Backwards Decoding Strategy for Decoding Polysyllabic Words

A Master’s Research Project Presented to

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There are many problems children face when learning to read. There are many aspects and different things they have to remember during the reading/decoding process. Learning to read is a difficult task for many, especially those that have learning disabilities (Brady & Cohen, 2011). Teachers need to help students understand that not all students are great readers and an ability to read does not reflect on their intelligence. Not everyone learns at the same pace and some may need to be taught in different ways than others. There are many different interventions for struggling readers, and one that is explored in the present study is teaching students to decode words backwards. Many interventions teach children word decoding from the first letter and the student is supposed to blend the individual sounds of the word as they decode the word from front to back. In this researcher’s experience, children that have issues with blending struggle with decoding due to issues with blending.

Many students understand how to split words into their individual sounds but when it comes to putting all those sound together they struggle (Brady & Cohen, 2011). If students look at a word and can separate the word by chunking it into smaller more familiar segments, they are able to successfully decode the word. The theory behind the present study focusing on backwards decoding is based on the researcher’s own struggles with learning to read. As a child I started segmenting words and reading them backwards to correctly blend the sounds in words. For example, the way decoding is traditionally taught, children are given a word and are expected to read it just as it is written. The theory of backwards decoding is based on chunking the word in reverse order. Consider the process of backward decoding for the word, substitution:

- s

Add it to –tion, to give –tions,
Chunk the next part as –*tu*.

Add it to –*tions* for -*tutions*,

Chunk –*ti* and add it to –*tions* for -*tutions*,

Add -*s* to the beginning, resulting in –*stitions*,

Finally, add the last chunk, *sub*- to complete the entire word as *substitutions*.

During backwards decoding, students re-read each section of the word while decoding each new segment. In the traditional method, segments of words are read one time and by the time the last segment is decoded, previous sections could be forgotten. The backward decoding method encourages blending right from the beginning of the decoding process.

The backward method of decoding also makes use of social aspects of learning. The literature supports the importance for educators to model correct behavior for their students (Phillips & Soltis, 2009). With the backwards method, it is important for the teacher to work with the students and model the decoding method, since this is a novel method and throughout their schooling they have been taught only one way of decoding. According to Phillips and Soltis (2009), Albert Badura, the renowned Stanford psychologist, made a point to stay that if humans had to learn everything on their own, learning would be not only an exceedingly laborious activity but hazardous as well.

**Literature Review**

The researcher conducted an extensive search using many different databases as well as a variety of terms in a review of existing literature. Some data bases searched include: ERIC, Academic Search Complete, LexisNexis Academic, Ebsco Psychology and Behavioral Sciences Collection, Education Research Complete, and Ohiolink Language Learning Center. Among the
many search terms used included: decoding strategies, decoding and learning disabilities, decoding polysyllabic words backwards, teaching strategies for students with reading difficulties.

Early intervention is very important when it comes to students learning to read. There are many factors that influence children’s ability to read. Students that struggle with reading have a harder time in all academic areas (Cummings, Dewey, Good, & Latimer, 2011). Teachers need to make sure students have the same advantage as readers that do not struggle. By giving struggling readers interventions, they have the resources and potential to be on the same level as their non-struggling peers. Not all students learn at the same pace or even using the same methods, so research on different methods will help students further their academic careers and help them to be more successful readers.

Many studies have been conducted to determine the best strategy to use when helping struggling readers. Several are reviewed in the next section.

A study by Brady and Cohen (2011) examined word decoding for second graders with learning disabilities through the use of children literature. Their research addressed two main questions. First, would students receiving a reading intervention that integrated meaning-based and code-based strategies increase reading accuracy on training words that contain three common vowel patterns, in isolation and in context? Second, would students who receive the intervention increase their reading accuracy of novel (untrained) words and nonsense words that contain the same patterns as the training words?

The main purpose of this study “was to explore a reading intervention that intergraded code-based strategies” (Brady & Cohen, 2011, p 106). These interventions were taught using only children’s literature with meaning and code-based elements.
Five students from a private elementary school diagnosed by a school psychologist were chosen for this study. The five students included three boys and two girls; all five from the upper middle class with English as their primary language. All five read below grade level on the Woodcock Reading Mastery Test-Revised-Normative Assessment (WRMT-R). These students were selected using six criteria (a) second grade placement, (b) willingness of parent and child participation, (c) regular attendance, (d) full-scale IQ, (e) phonics ability, and (f) discrepancy between students IQ and score on the WRMT-R.

Each student was given the word identification, word attack, and passage comprehension subtests of the WRMT-R for possible pre- and post-test changes. The pre-test was used to establish a baseline and the post-test was administered the last week of the study. The interventions were put in place every day for 40 minutes with 20 minutes spent on shared reading of children’s literature and 20 minutes on phonics instruction. Daily reading measures were taken during morning homeroom 23 hours after specific interventions. The data was collected by a doctoral level special educator. The findings showed that students benefited from the interventions with post-test scores showing an increase in each subtest for all five students.

The reading interventions were deemed a success and the students continued to increase their scores throughout the year. Brady and Cohen (2011) recommended more research particularly in the area of comprehension. Overall using children’s literature to increase decoding skills in children with reading disabilities indicated a positive result.

