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WORD CALLING IN 3RD AND 4TH GRADERS: EXPLORING STUDENT AND TEACHER CHARACTERISTICS

By

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A dissertation submitted in partial fulfillment of the requirements for the

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May 2013

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ABSTRACT

WORD CALLING IN 3RD AND 4TH GRADERS: EXPLORING STUDENT AND TEACHER CHARACTERISTICS

by

Lindsay Starr Couzens

Reading difficulties in elementary school-aged children may occur when two components of reading- word identification, comprehension, or both of these skills- are weak or underdeveloped (Gough, 1972; Hoover & Gough, 1990; Joshi & Aaron, 2000; Savage, 2001). One type of reading difficulty that is frequently identified by teachers is known as "word calling." Previous research (Hamilton & Shinn, 2003; Hendricks, Reynolds & Sinatra, 2003, Meisinger, Bradley, Schwanenflugel, Kuhn, & Morris, 2009) found that teachers were not accurate in their identification of word callers (word callers). They tended to over-identify these students in their classrooms, confusing them with typical struggling readers.

The theoretical notion that only small numbers of word callers exist in any given classroom has been supported in the research literature (Shankweiler et al., 1999; see also Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009). For example, Shankweiler et al. (1999) found that only 2.5% of a sample of 361 students between 2nd and 4th grades fit the criteria of word callers. Even students who could be classified as word callers barely fit the criteria. Their

word identification skills were not exceptional and further, not as highly developed as the word identification skills of the proficient readers used for comparison in the study (Shankweiler et al., 1999). One would expect that true word callers would have word identification ability similar to proficient readers.

The current study asked teachers to categorize 3rd and 4th grade students as proficient readers, struggling readers, or word callers. The students were assessed on their word identification and comprehension abilities, vocabulary, and working memory to determine the characteristics of the teacher-identified word callers and whether there were any actual word callers in the sample.

No students could be classified as word callers, based on theoretical criteria. The teacher-identified word callers' performance on the tasks made them appear to be another variety of struggling reader. Teachers were interviewed to determine how they categorized their students and what interventions they would provide for word callers and struggling readers. Analyses revealed that teachers had multiple strategies to assist struggling readers, but fewer well-developed strategies for improving word callers' reading abilities.

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CHAPTER I

Introduction

Reading can be thought of as being composed of two distinct but highly interrelated processes: decoding text and comprehending the text that has been decoded (Gough, 1972; Hoover & Gough, 1990; Joshi & Aaron, 2000; Savage, 2001). Here decoding is defined as perceiving and identifying letter and word patterns presented on the page, while comprehension is defined as making sense of or understanding the text. This idea was first represented as the formula R = D + L, where R = reading comprehension, D = decoding, and L = listening comprehension (Gough, 1972). There are two problems with this initial concept. First, it misrepresents what reading actually is by suggesting that if one of the components is completely missing (or equals 0), reading can still take place. Further, it specifies decoding instead of the more general concept of word identification, of which decoding is a key aspect. The representation was later updated to R = WI x L, where WI = word identification, to address these two issues (Gough, Hoover & Peterson, 1996; Hoover & Gough, 1990; Reynolds, 2000).

Reading difficulties may occur when word identification, comprehension, or both of these skills are weak or underdeveloped. One type of reading difficulty that is frequently identified by teachers is known as “word calling.” Previous research (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009) found that teachers were not accurate in their identification of word callers. They

tended to over-identify these students in their classrooms, confusing them with typical struggling readers. Findings from these studies form the basis for the study outlined in this proposal.

Word Calling

The accepted theoretical basis for the identification of word callers was provided by scholars during the period between 1986 and 1999 (Shankweiler et al., 1999; Stanovich, 1986). The most concise definition of word calling is efficient word identification with a lack of comprehension (Stanovich, 1986). Stanovich cautioned that simply measuring word identification accuracy is not enough. Fluency— fast, effortless *and* accurate word identification – is a necessary criterion in defining word callers. Stanovich's caution was prescient. Other scholars have attempted to conduct research on word callers without attending to accurate measurement of word identification speed, making their results open to question (Nation, Clarke, Marshall, & Durand, 2004; Nation, Clarke & Snowling, 2002; Nation & Snowling, 1998a, 1998b, 2000; Stohard & Hulme, 1992, 1995).

Further, it is necessary that the words being tested exist in the child's vocabulary when determining whether a child is a word caller. One cannot expect a child to comprehend text if the meanings of the individual words have never been learned (Stanovich, 1986). Yet, measures of vocabulary have been frequently absent from previous word caller studies. Even when measures of vocabulary knowledge are included, they seldom if ever measure vocabulary

knowledge on the words that are to be comprehended (Hamilton & Shinn, 2003; Meisinger et al., 2009; Nation et al., 2004; Nation et al., 2002; Nation & Snowling, 1998b). Finally, evidence suggests that there are only small numbers of word callers in existence, not the large numbers that teachers have identified in previous research (Hendricks et al., 2003; Shankweiler et al., 1999; Stanovich, 1986, 2000).

The theoretical notion that only small numbers of word callers exist in any given classroom has been supported in the research literature (Shankweiler et al., 1999; see also Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009). For example, Shankweiler et al. (1999) found that only 2.5% of a sample of 361 students between 2nd and 4th grades fit the criteria of word callers. Even students who could be classified as word callers barely fit the criteria. Their word identification skills were not exceptional and further, not as highly developed as the word identification skills of the proficient readers used for comparison in the study (Shankweiler et al., 1999). One would expect that true word callers would have word identification ability similar to proficient readers. This expectation is supported by the theoretical basis for identifying word callers, which states that these students should be fluent in their word identification (Stanovich, 1986, 2000).

Other work found that teachers identified up to 40% of students in their classrooms as word callers (Hamilton & Shinn, 2003; Hendricks et al, 2003; Meisinger et al., 2009). In one study, all but two of 40 teacher-identified word

callers were excluded from word caller status by carefully measuring word identification accuracy and speed for both real and pseudowords (Hendricks et al., 2003). Similarly, Hamilton and Shinn (2003) found that teachers overestimated the word identification ability of all of their students, but especially for the students they had identified as word callers.

The work by Hamilton & Shinn (2003), Hendricks et al. (2003) and Meisinger et al. (2009) shows evidence that teachers identify a high number of word callers in their classrooms despite the fact that the theoretical definition and relevant research suggest that word callers are a limited phenomenon (Stanovich, 1986; see also Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009; Shankweiler et al., 1999).

Verbal Efficiency Theory

Verbal Efficiency Theory (VET) provides a major theoretical foundation for the proposed study (Perfetti, 1985). Briefly, VET suggests that working memory is fixed and limited. So, if word identification takes up too much working memory capacity, comprehension must suffer. However, if word identification is fast and accurate, working memory capacity should be emancipated for use with comprehension (Reynolds, 2000). This is what makes word callers a topic of high interest for research. Word callers appear to be fast, accurate decoders yet they do not comprehend well.

VET explains individual differences in reading comprehension through the assumption that individuals with effortless word identification skills tend to have

higher comprehension than those individuals who struggle with word identification (Perfetti, 1985, 1997, 2007).

VET is a critical concept related to word calling research because it provides a possible explanation for the fact that word callers appear to be identifying words fluently while having difficulty with comprehension. It may be that the identified word callers are not actually identifying words as quickly and accurately as it would appear, and should instead be classified as struggling readers.

Purpose

The current study was designed to replicate and extend the findings of Hendricks et al. (2003) by determining whether children who are identified by their teachers as word callers fit the theoretical definition as described by Stanovich (1986) and Shankweiler et al. (1999). I investigated whether differences in 3rd and 4th graders relate to differences in the numbers of word callers identified by 3rd and 4th grade teachers. Further, I examined the relationship between word calling and verbal working memory. The additional study of 4th grade students and the investigation of working memory serve to extend the original research by Hendricks et al. (2003). The study investigated the types of interventions assigned to students in the three categories (struggling readers, word callers, proficient readers) by their teachers. Finally, I was interested in investigating whether there are differences among the interventions

assigned by 3rd and 4th grade teachers. The following research questions, generated from previous research, were examined:

1. Do students identified as word callers fit the theoretical definition, based on their word identification and comprehension abilities?

   Replicating the results found by Hendricks et al. (2003) was important because of the conflicting results in the previously mentioned studies on word callers. Word callers have been shown to exist only in small numbers and further, teachers tend to over-identify word callers in their classrooms (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009; Shankweiler et al., 1999). However, in studies by Nation and her colleagues, large numbers of word callers were identified. There are varying estimates, but no solid standards for the numbers of actual word callers found in the early grades. This replication will help to determine whether or not word callers exist in large numbers.

2. Are there differences in working memory span among teacher-identified students (struggling, word callers, proficient) vs. researcher-identified students?

   Several studies have examined the relationship between working memory and word callers (Stothard & Hulme, 1992; Weismer, Evans & Hesketh, 1999; Yuill, Oakhill & Parkin, 1989). The results of these studies may be flawed because most of the studies used a crude word identification speed measure that is not accurate enough for the

identification of word callers. Also, Verbal Efficiency Theory (Perfetti, 1985) suggests that as individuals gain automaticity in lower-level skills like word identification, which tend to be capacity draining until automaticity is reached, they will have more capacity left for complex processes involved in comprehension.

3. Do 3rd and 4th grade teachers differ in the number of word callers they identify?

It was important to examine whether 4th grade teachers differ from 3rd grade teachers in the number of word callers they identify. Fourth grade teachers have not specifically been targeted in previous studies to determine how many word callers they identify, although some research has determined that 4th grade students are as likely as 3rd grade students to be word callers (Nation et al., 2004; Nation, Clarke & Snowling, 2002; Nation & Snowling, 1998a, 1998b, 2000).

4. Do 3rd and 4th grade teachers differ in their reasons for identifying word callers?

Fourth grade teachers may identify more word callers than 3rd grade teachers because of a shift in 4th grade language arts curriculum from an emphasis on decoding strategies to an emphasis on comprehension strategies (Clark County School District, 2011).

5. What kinds of interventions do teachers assign to the three groups (proficient, struggling, word caller)?

Understanding what kinds of interventions teachers assign is key to further development of the readers. If teachers are misidentifying students as word callers when they are actually some other kind of struggling reader, the students may not be receiving the most beneficial reading remediation.

6. Do the interventions assigned by 3rd grade teachers differ from those assigned by 4th grade teachers?

The curricula for 3rd and 4th grades are categorically different in that the 3rd grade curriculum is focused on both developing word identification skills and building comprehension while the 4th grade reading standards focus mainly on comprehension of material (Clark County School District, 2011). These differences in the focus on reading instruction may translate to teachers assigning more comprehension-based interventions to word callers because they are less focused on word identification instruction.

CHAPTER II

Review of Related Literature

The purpose of Chapter II is to review the research literature that provides a foundation for the research questions discussed first in the introduction. I will describe and discuss the components that form the definition of word callers given in the introduction. Those components are word identification, comprehension, and working memory. Then, I will describe relevant theoretical underpinnings and related research for each component, along with a discussion of relevant theoretical models of the processes discussed.

More specifically, topics are discussed in the following order:

1. Word identification is discussed first because it provides the primary basis for accurately identifying word callers, the participant population of interest for the dissertation.
2. A discussion of reading comprehension is necessary because a marked deficiency in reading comprehension is a hallmark of word callers.
3. I review research related to working memory. Working memory directly relates to my second research question. I suggest that limited working memory might be a contributing factor in word callers' difficulty with reading comprehension. There is literature to suggest this relationship (Stothard & Hulme, 1992; Weismer et al., 1999; Yuill, Oakhill & Parkin, 1989). However, I am concerned with some methodological issues in the extant work; specifically, the lack of speed criteria.

4. Verbal Efficiency Theory (VET) is discussed after the various components because it forms the theoretical foundation that ties all of the preceding concepts together.
5. I discuss available research literature on word callers themselves, including issues in the current research and how this study will address and alleviate some of these issues.
6. I discuss the literature on grade differences because I compared 3rd and 4th grade students and teachers in the current study.

Word Identification

I will begin the following section by describing two theories of word identification that pay specific attention to word identification processes (Gough, 1972; Ehri, 1994). Gough's approach focused on a formula that became useful for explaining individual differences in reading ability. Ehri's approach was developmental and did not focus at all on processing aspects; however, it is important for describing how readers evolve and why teachers might misidentify word callers. Research supporting these theories will be described and discussed after each of the models is described. Finally, I will discuss practical implications of word identification with regards to word callers and the current study.

Gough. Gough's early model of reading consisted of the idea that reading was composed of linguistic comprehension and decoding (1972). He based this on the theory that individuals who lack the ability to read *can* typically understand

spoken language. Gough used this idea to come up with a formula to capture his model of reading: R = WI + L. Recall from the introduction that R is reading ability (as measured by reading comprehension), WI is word identification and L is listening comprehension. Both comprehension and word identification are necessary components for reading. However, neither is sufficient on its own (Gough, 1972; Gough et al., 1996; Hoover & Gough, 1990).

Hoover and Gough (1990) further refined Gough's (1972) formula. Word identification without comprehension is not useful. The ability to comprehend without word identification is similarly not an accurate definition of "reading." Hoover and Gough developed an updated equation of reading to reflect this idea. The new equation was multiplicative rather than additive (1990). The equation is expressed as R = WI x L. The multiplicative nature of the model means that R must equal zero if either WI or L equals zero. Also, R is dependent on the lower value of the two variables as WI or L approaches 1. So, if an individual has word identification ability that approaches 1, but a linguistic comprehension ability that is only .5, reading ability cannot equal one. This individual's reading ability is constrained by the difficulty in comprehension ability (Hoover & Gough, 1990).

It is important to note that this model is primarily bottom-up in nature, though the authors reject that label (Hoover & Gough, 1990). Strictly bottom-up models deny that higher-level processes (such as context) can influence lower-level processes (such as word identification). While Hoover and Gough accept that some higher and lower level processes can interact, this model still relies on

the assumption that reading comprehension is essentially a bottom-up process (1990).

Word identification is defined as “efficient word recognition,” in the simple view of reading (Hoover & Gough, 1990). However, word recognition must be paired with lexical access to be of any use (Perfetti, 1985). Semantic information is retrieved simultaneously when a word is accessed from the lexicon. Beginning readers are faced with the task of pairing never-before seen printed words with their mental lexicon of heard words. Thus, the task is phonological in nature for beginning readers (Hoover & Gough, 1990). As readers gain more practice reading printed words, the task shifts to a focus on printed letters.

The simple view of reading was initially developed as an additive model (Gough, 1972). However, a multiplicative model is more explanatory (Hoover & Gough, 1990; Joshi & Aaron, 2000). This is especially true when investigating readers with individual differences. Reading ability is constrained by weaknesses in either word identification or comprehension (Catts, Adlof & Weismer, 2006; Joshi & Aaron, 2000).

Gough’s (1972) model provides an explanation for individual differences among readers through its multiplicative nature. Struggling readers are the product of an inverse relationship between word identification and comprehension. This means that poor readers will be the result of one of three possibilities: a) high word identification with low comprehension; b) low word

identification with high comprehension; c) low word identification and low comprehension (Catts et al., 2006; Hoover & Gough, 1990).

Some scholars have sought to further explain individual differences among readers by attempting to separate word identification speed from the formula (Adlof, Catts & Little, 2006; Joshi & Aaron, 2000). It is difficult to remove speed from word identification because efficient word identification implies that the process is fast (Stanovich, 1986). In fact, the variance in reading ability can be fully explained by comprehension without any contribution from word identification by the time readers are in the eighth grade (Adlof et al., 2006). This supports the idea that readers continue to develop their word identification skills until they are completely effortless.

An important critique of the research supporting the simple view of reading is that it relies on reading comprehension as the main outcome rather than a general measure of reading ability. Many factors other than reading comprehension can impact readers' overall reading ability. These can include speech perception, spatial perception, general language ability and figure drawing (Butler, Marsh, Sheppard & Sheppard, 1985; Watson & Miller, 1993).

Ehri. Ehri's (1994) model is comprised of phases that readers progress through as they move from non-readers to skilled readers. This phase-based model does not address processing aspects of the reading process- a major limitation. However, it does address the developmental nature of reading. This is important because it has implications for understanding how the processing

aspects of reading might evolve over time. Ehri's (1994) model was not designed to address reading comprehension; rather, it is a model of word identification.

Readers in each phase use and develop different processes to identify words. Readers attempt to identify words based on visual signals in the logographic phase (the Look-Say method). The alphabetic phase consists of readers who identify words based on letter-sound correspondences. The orthographic phase moves to a model in which readers identify words based on spelling patterns. Finally, familiar and unfamiliar words are identified fluently in the automatic phase using all of the learned methods. See Figure 1 for a depiction of Ehri's phases.

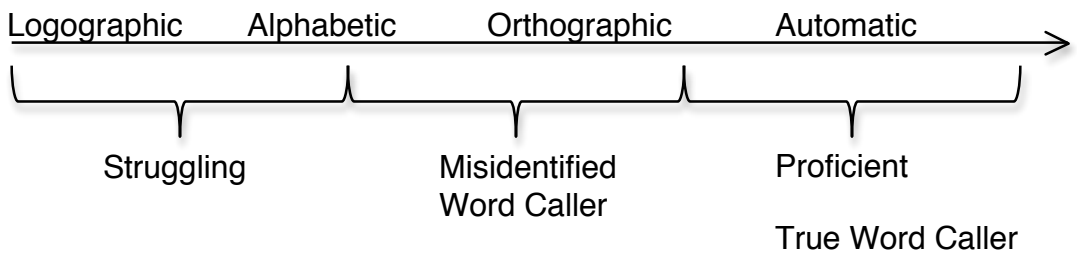

*Figure 1.*Ehri's (1994) model of reading phases. Adapted from "Development of the ability to read words: An update" by L.C. Ehri, 1994, *Theoretical Models and Processes of Reading* (R. B. Ruddell, M. R. Ruddell, & H. Singer, Eds.), Copyright 1994.

Ehri's approach to reading development is important to the discussion of word callers. Readers commit letter-sound correspondences and orthographic

patterns to long-term memory as they become more skilled. The patterns can be quickly accessed when readers encounter a new word. Further, the most skilled readers- those at the automatic phase- rarely have to use word identification strategies. Their word identification skills are efficient and automatic and do not demand attention.

