comprehension in children. When children read a passage aloud, their prosody provides clues to the meaning of the sentence. However, children who have poor text prosody skills are more likely to miss these clues and thus, misinterpret the sentence. Research shows that children who are less skilled readers have a lower quality of text reading prosody than their peers who read at or above grade level (Schwanenflugel, Hamilton, Kuhn, Wisenbaker, & Stahl, 2004). Therefore, the stronger the prosody skills of a child, the better

their reading comprehension will be. However, it is unknown whether or not children with primary language impairment have differences in prosody, specifically the number and duration of pauses, when compared to children without primary language impairment. Therefore, the purpose of this study is to determine (a) if children with primary language impairment have more pauses during text reading than children without primary language impairment and (b) to identify if children with primary language impairment have pauses of longer duration than children without primary language impairment.

## LITERATURE REVIEW

### **Text Reading Prosody**

Previous research states that text reading prosody is very different than speech prosody. Speech prosody is generated spontaneously, while text reading prosody is not. It is also known that skills in speech prosody do not always translate to text reading prosody (Veenendaal, Groen, & Verhoeven, 2014). There is evidence that suggests there are more pauses during spontaneous speech than there should be during text reading. It is also known that both speech and text reading prosody develop alongside other language skills.

Read and Schreiber (1982; 1987) discovered that children are also more reliant on prosody than adults when it comes to text reading comprehension. Children who produced fewer pauses during text reading presented more adult like prosody when examined again the following year. Therefore, it was determined that children who had more pauses during text reading experienced delayed abilities in reading comprehension at a later age (Miller & Schwanenflugel, 2008). This study also noted that higher-level syntax in reading resulted in more pauses in children's productions. As children get older, syntactic complexity increases during reading and those who have difficulties with reading will pause more as they attempt to decipher the text. Children

without primary language impairment improve their text reading prosody and reduce the number of pauses produce during a passage through reading practice and development in age (Miller & Schwanenflugel, 2008). It is unknown if this improvement holds true for children with primary language impairment.

### **Text Prosody and Reading Comprehension**

There are conflicting studies that state reading comprehension skills are solely dependent on particular components of prosody. Ravid and Mashraki (2007) found that differences in fundamental frequency had a greater impact on reading comprehension than did differences in pausing. However, Miller and Schwanenflugel (2008) and Álvarez-Cañizo, Suárez-Coalla, and Cuetos (2015) found that children who pause more during text reading are more likely to have difficulties with decoding. Difficulties with decoding, in turn, affect the child's reading comprehension skills. Miller and Schwanenflugel (2008) also found that children who had typical decoding abilities read text at a faster rate than their peers who had deficits with decoding. Children who have difficulties with decoding often have poor reading comprehension skills and read considerably slower than children without primary language impairment. The working memories of children with difficulties decoding are likely more focused on decoding the text rather than understanding the concepts. Taking this into consideration, it is assumed that children with decoding deficits will produce longer pauses as they try to decode the material. Children who are stronger readers have a sense of automaticity when reading and are therefore better able to think about the concepts of the material (Álvarez-Cañizo, Suárez-Coalla, & Cuetos; 2015).

### **Primary Language Impairment**

Primary language impairment is defined as a language disorder where “children perform below age expectations on language measures despite having adequate cognitive and sensory skills for typical development” (pg. 11, Rice, Warren, & Betz, 2005). Children diagnosed with primary language impairment do not have any other co-occurring impairments such as hearing loss, Autism Spectrum Disorder, or Intellectual Disability. Children with primary language impairment are known to have difficulties with both expressive and receptive language. While primary language impairment has the potential to affect all five domains of language (phonology, morphology, syntax, semantics, and pragmatics), previous research has found that morphology, syntax, and semantics are most significantly affected (pg. 12, Rice, Warren, & Betz, 2005). To date, it is known that children with primary language impairment have increased difficulties in decoding abilities (Miller and Schwanenflugel, 2008 and Álvarez-Cañizo, Suárez-Coalla, and Cuetos, 2015), which is vital to reading. It is also known that children with weaker reading skills have trouble with age-appropriate text reading prosody, which is comprised of the number of and duration of pauses. Previous studies such as the Miller & Schwanenflugel (2008) study only report the reading level of the participants and do not label any of its participants with potential disorders such as primary language impairment. Because children with primary language impairment commonly present deficits in their decoding abilities, it is predicted that children with primary language impairment will produce a larger number of pauses during text reading than children without primary language impairment. The purpose of this study is to compare the number of pauses children with primary language impairment produce during a reading passage to the number of pauses children without primary language impairment produce. The current study also examined whether or not these pauses for children with primary language impairment are of longer duration than those of the children without primary language impairment.