According to the research by Balkom, Bosman, Verhoeven, and Weerdenburg (2011), many students with specific language impairments (SLI) have problems with phonological, morphological, and lexical levels of reading which is related to poor reading performance. The authors conducted a study to determine if an intervention using formal reading instruction
improved reading levels for Dutch students with SLI. This study was a follow up to a study conducted by Van Weerdenburg seven months prior with the same children. The study by Balkom et al. (2011) addressed three main questions. First, what are the predictive values of linguistic factors assessed at age 7.4 years with respect to word decoding 7 and 19 months later? Second, what are the predictive values of linguistic factors assessed at age 7.4 years with respect to spelling 7 and 19 months later? And finally, to what extent do children with SLI with normal literacy skills differ from children with SLI poor literacy skills on language and language-related measures?

The purpose of the study was to see if the interventions from 7 and 19 months prior helped Dutch students with SLI’s. The students were native Dutch speakers diagnosed with Specific Language Impairments by a team of specialists. In the Netherlands there are 30 schools that teach students with SLI’s, and of the 30 schools, 29 of these schools participated in the study. There were a total of 187 students that began the study but 39 had to drop out over the course of the longitudinal study because they no longer met the criteria for the study.

Participants were tested at three different points during the two year study. First, when the interventions were first put in to place, second, midway through the intervention, and finally after the interventions were complete. The tests were conducted by specialist from the school and trained test assistants that worked with the students daily. The tests consisted of word decoding, and spelling questions in order to answer the first two research questions. In order to answer the third research question, the researchers examined students’ reading scores and compared the struggling readers to the non-struggling students.

The findings of this study concluded that students with SLI should start reading instruction at an earlier age than their peers without SLI. Starting at an earlier age can address
problems SLI’s can cause in students’ learning. They also found that when comparing students that had the interventions to their peers without SLI’s, those with SLI were still not at the same level as their peers, but they were closer than those that did not have the interventions.

Compton, Gilbert, and Kearns (2011) examined two different decoding strategies asked four questions. First, what is the effect of word-specific grapheme-phoneme correspondence knowledge on decoding accuracy? Second, what are the effects of phonemic awareness, naming speed, and working memory in predicting decoding accuracy after controlling from grapheme-phoneme correspondence knowledge and word characteristics, and how much person variance do these factors account for? Third, what are the effects of average rime-neighbor frequency, rime-neighborhood size, interaction of frequency and size, and grapheme complexity in predicting decoding accuracy after controlling for grapheme-phoneme correspondence knowledge and person characteristics and how much word variance do these factors account for? And finally, are there interactions between the person and word characteristics?

Fifteen schools participated in the study, and each first grade teacher nominated 6-10 students depending on class size. The nominated students were struggling readers. A total of 287 students nominated for the study and after further testing 250 were chosen to participate in the study. Students were then randomly assigned to one of four groups. One group served as a control group taught using the school’s traditional reading curriculum, while the other three groups were taught using specific interventions.

Decoding was measured using a targeted nonword test that was created by one of the researchers. The students were given a list of 20 pseudo-words created to measure specific areas. Phonemic awareness was measured by sound matching. In this task, students were given four pictures, and the assessor read a word to the students and asked which card had a word that
either started or ended with the same sound as the given word. Rapid naming was measured by asking students to name letters as fast as they could. Students were given a list of randomly placed letters and they were asked to read them as fast as they could. Rime frequency was measured in two ways: rime-neighborhood size and rime-neighborhood frequency. The first was measured by taking a random list of words created using textbooks from the school as well as popular fiction and non-fiction books. The neighborhood size was determined by the number of monosyllabic words that appeared at least once in 1,000,000 words. The second was measured by how often a word appeared in 1,000,000 words using random books across different subject areas. Word-specific grapheme-phoneme correspondence (GPC) knowledge was assessed by giving students a 48-item test that required them to determine the relationship between graphemes and phonemes. Finally, working memory was assessed by reading a list of numbers to the students and students would have to repeat the list back to the assessor in reverse order.

The researchers found that when it came to the relationship between grapheme-phoneme correspondence (GPC) knowledge and decoding it is not always a positive one for every person or every word. The findings indicate that an individual does not have to have GPC knowledge to decode every word. In the working memory area, findings were inconclusive. The authors did not take into account the age and the range of the test they administered to students.

According to Hines (2009) learning is a prerequisite for success in a literate society. When students struggle with reading they tend to have over all poor academic performance, poor self-esteem, and poor motivation. The study was designed to look at a different way of teaching students struggling with reading. Hines (2009) states that even though the current accepted remedial approach to decoding instruction successfully improves the skills of majority readers, it still fails a sizable number of at-risk readers. The study attempted to determine the effectiveness
of an instructional program emphasizing rimes or word families rather than grapheme-phoneme relationships. Hines believed that color-coding the onset-rime would benefit struggling readers.

Participants in the study consisted of first-grade students attending an elementary school in the eastern United States. There were a total of 87 possible participants that were predominately middle class and Caucasian. Of the 87 possible participants, letters were sent home informing parents that their child could participate in the research, however, only 32 parents sent permission slips in for their child to participate. Consenting students were then screened. Of the 32, six students met all criteria to participate in the study. Due to unforeseen circumstances the final count of participants in the study ended up being four: two male and two female students, comprised of two Hispanic, one mixed race, and one Caucasian student.

Hines used books that were organized by rime patterns and each pattern was coded with a different color. Each student had the intervention four to five times a week. During intervention sessions, students would be given a book to read. While reading, the instructor would follow along and if any help was needed, the instructor would give it. The students could only have a small number of mistakes before they would have to re-read the book the next day. After the books were read, the students had flash cards to read through and if they made a mistake the instructor would correct them immediately. Students were measured by their correct responses. The intervention period lasted anywhere from 15-30 minutes.