Students who are misidentified as word callers may be mistaken as automatic or orthographic readers, when in fact they have difficulty with word identification and are most likely still in the alphabetic phase (Hendricks et al., 2003). These misidentified students may be missing key strategies and instruction that would allow them to develop into automatic readers.

Ehri's model was based on the idea that readers develop through a series of phases as they gain more experience with print. Readers develop more sophisticated and efficient word identification skills as they progress through each phase (Ehri & Wilce, 1979). Further, there is evidence that readers do shift from phase to phase (Ehri & Wilce, 1983; Ehri & Wilce, 1985; Mason, 1980). For instance, familiar words are identified faster than less familiar words. This is because they become more automatized with practice (Ehri & Wilce, 1979).

Logographic reading is not actually reading (Ehri & Wilce, 1985; Mason, 1980). Readers in the logographic phase were unable to identify words they had been trained to identify only minutes before the target session. Knowledge of grapheme-phoneme pairs is advantageous over holistic word knowledge when identifying words (Jeffrey & Samuels, 1967).

I presented both Gough and Ehri's approaches to word identification because they provide a useful framework for the current study. Each approach has weaknesses. Gough's (1972) approach confused reading comprehension with reading ability. Ehri's (1994) approach did not address processing factors in word identification. A more complete picture of word identification can be developed when Gough's formula is combined with Ehri's developmental phase model. My approach is to combine the function of Gough's formula (R = WI x L) with Ehri's description of how readers evolve as they acquire skills. Neither of these approaches to understanding reading provides a description of the processes relating to comprehension, though Gough's formula makes it clear that comprehension is a necessary component of reading ability. The following section will describe approaches to reading comprehension.

Comprehension

I will describe approaches to understanding reading comprehension processes in the following section. In particular, I will review Schema Theory (Anderson Reynolds, Schallert & Goetz, 1977; Bartlett, 1932; Kant, 1781/1963; Minsky, 1975) and several recent models of reading comprehension developed using Schema Theory as a basis. For example, Rumelhart (1977), Stanovich (1980), and Adams (1990) have developed reading comprehension models that used aspects of Schema Theory. Research supporting all of these theories will be described and discussed. Finally, I will discuss why understanding reading comprehension is critical to understanding word callers.

Schema Theory. Schema Theory provides a basis for understanding the nature of comprehension in general and reading comprehension in particular. More specifically, Schema Theory articulates the processes that surround the interactivity of knowledge when readers attempt to comprehend text. The reading models of Rumelhart (1977), Stanovich (1980) and Adams (1990) all rely explicitly or implicitly on the foundation provided by Schema Theory. Also, I will describe some of the research that supports Schema Theory. Finally, I will explain the importance of comprehension and attention-demanding comprehension processes to understanding the nature of word callers.

An individual's schema for any given concept is constructed based on that individual's personal experience as stored in memory—called background knowledge in much of the extant research. Significant contributors to personal background knowledge can be: a person's culture, sex, personal history, occupation, formal education, and beliefs (Anderson et al., 1977; Reynolds, Taylor, Steffensen, Shirey & Anderson, 1982). The key point of Schema Theory is that people's background knowledge has a significant influence on how they can and will interpret text information. For example, children from white middle class backgrounds frequently misinterpret instances of "sounding" (a good-natured game played among young African-American males involving apparent ritual insult) as actual mean-spirited confrontations. Urban African-American youth virtually never make this mistake (Reynolds et al., 1982). This means that groups of individuals can, and frequently do, interpret identical texts in different

ways, because they interpret incoming information within the frame of their existing schemata or background knowledge (Anderson, 1984; Bransford & Johnson, 1972; Reynolds et al., 1982).

In general, schemata have six essential functions (Anderson, 1978, 1984; Anderson et al., 1977):

- They allow for the assimilation of text information. Schemata contain slots (cognitive expectations) or placeholders for elements of information either seen or expected to be seen in texts. The slots facilitate ongoing text comprehension as they are filled with information from the text (Anderson, 1978, 1984; Anderson et al., 1977, Reynolds, 1979).
- They facilitate inference making. No text is completely explicit. Readers must always make inferences about what they are reading. Schemata allow readers to fill the inferences with their background knowledge on a particular or related topic (Anderson, 1978, 1984; Anderson et al., 1977; Reynolds et al., 1982).
- Schemata focus the allocation of attention on text segments made important by active schemata (Goetz, Schallert, Reynolds & Radin, 1983) or higher-level “text reading” schemata (Reynolds, Wade, Trathen & Lapan, 1989). Text reading schemata include cues from the text such as titles, illustrations, topic sentences or highlighted text. Schemata help identify information about what information is salient and what information

is less important. This allows readers to focus their attention on the information that is most relevant to the text (Reynolds & Anderson, 1982).

- They provide a mechanism for organized memory searches. This is achieved through the structure of the schema. A reader can access necessary information by following the structure of the schema. For example, readers could trace their knowledge about baseball games when trying to remember details from a passage about going to a ballpark (Anderson, 1984; Anderson & Pichert, 1978; Pichert & Anderson, 1979).
- They allow readers to summarize information. The structures of relevant schema assist in the identification of important text elements and thus facilitate the summarization of text. Readers can recall the most important overall concepts from a passage and omit small details that do not add to the summary (Anderson, 1984; Anderson & Pichert, 1978; Reynolds & Anderson, 1982; Reynolds et al., 1989).
- They help readers fill in gaps when recalling information they have forgotten. Readers can access information they do remember; then they can use a schema to fill in the rest of the information. For example, readers may be able to infer that a character brought a baseball glove to the game if they can recall that a character caught a foul ball (Anderson, 1978; Anderson & Pichert, 1978; Spiro, 1977).

Numerous empirical studies of Schema Theory have supported the findings outlined above. These studies include, but are not limited to investigations of the: effects of background knowledge on text learning and recall (Anderson et al., 1977; Cirilo & Foss, 1980; Goetz et al., 1983); effects of cultural schemata (Reynolds et al., 1982; Steffensen, Joag-Dev & Anderson, 1979); effects of schemata on attention allocation (Bransford & Johnson, 1972; Goetz et al., 1983); effects of schemata on backward memory searches (Anderson & Pichert, 1978; Pichert & Anderson, 1979); and readers' occupations and the interpretation of texts (Goetz et al., 1983).

In summary, readers' background knowledge, experiences, cultures, and even occupation can all impact the way that they interpret texts. Texts can be nearly impossible to comprehend if they are too esoteric and contain no clues as to their meaning.

The empirical research surrounding Schema Theory made it evident that higher-level processes can affect the ways in which readers comprehend text. This gave rise to models of comprehension that were based on the idea of interaction among lower-level and higher-level processes. Understanding these reading models is critical to understanding the theoretical nature of word callers. Recall that the definition of word callers involves the interaction of both word identification and comprehension, which is described in detail in the interactive reading models.

Rumelhart. Rumelhart (1977) developed his interactive model based on the assumption that linear, bottom-up models such as that developed by Gough (1972) did not account for the interaction between higher-level and lower-level processes, among other issues. For example, Gough's model could not account for contextual facilitation in letter identification and word identification (Rumelhart & McClelland, 1982). These findings indicated that Gough's model was inadequate for describing a reading process that is neither linear, nor strictly sequential in nature (Rumelhart, 1977).

Rumelhart's model is presented visually in Figure 2.

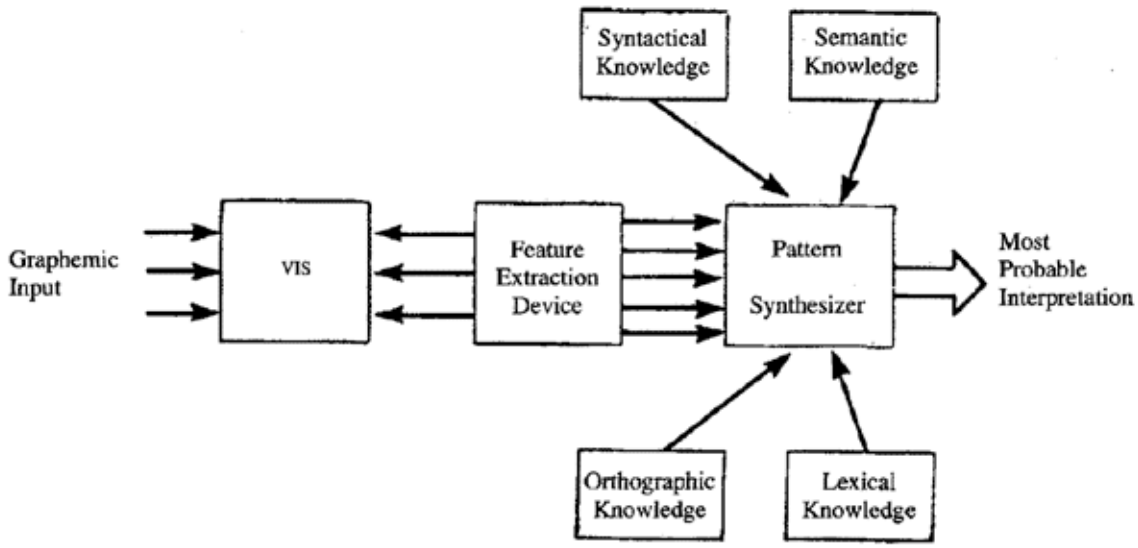

*Figure 2.*Rumelhart's (1977) interactive model of the reading process. Adapted from "Toward an interactive model of reading" by D.E. Rumelhart, 1977, *Attention and Performance (S. Dornic, Ed.) 4*. Copyright 1977 Erlbaum.

Rumelhart's interactive model begins with input from printed information that is registered by a visual information store (VIS). The feature extraction device searches the VIS for critical features (shapes that are interpreted as letters), which are then passed to the pattern synthesizer. The pattern synthesizer contains knowledge about:

1. orthography (letters and the relationships among letters)
2. lexical information (word meanings)
3. syntactic information (grammatical rules)
4. semantic meaning (within the context of both memory and text information).

All of this information converges simultaneously to provide the most probable interpretation of the text, given the text input and background knowledge (Rumelhart, 1977).

This general model was useful in describing the reading process, but was not useful for describing how processes could interact. Rumelhart adjusted the model and focused on the pattern synthesizer, which he renamed the "Message Center". An example of the Message Center works is depicted in Appendix 1.

Rumelhart (1994) revised his model by breaking the orthographic knowledge source into three different knowledge sources: letter-cluster, letter and feature level. The knowledge sources are represented in the diagram along the left-hand side. Knowledge sources act on perceived text found within the

Message Center. The Message Center is a temporary store for chunks of text and hypotheses from knowledge sources.

Each knowledge source consists of nodes (represented by the boxes within the diagram) that serve to pass information to neighboring nodes or nodes at levels directly above or below. Nodes can be excited or inhibited, depending on information passed from lower and higher levels. Nodes are connected based on their relationship to one another, with similar nodes being grouped together. Neighboring nodes can be excited by means of a spreading activation mechanism (McClelland & Rumelhart, 198).

Knowledge sources work continuously as readers perceive text (Rumelhart, 1994). Every perceived letter feature sets off a chain of processing that continues as readers continue to view written information. Each knowledge source works with those above and below to constrain and facilitate hypotheses related to letters, language structure and meaning.

The example shown above illustrates how text is processed by the various knowledge centers. A reader views the words “The car” after looking at the image displayed in Appendix 2.

Features are identified and the letter level knowledge source begins to form hypotheses about possible letter combinations. These are confirmed or rejected by the lower-level nodes. Higher-level nodes are activated as the letters are confirmed. The image viewed alongside the text activates higher-level nodes seen in the message center figure as the nodes for “Volkswagen” and “Lake”.

This example shows that the node activation for “Volkswagen” helps to confirm the node for “car”, thus allowing for faster processing time.

Rumelhart’s (1977; 1994) models pioneered the idea of incorporating interactive processes in reading. Empirical support for interactive processes has been shown in a number of ways. Letters are perceived more accurately when they are surrounded by contextually relevant letters than when they are presented in isolation (Rumelhart & McClelland, 1982). The same results have been found when target letters are embedded within a string of digits (Rumelhart & McClelland, 1982). Studies such as these show that higher level processes are facilitating letter identification when letters are presented within words.

The same kinds of results have been found for semantic facilitation. Ambiguous words can be perceived faster when they are displayed after semantically related words (Schvaneveldt, Meyer & Becker, 1976). In this case, the semantically related word constrained word identification for the ambiguous word.

Also, syntax can constrain lower-level processes. Oral reading errors are typically correct with regards to sentence syntax (Clay, 1968; Weber, 1970). This can only be explained if the syntactic knowledge source were able to constrain word identification.

Rumelhart’s interactive model is relevant to the discussion of word callers because it addressed the issues of how reading processes can occur simultaneously and interactively while processing text. Misidentified word callers

may actually be poorly identifying words, which can hinder the interaction between word identification and comprehension. Rumelhart's model was missing a practical component for understanding individual differences among readers. Stanovich (1980) provided this component with his interactive-compensatory model of reading comprehension.

Stanovich. Stanovich (1980) took Rumelhart's (1977) model a step further by adding a compensatory mechanism to the established interactive mechanism. This innovation proved useful in providing explanations for individual differences in reading ability. Stanovich's interactive-compensatory model is similar to Rumelhart's (1977) interactive model in that word identification is achieved through many different sources of knowledge converging in identification of letters and words. Processes at any level are free to interact with processes that are both higher-ordered and lower-ordered. This is slightly different from Rumelhart's (1977) model because the earlier model only allowed for interaction at directly adjacent levels of processing.

Stanovich added the compensatory element to further account for individual differences in readers; thus, increasing the usefulness of the model for generating new reading research and successful intervention strategies (1980; 1984). The compensatory assumption refers to the notion that individuals can at least partially compensate for weaknesses in any given process by relying more heavily on alternative processes. For example, a reader who has difficulty with automatic word recognition may rely on contextual mechanisms to compensate

for those weaknesses. A more detailed example can be seen by examining the proposed contextual mechanisms within the interactive-compensatory model.

Contextual mechanisms. An important assumption of Stanovich's (1980) model is that there are two types of contextual mechanisms. Both mechanisms may operate simultaneously. The first is an automatic spreading mechanism, which operates at high speed and uses low amounts of cognitive resources. This mechanism is semantic in nature and facilitates context effects, but does not inhibit them. The automatic spreading mechanism can directly speed word recognition and is the effect studied by Rumelhart and McClelland (1981; 1982).

The second type of contextual mechanism is that involved in contextual prediction and knowledge construction based on text. This mechanism is slow and laborious and it both facilitates and inhibits context effects. Unlike the automatic spreading mechanism, readers use the process of contextual prediction purposefully and consciously. The problem with relying on contextual prediction to compensate for poor decoding is that the process is cognitively draining. This means that there are fewer cognitive resources left over to devote to other conscious processes such as those involved in comprehension (Stanovich, 1984; Perfetti, 1985). Also, contextual prediction is frequently inaccurate and can lead to diminished orthographic processing of text (Adams, 1990).

A rich history of empirical research shows evidence that words are read faster in context than in isolation (Archer & Bryant, 2001; Goodman, 1965; Landi, Perfetti, Bolger, Dunlap & Foorman, 2006; Martin-Chang & Levy, 2006; Martin-Chang, Levy & O'Neil, 2007; Nicholson, Bailey & McArthur, 1991; Stanovich, West & Feeman, 1981). This line of research lends credibility to the argument that reading is an interactive process.

The line of research on context effects and compensatory processes in reading is important to word calling. The effects of compensatory processes may explain why teachers misidentify students as word callers. These students might be identifying words laboriously but accurately, because the context of the text may facilitate word recognition.

Stanovich's interactive-compensatory model is useful because it explains how readers might compensate for weaknesses in processing. However, it lacks the simplicity needed for practitioners to easily apply the model to reading interventions. Adams' theory of reading comprehension focused on the attentional aspects of reading. Also, her theory gave more precision to the interactive-compensatory model and expanded on the practical implications of interactive-compensatory models.

Adams. Adams' theory of reading incorporates both Schema Theory and Stanovich's interactive-compensatory model. It is similar to the other reviewed models in that different processes are free to interact with one another. Adams' model is conceptually simpler than the other reviewed models. Her focus is less

on delineating specific processes, and more on creating a model that focuses on the practical implications of inefficient processing within the model. This makes the model more useful to practitioners than more theoretical models.

Adams' (1990) model can be represented visually in Figure 5.

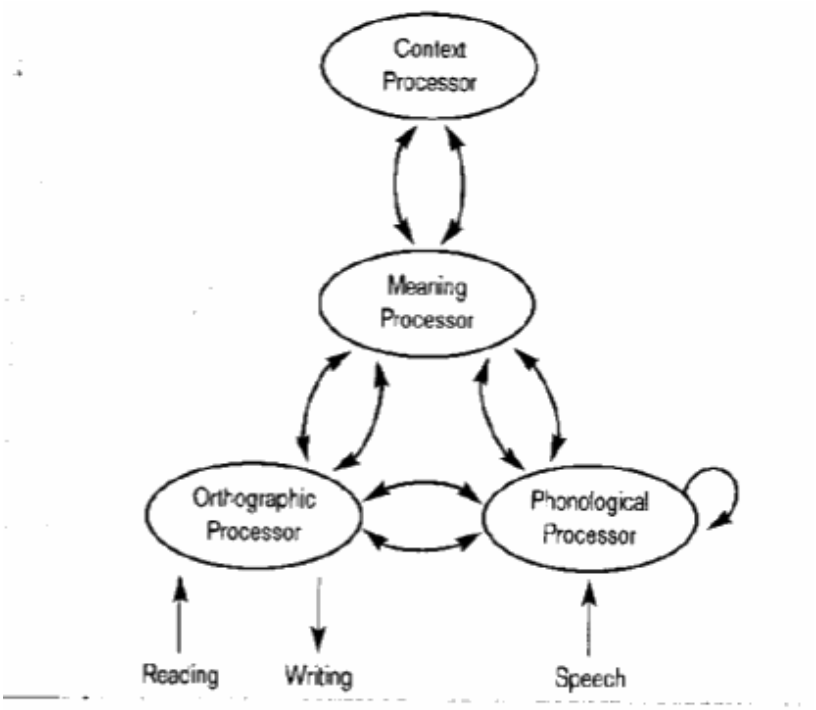

Figure 5. Adam's (1990) depiction of the four processors. Adapted from *Beginning to Read* by M.J. Adams, 1990, Cambridge, MA: MIT Press Copyright 1990 MIT Press.