## RESEARCH QUESTIONS

1. Do children with Primary Language Impairment (PLI) produce more pauses during text reading than children without PLI?
2. Do children with PLI produce pauses of longer duration during text reading than children without PLI?

Based on previous research, it is hypothesized that children with primary language impairment will produce more pauses during text reading when compared with aged-matched children without primary language impairment. It is also hypothesized that these pauses will be longer in duration than children without primary language impairment.

## METHODOLOGY

### **Participants**

This study analyzed recordings that were collected by researchers in a pre-existing study (Nusz & Brimo, 2018). The pre-existing study collected data from 23 third-grade children and their parents. Each child was given a test battery that included the following assessments: the Clinical Evaluation of Language Fundamentals, Fifth Edition (CELF-5), the Test of Word Reading Efficiency, Second Edition (TOWRE-2), the Goldman-Fristoe Test of Articulation 3, and the Kaufman Brief Intelligence Test, Second Edition (K-BIT-2). Each child also received a hearing screening to eliminate hearing loss as a possible confound. Reading samples from 13 of the children from the pre-existing study were used for the purpose of this study. These samples were collected from ten of the children labeled as not having primary language impairment and three of the children labeled as having primary language impairment.

<i>Descriptive Statistics</i>		
	Grouping	
	<u>With PLI</u>	<u>Without PLI</u>
Age (months)	122.67 (12.74)	109.50 (6.24)
Nonverbal IQ	92.00 (9.54)	110.30 (14.59)
Core Language	73.00 (13.11)	116.00 (14.93)
Word –Level Reading	77.67 (15.58)	103.70 (11.58)

## **Procedures**

All participants in the pre-existing study (Nusz & Brimo, 2018) read a grade level passage and an additional passage that was assigned based on the child’s word-level reading score. Children who scored average to above average on the word-level reading assessment read a fourth-grade level passage. Children who scored below average on the word-level reading assessment read a second-grade passage. Only the recordings of the grade level passage were analyzed for the current study. To give the participants a chance to become accustomed to the format of the reading, only the text reading prosody in the second paragraph of this passage was analyzed.

The recordings of this paragraph were analyzed using the digital speech software system Praat (Version 6.0.37). “Praat is a comprehensive speech software package designed to analyze, synthesize, and manipulate digital speech data” (pg. 7, Miller & Schwanenflugel, 2006). Praat was used to analyze the number of pauses and duration of pauses. This study uses the same criteria to measure a pause as Miller and Schwanenflugel (2006), stating that “only pause lengths exceeding 100 milliseconds were included because they could be reliably measured.” The

primary investigators counted the number of pauses a child takes in the second paragraph of the reading passage by looking at the number of instances where there is an absence of sound longer than 100 milliseconds. The primary investigators also measured the duration of each pause using the stopwatch feature in Praat. Due to the nature of the pre-existing study, some parents interacted with their child during the reading of the passage. The pauses during the spoken interaction between the parent and child were not measured, as those pauses did not occur during the text reading. Once parent feedback was completed and the child began reading the passage again, the pauses continued to be measured.

### **Data Analysis**

All data was entered into SPSS. The average number of pauses during the second paragraph of the reading passage was then calculated for the two groups. The average duration of these pauses was also calculated for these two groups. Data was analyzed using two, independent samples t-tests to determine if the children with primary language impairment have more pauses and/or increased pause duration during the text reading children without primary language impairment.

## RESULTS

### **Number of Pauses**

The first research question asked if children with primary language impairment produced more pauses during text reading than children without primary language impairment. Based on the data collected in this study, there was a statistically significant difference in the number of pauses produced during text reading between the children without primary language impairment ( $M = 68.30$ ,  $SD = 22.97$ ) and children with primary language impairment ( $M = 130.67$ ,  $SD = 11.02$ ),  $t(11) = 4.45$ ,  $p = .001$ ,  $d = 3.45$ . This supports the hypothesis that children with primary

language impairment produce significantly more pauses than children without primary language impairment during text reading.