Findings indicate that the interventions had a positive effect on all four students. This study supports research that states that teaching onset-rimes was effective when teaching struggling readers. Hines concluded that intervening early with struggling readers is most effective and states that one interesting finding was that similar to normally achieving readers,
struggling readers have the ability to draw analogies to successfully decode; they just do not do it spontaneously.

Cummings, Dewey, Good, and Latimer (2011) suggest students that struggle with learning to read will continue to have troubles with academic achievements throughout their education and that having struggling readers enter intervention programs have shown to increase their academic achievement. The purpose of their study was to reproduce findings from previous research. Their replication study was designed to determine if using nonsense words when teaching oral reading fluency is the best way to teach students. They also wanted to test the appropriateness of a revised list of nonsense words.

The participants in the Cummings et al. (2011) study were chosen because of their proximity to the researchers. There were 12 schools that participated in a larger study using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) test and of the 12 schools, one was chosen to participate because of its location in the Pacific Northwest. The final sample consisted of 66 first graders that were predominantly Caucasian (72% Caucasian, 17% American Indian/Alaskan, and 8% Latino).

Data was collected in the winter when the school was giving their winter assessments using the DIBELS. The data was collected by trained practitioners from the University of Oregon. For the Nonsense Word Fluency Assessment the students were given a list of nonsense words and asked to read them. Students’ responses were then coded into five different categories on how the student read the nonsense word. In the area of oral reading fluency (ORF) students had to read passages out loud to the practitioners while they kept a running record.

In this study the researcher again felt that it is important to have early intervention with struggling readers.
Each of these studies support the importance of decoding. It is clear that it is important for every student to have appropriate decoding skills. There are many different strategies when it comes to decoding and each teacher has their own way of teaching these skills. All teachers strive to help their students learn and know that what works for one student may not help another. It is important to understand this and be aware of the plethora of research that is available to educators to help students learn.

**Method**

**Setting**

This study was conducted in a middle school in 2013 during the months of March and April. Participants were chosen from two different seventh grade study hall classes. These classes were chosen because of ease of access for the researcher. At the time, the researcher was completing an internship under the supervision of a licensed intervention specialist. Between the two classes, there were a total of twenty-four students, comprised of five girls and nineteen boys. The eighth period class had a total of eleven students, two girls and nine boys. The ninth period class had a total of thirteen students, three girls and 10 boys. Each class was made up of students currently being served on an Individualized Education Plan (IEP).

The middle school is located in a rural community in Southeastern Ohio with a total of 45,000 people in the community. According to the Ohio Department of Education, among this population, 95% are white and 9.5% live in poverty.

**Participants**

The three students whose parents consented and students assented to participate in the research study were three boys, two from eighth period and one from ninth period. As stated
before each student was being served on an IEP. All participants were assigned pseudonyms to protect their confidentiality and identities.

**Michael.** Michael is a thirteen year old seventh grader diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD), as well as Other Health Impairments (OHI). Michael receives instruction for English/Language Arts in a resource room. According to Michael’s Evaluation Team Report (ETR), his decoding skills fell in the Borderline range. Michael was able to decode single syllable nonsense word correctly, for example he was able to correctly decode the nonsense word “leb”. His ETR showed that Michael struggles with multiple syllable word decoding that have long, middle vowel sounds, but that Michael has adequate phonemic skills in isolation. When meeting Michael, he was very pleasant and eager to participate in the intervention.

**Joe.** Joe is a thirteen year old seventh grader who has been identified as having Specific Learning Disability. Joe receives instruction for English/Language Arts in a resource room. According to Joe’s ETR, his word identification skills are at an average range when compared to his peers. Joe is able to decode polysyllabic words when presented with them but he takes time sounding out the words. Joe ETR states that he struggles with comprehension due to the length of time it takes for him to decode polysyllabic words. Joe was very interested when the intervention was presented to him. He asked many questions about what he would be doing and how it would help him. Joe was very enjoyable to meet and work with.

**Adam.** Adam is a thirteen year old seventh grader identified as having a Specific Learning Disability. Adam receives instruction for English/Language Arts in a resource room and also has behavioral issues that impact his learning. According to Adam’s ETR, he scored below average on all areas of Reading as measured by the Wechsler Individual Achievement
Test (WIAT). His English/Language Arts teacher stated that Adam would benefit from any decoding intervention. When first talking with Adam about this intervention, he was very eager to begin. Adam was very pleasant while working on the intervention and enjoyable to work with.

**Instrumentation**

Data for this study was collected using a pre and post intervention assessment. During the pre-intervention, all students in the two classes were individually audio recorded while decoding a list of polysyllabic nonsense words read aloud (see appendix A). Once the decoding sessions were completed, the researcher played back the audio recording and using a running record approach, deciphered how students decoded the polysyllabic words. Students were then invited to participate in the intervention depending on how many polysyllabic words were decoded incorrectly. The students that agreed to participate in the study were sent home with a parental consent form to be signed by their parents or guardians (see appendix D). Once parental consent forms signed, assent forms were given to the students to be signed (see appendix E). Following the consent process, the intervention took place.

During the pre-intervention phase, students were asked decode the polysyllabic words found in appendix A aloud so they could be audio recorded. Once the student completed the decoding session the researcher played back the audio recording and deciphered how the students decoded the polysyllabic words. The intervention then took place using the list found in appendix B. Once the intervention was over, students were asked to read the polysyllabic nonsense word list found in appendix C. Students were asked to decode the polysyllabic words found in appendix C aloud so they could again be audio recorded. The same procedures were
followed for both the pre- and post-assessments. Pre and post decoding of polysyllabic nonsense words were compared to determine differences in decoding skills following the intervention.