Four processors act simultaneously on information as readers visually process letters. It is the interaction among the processors that accounts for fluent reading (Adams & Bruck, 1993). The orthographic processor allows readers to

identify letters and letter patterns. The context processor activates relevant schema as words are read. The meaning processor accesses semantic meanings of words as they are encountered. The phonological processor deciphers spoken language and allows readers to subvocalize (sound out words silently) as they read. The processors are not necessarily discrete “places” in the brain where reading takes place. Rather, they serve as a description of the way that text is processed and interrelated with prior knowledge in order to be understood.

An important idea in Adams’ model is that skilled readers do not use context to anticipate the meanings of words they have not yet read. Instead, all possible meanings of ambiguous words are activated until the proper meaning is determined based on the context of the text. This contextual mechanism is similar to the notion of spreading activation in Stanovich’s (1984) interactive-compensatory model because it is unconscious and automatic.

Adams’ model places a high priority on fluent, efficient word identification. Information is passed between lower and higher processors. Therefore, attention can be allocated to higher-level processing when word identification is fast and accurate. The interactive processes depend on accurate information coming from the orthographic processor.

Students who are misidentified as being word callers likely have trouble with word identification (Hamilton and Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009). Trouble with fast, accurate word identification makes it

difficult for higher-level processors to interact with lower-level information because fewer cognitive resources may be left over for complex comprehension processes to occur.

Empirical research has shown that good readers attend to individual letter and orthographic patterns in words. This occurs even when words can be perceived holistically (McClelland, 1976). This provides evidence for the orthographic processor's role in processing letters and letter patterns as readers view text. Also, readers attend to the first few letters of low frequency words even while they are visually fixating on the previous word (Lima & Inhoff, 1985). This finding suggests that readers are indeed looking at individual letters and letter patterns. This phenomenon is called the parafoveal preview effect (Kennison & Clifton, 1995).

Additionally readers fixate longer on words with ambiguous meanings. This supports a model in which all meanings of a lexically ambiguous word are accessed before the appropriate meaning is selected (Duffy, Morris & Rayner, 1988). Further, readers fixate longer on ambiguous target words when they are preceded by a sentence that primes a subordinate meaning (Kambe, Rayner & Duffy, 2001). This suggests that the dominant meaning of a word is accessed first and must be adjusted.

The meaning processor helps readers learn vocabulary. The bulk of vocabulary gained from reading text comes from repeated exposures (Nagy, Herman & Anderson, 1985). However, a small but statistically significant chance

exists that students can learn word meanings from just one exposure (Nagy, Anderson & Herman, 1987). These studies illustrate the interactions among the meaning, context and orthographic processors.

In summary, Adams' (1990) model accounts for fluent and efficient reading through the fast and efficient interaction among the processors. The most critical processor for fluent reading is the orthographic processor. Accurate information from the orthographic processor ensures appropriate responses and interactions among the higher-level processors. Contextual facilitation is an important part of Adams' model. However, using context to guess upcoming words is not. This is similar to Stanovich's model, where contextual guessing can occur, but with the caveat that it is slow, laborious, and frequently incorrect.

The models of reading comprehension discussed in this section build upon one another. Schema Theory was the foundation for each of the models, whether explicitly or implicitly. Schema Theory facilitated the development of interactive models through the discoveries associated with the interaction between text interpretation and existing knowledge.

Rumelhart's (1977) model was the first to explicitly outline an interactive model of reading comprehension. However, it was missing a component to explain individual differences among readers. Stanovich (1980) fulfilled that requirement with his interactive-compensatory model. Adams (1990) took each of the models described above and pulled them together into one simplified model with a focus on practical implications. Adam's model is the best fit for the current

study because it combines each of the previous models of reading comprehension and focuses on what happens to a reader if various processors fail to act appropriately. Further, Adam's model provides a clear link to the misidentification of word callers. Readers may be misidentified as word callers if they are laboriously but accurately decoding. The slow, attention-heavy decoding of these readers leaves less attention emancipated for higher-level processes, resulting in a lack of comprehension (Just & Carpenter, 1980; Perfetti, 1985; Reynolds, 1992, 2000).

A common thread throughout this chapter is that working memory capacity constrains reading ability (Baddeley & Hitch, 1974; Daneman & Carpenter, 1980; Just & Carpenter, 1980; 1992; Perfetti, 1985; Reynolds, 2000). I have made the point that if available cognitive resources cannot meet the demands of any particular reading process, comprehension will suffer. I will discuss working memory capacity and its impact on reading comprehension in the following section.

Working Memory Capacity

Much working memory research has focused on explicating the relationship between working memory and reading ability, particularly in the area of reading difficulties. This is due to the significant role that working memory plays in understanding these problems. Many theories of working memory exist (Baddeley, 1986; Baddeley & Hitch, 1974; Broadbent, 1958; Just & Carpenter, 1980; LaBerge & Samuels, 1974; Miller, 1956); however, I will focus my

discussion on the model of working memory described by Just and Carpenter (1980) for two reasons:

- While other theorists have described models of working memory (see for example, Baddeley & Hitch, 1974; Broadbent, 1958; LaBerge & Samuels, 1974; Miller, 1956), Just and Carpenter's model is the best fit for this study because of its major focus on the interaction between working memory capacity and reading ability.
- Just and Carpenter's (1980) model relates directly to the role of working memory in understanding individual reading difficulties, including word callers. Specifically, Just and Carpenter's model describes the reciprocal relationship between processing and storage. This relationship is key to understanding why some readers struggle.

Working memory has both storage and processing features (Daneman & Carpenter, 1980; Just & Carpenter, 1992). Storage refers to the ability to temporarily hold information that will be processed in working memory. An example of this would be holding text propositions (bits of information) in working memory while waiting for higher-level processes to occur. Processing in the Just and Carpenter (1980) model refers to mental computations performed on information held in working memory. This can include integrating various propositions in order to make sense of a sentence and accessing background knowledge. Processing occurs within working memory at many levels

simultaneously. This means that lower-level processes such as letter identification occur at the same time as higher-level processes like semantic processing. This is similar to the interactive models of reading comprehensions discussed earlier (Adams, 1990; Rumelhart, 1977; Stanovich, 1980).

Working memory has a limited and fixed capacity, which extends to both storage and processing requirements (Baddeley & Hitch, 1974; Daneman & Carpenter, 1980; Just & Carpenter, 1980; Just & Carpenter, 1992; LaBerge & Samuels, 1974; Miller, 1956; Perfetti, 1985; Reynolds, 1992). Readers who have larger capacities or who use their capacity in efficient ways can integrate more text elements simultaneously than readers with smaller or less efficiently organized capacities. Just and Carpenter suggest that working memory capacity can effect reading in at least three ways:

- working memory has fixed and limited storage capacity. Information stored in working memory can be displaced (pushed out and forgotten) when required storage demands exceed available capacity. Displacement is detrimental to reading comprehension when the displaced information is necessary for successful comprehension of a text.
- working memory has a fixed and limited duration. Information held in working memory for an extended period of time begins to decay and becomes less usable. Information that is consciously maintained can last longer in working memory; however, the

conscious effort required to maintain information in working memory reduces capacity for needed processing activities.

- working memory has fixed processing capacity. Comprehension breakdowns can occur when processing demands exceed available working memory processing capacity. This means that reading comprehension processes are slowed down and some cannot be completed (Just & Carpenter, 1992).

The demands of tasks on capacity can be reduced even though overall working memory capacity remains fixed. Capacity demands can be reduced consciously or unconsciously. Conscious capacity reduction occurs when individuals employ reading strategies. These can include control of reading rate, attending to salient information, applying background knowledge, and organizational strategies such as chunking (Just & Carpenter, 1980; Reynolds, 1992).

Unconscious capacity reduction occurs in two major ways: through contextual facilitation and automaticity. Contextual facilitation works in the same way as the compensatory mechanism in Stanovich's (1980) interactive-compensatory model. Text activates relevant schemata, thus facilitating more efficient processing when text related to the activated schemata is encountered. This process is automatic and does not require awareness from the reader.

Automaticity refers to the development of efficient processing through over-learning (Just & Carpenter, 1992). A good example of this phenomenon is

the development of word identification. Beginning and struggling readers often identify words slowly and laboriously. As they develop more efficient word identification skills, their comprehension also improves. There is more available capacity within working memory to handle reading comprehension processes.

Empirical studies on individual differences in working memory capacity have shown a link between reading ability and working memory capacity (Daneman & Carpenter, 1980; Just & Carpenter, 1992; King & Just, 1991). Earlier studies used a digit span task to show that reading processes and the digit span task tap the same bank of storage resources (Baddeley & Hitch, 1974; Hitch & Baddeley, 1976). Reading span tasks, such as those used by Daneman and Carpenter (1980), Just and Carpenter (1992), and King and Just (1991), are a better measure of the relationship between working memory and reading ability. This is because reading span tasks tap *both* storage and processing capacity by requiring participants to process language while holding information in working memory. For this reason reading span tasks are a better tool for understanding individual differences in reading ability.

Other studies have increased the understanding of the limited and fixed nature of working memory capacity (Daneman & Carpenter, 1980; Hannon & Daneman, 2001). These studies showed the relationship between storage and processing through manipulating storage demands while reading. Participants showed an increase in processing time as the demands on available resources were increased. Manipulating the difficulty of sentences impairs storage capacity

(Carpenter & Just, 1989). Participants were less likely to correctly identify target words from the span task as sentence difficulty increased. Further, information stored in working memory can decay if processing takes too long (Carpenter & Just, 1977) or if the distance between a pronoun and its referent is too great (Just & Carpenter, 1980).

To summarize, working memory capacity is important to understanding word callers. Previous research has shown that teachers over-identify word callers (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009). The identified students decoded accurately, but laboriously. This likely increased working memory processing demands and led to decreased comprehension.

Previous studies (e.g. Nation & Snowling, 1998a; 1998b; Nation & Snowling, 2000; Nation et al., 2002; Nation et al., 2004) have ignored the notion of speed as a critical factor in processing. The current study investigated whether slow processing can make readers appear to be word callers, when in fact they simply need to automate their word identification skills. This study will help to clarify the relationship between working memory capacity and reading success.

Just and Carpenter's (1992) theory of working memory is important to Verbal Efficiency Theory (VET), which will be discussed in the section below. I will discuss how inefficient use of working memory capacity can hinder reading comprehension within the discussion of VET.

Verbal Efficiency Theory

The following section will describe VET and its various components. VET is important because it offers a theoretical explanation for the discrepancy between misidentified word callers' accurate word identification and their poor comprehension. The discussion will begin with a summary of VET and its assumptions and components. Research relevant to VET will be described and finally, the practical implications of VET with regard to word callers will be discussed.

VET is similar in focus to working memory models; however, it is broader in range. It is the most appropriate model for the current study for the following reasons:

- VET encompasses both working memory models and interactive models of reading. It is a more comprehensive model of individual differences in reading.
- VET focuses on the specific reading processes that can hinder comprehension (Perfetti, 1985). Models of working memory only describe issues of storage and processing within the confines of working memory.
- The focus on specific processes allows for a practical approach to understanding individual differences in reading. Understanding which processes may be hindering comprehension facilitates the development of reading interventions to assist struggling readers.

- Finally, VET is a good fit for the current study because past research has shown that students misidentified as word callers tend to actually decode laboriously (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009). These students are less verbally efficient, which is likely the cause of their poor comprehension. Verbal efficiency refers to the level of automaticity and speed with which a reader operates the subcomponents of the reading process (Perfetti, 1985; Walczyk, 2000).

VET rests on several assumptions, which are strongly related to interactive models of reading. The most foundational assumption is that the attention available to be applied to the reading process is fixed and limited (LaBerge & Samuels, 1974; Perfetti, 1985; Pressley, 1997; Reynolds, 1992, 2000; Reynolds, Standiford & Anderson, 1979; Samuels, 2006). Some of the processes involved in reading require a large amount of attention while others require less. The amount of attention required for any given process is not fixed; rather, it can be reduced as a reader becomes more skilled (Daneman & Carpenter, 1980; Just & Carpenter, 1992; Perfetti, 1985; Reynolds, 1992, 2000). However, not all processes have the potential to become fully automatic. Samuels (2006) argued: “even though aspects of comprehension, such as making inferences, can become automatic, considerable attention will always be required in order to construct a meaningful and coherent representation of a text” (p. 38).

Another assumption of VET is that working memory capacity and attention are limited (LaBerge & Samuels, 1974; Larkin, Woltz, Reynolds & Clark, 1996; Just & Carpenter, 1992; Reynolds & Samuels, 1996; Perfetti, 1985; Reynolds, 1992, 2000; Samuels, 2006). Recall that working memory has a limited capacity for holding units of information at any given time. When activation of units exceeds that capacity, some of the information is displaced, causing it to be forgotten (Just & Carpenter, 1992; La Berge & Samuels, 1974; Miller, 1956; Samuels, 2006). These elements can include permanent information retrieved from long-term memory as well as partially processed new information such as text on a page (Perfetti, 1985).

A final assumption of VET is that readers are able to allocate resources as they read (Perfetti, 1985; see also Reynolds, 1992, 2000; Reynolds et al., 1979). VET accounts for allocation of attentional resources in the similar way to Just and Carpenter's (1992) theory of working memory. Readers can use a variety of strategies to allocate resources. They can attend to information that is perceived to be salient, they can focus on information made salient by text cues, and they can use strategies to facilitate efficient organization of the text (Just & Carpenter, 1980; Reynolds, 1992).

Given these assumptions, a key aspect of VET is that the various components of the reading process share and compete for available attention. When attention is overused by one component (e.g. word identification), other component processes may suffer. If comprehension processes suffer, effective

reading will not occur. To revisit Gough's formula, R = WI x L. A low value for word identification (WI) or listening comprehension (L) will result in a lower value for reading (R).

Perfetti identified two main types of reading processes: lexical processes and comprehension processes. Lexical processes refer to activities of word identification and lexical access (the retrieval of word meanings from long-term memory). Comprehension processes include text modeling (making inferences, integrating information to background knowledge and previously read text), and proposition encoding (keeping track of, and making sense of the units within a sentence that give it structure and meaning).

Some of these processes (e.g. word identification) can be sped up through the development of automaticity. To restate, automaticity refers to an activity that happens without the conscious direction of the individual. Automatic processes happen with great speed and use minimal attention. The fundamental tenet of VET is that readers who can efficiently and automatically identify words have more working memory capacity left over for attention-demanding processes required for reading comprehension (Perfetti, 1985; see also Just & Carpenter, 1992; Perfetti, 1997, 2007; Stanovich, 1986; Walczyk, Marsiglia, Bryan & Naquin, 2001).

Research has been largely supportive of VET. The relationship between verbal efficiency and reading ability has been established both by examining comprehension abilities with readers of fast and slow word identification abilities

(Perfetti & Hogaboam, 1975) and by examining word identification abilities with readers of high and low comprehension abilities (Hogaboam & Perfetti, 1978).

There are numerous ways to compensate for poor verbal efficiency (e.g. contextual facilitation, semantic activation, and control of reading rate); however, fast and accurate word identification is the best way to reduce lower-level processing demands and increase available working memory and attentional capacity available for comprehension.

In summary, VET can explain the poor comprehension of misidentified word callers. While the students in studies such as Hendricks et al. (2003), Hamilton and Shinn (2003) and Meisinger et al. (2009) decoded accurately or were perceived to decode accurately, they were actually very slow at word identification. VET suggests that the laborious nature of their decoding ability may contribute to their lack of comprehension. VET is the appropriate theoretical framework for this study because it incorporates interactive models of reading and working memory capacity theories to explain why students who decode accurately but slowly could have poor comprehension. Much of the current research on word callers failed to consider this possibility. The following section will discuss word callers and the research surrounding students who are perceived to fit the definition of word callers.

Word Calling

The theoretical definition of word caller is fluent word identification with a lack of comprehension (Stanovich, 1986). Fluent word identification means fast

and accurate decoding. Word identification speed is a critical factor because it is an indicator of automaticity. Also, the words being "called" must be in the child's vocabulary. This is because the knowledge of individual word meanings is necessary for comprehension to take place. Therefore, comprehension can only be accurately assessed if readers understand the meanings of the individual words they are reading. True word callers have been shown to be a rare phenomenon (Shankweiler et al., 1999); however, teachers frequently misidentify word callers in their classrooms leading to the mistaken belief that word callers are quite common (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009)

Indeed, studies of word callers likely misidentify word callers, mostly because some scholars fail to address two of the key aspects of the theoretical definition of word caller as described by Stanovich (1986) and Shankweiler et al. (1999). The two criteria most frequently overlooked are vocabulary knowledge and decoding speed.

Numerous studies mention children who have trouble comprehending text despite normal word identification ability (see for example: Hamilton & Shinn, 2003; Meisinger et al., 2009; Nation & Snowling, 1998a; 1998b; 2000; Nation et al., 2002; Nation et al., 2004; Royer & Sinatra, 1994; Shankweiler et al., 1999; Stothard & Hulme, 1992; 1995). Many of these studies use the term "poor comprehenders" instead of word callers to describe students who identify words normally with a lack of comprehension. A major problem with these studies is that

they do not obtain accurate speed measures when they identify word callers. Therefore, their measures of normal decoding lack precision. It is impossible to ascertain whether the identified word callers fit the theoretical definition without precisely measuring word identification speed. For example, Stothard and Hulme (1995) compared the phonoligcal skills (understanding of letter-sound correspondence) of word callers to those of groups matched for either chronological-age or comprehension-age. Word callers were identified by examining scores and reading times on the Neale Analysis of Reading Abilty (NARA) and selecting those students who showed a large gap between comprehension and decoding abilities. The NARA measures reading speed by requiring an expirementer to time participants' reading with a stopwatch.