### **Duration of Pauses**

The second research question asked if children with primary language impairment produced pauses of longer duration during text reading than children without primary language impairment. Based on the data collected in this study, there was no statistically significant difference in the number of pauses produced during text reading between children without primary language impairment ( $M = .49s$   $SD = .13$ ) and children with primary language impairment ( $M = .59s$ ,  $SD = .14$ ),  $t(11) = 1.24$ ,  $p = .242$ . While this does not support the hypothesis that children with primary language impairment will have pauses of longer duration than children without primary language impairment, the data did reflect that there was a small difference in duration of pauses between the two groups. Further exploration of this topic is needed in order to draw a conclusion regarding duration of pauses during text reading.

### DISCUSSION

The purpose of this study was to determine if (a) if children with primary language impairment have more pauses during text reading than children without primary language impairment and (b) to identify if children with a primary language impairment have pauses of longer duration during text reading than children without primary language impairment. The results of this study indicated that there was a statistically significant difference ( $p = .001$ ) in the number of pauses children in the two populations take; however, there was not a statistically significant difference ( $p = .242$ ) for the duration of these pauses.

This study found that children with primary language impairment made a significantly greater number of pauses during text reading than children without primary language

impairment. The implication of these results is that children with primary language impairment struggle to read text without constantly stopping to pause and decipher the language. Text reading prosody is correlated with reading comprehension. Therefore, it is possible that children with primary language impairment do not understand the material they are reading because of the number of pauses they produce. The results from this study are consistent with previous findings in that children who have poor decoding abilities often perform significantly lower than children without decoding difficulties during a reading assessment (Veenendaal, Groen, & Verhoeven, 2014).

The children with primary language impairment in this study all had below-average word-level reading skills that may have increased their use of pauses. The increased use of pauses may have allowed them time to decipher and understand the text. While not explicitly measured in this study, the children with primary language impairment often asked their parents questions about the content of the story, indicating their comprehension was hindered in comparison to children without primary language impairment. Previous studies indicated that children with poor reading skills produced more pauses during text reading than their peers who read at or above grade level (Álvarez-Cañizo, Suárez-Coalla, & Cuetos, 2015); however, this study was the first to compare the pausing of children with and without primary language impairment. The results indicating that children with primary language impairment produce more pauses during text reading than children without primary language impairment are crucial to helping parents, educators, and speech pathologists better acknowledge and help children who were previously only labeled as a poor reader. Children with primary language impairment experience difficulties in areas outside of just reading; however, parents and teachers may mislabel kids as a poor

reader, when they ultimately need additional services to help improve all of their language and literacy skills.

While this study did find a significant difference in the number of pauses between the two populations studied, there was no significant difference in the duration of the pauses that were produced by the two groups. This could be attributed to the small sample population used in this study and the presence of outliers in both groups of participants. While not significant, there was a small difference in the average duration of the pauses produced during the text reading, .48 seconds for the typically developing group and .59 seconds for the language impaired groups. This difference does support the hypothesis that children with primary language impairment produce pauses of longer duration than their typically developing peers during text reading; however, the results must be counted as inconclusive due to the very small population size.

#### LIMITATIONS AND FUTURE DIRECTIONS

The limitations of this study include a small population size and the presence of outliers when analyzing the duration of pauses during text reading. Ideally the population size for this study would have been considerably larger, as the original goal was 32 children, 16 children without primary language impairment and 16 children with primary language impairment. Three participants were not included in the data analysis because they did not actively engage in the reading passage. These participants repeated what their parent said, instead of independently reading the passage. The data from these participants could not be analyzed and be considered an accurate representation of their reading ability.

There were also a number of outliers in both the typically developing and language impaired populations when it came to duration of pauses during text reading. Therefore, the data collected did not come back statistically significant and is considered unreliable. Future studies on the

duration of pauses during text reading is needed to accurately drawn a conclusion that compares the duration of pauses between children with primary language impairment and children without primary language impairment.

### CONCLUSION

In conclusion, this study identified a significant difference in the number of pauses children with primary language impairment produce in comparison to children without primary language impairment. Children with primary language impairment produce considerably more pauses during text reading than children without primary language impairment, possibly hindering their reading comprehension. The duration of pauses did not seem to significantly differ between the two populations. Moving forward, further examination is needed with a larger sample population in order to more accurately identify whether or not there is a significant difference in duration of pauses between the two populations. The results of this study indicate that parents, teachers, and speech pathologists need to identify children who exhibit difficulties with text reading prosody and determine whether or not the child potentially has a language impairment. If so, early intervention provides the highest chance for these children to develop more age appropriate language skills.

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