** Procedures**

The first step in the study was to see which students qualified to participate in the intervention. All twenty-four students were asked by the researcher to read one a list of ten polysyllabic nonsense words found in Appendix A. These words were made up by the researcher. When developing nonsense words, the researcher came up with three different lists for the students to decode during each portion of this study. The first list was created to judge the decoding skills of each student, and to see which students would benefit from the intervention. Students had the option to opt out of the study and not read the list, and by opting out, they also opted out of participation in the research study.

During the first step, students were asked to come to the researcher’s desk and the list was put in front of them to decode. Students were informed that all words were made up and they may be hard to read and it is okay if they got them wrong. At the same time, the students were also briefed on the study and how it could help them with future reading. To qualify for the intervention and participate in the research study, students would have to decode at least seven of the ten incorrectly. Students also had the option to say “pass” if they did not want to attempt to decode the polysyllabic nonsense word. This was counted as an incorrect response.

A total of seventeen students qualified for the study, three girls and fourteen boys. Another ten students decoded a total of six words incorrectly so they just missed the opportunity to receive the intervention and participate in the research study. The seventeen students that qualified to participate in the research study were then asked again if they wanted to continue and participate in the study. Of the seventeen, seven agreed to participate, one girl and 6 boys.
These seven students were then given consent forms for their parent to read and sign if they agreed to have their children receive the intervention and participate in the study. The permission slips described the intervention and what their children would be doing during the intervention. The consent form had all contact information for the researcher just in case the parents had any questions or concerns prior to providing consent.

A deadline was set for the students to return the consent forms. This date was one week from the day they were sent home. Of the seven students that agreed to participate, only three returned with signed consent forms. Once these three returned their slips they were then asked once more if they wanted to proceed with the intervention and they were then told again what the intervention consisted of, and asked if they had any questions. These three students were informed that even though the intervention was being done by one of their teachers, their grade would not be impacted by the intervention. The students were also informed that during the intervention they would be given another list of polysyllabic nonsense words to decode, and if they do not know how to decode the words it will be fine.

The three students that agreed to participate in the research study and received the intervention were three boys, two from eighth period and one from ninth period. As stated before, each student was being served on an IEP.

During the study the students decode the polysyllabic words to the best of their ability; the researcher asked the student to read the words aloud. The researcher wrote down exactly what they said if they were unable to correctly read the word. The researcher used the audio recording to listen to the students in order to correctly write what was decoded. Following the two week intervention, the researcher had the students re-read the same list but this time the researcher had them decode the words backwards. The researcher made sure the students
understood what they were to do by modeling the process for them. The researcher did not indicate whether they read each word correctly during the pre-assessment because the same list would be used for the post-assessment. Once both decoding sessions were completed, the researcher went over the list of words with the students to let them know how to correctly read the words.

**Pre-Assessment**

At the start of the intervention, the students were asked to decode a list of ten polysyllabic nonsense words. The decoding was audio recorded and answers were transcribed to compare to students’ post intervention decoding. Students were asked to report to the computer lab that is located across the hall from their classroom. They were then instructed on what was to take place when they were decoding the list of polysyllabic nonsense words. They were informed that they were going to be recorded and to try their best. They were also reminded that at any time they wanted to pass on a word they were able to, they were also told that they would not be told correct way to decode the words on the list until after the intervention. Once all students had completed the pre-assessment decoding, the intervention phase began.

**Intervention**

At the start of the intervention, all students were present each day. The intervention was started on the Monday following the pre-assessment decoding the list of polysyllabic nonsense words. The intervention occurred three times a week for two weeks and took place on Monday, Wednesday, and Friday for thirty minutes each session. During the intervention, a different list of ten polysyllabic nonsense words was used. See Appendix B. During the intervention, the researcher demonstrated how to decode the word backwards, and asked the students if there were any questions about the strategy. Due to the time allowed for the intervention, the two students
(Michael and Joe) in eighth period were taught the intervention together, as compared to ninth period when the student (Adam) worked one-on-one with the researcher.

Once all of the students’ questions were answered, the intervention continued. The intervention took place for a total of six days, on the first two days of the intervention the students were allowed to experiment with the words, looking at them and trying to decide the correct way to decode the nonsense words. During the next two days of the intervention, the researcher took students to the computer lab and instructed the students how to use the chunking strategy to help with decoding. All three students did not understand how to use chunking to aid in decoding. As a result, the researcher had to teach the students the strategy of chunking. All three students caught on to this strategy very quickly and teaching how to chunk backwards was then begun. Students were told to look for sounds or words inside the polysyllabic nonsense word they already knew. Once these were located, students began to sound out the nonsense words.

For example, with the word: *blahlohipnaw*, each student was able to find the sound *naw* and would write it on a piece of paper. Once that sound was decoded they saw the word *hip*, and added it to the sound *naw* in order to get the new sound *hipnaw* by blending the two together. The students understood that they needed to combine those two chunks to decode the word correctly. The next sound the students pulled out was *lo*, again they blended that to what they already had to get *lohipnaw*. Finally, students blended the last segment in the nonsense word *blah*, the final step was to blend it all together to get the word *blahlohipnaw*.

The students seemed to really enjoy working with the nonsense words once they were taught the backwards decoding method. The students still struggled when they were
using the chunking method to decode the words backwards. They understood what they needed to do but when it came to actually pulling out the sounds and words in the polysyllabic nonsense words the students had a hard time. The researcher noticed this and informed the students that they needed to slow down and look at the words. The students seemed to want to rush through and get through as many words as possible.