Word callers performed at the same level as the chronological-age matched group on measures of phonological skill and pseudoword reading. Further, poor decoders had impaired phonological skills compared to groups matched for both chronological age and reading ability. They determined that the development of phonological skills are responsible for the word callers decoding ability and the lack of phonological skills are responsible for the poor decoders lack of decoding ability. However, an explanation for the descrepancy between the word callers' reading ability and comprehension ability was not offered.

I suggest that a major flaw in this study is the classification of the test participants. The NARA measures reading speed at the passage level using a stopwatch. This measure of reading rate may not be accurate enough to assess

the true decoding ability of these students. This could account for the inflated number of word callers found. Ten percent of Stothard and Hulme's (1992) sample were found to lack comprehension despite normal decoding ability. This is markedly larger than the estimation of Shankweiler et al. (1999) who used a more conservative cut score and buffer zone to identify anomalous cases.

Similarly, vocabulary knowledge is rarely addressed in studies of word callers. Some studies address general vocabulary knowledge (Hamilton & Shinn, 2003; Nation et al., 2004; Nation et al., 2002; Nation & Snowling, 1998b); however, the vocabulary measures in these studies are never used as a criterion for identifying word callers. Rather, it is used as a measure of overall language ability.

Nation and Snowling (1998b) conducted a study of word callers that included several vocabulary measures. As mentioned above, the vocabulary measures were not intended to facilitate the process of identifying word callers. In this instance they were used as a measure of semantic knowledge. Word callers were identified using scores from the NARA.

Word callers did not differ from normal readers on a phonological skill task, but they performed significantly worse than normal readers on the semantic knowledge (vocabulary) task. A second experiment revealed that normal readers performed significantly better than word callers on the measure of semantic fluency while there was no significant difference between groups on a measure of rhyming fluency. Further, word callers were able to read high-frequency and

regular words at the same rate as normal readers. However, they were significantly slower and made more mistakes when reading low-frequency and irregular words. Nation and Snowling attributed these results to low semantic knowledge in the word caller group.

Again, the participants in this study may not have been classified properly. The participants were classified using real and non-word word identification accuracy; however, the measure of word identification speed was determined using a stop watch and measured the rate of the entire passage. The non-word reading task did not measure speed. It is difficult to interpret the findings without knowing the rate at which the participants read the classification materials. It could be possible that the children classified as word callers actually lacked word identification skills, as demonstrated by their inability to decode low-frequency and irregular words.

A contradiction seems apparent in the literature. On one hand, Stanovich (1986) and Shankweiler et al. (1999) suggest that word callers should not exist in large numbers. Shankweiler et al. (1999) confirmed this by carefully examining a database of reading measures and finding only 2.5% of their sample fit the criteria for word callers. Indeed, word callers should be a rare phenomenon because there is substantial research that suggests that word meanings are accessed as words are identified (Adams, 1990; Duffy et al., 1988; Kambe et al., 2001; Rumelhart, 1977; Stanovich, 1980, 1994).

However, there is a substantial amount of work suggesting that word callers are abundant. Stothard and Hulme (1995) easily found nearly 10% of their participants could be classified as word callers. Nation and Snowling (1998b) found that 9% of their participant pool fit their criteria for word callers. Indeed, several studies have found up to 14% of their participants could be classified as word callers (Nation & Snowling, 1998a; 1998b; Nation et al., 2002; Stothard & Hulme, 1992; 1995).

Hendricks et al. (2003) found evidence to support the findings of Shankweiler et al. (1999). Third grade teachers were asked to identify possible word callers, proficient readers and struggling readers in their classrooms. Participants in all three groups were administered a series of tasks intended to ascertain their real- and pseudo-word identification speed and accuracy, reading comprehension and vocabulary knowledge. Analyses indicated that the students identified as word callers tended to identify real words slowly but accurately. Although they were able to successfully identify words, they lacked fluency. Further, these misidentified students were unable to quickly or accurately identify pseudowords. This indicated that they were not efficient at word identification and could not be classified as word callers. Indeed, analyses revealed that only 1.6% of the sample could be considered word callers. Most of the misidentified word callers should have been identified as regular struggling readers.

It is possible that studies finding large numbers of word callers are misidentifying those students because of the flaws in their methodology. Failing

to carefully measure vocabulary and word identification speed could lead to labeling students as word callers when they actually lack verbal efficiency. The current study will help to clarify whether or not word callers exist in large or small numbers when precise measures of word identification speed are used to help classify students as word callers. Also, the study attempted to find differences among 3rd and 4th grade students and differences in the ways that their teachers identify and instruct students in the three categories (proficient, struggling, word caller). A discussion of grade differences follows.

Grade Differences

The focus of reading instruction in lower grades (grades 1-3) is the acquisition and development of basic reading skills: decoding fluency and comprehension strategies (Chall, 1996; Sanacore & Palumbo, 2009). The students in these grades tend to fall into the Alphabetic and Orthographic stages (Ehri, 1994). The fourth grade begins a shift from “learning to read” to “reading to learn”. Put simply, this means that text in the intermediate grades moves from a tool for developing reading skills to a vehicle for learning new content (Chall, 1996; Sanacore & Palumbo, 2009; Snow, Barnes, Chandler, Goodman & Hemphill, 1991). Readers in the 4th grade are expected to be in or nearing the Automatic phase (Ehri, 1994).

The emphasis on reading in the fourth grade changes from skill acquisition to content comprehension. Thus, the texts used in the curriculum change as well. Texts tend to be expository rather than narrative. Expository texts are those that

are intended to convey information and facts. The organization of expository texts tends to be much different from reading materials used in lower grades. Expository texts may contain headings, text styles such as bolding, underlining and italics, and they may contain graphs and charts (Sanacore & Palumbo, 2009). Further, the texts require some background knowledge on the topic as well as knowledge of content-specific vocabulary knowledge.

Students who have struggled to acquire basic reading skills in the lower grades (and who remain in Ehri's Alphabetic and Orthographic phases) are at risk of falling further behind when they reach the fourth grade, while proficient readers continue to excel (Stanovich, 1986). This phenomenon is known as the "Fourth Grade Slump" (Chall, 1996, Sanacore & Palumbo, 2009; Snow et al., 1991) and is characterized by a deceleration and possibly a decline in the reading scores of fourth grade students. The slump is particularly noticeable in students' comprehension abilities (Sanacore & Palumbo, 2009).

The shift in curriculum and the impact on some 4th grade students' comprehension abilities could lead to a difference between the numbers of word callers identified by 4th grade teachers versus 3rd grade teachers and in the reasons for identifying these students. Many 4th grade students who decode accurately but laboriously while struggling with new vocabulary and unfamiliar concepts may be mislabeled as a word caller by their teachers.

Summary

The theoretical foundation outlined in Chapter II provides a framework for the research questions that will be answered in the dissertation. Word identification and reading comprehension are two of the main criteria for identifying word callers. The models presented by Gough (1972) and Ehri (1994), when combined, present the best fit for the current conception of how word identification applies to word callers.

The comprehension models presented built on one another. Schema theory proved that higher and lower-level processes could interact with one another. Rumelhart (1977) took this information and used it to compose an interactive model of reading comprehension. Stanovich (1980) built on Rumelhart's interactive model by adding a compensatory mechanism to explain how readers can accommodate for weak word identification through the use of contextual facilitation. Adams simplified the interactive models and focused on the practical implications for readers who struggle with reading processes.

The model of working memory capacity presented demonstrated how capacity is fixed and limited (Just & Carpenter, 1980). The model I chose to focus on showed how working memory capacity constrains reading ability when a process requires more storage or processing than is available.

Finally, VET was presented as a theory that combines each of the concepts above into one theory that can explain why misidentified word callers may struggle with comprehension (Perfetti, 1985). It could be possible that the

misidentified word callers lack verbal efficiency, causing them to decode laboriously. This in turn uses working memory storage, which is then not available for comprehension processes.

The current study was designed to determine whether the results found by Hendricks et al. (2003) can be replicated, and whether there were differences among 3rd and 4th grade teachers in the number of word callers they identify. This study assessed working memory span to determine whether there are working memory differences among the three teacher-identified groups. I also determined what kinds of interventions teachers assign to different types of struggling readers and whether there were differences in intervention use between 3rd and 4th grade teachers.

Specifically, my research questions were:

1. Do students identified as word callers fit the theoretical definition, based on their word identification and comprehension abilities?
2. Are there differences in working memory span among teacher-identified student groups (struggling, word callers, proficient) vs. researcher-identified student groups?
3. Do 3rd and 4th grade teachers differ in the number of word callers they identify?
4. Do 3rd and 4th grade teachers differ in their reasons for identifying word callers?
5. What kinds of interventions do teachers assign to the three groups?

6. Do the interventions assigned by 3rd grade teachers differ from those assigned by 4th grade teachers?

CHAPTER III

Methods

Design

This study used a mixed-methods sequential explanatory design to investigate the research questions (Creswell, 2009). A 2 x 3 factorial design with grade (3rd or 4th) and student categorization (proficient, struggling, word caller) as the between subjects variables was used to interpret the quantitative data. The dependent measures were: comprehension, vocabulary, word identification fluency (real and pseudoword), and working memory capacity. A description of these measures follows in the Measures section. The qualitative portion of the study involved interviewing teachers to gain perspective on their understanding of word callers and their methods for providing interventions for struggling readers in their classrooms.

Measures

Independent measures. The independent measures were grade (3rd or 4th) and student categorization (proficient, struggling, word caller). Teachers were asked to identify students that fit into one of these three categories. All teachers were given the definition of word calling ("students who decode fluently but lack comprehension) before being asked to categorize students. Teachers were instructed to categorize their students based on any information available to them.

Dependent measures. The dependent measures consisted of a comprehension task, a vocabulary task, two word identification fluency tasks and a working memory capacity task. Also, transcripts of teacher interviews from each classroom were obtained. See Table 1 for a list of each of the dependent measures with their corresponding instrument and research question. Each of these instruments will be described individually in the following section.

Table 1

List of Dependent Measures

Dependent Measure	Measured By	Addresses RQ #
Reading Comprehension	SVT (Royer, Greene & Sinatra, 1987)	1
Vocabulary	Vocabulary Interview	1
Word ID Fluency	CAAS (Royer & Sinatra, 1994)	1
Working Memory Capacity	CLPT (Gaulin & Campbell, 1994)	2
Teacher Interview	Interview Protocol	3,4,5,6

Comprehension. Students were asked to complete a Sentence Verification Task (SVT) appropriate for their grade levels (Royer, Greene & Sinatra, 1987). The SVT consists of three short passages, each followed by a

series of 16 sentences. Students were instructed to decide whether each sentence could have been from the passage by marking each item as “Yes” or “No”. The task was designed so that 4 items are identical copies of sentences from the stories, 4 items are paraphrases from the story, 4 items are conceptually similar but not from the story and 4 items are plausible distracters. Reliability estimates for the SVT range from .71 to .98, indicating high reliability (Royer et al., 1987). The SVT has been found to be a reliable measure of reading comprehension for 3rd grade students (Rasool & Royer, 1986) and 4th grade students (Royer, Hastings, & Hook, 1979).

Half of the items on the SVT were true and half were false. Participants’ scores on this measure consisted of the number of items scored correctly. A small number of participants did not complete all three stories due to various circumstances. In most of these cases, the student had to leave the testing room (sometimes they were called back to class; in one case the end of the day bell rang sooner than expected; in another case a parent came to collect her child). Overall percentage scores were calculated for all participants to account for these cases. A higher percentage score indicated better reading comprehension. SVT instructions and an example passage with questions can be found in Appendix 3.

Vocabulary. Participants’ vocabulary knowledge was measured by asking students to define words taken directly from the comprehension measure and the word identification measure, and thus is also appropriate for their grade

levels. Approximately half of the words were obtained from the comprehension measure, and half from the word identification measure. Two 3rd grade and two 4th grade teachers previously checked the list to ensure that the vocabulary words were appropriate for the respective grade levels. Participants were asked to give a dictionary definition or use the word in a sentence. Participants' responses were tape-recorded and transcribed for scoring.

Transcripts of participants' vocabulary interviews were read and scored for accuracy by multiple independent scorers. Training included instruction on the rubric illustrated in Appendix 4. The rubric was described and explained to all scorers. Scorers were given examples of scoring procedures and then completed the rubric for 4 vocabulary examples. Scorers completed the example words on their own. Scores were discussed until the researcher was satisfied that scoring would be congruent among scorers. Individual scores were compared and discrepancies were discussed and resolved. Resolution occurred for all discrepancies.

Word identification fluency. Word identification fluency was determined by measuring participants' word identification accuracy and speed on both real and pronounceable non-words (pseudo-words). These skills were measured using the Computer-based Academic Assessment System (CAAS). This system was designed for students from Kindergarten through adulthood. The program is set up so that the researcher chooses the appropriate grade level for the participants. The program consists of a presentation of a series of words on a

computer screen. Participants were run individually. Participants were instructed to say each word into a provided microphone as quickly as they can without making mistakes. Each word remains on the screen until the microphone detects speech. The program measures the speed and accuracy of word identification for both real and pseudo-words by measuring the elapsed time (in milliseconds) from the onset of the presented word until the participant speaks into a microphone. The researcher scored each item by clicking a mouse button. Two scores for each word were obtained; speed in milliseconds for each word, and accuracy (scored by the test administrator).

CAAS response time reliability was calculated by obtaining consistency of measurement indices (Royer & Sinatra, 1994). Reliability indices ranged from .88 to .97, averaging .94. This indicates that the CAAS response time measures are reliable. Also, validity data was collected. It was found that CAAS is a valid instrument based on the following characteristics: CAAS response times improved as a function of grade; response times correlated to student book levels; students designated by CAAS as High, Medium or Low corresponded to other indices of student reading level (Royer & Sinatra, 1994).

Speed of response was scored automatically in milliseconds by the computer used to assess the participants. Accuracy was scored by the researcher at the time of administration by clicking one of two mouse buttons corresponding to a correct or incorrect score for each word identified. Correct

pronunciations of pseudo-words were agreed upon in advance by all test administrators. Word identification fluency word lists can be found in Appendix 5.

Working memory capacity. Participants were presented with the Competing Language Processing Task (CLPT), a modified sentence span task developed by Gaulin and Campbell (1994). The task consisted of 42 three-word sentences (e.g. Horses eat candy.). The students listened to groups of 2, 3, 4, 5, and 6 sentences and were asked to decide if each sentence is true or false while remembering the last word in every sentence in that group. After each group was completed, the participants were asked to recall the last word from each sentence in any order. This task was developed specifically for children aged 6-10 years of age (Gaulin & Campbell, 1994).

The validity of the CLPT was measured by calculating correlations between the CLPT and the PPVT-R and between the CLPT and digit-span and word-sequence tasks. Gaulin and Campbell (1994) suggested that the CLPT may include a stronger influence of verbal features of working memory than is evident in traditional recall scales. Correlations of the CLPT with two measures of verbatim repetition were statistically significant, .47 and .49. The correlation of the CLPT with the PPVT-R, a measure of receptive vocabulary, was higher, .63, although the difference in this sample was not statistically significant.

Test administrators scored the CLPT at the time of testing. Students were scored on both the true/false and word recall portions of the task; thus each student received two scores for this task: number of correct true/false responses

and number of correct word recall responses. Nearly every student scored nearly every item correct on the true/false portion of the task, resulting in very little variance. Therefore, only the recall score was used for analyses. CLPT instructions and scoring sheet can be found in Appendix 6.

Teacher Interview. Semi-structured teacher interviews were conducted to determine why each child was assigned to each particular category. The teachers were asked to define word calling. Also, the teachers were asked what reading interventions they would recommend for each child and the forecast for success for each student. A variety of other questions related to reading instruction were asked. A copy of the teacher interview protocol can be found in Appendix 7.

Teacher interviews were transcribed and checked for accuracy. The interviews were then examined to find information that answered specific questions related to Research Questions 3 – 6. Interviews were re-read several times following the initial information search. The purpose of the additional readings was to search for emergent themes. Thirty-three codes were developed based on emergent themes from the interview data. After analytic review, similar codes were collapsed under a more common term (e.g. the codes "comprehension assessment" and "formal reading assessments" were combined into the common term "reading assessments"). Codes that were not salient to the thematic analysis were dropped, resulting in 14 codes that were used for analysis.

Participants

Students. Student and teacher participants were recruited from a large, southwestern school district. A random list of all district schools with a percentage of LEP (Limited English Proficiency) students lower than the overall district average was created and sampled from the top until entry was obtained for 6 schools. LEP students were eliminated from the study because their language barrier presented a potential confound for the current study. The participants were 80 third-grade and 111 fourth-grade students. Students were sampled based on teacher participation (those teachers who agreed to be part of the study) and permission slip return. Teachers placed 178 students (71 3rd graders and 107 4th graders) from 27 classrooms into one of three groups (word caller, proficient or struggling). Students who were not categorized were not included in the data analyses. Of the participants, 92 were female and 86 were male.

Consent was obtained from participants' parents ahead of time. Letters and consent forms were sent home with students explaining the study. Assent was obtained at the time of the study from students who returned the parent consent forms. The assent form was read aloud to each participant. Students were allowed to refuse participation; however, only one student refused to take part in the study.

Teachers. Teachers from each classroom were asked to participate in a semi-structured interview. Fourteen 3rd grade teachers and 11 4th grade teachers

from a large, southwestern school district were sampled. Of those, eight 3rd grade teachers and three 4th grade teachers consented to be interviewed. The teachers were asked a series of questions concerning their general approach to reading instruction and remediating both struggling readers and word callers.

Procedure

Before entering the classroom to collect data, teachers were asked to categorize students in their classrooms whom they think fit the criteria of one of the following groups: word callers, proficient readers or struggling readers. Teachers were provided a definition of word callers (students who decode fluently yet lack comprehension) before being asked to classify students. Teachers were not required to find students to fit any of the three categories. They were free to place as many or as few students into each category as they saw fit.