The last two days of the intervention the students were given the first list of words (appendix A) to decode on their own while the researcher sat and observed the students implementing the strategy. During this phase of the intervention, the researcher interjected when the students were struggling with chunking and blending the words back together. The students in this phase of the intervention enjoyed decoding the words using the backwards strategy, one student even said “I like this, it is helpful.” This portion of the intervention was to make sure the students understood what they were doing and if they had any further questions getting them answered.

**Post-Assessment**

The last step of the intervention process was having the students re-decode the polysyllabic nonsense words from the beginning of the intervention. The students followed the exact same procedures as for the pre-assessment. Students were asked to report to the computer lab that is located across the hall from their classroom. They were then instructed on what was to take place when they were decoding the list of polysyllabic nonsense words. They were informed that they were going to be recorded and to try their best. During this decoding session the students were informed that they could only skip one word in the list and they needed to attempt to read every word. Students were also asked to remember to use the intervention that was taught to them.
This decoding session was recorded and the answers were written down in order to compare to the first decoding session.

Once the final decoding session was complete, all words were decoded for the students to inform them of the correct pronunciation of the nonsense words. The students enjoyed having the lists read to them to see if they were able to decode the words correctly.

**Data Analysis**

When analyzing the data the researcher took the written records and compared the number of words the students were able to correctly decode forwards versus backwards. The researcher went back to the audio recordings to double check student pronunciations. The researcher calculated the percentage of words read correctly to determine if the strategy of backwards decoding was effective.

**Results**

Prior to intervention, the three students read the list of polysyllabic nonsense words found in appendix C. The results indicated the students were unable to read many of the words correctly. The average of words read correctly was only .06%. Michael read all words incorrectly, Joe read only two words correctly, and Adam did not read any words correctly on the first attempt. Each student used a different strategy for decoding the list of words, and all tried very hard when attempting to decode.

Table 1

*Results of Pre- and Post-Intervention Decoding*

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-Intervention % correct</th>
<th>Post intervention % correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Michael. During Michael’s first attempt at decoding the list of polysyllabic nonsense words, he tried to sound out each individual sound. Many times this caused issues when trying to blend the words together. Michael took his time and tried very hard with each word. A common issue he had when decoding was adding phonemes that were not in the words. He also struggled with vowel sounds, and seemed to be unfamiliar with the different vowel sounds. His decoding attempt was audio recorded and then played back. The researcher listened to the recording and transcribed Michael’s actual decoding. Table 2 contains the list of words along with Michael’s decoding.

Table 2

Michael’s First Attempt at Decoding: Pre-assessment

<table>
<thead>
<tr>
<th>Actual decoding of wordlist A</th>
<th>Pre-Assessment Decoding</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Hi-duc-mip-tru</td>
<td>5. Hi-duc-mip-tru</td>
</tr>
<tr>
<td>7. Lop-drup-fre-la</td>
<td>7. Lop-drup-fre-la</td>
</tr>
</tbody>
</table>
As can be noted by the results provided in Table 2, Michael struggled when decoding prior to the intervention.

After the intervention, Michael was asked to read the same list of ten polysyllabic nonsense words. During the post-assessment, Michael used the backwards decoding strategy taught during the intervention. Michael again took his time and put forth great effort to decode words correctly. Table 3 shows the post-intervention decoding compared to his first attempt and the actual nonsense words. Words that were read correctly are highlighted in yellow, errors that were made in the first attempt and second attempt are highlighted in light blue, and parts of the words that were read correctly in the second session that were read incorrectly in the first session are highlighted in pink.

Table 3

*Michael’s Pre & Post-intervention Decoding*

<table>
<thead>
<tr>
<th>Actual decoding of A</th>
<th>Pre-intervention Decoding</th>
<th>Post-intervention Decoding</th>
</tr>
</thead>
</table>
Joe. During Joe’s first attempt at decoding the list of polysyllabic nonsense words, he rushed through the list. When trying to sound out the individual sounds in the polysyllabic nonsense words he tended to find words or sounds he was familiar with, he would either give up and or guess. In Joe’s first attempt he tried to pass every word because the cause him to become frustrated because he did not know how to decode the words correctly. Due to a need for adequate data, the researcher informed Joe that he would be able to skip words but it would be very helpful for Joe to attempt each word. After this prompting by the researcher, Joe attempted each word and in the end only passed on two words. When decoding during his first attempt, Joe added sounds to the polysyllabic words as well as not correctly decoding the vowel sounds in the polysyllabic words. Joe’s decoding attempt was audio recorded and then played back. The researcher listened to the recording and documented how Joe actually decoded the words. The following is the list of words, the way Joe decoded is on the left and the correct decoding is on the right.

Table 4
Joe’s Pre-assessment Decoding

<table>
<thead>
<tr>
<th>Actual decoding of A</th>
<th>Joe’s Pre-assessment</th>
</tr>
</thead>
</table>
As seen in table 3, Joe was able to correctly decode two of the polysyllabic nonsense words. These were the last two words he attempted and he took extra time working on these last two words.