To minimize disruption in participants' studies, the student measures were administered on 2 separate occasions. The first session consisted of the CLPT and the vocabulary interview. Students were tested in a quiet, empty space and the CLPT was individually administered. After the CLPT was completed, the students were individually asked to define each vocabulary word by giving a dictionary definition or using the word in a sentence. When these tasks were completed the students were sent back to class.

The second session, conducted 1 to 2 days after the first session, consisted of the administration of the CAAS and the SVT. Students were taken

to an empty, quiet space for individual administration of the CAAS. Students were presented with instructions and several practice items before the actual test administration began. After the CAAS was completed, students were asked to complete the SVT, either individually or in small groups of no more than 3 students at a time. The instructions were read and a short practice item was completed. When the test administrator was certain that the students understood the task, they were given the actual test and asked to complete it. When the students were finished with both tasks they were sent back to their classrooms.

Teacher interviews. Teachers were interviewed at a time and place convenient to them. Scheduling was arranged on the first day the researcher arrived at each school. Teachers were asked to read and sign the informed consent form, including a separate signature agreeing to be tape-recorded. Once consent was obtained, the recording device was switched on and the researcher asked the questions listed on the interview protocol. Probes were asked when deemed necessary by the researcher. Interviews were transcribed verbatim for analysis.

CHAPTER IV

Results

I will begin by presenting the descriptive statistics for each category of student (proficient, struggling, word caller). Next, the results of the statistical tests used to examine research questions 1 and 2 will be presented. Then, research questions 3, 4, 5, and 6 will be examined. These research questions depended almost entirely on teacher interviews. Finally, I will examine other findings from the teacher interviews that do not directly answer research questions, but merit exploration.

There were large differences in the number of students identified in each of the three categories (proficient [N=114], struggling [N=54], word caller [N=10]). There were especially few word callers identified. The argument could be made that these students should be collapsed into the struggling reader category for analysis, as word callers are a special variety of struggling reader. However, I will keep the groups separate for the purpose of this dissertation study. Maintaining all three groups is important because it preserves the purpose of examining word callers. The small number of word callers and the resulting uneven sample sizes may lead to a violation of some assumptions underlying the planned statistical tests; statistical tests designed to account for these violations were used whenever possible. However, descriptive data can provide information about these students and might help shed light on what kinds of students are being identified as word callers.

Descriptives

The descriptive statistics are reported, both by overall teacher-assigned category (with grade collapsed) and by teacher-assigned category within grades (3rd vs. 4th). See Tables 2 through 5 for overall descriptive data (Table 2), a summary of descriptive data by teacher-assigned category (Appendix 8), and a summary of descriptive data by grade (Tables 4 and 5).

Table 2

Overall Means, Standard Deviations, and Range Values for All DVs

Dependent Variable	*M*	*SD*	Range
Vocabulary	2.45	.38	1.80
SVT	74.51	11.96	54.17
CLPT	22.48	4.35	20
Real Word Speed	0.80	0.40	3.26
Real Word Accuracy	95.89	7.54	45.46
Pseudoword Speed	1.28	0.75	4.73
Pseudoword Accuracy	80.62	19.98	90.91

Note: Vocabulary scores were combined to calculate a mean score for each participant. The SVT means represent the percentage of correct items from all three grade-level stories. The CLPT means represent the mean number of words recalled. Real Word Speed and Pseudoword Speed means are measured in seconds, and Real Word Accuracy and Pseudoword Accuracy means represent the overall percentage of words correctly identified.

Word callers vs. proficient and struggling readers. Word callers had real word speed scores as slow as struggling readers and they were the least accurate of the three teacher-assigned categories. Word callers had the lowest mean pseudoword accuracy scores, and the slowest mean pseudoword speed times of the three teacher-assigned categories. This should only be the case if the students identified as word callers did NOT fit the theoretical criteria. Word callers scored higher on comprehension (as measured by the SVT) than struggling readers, but lower than proficient readers. However, teacher-assigned word callers also had the lowest mean vocabulary score, slightly lower than teacher-assigned struggling readers. This is important because actual word callers would need to have a higher vocabulary score than struggling readers to fit the theoretical criteria established in Chapter II. Also, word callers had the lowest mean working memory scores (as measured by the CLPT). These factors combined may indicate that the students identified by their teachers as word callers are probably some other variety of struggling reader. See Appendix 8 for a summary of means and standard deviations by teacher-assigned category.

Word callers by grade*.* Descriptive data for word callers in the 3rd grade (N = 3) were particularly unusual. Teacher-identified word callers in the 3rd grade had lower real and pseudoword accuracy than 3rd grade struggling readers and were slower than 3rd grade struggling readers on the pseudoword speed measure. These students scored the lowest on the vocabulary measure than any other group. While they scored higher than 3rd grade struggling readers on the

SVT, they scored markedly lower than any other group on the measure of working memory capacity. See Table 4 for a summary of 3rd grade means and standard deviations.

Table 4

Means and Standard Deviations By Category- 3rd Grade

	Proficient (N = 42)		Struggling (N= 27)		Word Callers (N = 3)	
Dependent Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Vocabulary	2.59	0.32	2.30	0.45	2.16	0.30
SVT	77.33	11.62	61.73	10.92	64.58	0.00
CLPT	23.59	4.05	21.75	4.23	14.33	1.16
Real Word Speed	0.80	0.19	1.15	0.68	1.16	0.13
Real Word Accuracy	97.70	3.25	89.68	11.02	76.61	13.76
Pseudoword Speed	1.40	0.87	1.70	0.65	2.42	0.52
Pseudoword Accuracy	79.61	23.63	67.63	18.55	55.07	16.22

Note: All categories (proficient, struggling, word caller) are teacher-identified.

Word callers in the 4th grade (N = 7) were slower than struggling readers on both the real and pseudoword speed measures, and MORE accurate than struggling 4th grade readers on both the real and pseudoword accuracy

measures. They had higher comprehension scores than 4th grade struggling readers. Also, they had slightly lower working memory capacity than 4th grade strugglers. See Table 5 for a summary of 4th grade means and standard deviations.

Table 5

Means and Standard Deviations By Category- 4th Grade

	Proficient (N = 72)		Struggling (N= 27)		Word Callers (N = 7)	
Dependent Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Vocabulary	2.51	0.33	2.27	0.43	2.30	0.31
SVT	79.65	8.77	70.06	10.47	74.11	12.66
CLPT	23.35	3.91	20.52	4.56	20.29	4.61
Real Word Speed	0.70	0.35	0.70	.029	0.84	.020
Real Word Accuracy	98.82	2.53	93.40	9.77	95.97	5.32
Pseudoword Speed	1.07	0.63	1.13	0.67	1.30	0.80
Pseudoword Accuracy	89.62	10.73	72.53	19.30	83.76	33.19

Note: All categories (proficient, struggling, word caller) are teacher-identified.

Research Question 1

This research question asked whether students identified by their teachers as word callers would fit the theoretical criteria set forth by Stanovich (1986) and Shankweiler et al. (1999). The dataset was screened prior to planned analyses to ensure that assumptions of normality were met. A factorial MANOVA was performed to examine the research question with grade (3rd or 4th) and student categorization (proficient, struggling, or word caller) as the between participants variables. The dependent measures were word identification fluency (real and pseudoword), comprehension, vocabulary, working memory capacity, and a teacher interview.

The MANOVA results are reported from higher order (interactions) down to main effects. First, the results of the multivariate interaction results are reported. Next, univariate interaction results are reported. Finally, I report the simple effects for the significant univariate interactions. The main effects are described following the interaction effects. Multivariate main effects are described first, followed by univariate main effects.

A statistically significant interaction effect was found between grade (3rd and 4th) and category (proficient, struggling, word caller), $F(14,334)=2.752$, $p<.05$. The interaction effect was not substantial (partial $\eta^2 = .10$). Small partial η^2 values are defined as those between 0 and .10, modest values are between .10 and .30, moderate values are those between .30 and .50, with anything greater than .50 being a strong effect size (Muijs, 2004).

A follow-up univariate factorial ANOVA indicated that the interaction effect was significant only on two of the dependent measures: real word speed, $F(2,172) = 3.65$, $p < .05$, and real word accuracy, $F(2,172) = 7.98$, $p <. 05$. Analyses showed that partial η^2 for real word speed was .04, and partial η^2 for real word accuracy was .09, indicating weak practical significance for both measures. All following ANOVA results will refer to these two measures.

Simple effects for real word **speed** were tested for significance. A one-way ANOVA found that 4th graders ($M = .71$, $SD = .33$) tended to read faster than students in the 3rd grade ($M = .94$, $SD = .45$), $p<.05$, partial $\eta^2 = .05$. The finding indicates a weak simple effect.

Games-Howell post-hoc tests were used to determine whether there were significant differences among the three teacher-identified categories (proficient, struggling, word caller). This particular post-hoc test was chosen because it accounts for violations of homogeneity of variance and unequal samples sizes. Post hoc tests showed that proficient readers ($M = .74$, $SD = .30$) generally read faster than struggling readers ($M = .93$, $SD = .56$). However, there was no significant difference between proficient readers and word callers ($M = .93$, $SD = .23$), $p>.05$. Further, no significant difference was found between struggling readers and word callers.

Simple effects for real word **accuracy** indicated that 4th graders ($M = 97.28$, $SD = 5.89$) tended to read words more accurately than 3rd grade students

(M = 93.87, SD = 8.89), p<.05, partial η^2 = .12. The effect size indicated a modest practical significance.

Proficient readers (M = 98.41, SD = 2.85) generally read more accurately than struggling readers (M = 91.54, SD = 10.48), p < .05. There was no significant difference between proficient readers and word callers (M = 90.16, SD = 12.18), p>.05. No significant difference was found between struggling readers and word callers. All simple effects results can be seen in Table 6.

Table 6

Summary of Univariate Simple and Main Effects

	Grade				Category			
Dependent Variable	*M*	*SD*	*p*	Partial η^2	*M*	*SD*	*p*	Partial η^2
Vocabulary	2.45	0.38	.792	.00	2.45	0.38	.000	.12
SVT	74.25	11.93	.009	.04	74.51	11.96	.000	.24
CLPT	22.43	4.36	.155	.01	22.48	4.35	.000	.13
Real Word Speed	0.81	0.40	.003	.05	0.80	0.41	.009	.05
Real Word Accuracy	95.86	7.46	.000	.12	95.89	7.54	.000	.25
Pseudoword Speed	1.28	0.74	.000	.08	1.28	0.75	.031	.04
Pseudoword Accuracy	80.49	19.85	.002	.05	80.62	19.98	.000	.13

Multivariate main effects were examined. Pillai's Trace was used because Box's M indicated that homogeneity of variance was violated (α = .000). Pillai's Trace is a more conservative statistic than other tests. Main effects were found for Category, $F(14,334) = 7.78$, $p < .05$., partial $\eta^2 = .25$, and Grade, $F(7,166) = 6.33$, $p < .05$., partial $\eta^2 = .21$. These findings suggest that both teacher-assigned category and grade level had a statistically significant effect on the combined dependent variables.

Follow-up ANOVAs indicated that a number of variables were significantly influenced by Grade and Category. See Table 6 for a summary of Univariate main effects.

Scatterplot. A scatterplot was created to determine whether any participants might be actual word callers (see Appendix 9). Participants were ranked according to their comprehension (as measured by the SVT) and their reading ability (a combined score comprised of pseudoword speed and accuracy). The score was created by ranking participants first by their pseudoword speed, then by pseudoword accuracy. This method ensured that participants who had the highest scores were those participants who were both fast *and* accurate at pseudoword identification. Pseudowords were used because they eliminate the possibility of participants identifying words based on familiarity. Thus, they are a cleaner measure of students' word identification ability. Word identification is on the y-axis, with slower, less accurate participants closer to 0.

Comprehension is on the x-axis, with the participants who demonstrated low comprehension ability closer to 0.

More proficient readers appear in the upper right quadrant of the scatterplot (high word identification and high comprehension). Struggling readers appear in the lower left quadrant of the scatterplot (low word identification skills and low comprehension). Any actual word callers should appear in the upper left quadrant, because they should have high word identification skills with low comprehension. Participants in the lower right quadrant are not of interest to the current study. These students could be considered dyslexic (Shankweiler et al., 1999).

Only one participant appeared to be a word caller based on the scatterplot results, though 10 word callers were identified by their teachers. Participant 48 (highlighted in Appendix 9 by the arrow in the upper left quadrant), a 4th grader, demonstrated both fast word identification skills (above the overall mean for pseudoword identification, though not quite 1 *SD* above the mean), and very low comprehension (scoring 50% on the SVT, which was nearly 2 *SD* below the overall mean). Participants were compared to the sample, rather than to normed data. This was done because the study is interested in teacher categorization of students; thus, it is necessary to compare students within the sample. Interestingly, the classroom teacher identified this participant as a word caller. Participant 48 had a vocabulary score lower than the mean vocabulary score for any teacher-identified category (proficient, struggling, word caller) in the 4th

grade, though the score for this participant was not quite 1*SD* below the overall mean. This participant had a very low SVT score (nearly 2 *SD* below the overall SVT mean) and a lower working memory capacity score than all three 4th grade teacher-identified categories. The participant's pseudoword speed was faster than even the mean proficient 4th grade value, and the participant's pseudoword accuracy was 100%. Surprisingly, this participant did not do as well on real word speed or accuracy. This is interesting because a high level of ability on pseudoword measures indicates high word identification ability in general. Thus, the subject should have performed well on both measures.

It is unusual that a participant would perform poorly on real word tasks when it is clear that this student can decode quickly and accurately, as evidenced by the participant's high scores on pseudoword accuracy and speed tasks. Participant 48's real word speed was slower than the mean speed of any of the three teacher-identified categories for 4th grade (and 1*SD* below the overall mean), and the participant's real word accuracy was similarly lower than the 4th grade means for all three categories (and 1*SD* below the overall real word accuracy mean). Participant 48 did not meet the criteria for classification as a word caller, even though this participant's teacher identified the student as such. While the participant had good pseudoword speed and accuracy and low comprehension, the lack of vocabulary combined with poor performance on real word tasks makes exclusion necessary.

Other participants of interest include the small number of students near participant 48 on the scatterplot, including numbers 35, 150, 115, 168, and 13. None of these participants were identified by their teachers as word callers. Participants 101, 37 and 74 were not examined because their comprehension scores were too close to the overall mean comprehension score.

Examination of the five participants of interest showed that none of these participants fit the theoretical definition of word callers. The reasons for excluding these participants are described in the following paragraphs. Participant 13 was at or just below the mean on every measure, with the exception of comprehension, which was almost 1 *SD* below the overall mean. This subject was eliminated from word caller status because his or her word identification was average compared to the sample.

Participant 35 was 1 *SD* below the mean on the comprehension measure, but was also 1 *SD* below the overall mean for real word speed and 2 *SD* below the overall mean for real word accuracy. This participant identified words very laboriously and therefore cannot be called a word caller.

Participant 168 was 1 *SD* below the mean for the comprehension measure. However, this participant had scores for all other measures that hovered just around the overall means for each task. This participant did not excel at word identification speed or accuracy, but rather, had scores that were average compared to the sample on these tasks. Therefore, this participant did not meet the criteria for word calling.

Participants 115 and 150 both had comprehension scores 1 *SD* below the overall mean for that measure. Both of these participants had word identification scores near the overall mean, with none of these scores even 1 *SD* above or below the overall mean. However, both of these participants had vocabulary scores 1 *SD* below the overall mean. Vocabulary knowledge is critical for word caller classification. These participants scored low on vocabulary knowledge, indicating that their difficulty with comprehension may lie in their inability to understand the individual words within the texts they are reading. These participants did not meet the criteria for word caller status.

The rest of the teacher-identified word callers were distributed throughout the scatterplot. Four of the teacher-identified word callers were found in the lower-left quadrant, indicating that those students had both low comprehension and low word identification abilities. Two of the participants were nearly in the center of the scatterplot. These students appeared to have an average reading ability compared to their peers. Three teacher-identified word callers were found in the upper-right quadrant of the distribution. These students performed well on the comprehension tasks and the word identification tasks. Participant 123, located close to the middle of the scatterplot, actually performed very poorly on the real word accuracy measure. Based on this information, it can be assumed that this participant should have been clustered with the four teacher-identified word callers closer to 0 on the y-axis. The three participants in the upper right quadrant were of interest because they appeared to be proficient readers rather

than word callers. These three participants scored about equally as well on the real word tasks as they did on the pseudoword tasks. This combined with their relatively high comprehension scores indicated that they should be excluded from word caller status.

Research Question 2

This research question asked if there were differences among the three categories (proficient, struggling, word caller) in working memory capacity as measured by the CLPT. A one-way ANOVA with Games-Howell post-hoc tests was calculated. Univariate main effects showed that working memory capacity was significant for Category (see Table 6). Levene's statistic was not violated for the working memory capacity measure ($p = .715$). Follow-up pairwise comparisons showed that proficient readers ($M = 23.44$, $SD = 3.95$) had significantly higher working memory capacity than both struggling readers ($M = 21.15$, $SD = 4.40$) and word callers ($M = 18.50$, $SD = 4.77$). Struggling readers and word callers were not significantly different on the working memory capacity variable. It must be reiterated that there were only 10 teacher-identified word callers in the sample; therefore, results pertaining to word callers must be interpreted cautiously, even though the selected post hoc test accounted for unequal sample sizes. The effect size for the proficient and word caller comparison was moderate ($r^2 = .24$). Comparisons between the remaining two sets of groups (proficient vs. struggling and struggling vs. word callers) resulted in small effect sizes ($r^2 = .07$ and $r^2 = .08$, respectively).

The descriptive data showed that word callers had much lower working memory capacity than both struggling and proficient readers. The CLPT mean for word callers was nearly 1 *SD* below the overall mean for that task. Teacher-identified word callers in the 3rd grade had particularly low working memory scores. The mean for these 3 participants was almost 2 *SD* below the overall mean on the CLPT. Teacher-identified word callers in the 4th grade performed better on the working memory task, with the mean less than 1 *SD* below the overall mean. However, even these students performed worse overall on this task than struggling readers. See Appendix 8 for a summary of means and standard deviations by teacher-assigned category.