After the intervention Joe was asked to read the same list of ten polysyllabic nonsense words. During the post intervention decoding session, Joe rushed through decoding and wanted to pass every word. Joe did not use the intervention that was taught to him, he used the same strategy in this attempt as he did in the pre-assessment. After being prompted to remember to slow down and use the intervention that was taught to him, he took his time and tried to use the intervention. Table 5 shows post-intervention data compared to pre-assessment decoding and the actual decoding of the nonsense words. Words that were read correctly are highlighted in yellow, errors that were made in the first attempt and second attempt are highlighted in light blue, and parts of the words that were read correctly in the second session that were read incorrectly in the first session are highlighted in pink.
### Joe’s Pre- and Post-intervention Decoding

<table>
<thead>
<tr>
<th>Actual decoding of A</th>
<th>Joe’s Pre-assessment Decoding</th>
<th>Joe’s Post-intervention Decoding</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Juf-higg-in-moz-nip</td>
<td>2. Juv-hing- (Student then PASSED)</td>
<td>2. Juv-big- (Student then PASSED)</td>
</tr>
<tr>
<td>5. Hi-duc-mip-tru</td>
<td>5. Hed-uc-me-trup</td>
<td>5. Hid-is-up-tru</td>
</tr>
<tr>
<td>7. Lop-drup-frew-la</td>
<td>7. La-drup-wah-la</td>
<td>7. Lep-drup-fri-la</td>
</tr>
</tbody>
</table>

**Adam.** When Adam first read the list prior to the intervention he rushed through and got very frustrated. He made the comment that he did not want to do this and wanted to give up. After some coaxing from the researcher, Adam decided to give it another try, but continued to become frustrated when attempting to decode. Adam did not read any of the ten polysyllabic words correctly during the pre-assessment. He also chose to skip three of the ten polysyllabic nonsense words. When evaluating his pre-assessment, Adam added sounds to words that were
not there and gave up and guessed instead of trying to sound out or decode the words. Adam’s pre-assessment was audio recorded and then played back, the researcher listened to the recording and documented the way that Adam actually decoded the words. The following is the list of words, the way Adam decoded is on the left and the correct decoding is on the right.

*Table 6*

**Adam’s Pre-Assessment Decoding**

<table>
<thead>
<tr>
<th>Actual decoding of A</th>
<th>Adam’s Pre-assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Juf-higg-in-moz-nip</td>
<td>2. Juf- (Student then PASSED)</td>
</tr>
<tr>
<td>4. Quen-tiple-shu-men</td>
<td>4. Student did not attempt</td>
</tr>
<tr>
<td>5. Hi-duc-mip-tru</td>
<td>5. Hid-u-see-picter</td>
</tr>
<tr>
<td>6. Bre-trip-luc-frump</td>
<td>6. Bret-chipel- (Student then PASSED)</td>
</tr>
<tr>
<td>7. Lump-er-up-frump-da-fro</td>
<td>7. Lop-drup-frew-la</td>
</tr>
</tbody>
</table>

As noted in table 6, Adam was unable to decode any of the words correctly during the first session. He got very frustrated when attempting to decode the list of ten polysyllabic nonsense words for the first time. He rushed through the list and when he would get frustrated he would give up and just make up sounds or he chose to pass the word. He looked at one word and did not even try attempting it. Adam’s ETR showed that he scored well below his peers on the
Backwards Decoding

reading section of the Wechsler Individual Achievement Test (WIAT). The results of the pre-assessment are congruent with his scores reported on his ETR.

Adam participated in the intervention and seemed to completely understand how to chunk and blend the words. Unfortunately due to Adam’s behavior he was suspended during the week that the finale decoding session took place, because of this there is incomplete information and no post-assessment data for comparison.

Discussion

The results of this intervention indicate that this intervention did not prove to be successful in this setting. One participant improved his decoding strategy as well as his blending skills although his skills did not improve dramatically. It is unlikely this intervention would hinder a student’s ability to decode polysyllabic words; however, before this intervention is implemented in other settings, much more research should be completed. There were many issues when completing this research and there were also many limitations.

Michael

Results indicate that Michael’s post-assessment decoding was more successful than the pre-assessment. He was unable to read any of the words correctly in the first attempt, in the second attempt Michael was able to read three words correctly. Although he only was able to decode three of the words correctly, he was able to decode more parts of the nonsense words correctly. In Michael’s first attempt, he was not able to correctly decode many of the sounds in the nonsense words.

Most of the difficulties Michael encountered when decoding these words were the same issues for which he is receiving instruction in the Language/Arts resource room. According to his evaluation team report (ETR), Michael is able to decode single syllable nonsense word
correctly. For example, during his evaluation for services, he was able to correctly decode the nonsense word *leb*. His ETR showed that Michael struggles with decoding multiple syllable words that have long, middle vowel sounds.

The ETR also indicated that Michael has adequate phonemic skills in isolation. In the pre- and post-assessment when decoding the list of ten polysyllabic nonsense words, Michael demonstrated his phonemic skills with all consonants but struggled with the different vowel sounds. Although the intervention did not solve Michael’s decoding issues, there was a noticeable improvement in his decoding strategy. Michael also improved in his blending skills during the course of this intervention. Prior to intervention when decoding, Michael’s blending was choppy. Post-intervention, Michael’s blending improved and his decoding was much smoother. Overall, the intervention helped Michael in all aspects of decoding but did not result in vast improvements in decoding polysyllabic nonsense words.

**Joe**

Data indicates that Joe did not experience much benefit from this intervention. In the first session, Joe decoded two words correctly and had a difficult time decoding the different sounds in the polysyllabic nonsense words. During the first session, Joe also rushed though the list and wanted to skip many of the words. When it was time for Joe to read the same list during the post-assessment he again started rushing through the list of words and did not try using the intervention. The researcher reminded Joe to take his time when decoding and to remember to try to use the intervention. After prompting, Joe tried to use the intervention but continued to rush and did not use the intervention correctly. He was supposed to use the chunking and blending backwards strategy; however, he used the chunking and blending strategy but did it the way he was originally taught, by doing it forward rather than backwards. The forward blending
strategy did not seem to benefit Joe either because he was not as successful on the post-assessment. During the post-assessment, Joe only decoded one word correct and out of the ten polysyllabic nonsense words he decoded sounds correctly from five of the words.

Unfortunately, the intervention was not successful with Joe. According to his ETR, Joe is able to decode polysyllabic words when presented with them but only when he takes time when sounding out the words. During the intervention Joe did not demonstrate an ability to decode polysyllabic nonsense words even when given an adequate amount of time. It will be suggested to Joe’s English/Language Arts teacher that he may need to be re-evaluated.

**Limitations**

In every research project there are limitations that can range from small, insignificant issues to large, unmanageable situations. This research is not any different as there were several limitations identified in this study.

One limitation was that the only participants were boys, which is a problem because it does not provide a fair representation of the population. In a research study there should be an equal representation of both male and female participants in order to receive adequate information. If there are not an equal numbers of participants, the sample should represent the population where the research is taking place. In this instance, there are a total of six-hundred and sixty-eight boys and six-hundred and twenty-nine girls at the Middle School where the research took place. In the two classes available to the researcher, there were a total of five girls and nineteen boys. With these numbers, the male to female ratio would have been very low but ideally, there should have been females represented in the study. Typically there are more male students placed in resource rooms, and because of this, there were fewer female students available to participate in the study. The female students that were available unfortunately did
not want to participate. For future studies, this issue could be remedied by ensuring more female participants. Students work well with incentives, offering them bonus points or other external reinforcement would work well if future studies are done in a school setting.

In addition to only having male students participate, there were only three students participating, which in itself is a limitation. With only three students, the amount of data was limited, but a sample size of three was good given the small number of students who were eligible to participate. Another limitation of having so few participants, the study relied heavily on those students being in attendance. When one student missed class, it threw off the intervention, and at one point, two students missed on the same day, so the intervention had to be postponed for that day. When there are more participants in a research study, the research findings are more reliable and the have greater validity.

Another limitation was that the intervention occurred at one middle school and only students from one resource room. This resulted in a small sample size and one that was not very diverse. All students were from a rural Appalachian county, with a low social economic status, and all were Caucasian. With a more diverse sample, the results could have been more reliable. All school districts choose their own reading curriculum and methods for reading instruction. If participants were drawn from many different schools, the research findings would be much more valid.

Having seventh grade students as the participants in the study was another limitation because these students have already acquired their decoding strategies and it is difficult to change a person’s strategy after several years of instruction in the same method or strategy. When students are taught to read, they are taught a specific way from their teacher, and some adopt this way of learning, or tweak it in a way that works for them. By the time students are in
the seventh grade, they are fairly aware of what works best for them and trying to get them to change is much more difficult. The researcher asked one of the participants what he thought of the intervention strategy compared to his own decoding strategy and the student replied, “If it ain’t broke, don’t fix it.” Clearly, this student felt his decoding strategy worked just fine, even though he was a struggling reader, and learning a new strategy was just too difficult. If this intervention was used on a younger group of students it may have been more successful. This may be more successful if introduced when students are first being taught to read. At that early stage in their learning to read, students have not quite adopted a specific way to decode polysyllabic words. Providing them with a different strategy may lead them to decide on their own what works best for them. As people learn different things throughout their educational lives they adopt their own ways of doing certain things, and decoding polysyllabic words may be no different.

Two of the three participants were unable to recognize specific vowel sounds. This posed a problem because during decoding, students would decode the words incorrectly due to their inability to recognize vowel sounds. For future studies, participants must be pre-assessed to determine that they are able to recognize all the different phonemes in order to decode the words correctly. Since the participants were in seventh grade, it was assumed that they would know all the phonemes. Unfortunately this was not true; and as a result, one entire day was spent going over what the different phonemes. This process took time that could have been spent working on the actual intervention; instead time was spent on reviewing vowel sounds. Before the process of determining eligible participants for future studies, students should be evaluated to determine their knowledge of the different phonemes, those who do not, would excluded from participation in this specific study.
Not only did students have issues with the different phonemes, they also had difficulty with blending. This was a limitation because when the students did not blend correctly, it caused them to mispronounce words. When students were attempting to blend they were very choppy and would leave out specific phonemes. For example students would take the “substitution” and try to decode and blend it like so:

Su-ub-s-ta-it-u-t-i-on

As can be seen in this example, blending is a very important step in decoding and without it, decoding does not happen very easily. There should also be a pre-assessment of blending skills before participants are allowed to participate in the study. Participants in this study who experienced difficulty blending polysyllabic words also had difficulty blending polysyllabic nonsense words. Two of the three students also seemed to rush through decoding the list of polysyllabic nonsense words both times, during the pre-assessment as well as the post-assessment sessions. These two were also the students who experienced the most difficulty with blending which could have stemmed from their rushing through the decoding process. This was a limitation because it appears the students did not make an adequate attempt at decoding the words. After students were prompted to slow down and look at each individual sound, they tended to do better, but still rushed through the intervention. That being said, there is not much that can be done in future studies to prevent students from rushing through the decoding process, other than to remind them to take their time.

The final limitation was one of the participants exhibited behavioral issues. Because there were only three participants, the researcher relied on each of the participants to be present each day. Unfortunately due to one participant’s behavioral issues, he was suspended for the last week of the intervention, and due to the time-frame allotted to the study, it could not be
extended. Therefore, the missing post-assessment results for this student compromised the results of the entire study. The validity of this study was impacted because the researcher only had complete data for two students and does not provide an adequate amount of information for the entire study.