Working memory scatterplot. Participants were plotted on a scatterplot by their working memory capacity and word identification abilities (see Appendix 10). Participants were ranked according to their word identification abilities by creating a combined score comprised of pseudoword reading speed and accuracy, consistent with the method for plotting students in Appendix 9. Recall that the combined score accounted for participants who responded quickly, and who were able to correctly identify the words on the screen. Thus, the participants who ranked the highest were those who identified words with speed AND accuracy. It is important to note that the scatterplot depicted in Appendix 10 does not indicate classification of word callers as it does not contain information about comprehension ability; rather, it depicts the distribution of participants relative to their working memory and word identification abilities.

Several teacher-identified word callers appeared to be in a similar chart location in Appendix 9 and Appendix 10. Notably, participants 174, 169, and 20 were in the lower left quadrant in both figures. These subjects had low working memory, low comprehension and low word identification skills. Participant 122 was similarly in almost the same location on both figures. Participant 5 had high comprehension, and was almost 1 *SD* above the overall mean on the working memory task.

It appeared that several teacher-identified word callers had working memory scores that were similar to their comprehension scores, based on visual examination of the scatterplot found in Appendix 10. Recall that there is a body of research showing the connection between working memory capacity and reading ability (Daneman & Carpenter, 1980; Just & Carpenter, 1992; King and Just, 1991).

Research Questions 3 - 6

Teacher interviews were analyzed to answer research questions 3, 4, 5, and 6. Recall that these research questions ask the following:

- (RQ3) Do 3rd and 4th grade teachers differ in the number of word callers they identify?
- (RQ 4) Do 3rd and 4th grade teachers differ in their reasons for identifying word callers?
- (RQ 5) What kinds of interventions do teachers assign to the three groups?

- (RQ 6) Do the interventions assigned by 3rd grade teachers differ from those assigned by 4th grade teachers?

Research Question 3 was answered in two ways. Teachers were asked to categorize the students in their classrooms at the time of data collection. Also, an interview question asked teachers how many word callers they had in their classrooms. The number of teacher-identified word callers included in the quantitative portion of the study versus the number reported in the interviews varied for some teachers. This is because the teacher-identified word callers included in the quantitative portion of the study were identified based on student participation and parent permission. Thus, teachers might have identified more total word callers in their classrooms than the number included in data collection because some teacher-identified word callers may have failed to return a permission slip or may have been absent during data collection. The interview process was the only time in which these "extra" teacher-identified word callers were brought to the attention of the researcher.

Responses from 3rd and 4th grade teachers on the number of word callers in their classrooms were very similar. Most teachers identified fewer than three word callers in their classrooms, with a few identifying more than three. Specifically, 10 teachers identified between 1 and 3 word callers in their classrooms. Three teachers identified 4 or more word callers. Nine of the 13 teachers who identified word callers taught 3rd grade; four taught 4th grade. The

number of teacher-identified word callers was obtained from a total of fifteen 3rd grade teachers and twelve 4th grade teachers.

Research questions 4 through 6 were answered through analysis of teacher interviews. Three emergent themes were developed, each of which contained a number of factors. The emergent themes were "Reasons for identifying word callers", "Interventions", and "Forecast for success". See Appendix 11 for a list of themes and factors.

Reasons for identifying word callers. Research question 4 was answered by asking teachers how they define word callers, then how they would determine whether a student was a word caller. Two categories of responses emerged from the responses to the definition question. A group of teachers responded to the definition question with a very basic understanding of word calling. Examples of the simplistic definition of word calling included the following:

- Teacher A, 3rd grade - "…he can read so high, but when you ask him what happens, [he says] 'Mmmm… I don't know.'"
- Teacher C, 3rd grade - "Reading with no comprehension."
- Teacher D, 3rd grade - "Those kids who can say the word and if you ask them a question, they can't answer it."
- Teacher G, 3rd grade - "…they have a basics in phonics, and they're able to get through the words, but they don't hold meaning for them."

These responses seem to indicate an oversimplified understanding of word calling. Teacher G's response is the most developed of this set; however, the response lacks the critical factor of word identification speed.

The second category that emerged was from a group that gave responses specifically mentioning fluency or word identification speed. All 4th grade teachers who were interviewed fell into this category. Responses included the following:

- Teacher K, 4th grade - "They do well on the AIMS; we do whole class fluency practice, and they get high scores on that, but when it comes time for a Trophies comprehension test, the scores are low."
- Teacher I, 4th grade - "… his fluency is right on the cusp of being where it's supposed to be, but his comprehension is definitely not there."
- Teacher J, 4th grade - "It's mostly those simple words they can read, mostly like those CVC [consonant-vowel-consonant] words that they do really well with, and they can read them and without any understanding because they've never been asked to understand. It's all about sounding out words and how fast you can read, and very little on comprehension."
- Teacher F, 3rd grade - "I would say they are really fluent, but they have no idea what they're reading."

This is important because speed of word identification is a key factor in the theoretical definition of word calling. Recall that to be defined as a word caller, a reader must identify words accurately and quickly (Shankweiler et al., 1999;

Stanovich, 1986). It is critical that teachers understand this because readers who identify words laboriously may have poor comprehension because of the lack of leftover resources for comprehension processes (Perfetti, 1985).

It is difficult to say that there was a difference between 3rd and 4th grade teachers regarding their definitions of word calling. All 4th grade teachers mentioned fluency or word identification speed in their definitions. However, not all 3rd grade teachers failed to do so. Also, there were only three 4th grade teachers who consented to be interviewed, while there were eight 3rd grade teachers in the sample. A larger and more even sample would allow for a more confident analysis of the differences between the two grade-levels.

Interventions. Teachers were asked what interventions they would provide to a word caller to answer Research questions 5 and 6. Examples of teacher responses follow:

- Teacher C, 3rd grade - "Make the reading meaningful. Let them touch stuff, use all their senses."
- Teacher J, 4th grade - "…give them the four phonics assessments and start from there, and take wherever they stop being successful, start by the step below that and use it for phonics and work with them daily on getting them to understand those rules of whatever level they're at and how that works."

This teacher demonstrated an understanding that word callers can often be poor decoders who appear to be proficient at word identification. Four of the

11 teachers interviewed suggested fluency interventions for word callers. These are some of the typical responses indicating the use of fluency interventions:

- Teacher G, 3rd grade - "The first thing I would do is check your fluency… I would focus on that, and I would bring in some of the Taberski things. I would work with him or her with Taberski things."
- Teacher H, 3rd grade - "I've had them do timed reading to try to get them to beat their time, just to get them more fluent and speed up."
- Teacher J, 4th grade - "…take wherever they stop being successful, start with the step below that and use it for phonics and work with them daily on getting them to understand those rules of whatever level they're at"; "…just keep reading it over and over trying to get the reading speed up."
- Teacher K, 4th grade - "…a lot of just keep reading it over and over trying to get the reading speed up."

In contrast, every single teacher mentioned comprehension strategies when asked about interventions for word callers. Examples include:

- Teacher J, 4th grade - "Basically provide small passages. A lot of retelling, a lot of questioning, a lot of small group work where they're…discussing what they're reading."
- Teacher G, 3rd grade - "…in groups start working with them about thinking while they're reading… I'm modeling and thinking aloud for

them, the types of comprehension and the way I want them to think while they're reading."

- Teacher E, 3rd grade - "Discussing, you know stopping and discussing, summarizing, what did you just read about, asking questions…"
- Teacher I, 4th grade - "…things like making predictions, using graphic organizers but also kind of chunking the text and breaking it into pieces so that they can comprehend one small part at a time then put it together as a whole."

There did not appear to be a difference between 3rd and 4th grade teachers on the types of interventions they would provide for word callers. Four of the 11 teachers interviewed mentioned fluency interventions, with an even split between 3rd and 4th grade teachers. It is important that teachers recognize the need for fluency interventions, because if the students are misidentified as word callers, they could be lacking in fluency. Every single teacher interviewed mentioned comprehension interventions. This is expected, because one of the hallmarks of word calling is the lack of comprehension.

All of the teachers interviewed had numerous strategies in place to intervene with general struggling readers. For example, 3rd grade teachers gave the following descriptions of interventions for struggling readers:

- Teacher F - "You can give them more time, kids that are struggling with the reading, they can listen to it, the story, with headsets. We can assign a buddy, they read a page, the buddy reads a page… I track

them to make sure they're not just going through it, I send them back to re-read the story or whatever the case may be."

- Teacher E - "Repetition, re-reading things. And they do seem to be more attentive when they are either buddy reading and they are with someone who is accountable… or in small group because everybody just really wants the attention."
- Teacher D - "Small reading groups, books at their level… I use Reader's Theater to really help push that fluency and those repeated readings really help them understand the story better. We also do, like, focus on the theme, main idea and details and things like that."

4th grade teachers gave the following examples of interventions for struggling readers:

- Teacher I - "…reading practice and correction and self-correction like if they say a word wrong, I'll have them go back and sound it out, break it down, put it together. Asking questions, having them go back and re-read if they don't understand it."
- Teacher K - "Keep them on task as much as I can."
- Teacher J "A lot of times struggling readers will come to you and they don't have a sight-word base or they don't have a phonetic base, and if it was one of those things then we would work on their sight words, but also working on phonics within the context. I also use McCracken spelling through phonics as an intervention with kids."

The interviews suggest that teachers understand how to help general struggling readers to succeed, but they tend to have fewer strategies in place to assist word callers.

Forecast for success. Though it did not address the research questions, teachers were asked about the forecast for success for word callers and struggling readers. Several factors fit into this emergent theme. For example, six teachers mentioned that students' home life was a critical factor in their school success. When asked how children best learn to read, Teacher E, 3rd grade said, "I think with their parents, because I think at a young age they are getting their attention that they need but also doing something constructive." When Teacher B, 3rd grade, was asked whether word callers will succeed in their educational careers, her response was, "It depends on whether you have parental support. If they don't have exposure at home, they won't do well."

Other findings. Several factors from the initial coding process were of interest to the study. These factors provided contextual information that clarified the analysis of research questions 4 through 6. The factors of interest were vocabulary, practice reading, learning to read vs. reading to learn, teacher factors, and classroom observation as assessment. A list of these factors can be seen visually in Appendix 12. Vocabulary knowledge is important because it is a key component of the definition of word callers. Recall that if a child lacks knowledge of the vocabulary words in a given text, that child cannot be expected to comprehend the text (Stanovich, 1986). Practice reading is of interest because

it demonstrates that teachers understand that time spent reading is an important component to improving reading ability for all students (Snow et al., 1998; Stanovich, 1986, 1994). The concept of learning to read vs. reading to learn is important to this study because it formed part of the basis for comparing 3rd and 4th graders. It is of interest to the study that some teachers are aware of the distinction between the curricular needs of the two groups of students.

The finding that teachers identified factors related to instruction is important because it demonstrates that teachers seem to see that students need to be remediated as early as possible because intermediate- and upper- grade teachers may lack the ability to provide effective reading interventions. Classroom observation as assessment is an important finding because it shows that teachers rely on their observations of student learning behaviors in the classroom, sometimes in the absence of fine-tuned assessments. The identification of word callers requires such fine-tuned assessment. Thus, using classroom observations to identify word callers may contribute to misidentification of students as word callers. The following are detailed descriptions of each of these findings, with evidence from teacher interviews.

Vocabulary. Seven teachers talked about the importance of vocabulary in reading instruction. Two of those teachers mentioned vocabulary when defining comprehension. Teacher B said that comprehension is “understanding what you’re reading. It includes vocabulary.” Teacher D said “pure and simple understanding of what you’re reading and having an understanding of the

vocabulary." It is critical that teachers consider vocabulary knowledge when assessing students because without understanding the individual words in a text, comprehension is likely to fail (Stanovich, 1986). Also, failing to consider vocabulary knowledge could lead to misidentification of word callers if teachers are unaware that a lack of word knowledge is one potential cause of comprehension failure.

Practice reading. Six teachers emphasized the importance of time spent engaging in reading. Spending time engaged in reading practice is critical for early reading development (Ehri & Wilce, 1979; Snow et al., 1998; Stanovich, 1986, 1994). Time spent reading helps automate word identification skills (Ehri & Wilce, 1979), and automatic word identification skills allow more attention to be devoted to comprehension activities (Adams, 1990; Perfetti, 1985). Students identified as word callers have been shown to be frequently misidentified (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009). These misidentified students tend to lack word identification fluency rather than comprehension ability. Thus, time spent practicing reading could benefit these students. Of the six teachers who mentioned practice reading, four mentioned practice reading when asked about their personal philosophy towards teaching reading. For example:

- Teacher H, 3rd grade - "If it was up to me we would read a lot more to each other, share books, novels."

- Teacher A, 3rd grade - "I think it's important that children have the opportunity to read books at their level, but also above their level… so I encourage partner reading in my classroom a lot…"
- Teacher G, 3rd grade - "I believe that kids, in order to learn to read, they need to have lots of practice reading."
- Teacher I, 4th grade – "Really it's just practice. They have to read every day."

Learning to read vs. reading to learn. Three teachers mentioned the differences between lower and upper grades in terms of the maxim "Learning to read vs. reading to learn". This refers to the idea that as children progress through school, instruction focuses less on direct reading instruction and more on gaining knowledge through print. This idea formed the theoretical rationale for comparing 3rd and 4th grade students and teachers in the current study. Teachers responded as follows to the question "What is the goal of reading?":

- Teacher K, 4th grade - "…prior to fourth grade the kids are trying to learn how to read and now fourth grade and beyond they are reading to learn facts and figures and story lines and so forth."
- Teacher H, 3rd grade - "All of a sudden they're reading science and social studies text books, which they never had…and that kind of material has really increased, so it's a big challenge for them and expectations are greater. The teachers are giving them more homework, they're giving the kids more assignments."

- Teacher G, 3rd grade) - “The curriculum also explodes. There’s just so much content, physical content, the math, because the math is so much reading as well that they just get buried in all of it.”

Teacher factors. Somewhat related to the concept of “learning to read vs. reading to learn” was the theme of teacher factors. Teachers were asked about the educational outlook for word callers. Six of the teachers mentioned that the success of readers depends in part on the teaching ability of future teachers. For example:

- Teacher J, 4th grade - “By the time kids get to the fourth grade, most of the fourth grade teachers don’t know how to teach reading, so they assume that their kids can already read these books and novels and comprehend them… and they don’t know how to teach phonics.”
- Teacher F, 3rd grade - “The last couple of years we had… substitutes in there and her kids, when I get them, they are way behind.”
- Teacher G, 3rd grade - “Our intermediate teachers, if you’ve never come down and taught beginning readers to read, it’s a very difficult time, you have a very difficult time knowing how to break it down into their parts and pieces and to know how to intervene with them.”

This finding is interesting in terms of the outlook for word callers. Teachers seem concerned that if students are not successfully remediated before they reach the upper grades, or if the quality of teaching in the lower grades is poor, student reading success will suffer.

Classroom observation as assessment. Six of the 11 teachers interviewed mentioned that they use classroom observation as a form of assessment. The following are examples of teachers' descriptions of how they use classroom observations to assess readers:

- Teacher J, 4th grade - "…listening to them read… a lot of informal observation."
- Teacher H, 3rd grade - "…just do some sort of volunteer reading, whether it's just to you or aloud to the whole class if they feel comfortable… and you'll very quickly figure out which ones are either faking it till they make it or the ones that will you know…"
- Teacher C, 3rd grade - "I listen to them."

This is an important finding because word callers cannot be accurately identified using only classroom observations. Past studies (e.g. Hamilton & Shinn. 2003; Hendricks et al., 2003; Meisinger et al., 2009) and the current study show that teachers may not be able to accurately measure word identification fluency without using sensitive speed measures. Inaccurate assessments of word identification fluency can lead to misidentification of word callers, which tends to lead to improper interventions being applied to those students.

Summary

The results of the study showed mixed results. There were only 10 word callers identified in the study, which made it difficult to confidently discuss statistical differences between word callers and the other two groups of readers

(proficient and struggling). The use of statistical tests to account for unequal sample sizes allowed for some interpretation; however, it is likely that the marked difference in sample sizes contributed to a lack of power, which in turn likely led to a failure to reach statistical significance on post-hoc tests. In general, results showed that 4th grade students outperformed 3rd grade students on both real word speed and real word accuracy tasks. Proficient readers performed better than both struggling readers and word callers.

A scatterplot mapping pseudoword speed and accuracy, and comprehension revealed that only one student might have possibly been a word caller, suggesting that differences exits between teacher- and researcher-identified word callers. However, careful analysis of the participant's performance on all of the other tasks suggests that the participant is probably not a word caller. The rest of the teacher-identified word callers fell in various places on the scatterplot. Analysis of these participants' scores showed none of them could be classified as word callers.

Results of the working memory capacity analyses showed that proficient readers scored significantly higher than both struggling and word callers on the working memory capacity task. There was no significant difference between 3rd and 4th grade students on this task.

Teacher interview data showed that 3rd and 4th grade teachers responded similarly to questions about the number of word callers in their classrooms as well as the reasons for identifying word callers. They gave mostly comprehension

strategies when asked what interventions they would apply to word callers, indicating that they understand the main issue to be a lack of comprehension skill.

The following section will discuss these results and will describe the limitations of the study as well as suggestions for future directions.

CHAPTER V

Discussion

I will first discuss the findings related to each research question. Next, the findings from the additional information obtained from the teacher interviews will be described. I will then discuss the limitations of the present study. Finally, the theoretical and pedagogical implications of the study as well as possible future directions will be discussed.

Performance Of Word Callers Relative To Their Peers

Teacher-identified word callers who fit the theoretical criteria should show a specific pattern of results. They should decode as quickly and accurately as proficient readers, but have comprehension scores as low as struggling readers. The descriptive data in the current study made it clear that the teacher-identified word callers did not fit the criteria. Word callers were as slow as and less accurate than struggling readers on measures of real word speed and accuracy. They were slower than struggling readers on pseudoword speed, and while they were more accurate than struggling readers on measures of pseudoword accuracy, they were less accurate than proficient readers. Word callers scored higher than struggling readers on the comprehension measure. These characteristics show that even without statistical significance on the MANOVA analyses, the teacher-identified word callers in the current study are probably not actually word callers. Also, the results are consistent with past research

comparing teacher-identified word callers with theoretical criteria (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009).