**Implications**

This research study was completed to determine if using a backwards decoding strategy for polysyllabic words is a reliable strategy for struggling readers. This strategy was taught to three seventh grade students from a seventh grade resource room in a Middle School in the Appalachian region of Ohio over a two-month period. There were a total of twenty-four students available for the study but only elected to participate in the research.

This research examined how well participants could decode polysyllabic nonsense words. Once pre-assessment data was gathered, students were then taught a new way of decoding, this was how to decode words backwards by chunking and blending from the rime of the word. After the intervention, students were then asked to decode the same list of polysyllabic nonsense words used for the pre-assessment. Pre- and post-data were compared to determine the impact of the intervention. Due to many limitations there was inadequate data collected which in turn made the study findings unreliable and limited validity. Although this is true, the study did demonstrate some improvements for one participant. One student did improve his ability to decode polysyllabic nonsense words; although the intervention did not solve his difficulties completely. The other student who completed the intervention did not show any sign of improvement after the intervention. It is recommended that more data be collected on this intervention before this decoding method is completely disregarded.
Resources


Appendix A

Pre-Assessment Word List

1. Polynombert
2. Perneverous
3. Sawpinfrous
4. Cungrowing
5. Hutnetpile
6. Betsashan
7. Koplumat
8. Metingfroplugshu
9. Apetokfilin
10. Rowphencon
Appendix B

Assessment list

1. shuponmentic
2. Grepnonpic
3. Frewlispinic
4. Dokvemhip
5. Judbekfremdill
6. Optrupmichilt
7. Sabcomhisdep
8. Huplowfremic
9. Prefremjiplock
10. Vazquipmendglig
Appendix C

Intervention List

1. Hipnocilling
2. Jufhiggnmoznip
3. Kasfremdobmin
4. quentipleshumen
5. hiducmiptru
6. Bretriplucfrump
7. Lopdrupfrewla
8. Blahlohipnaw
9. Rembafgrup
10. Proplefremshup
Appendix D

Parental Consent Form

Ohio University Consent Form

Title of Research: Strategies for Decoding Polysyllabic Words
Researchers: Cassidy Robinette

You are being asked to allow your child to participate in research. For you to be able to decide whether you want your child to participate in this project, you should understand what the project is about, as well as the possible risks and benefits in order to make an informed decision. This process is known as informed consent. This form describes the purpose, procedures, possible benefits, and risks. It also explains how your child’s personal information will be used and protected. Once you have read this form and your questions about the study are answered, you will be asked to sign it. This will allow your child’s participation in this study. You should receive a copy of this document to take with you.

This study is being done because I am interested in seeing how children react to different learning strategies. I plan on implementing a different technique to use for reading unknown words. Many students have difficulties when it comes to reading and I would like to give students different strategies for reading. The strategy I plan on implementing is reading words backwards.

If you agree to allow your child to participate, your child will be asked to read a list of nonsense words and have it videotaped. They, over a two week period, they will be taught the strategy of reading words backwards during their study hall twice a week. After two weeks, they will be asked to read another list of words and have that videotaped as well.

Your child’s participation in the study will last for approximately 3 weeks.

No risks or discomforts are anticipated with your child’s participation in this study.

Individually, your child may benefit by learning a new strategy when reading, if your child comes across a word he/she is unfamiliar with, this strategy will help him/her figure the unknown word out.

Your child’s study information will be kept confidential by having all documents and video recordings kept locked in a desk, their names will never be used on any document, and will be destroyed upon completion of study.

Additionally, while every effort will be made to keep your child’s study-related information confidential, there may be circumstances where this information must be shared with:

* Federal agencies, for example the Office of Human Research Protections, whose responsibility is to protect human subjects in research;
* Representatives of Ohio University (OU), including the Institutional Review Board, a committee that oversees the research at OU;

**Contact Information**
If you have any questions regarding this study, please contact Cassidy Robinette at cr547003@ohio.edu or Dianne Gut at gut@ohio.edu

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, (740)593-0664.

By signing below, you are agreeing that:

- you have read this consent form (or it has been read to you) and have been given the opportunity to ask questions and have them answered
- you have been informed of potential risks and they have been explained to your satisfaction.
- you understand Ohio University has no funds set aside for any injuries you might receive as a result of participating in this study
- you are 18 years of age or older
- your participation in this research is completely voluntary
- you may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you and you will not lose any benefits to which you are otherwise entitled.

Signature________________________________________ Date________________

Printed Name________________________________________
Title of Research: Strategies for Decoding Polysyllabic Words
Researchers: Cassidy Robinette

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This study is being done because I am interested in seeing how children react to different learning strategies. I plan on teaching you a different way to read words you don’t know. Many students have difficulties when it comes to reading and I would like to teach you a different way to read words you don’t know. The strategy I plan on teaching you is called reading words backwards.

If you agree to try this, you will be asked to read a list of made up words and have it videotaped. You will then meet with me two times a week during your study hall and I will teach you how to read words backwards. After two weeks, I will have you read another list of words and videotaped you again while you read. This will take about 3 weeks.

Trying to read words that are hard to read might make you feel frustrated. You can stop any time you want and it won’t matter to your grade. But I would like you to try to read all the words.

This might help you by learning a new way to try reading. If you ever come across a word that you don’t know, this strategy will help you figure the unknown word out.

Your study information will be kept confidential (private) by having all papers and video record tapes kept locked in a desk, and your name will never be used on any Papers. Everything and will be destroyed when the study is finished.

Additionally, while every effort will be made to keep your study-related information confidential, there may be circumstances where this information must be shared with:

* Federal agencies, for example the Office of Human Research Protections, whose responsibility is to protect human subjects in research;
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Signature ________________________________ Date ________________
Printed Name ________________________________