A possible explanation for the teacher-identified word callers' poor comprehension ability is that they were actually not verbally efficient. Recall that verbal efficient readers should have higher comprehension that those who struggle with word identification because they have more cognitive resources available for processing text (Perfetti, 1985, 1997, 2007).

The fact that the teacher-identified word callers were not as accurate at word identification as proficient readers suggests that these readers may be lacking strategies for efficiently identifying words. They may be in Ehri's (1994) alphabetic stage rather than the orthographic or automatic stages.

Performance Of Word Callers By Grade

The pattern of descriptive results indicated that teachers identified some unusual students as word callers, particularly in the 3rd grade. The 3rd grade students identified as word callers had the lowest vocabulary scores and the lowest working memory capacity scores in the study for both grades and all categories. They could not be called true word callers because they had low vocabulary scores and were not particularly accurate or fast in their word identification skills. However, their low vocabulary and low working memory capacity made them a group of interest. It is possible that this combination of traits contributed in some way to their reading performance in their classrooms.

These students lacked verbal efficiency, which was likely the cause of their poor comprehension (Perfetti, 1985).

The low working memory scores for the 3rd grade teacher-identified word callers suggested that these students were not actually word callers. Likely, they have limited capacity for the number of tasks involved in word identification and comprehension. This, combined with their low verbal efficiency (as evidenced by their low word identification scores and their low vocabulary), suggested that they were another variety of struggling reader.

Replication of Hendricks et al. (2003)

Research Question 1 asked whether the results from Hendricks et al. (2003) would be replicated, specifically whether teacher-identified word callers fit the theoretical definitions. There were only 10 teacher-identified word callers in the sample while Hendricks et al. (2003) found that teachers identified up to 40% of their students as word callers. Also, no students in the current data set were found to be word callers. Thus, teachers were fairly accurate in terms of the overall numbers of word callers they identified. However, because none of the students in the sample were actually word callers, teachers still misidentified some students. This result is similar to other studies that sought to determine whether teachers were accurate in identifying word callers (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009). These studies all found no word callers in their respective samples and thus, teachers misidentified the word callers they identified.

The significant multivariate interaction between grade and category suggested that reading speed and accuracy for real words differed by grade and category. However, the practical significance was low, indicating that while mathematical significance was reached, the results were not very meaningful in a practical sense.

The interaction was only statistically significant for real word speed and real word accuracy. Examination of the simple effects showed that 4th grade readers tended to read faster and with more accuracy than 3rd graders. This is not surprising, as 4th grade readers had an extra year to practice their reading skills. Similarly, the category results were unsurprising. Proficient readers read faster and with more accuracy than both struggling readers and word callers. There were only 10 teacher-identified word callers in the sample; therefore, these results cannot be given too much weight. As discussed above, descriptive data suggests that teacher-identified word callers do not fit the theoretical criteria for classification as word callers.

Finding actual word callers in the sample. The scatterplot of participants (see Appendix 9) showed one student who might fit the theoretical criteria of a word caller at first glance. The student had low comprehension, but performed very well on the pseudoword speed and accuracy tasks. Further analysis of 48's performance showed that the student scored very low on the vocabulary measure, and further, did not do well on the real word tasks. Participant 48's low vocabulary score indicates that this student could not be a

word caller. Recall that Stanovich (1986) deemed that students who do not understand the words they are being asked to comprehend should not be classified as word callers. This is because it is difficult or impossible to comprehend a text without knowledge of individual word meanings. Further a lack of word meaning knowledge inhibits processes related to comprehension such as lexical access (Perfetti, 1985), allocation of attention to important text information (Goetz et al., 1983), semantic node activation (Rumelhart, 1977; 1994), and automatic spreading activation (Stanovich, 1980). None of these processes can be optimally efficient without vocabulary knowledge.

It is interesting that 48's teacher identified the participant as a word caller. This teacher was the only one in the study who was even close to correctly identifying a word caller. Most of the other teacher-identified word callers in the study were poor readers as measured by the dependent measures. The fact that only one teacher was even close to accurately identifying a word caller fits well with findings from other studies which indicated that teachers tend to mislabel students as word callers (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009).

Several other participants who were not identified as word callers warranted examination. Their scores on other measures showed that none of them fit the theoretical definition of word callers, based on their real word fluency, vocabulary knowledge and comprehension scores.

The remaining 9 teacher-identified word callers fell in various quadrants of the scatterplot. Closer examination of the rest of their scores indicated that none of them could be classified as word callers. In fact, 3 of the 10 teacher-identified word callers scored well on both real- and pseudoword tasks and showed high comprehension. Their teachers were correct in identifying them as having proficient word identification skills, but they underestimated these students' comprehension abilities.

Working Memory

Research question 2 sought to determine if there were differences among the teacher-identified categories on a measure of working memory capacity. The pattern of descriptive results was what would be expected. Proficient readers had higher mean working memory capacity than both struggling readers and word callers. Word callers had a lower mean working memory capacity score than struggling readers, and pairwise comparisons showed that word callers and struggling readers did not have statistically significant working memory scores. The three teacher-identified 3rd grade word callers had very low working memory capacity scores. These students could not be classified as actual word callers; however, the fact that their teachers selected them indicates the possibility that their working memory capacity could contribute to their overall reading difficulties.

A scatterplot of students' working memory values and their word identification abilities (see Appendix 10), showed that many teacher-identified word callers appeared to have working memory scores that were similar to their

comprehension scores when placement on the chart was examined. Research has shown that there is a connection between reading ability and working memory (Daneman & Carpenter, 1980; Just & Carpenter, 1992; King & Just, 1991). Working memory is fixed and limited (Baddeley & Hitch, 1974; Daneman & Carpenter, 1980; Just & Carpenter, 1980; Just & Carpenter, 1992; LaBerge & Samuels, 1974; Miller, 1956; Perfetti, 1985; Reynolds, 1992). Students with low working memory will have a more difficult time allocating cognitive resources to comprehension processes than students with high working memory. It is possible that this explains the visual relationship between comprehension and working memory seen in Figures 6 and 7.

The visual similarity of teacher-identified word callers' positions on Figures 6 and 7 is supported by VET. A major tenant of VET is that working memory is fixed, limited and that it constrains comprehension (Perfetti, 1985). This constrain is explained by the idea that fast, automatic word identification leaves more resources for comprehension processes. Laborious word identification leaves few emancipated resources and can lead to poor comprehension (Perfetti, 1985, Reynolds, 2000). This idea is echoed in Gough's (1972) formula (R = WI x L). Poor word identification will result in an overall lower score for overall reading ability.

Why Were Students Misidentified As Word Callers?

Ten students were teacher-identified as word callers in this study; after analysis, none were found to be actual word callers. This number is smaller than

the number of word callers identified in previous studies (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009), although at 5.6% of the entire sample, it still larger than the benchmark of 2.5% suggested by Shankweiler et al. (1999). The fact that none of the word callers identified by their teachers fit the theoretical criteria means that these students were all *misidentified* word callers. These misidentified students are at risk of falling further behind if they receive incorrect reading interventions. What causes students to be misidentified?

Two factors may contribute to misidentification of word callers. First, students may be accurate at word identification, but laboriously slow. These students may lack strategies for efficient word identification, perhaps using strategies in Ehri's (1994) alphabetic stage, rather than the more advanced stages of reading development. Using inefficient strategies drains cognitive resources, and contributes to overall low verbal efficiency (Perfetti, 1985). It may be difficult for classroom teachers to detect the laborious nature of word identification if they do not have access to sensitive measures of word identification speed.

A second possibility is that the students who are misidentified could be fast and accurate decoders *in context.* Many classroom assessments of word identification are done in the context of a passage. Thus, students can employ compensatory strategies such as those described by Stanovich (1980). Also, recall that words are read faster in context than in isolation (Archer & Bryant, 2001; Goodman, 1965; Landi, Perfetti, Bolger, Dunlap & Foorman, 2006; Martin-

Chang & Levy, 2006; Martin-Chang, Levy & O'Neil, 2007; Nicholson, Bailey & McArthur, 1991; Stanovich, West & Feeman, 1981). It would be easy to see how students who lack effective word identification strategies could disguise themselves as proficient readers if they always have compensatory strategies available to them. This is problematic because as they progress through school, vocabulary words will increase in difficulty and complexity. Those students who have multiple and effective strategies for identifying unfamiliar words will have a distinct advantage over students who lack those strategies (Ehri, 1994).

Many of the teachers in the study used AIMSweb to determine students' word identification skills. AIMSweb is a problematic choice for word identification because it combines the two factors listed above. It uses a crude measure of word identification speed (by measuring the time taken to read a whole passage). Students may be able to achieve a normal overall word identification speed depending on the number of sight words (those words that readers can identify without having to use decoding strategies) in the assessment text. Further, the words identified are within the context of a passage, giving the possibility that students could be using compensatory strategies that can make up for deficiencies in true word identification skill.

Also, it is possible that in addition to the two previously mentioned factors, teachers take a more holistic approach to identifying word callers. They may look at student factors such as motivation, native language, and home life when

determining whether a student is a word caller. The current study did not investigate extra-instructional factors in teacher identification of word callers.

Number Of Word Callers Identified By Teachers

Most teachers in the study identified fewer than 3 word callers in their classrooms. The number of word callers identified was extremely low for statistical analysis purposes. However, the fact that few word callers were identified was a good thing from both a pedagogical and theoretical perspective. Research has shown that few word callers actually exist (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009; Shankweiler et al., 1999); thus, it is a positive finding that teachers in the current study did not identify large numbers of word callers in their classrooms. The rate of word caller identification in the current study is closer to the theoretical standard than teachers in previous studies (Hamilton & Shinn, 2003; Hendricks et al., 2003; Meisinger et al., 2009).

However, the word callers who were identified by their teachers were all misidentified. It is possible that the students were misidentified for the reasons stated earlier (teacher-identified word callers may be identifying words laboriously slowly or using compensatory mechanisms to disguise their difficulty with word identification). It is not surprising that teachers misidentify word callers; previous research makes it clear that teachers commonly misidentify these students (Hamilton & Shinn, 2003, Hendricks et al., 2003; Meisinger et al., 2009).

Reasons For Identifying Word Callers

Research question 4 sought to determine whether differences existed between 3rd and 4th grade teachers on the reasons for identifying word callers in their classrooms. Most teachers gave simplistic answers to these questions. Nearly every classroom visited used AIMSweb Reading Curriculum- Based Measurement (R-CBM) to measure word identification ability in the classroom. AIMSweb R-CBM is a web-based program that measures decoding speed based on the number of words read from a passage in one minute's time. AIMSweb R-CBM does not contain a comprehension component. Classroom teachers administer AIMSweb R-CBM several times throughout the school year and use it as a benchmarking tool, ensuring that students are making progress in their reading ability.

It is possible that the use of AIMSweb R-CBM in the classroom has had a role in the decrease in the number of word callers identified. However, it should be noted that none of the identified word callers could actually be called true word callers. This could be due to the fact that AIMSweb R-CBM gives a crude measure of word identification speed because it uses the number of words read in one minute rather than the more accurate speed measure provided by CAAS. Also, AIMSweb R-CBM does not provide a pseudoword reading measure, which would eliminate the possibility that the words being read are sight words. Sight words do not require the use of word identification strategies; thus, it is not a clean measure of that skill. So, teachers are identifying fewer word callers, possibly due to the data provided by programs such as AIMSweb R-CBM.

However, the students they do identify are typically not actual word callers. This is problematic because these misidentified students are likely not receiving the kinds of reading interventions that will help them to succeed as readers.

Also, it is possible that professional development was a factor in the decrease in identified word callers. The current study used subjects from the same school district as Hendricks et al. (2003). The results of the earlier study were shared with school district personnel. District leaders in reading instruction have mentioned in informal conversations that they have used the results of the Hendricks et al. (2003) study in preparing teachers and district administration to properly identify word callers. While it is unknown to what extent word calling is discussed in professional development courses, it is possible that this exposure could have had an impact on teacher identification of word callers in the current study.

Interventions Provided By Teachers

Research questions 5 and 6 asked what kinds of interventions teachers provide for word callers and struggling readers and whether there were differences between 3rd and 4th grade teachers in the kinds of interventions they would provide. Interventions listed by 3rd and 4th grade teachers were similar. Teachers had multiple strategies in place for assisting general struggling readers. They tended to have far fewer strategies for assisting word callers. It is possible that the teachers interviewed didn't know enough about word callers to know how to help them.

Most teachers said that they would provide comprehension strategies. This is problematic for misidentified word callers in the study because they tended to have lower mean vocabulary scores, slower mean word identification times and lower mean word identification accuracy than general struggling readers in the study. These students likely need to develop their word identification skills in order to become successful readers. In particular, the three 3rd grade teacher-identified word callers had very low working memory capacity scores. These students would especially benefit from building word identification automaticity, as it would free up space in working memory for comprehension activities (Adams, 1990; Daneman & Carpenter, 1980; Ehri & Wilce, 1979; Just & Carpenter, 1980; Perfetti, 1985; Reynolds, 1992, 2000).

Salient Factors From Teacher Interviews

Teacher interviews provided extra information about how teachers provide reading interventions to struggling readers. Interview analyses revealed factors common to many of the teachers who agreed to be interviewed. These factors added to the quantitative findings by providing some context.

Vocabulary. Vocabulary knowledge is an important component of the theoretical definition of word callers. Students who are word callers must lack comprehension while understanding the individual words in a text. This ensures that their low comprehension is not limited to the assessment materials or low vocabulary in general. Seven teachers who were interviewed mentioned the importance of vocabulary knowledge as a component of reading comprehension.

This indicates an awareness of the importance of the relationship between word knowledge and text comprehension. Word knowledge is critical for interactive models such as those developed by Rumelhart (1977) and Stanovich (1980). In both of these models, knowledge of word meanings facilitates automatic spreading mechanisms that allow readers to efficiently comprehend text.

Practice reading. The teacher-identified word callers in the current study tended to have word identification skills as low or lower than struggling readers. These students would likely benefit from practice reading, as time spent engaging in reading text can facilitate automatic word identification (Ehri & Wilce, 1979). Automated word identification skills can free up space in working memory for comprehension activities (Adams, 1990; Perfetti, 1985). Six teachers mentioned practice reading as an important component of reading instruction. This is important to the students incorrectly identified as word callers because they have an opportunity to develop automatic word identification, which could help them throughout their reading development.

Learning to read vs. reading to learn. Several teachers noted a difference between the curricula in 3rd grade vs. 4th grade classrooms. The teachers expressed concern that the schoolwork, particularly with reference to reading material, becomes more difficult and complex. This fits well with existing literature on text difficulty as elementary school progresses (Chall, 1996; Meisinger et al., 2009).

It was expected in the current study that the difference in the goal of reading between the two grades might lead to differences in the numbers of word callers identified by teachers. The numbers of word callers identified by 3rd grader teachers and 4th grade teachers was very similar, though the numbers were too small to be tested for statistical significance. It is important to note that teachers are concerned about the differences in curriculum between the two grades. It was not possible to determine whether those differences contributed to differences in the numbers of word callers identified, but the concern exists for teachers.

Teacher factors. Several teachers mentioned that the success of students' reading ability depends at least partly on the ability of their teachers to provide reading instruction. Two of the teachers specifically noted that teachers of 4th graders and beyond can lack the pedagogical knowledge required to remediate struggling readers. This is an important finding to the current study because it highlights the urgency of correctly identifying the specific nature of students' reading difficulties. Students who do not receive appropriate reading intervention early on may fall further behind if teachers in subsequent grades lack the skills to assist them. This was a major concern of Stanovich (1986) and was what he labeled as Matthew Effects. Specifically, Stanovich was referring to a widening gap between struggling students and proficient students. This is a real concern for misidentified word callers, especially in light of teachers' concern that instructors may not be able to adequately address reading difficulties in intermediate grades and beyond.

Classroom observation as assessment. Nearly half of the teachers interviewed spoke about using classroom observations as a component of their assessment of students' reading abilities. This is problematic for the identification of word callers, as word identification speed can be difficult to assess using only classroom observation. In fact, only three of the 10 word callers identified by their teachers could be considered proficient at word identification. None of the teacher-identified word callers completely fit the theoretical definition. This finding is supported by past research from Hamilton and Shinn (2003), Hendricks et al. (2003) and Meisinger et al. (2009). All of these studies found that teachers misidentified word callers in their classrooms. Classroom observation must be followed up with more sensitive measures to identify word callers.

Implications

Statistical analyses were difficult to interpret in the current study, due to unequal sample sizes within the three categories. However, teachers did identify some word callers. These students did not fit the theoretical criteria. There are practical implications for those students. The teacher interviews illuminated the ways in which they identify word callers and assess all students in their classrooms. There are also important implications associated with classroom assessment. These implications will be discussed below.

Misidentified word callers. None of the students in the current study who were identified as word callers fit the theoretical definition. Some of the misidentified word callers lacked fast and accurate word identification skills.

Some actually had relatively high comprehension. Some lacked vocabulary knowledge. All of these students are likely to be receiving inappropriate reading interventions. This is especially problematic for the misidentified word callers who would benefit from word identification interventions. Their teachers identified them as having proficient word identification skills, and as such are probably not focusing on word identification as an intervention. It is likely that instead, teachers are providing comprehension instruction. These students may continue to fall behind if they do not receive the appropriate interventions (Stanovich, 1986).

Actual word callers. There were no actual word callers in the current study. However, teachers were able to identify only the most basic interventions for word callers in their interviews. In contrast, teachers gave multiple and varied intervention strategies for general struggling readers. Although word callers are rare, it is important that teachers understand how to remediate these students. Teachers need the proper knowledge to effectively assist actual word callers. Actual word callers would need to be thoroughly assessed on all aspects of reading ability (including, but not limited to: word identification speed and accuracy, both in and out of the context of other words, comprehension, vocabulary). With detailed analyses of actual word callers' abilities on each of these tasks, teachers would be able to effectively tease out the components with which students struggle. Actual word callers may lack specific comprehension strategies or they may need to build skill in comprehension monitoring. Actual

word callers may also have neurological issues that would need to be addressed outside of the classroom (Meisinger et al., 2009).

Assessment in the classroom. Most of the teachers in the current study use AIMSweb in addition to less formal reading assessments. Also, several teachers in the current study noted that they use classroom observation as a form of reading assessment. Ten word callers were identified in the current study, though none could actually be defined as word callers given their performance on a variety of sensitive measures. It is clear that the assessments used in the classroom can give teachers a general idea of students' reading abilities. However, these assessment measures are not adequate for identifying word callers. It is important for teachers to follow up on the assessments used in the classroom with more sensitive measures before designing intervention strategies that may be ineffective.

VET and working memory. Two of the major tenants of VET concern working memory. Specifically, VET states that working memory is fixed and limited, and that it constrains comprehension (Perfetti, 1985). There was no significant difference between word callers and struggling readers on the measure of working memory in the current study. Both groups had low working memory capacity in general. For VET, this means they were already at a disadvantage. These students may be more likely to forget text propositions or other components of the text as they are reading because their storage capacity

was found to be lower than that of proficient readers (Just & Carpenter, 1992; Walczyk, 2000).

While some processes (e.g. letter and spelling-pattern identification) can be automated and use up fewer resources, other processes (e.g. inference-making and comprehension strategy-monitoring) will always require attention (Daneman & Carpenter, 1980; Just & Carpenter, 1992; Perfetti, 1985; Reynolds, 1992, 2000). Readers must automate all possible processes in order to maximize the possibility of efficient comprehension of texts. Recall that effective reading cannot occur if either word identification or comprehension are inefficient (Gough, 1972). This tenant was echoed in VET and is suggested in Just and Carpenter's theory of working memory (1992).

Many of the word callers and struggling readers in the current study lacked verbal efficiency in addition to their low working memory capacities. This combination of traits could lead to serious limitations of available resources. The strain on attentional resources combined with low working memory capacity could mean that comprehension processes will suffer (Just & Carpenter, 1992; Perfetti, 1985; Walczyk, 2000). In fact, many of the word callers and struggling readers in the study had both poor verbal efficiency (identified via their slow word identification skills) and low comprehension (as measured by the SVT). This finding lends support to VET and theories of working memory that focus on reading ability.

Limitations

Several limitations to the current study were identified. These were Teacher identification of word callers, which lead to unequal sample size, low teacher participation and a lack of variability on the first scale of the CLPT. Unequal sample sizes among the three groups (proficient, struggling and word callers) may have contributed to a lack of statistical significance for some variables. Low teacher participation in interviews made it difficult to analyze research questions 3 – 6, which sought to investigate differences among 3rd and 4th grade teachers in the number of word callers they identify and how they would remediate word callers and general struggling readers. The lack of variability on the first scale of the CLPT meant that the measure could not be used to its full intent. These limitations will be discussed below.

Teacher identification finding. Teachers identified few word callers in the study. While this is a positive finding in that it implies that teachers are not misidentifying students in large numbers, the sample sizes for the three teacher-identified categories were markedly uneven. Unequal samples sizes can lead to violations of homogeneity of variance in data analyses. In particular, the number of word callers identified (N = 10) was very low compared to the sample sizes for proficient readers (N = 114) and struggling readers (N = 54). The small number of word callers compared to other categories contributed to a lack of statistical power. Statistical tests that account for unequal sample sizes were used whenever possible to correct for these issues. Larger numbers of word callers

and even distribution among categories would have allowed the possibility of obtaining statistical significance for more variables.

It should be noted that every single student who turned in a parent-signed permission slip was tested, although some were not included in the data analyses due to LEP status or lack of teacher-assigned category. There are several factors that may have contributed to the uneven sample sizes: parent factors, student factors, and teacher identification.

Parent factors. Parent permission slips were mandatory for inclusion in the current study. Several teachers mentioned through informal conversations that they find it difficult to get parents to return permission slips. Most of these teachers mentioned that the parents who are most reliable tend to be the parents of proficient readers. This may have contributed to lower numbers of struggling readers and word callers returning permission slips.

Student factors. There were far more proficient readers (N=114) in the sample than struggling readers (N=54) or word callers (N=10). To reiterate, every student who returned a permission slip and assented to the study participated. One reason for the differences in participation in the three groups could be related to the types of students targeted for the study. Multiple teachers said during informal conversations that struggling readers and word callers were less likely to turn in permission slips than proficient readers. This may have contributed to the low numbers of these two categories of readers.

Teacher identification. Teachers in this study did not identify a large number of word callers in their classrooms. This naturally led to a small sample of word callers. It is actually positive that teachers did not identify large numbers of word callers because it demonstrates that students' reading abilities are being more accurately assessed. Lower numbers of word callers identified means that there are fewer students who are likely *mis*identified as word callers. Fewer misidentified word callers means that there are fewer students who are receiving inappropriate reading interventions.

Low teacher interview participation. Only 11 of the 25 teachers who allowed access to their classrooms for the current study consented to be interviewed. The small number of teachers made it difficult to find differences between 3rd and 4th grade teachers in the number of word callers they identify in their classrooms as well as the types of interventions they would provide for word callers and general struggling readers.

There are several possible contributing factors to low participation by teachers. First, there was a district-wide fear of teacher layoffs due to budget cuts during the period of data collection for the current study. In fact, the school district eliminated over 600 teacher positions and laid off 419 teachers shortly after data collection was completed (Milliard, 2012). Teachers expressed concern that their interviews could somehow jeopardize their jobs; therefore, some were reluctant to consent to be interviewed.

Other teachers refused to consent to be interviewed because of political fears at their current schools. Teachers stated through informal conversation that they were concerned that their principals would access the interviews and that the transcripts would be used against them in some way. Teachers were assured that their data would never be used in such a manner, but most still refused the interview.

Lack of CLPT variability. The first scale of the CLPT was an indicator of how accurate students were when determining the truth of each sentence read aloud to them. The purpose of the task was to ensure that verbal processes were being accessed in addition to storage, which is tapped as students attempt to remember the last word of each sentence. Determining the truth of the 3-word sentences was very easy for all of the students. Very few students scored less than perfect on this measure; thus, it was eliminated from data analysis. This limits the study because the measure was not able to be used as completely as intended. Further, it calls into question how accurately the task taps verbal processes. It is possible that it was too easy, and thus did not actually measure what Gualin and Campbell hoped it would (1994).

Future Directions

There are several possibilities for future studies concerning word callers. Increasing the scale of the study would increase the chances of having an adequate number of teacher-identified word callers. Studying actual word callers would be novel, as studies up to this point have either inappropriately identified

word callers by using crude speed measures (Nation, Clarke, Marshall, & Durand, 2004; Nation, Clarke & Snowling, 2002; Nation & Snowling, 1998a, 1998b, 2000; Stohard & Hulme, 1992, 1995) or have found that few to no word callers existed in the sample.

If actual word callers were identified, it would be important to study their education progress over time, to determine how to best remediate actual word callers. Finally, studies to examine which intervention strategies can help both actual and misidentified word callers succeed would be a worthy endeavor. These students could be receiving inappropriate interventions, either because they are misidentified or because their teachers lack the proper pedagogical knowledge for dealing with word callers.

Large-scale studies. Future studies on word callers would need to be larger in scope than the current study. This would maximize the possibility of finding a statistically appropriate number of teacher-identified word callers. A study with a large enough sample of word callers could help determine whether factors such as working memory capacity have an impact on the identification of word callers. Further, a larger sample would allow for generalizing the results across the region of study. Large-scale studies could include previously excluded populations including special education and English Language Learner students to determine how these unique populations fit into the theoretical definition of word calling and whether they are identified as such.

Case studies. A small number of participants in the current study appeared to be word callers on some measures, but were excluded from word caller status when other measures were considered. A case study of these unusual students could help to examine all aspects of these students school, home and social activities that may contribute to their unusual pattern of quantitative scores.

Studying actual word callers. Most studies of word callers either find few to no actual word callers (Hamilton & Shinn, 2003; Hendricks, et al., 2003; Meisinger et al., 2009; Shankweiler et al.,1999) or they inappropriately identify word callers through the use of insensitive measures of word identification speed, leaving their results open to question (Nation, Clarke, Marshall, & Durand, 2004; Nation, Clarke & Snowling, 2002; Nation & Snowling, 1998a, 1998b, 2000; Stohard & Hulme, 1992, 1995). Future studies of word callers should attempt to identify enough actual word callers to determine factors that lead teachers to identify them as word callers and what interventions are most effective for these students.

It is important to study actual word callers for two reasons. First, teachers tend to misidentify students as word callers. Appropriate and accurate techniques for identifying word callers can be developed through the study of actual word callers. These techniques can be used in future research and in classrooms to avoid misidentifying word callers both in both settings. Second, careful study of actual word callers will help researchers determine factors that are common

among these unusual students. Understanding these factors could move forward the research of individual differences in reading ability.

Longitudinal studies. A study of actual word callers over time would be beneficial because it is important to determine what effects this specific type of reading difficulty can have over time, and the forecast for success when the proper interventions are given to these students. Stanovich (1986) warned that students who fall behind in reading ability could continue to fall behind even further as their educations progress. It is important to address whether word callers fit this pattern and to determine how these students can be remediated over time.

Intervention effectiveness. Similarly, it is important to study what kinds of interventions are most effective, for both actual and misidentified word callers. Misidentified word callers are often provided with comprehension interventions when they could benefit more from word identification automaticity. Further, actual word callers identified based on the theoretical definition derived from the works of Stanovich (1986) and Shankweiler (1999) have not been identified in large numbers in any study. Therefore, it is important to determine what interventions are the most effective in helping actual word callers achieve reading success.

Professional development and identification of word callers. It is possible that professional development that included information about word callers led to decreased identification of word callers in the current study. A

logical follow-up for future studies would be to compare teacher identification of word callers in areas that lack this type of professional development. This would help to tease out professional development as a factor in the over-identification of word callers.

Studies of professional development and word callers could also focus on whether there are interventions that are helpful to all students, but that specifically target reading deficiencies in misidentified word callers. For example, less common intervention strategies (such as building vocabulary and increasing word identification through automaticity) could be incorporated into teachers' repertoires. These strategies would be helpful to any student, and may be especially helpful to students who may be misidentified as word callers, but need specific help in other areas.

Teacher perceptions and identification of word callers. It is possible that teachers consider multiple extra-instructional factors when identifying word callers. Future studies should include measures of student motivation and should be designed to determine if there are criteria teachers use to identify word callers beyond assessments of word identification fluency and comprehension.

Summary

Very few word callers were identified in the current study. This is a positive finding because it suggests that teachers are using better somewhat better assessments to identify word callers. However, the students they did identify were not word callers. Some of them lacked fast and accurate word identification,

while others had adequate comprehension. Still others lacked vocabulary knowledge.

It is troubling that teachers are still misidentifying word callers in their classrooms. These students are likely receiving comprehension-based interventions when some of them need word identification interventions and some need vocabulary knowledge. It is clear that teachers need access to an assessment method that can follow up on classroom observations and rough measures of word identification speed. Until teachers both have the access and the resources (including time) to use these assessments, students are likely to continue to be misidentified.

Appendix 1

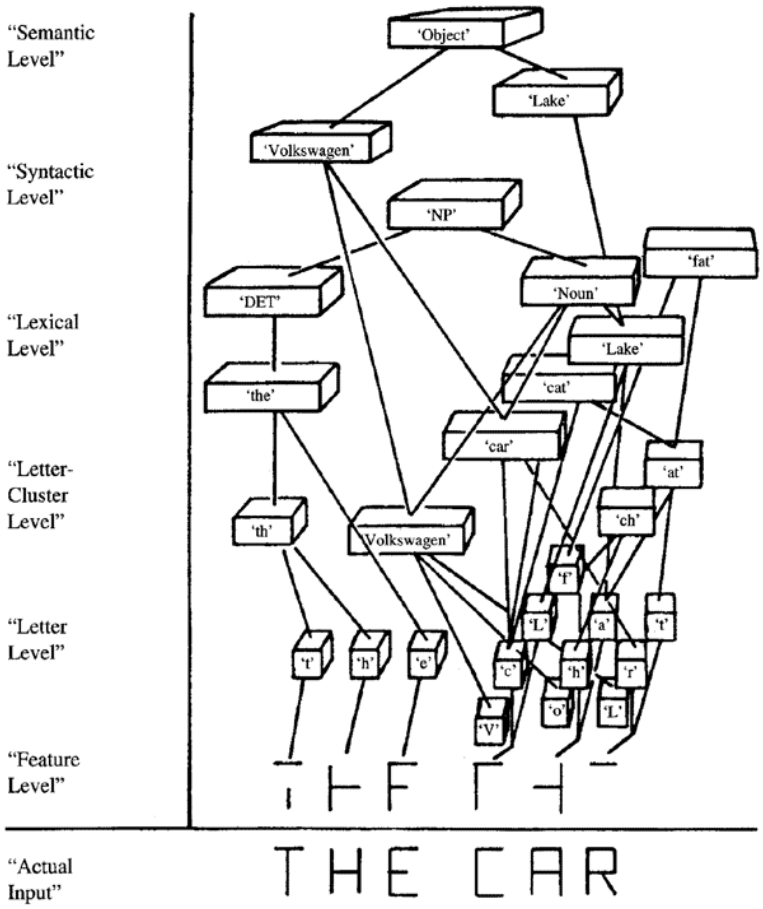

Figure 3. Rumelhart's (1994) depiction of the Message Center processing text. Adapted from "Toward an interactive model of reading" by D.E. Rumelhart, 1994, *Theoretical Models and Processes of Reading (R.B. Ruddell, M.R. Ruddell, & H. Singer, Eds.), 4th ed*. Copyright 1994 International Reading Association.

Appendix 2

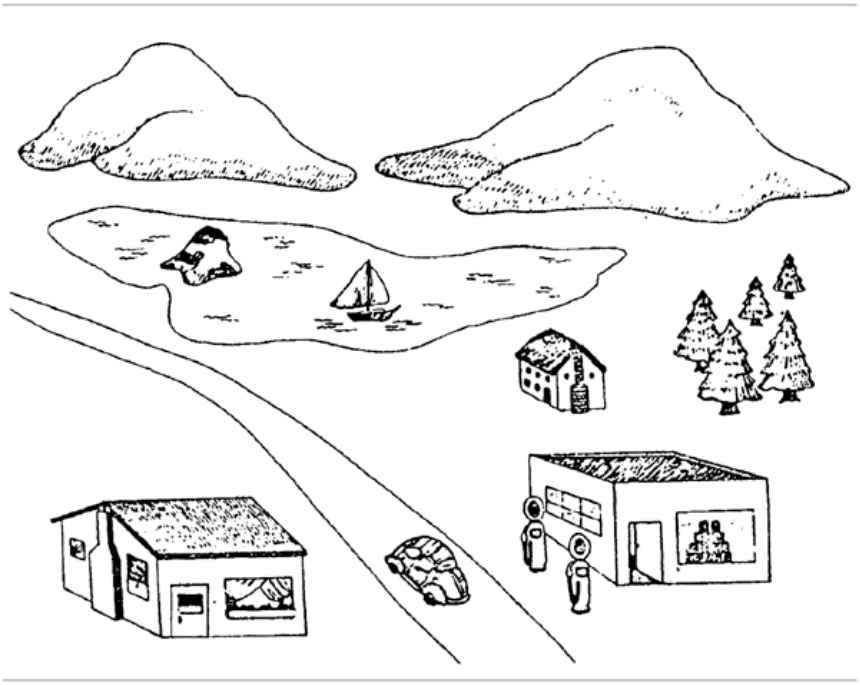

Figure provided by Jean Mandler.

Figure 4. Image displayed before participants viewed text reading “The car”. Adapted from “Toward an interactive model of reading” by D.E. Rumelhart, 1994, *Theoretical Models and Processes of Reading (R.B. Ruddell, M.R. Ruddell, & H. Singer, Eds.), 4th ed*. Copyright 1994 International Reading Association.

Appendix 3

SVT Instructions and example passage

Sentence Verification Task, 3rd and 4th grade
Instructions- please read aloud.

This is a test to see how well you understand stories that you read. You take the test by reading a story. After you have finished the story you will read several test sentences. Circle "Yes" if a test sentence means the same thing as a sentence in the story. Circle "No" if a test sentence has a different meaning than a sentence in the story. Do not look back at the story once you have finished reading.

Let's try an example from a story about a family that owns a restaurant. Read the story below and then we will answer the test questions.

When you have finished reading the story, Circle "Yes" if a test sentence means the same thing as a sentence in the story. Circle "No" if a test sentence has a different meaning than a sentence in the story.

You should have marked the first question "YES" because it means the same thing as a sentence in the story. In fact, the first test sentence is an exact copy of the second sentence in the story.

You should have marked test sentence two "NO" because it has a different meaning than a sentence in the story. The first sentence in the story says, "Mr. and Mrs. Cortina had been asked to prepare the food for a big party". The test sentence says "Mr. and Mrs. Cortina had been asked to prepare the decorations for a big party".

You should have marked the third test sentence "YES" because it means the same thing as a sentence in the story. The last sentence in the story says, "Ruby and Ricardo hoped they would also be able to attend the party." The two sentences mean the same thing so the test sentence should be marked "YES."

The last sentence should be marked "NO." The test sentence says that the party was going to be Saturday night, but there was nothing in the story about when the party was going to be. So the sentence should be marked "NO."

Do you have any questions before we start? When you have finished, please raise your hand and someone will collect your answers. You may begin.

Example passage and questions- 3rd grade

THE LAST BLUE WHALE

Ben Blue Whale is alone. Each day he swims a long way looking for another blue whale. He looks in all parts of the oceans. There he sees other kinds of whales. But he never sees a blue whale like himself.

Ben has been looking for blue whales since his mother left him. Even though he was small, he still remembers that day. Ben and his mother had heard the noise of a boat. But before they could swim away, there had been a loud noise. It had been made by the men on the boat. Ben did not understand what had happened. All he knew was that his mother had left him.

1. **YES** **NO** Ben didn't know what had happened.
2. **YES** **NO** After they swam away they couldn't hear the loud noise.
3. **YES** **NO** Ben and his mother heard the noises of a boat.
4. **YES** **NO** Ben's mother fed him her milk.
5. **YES** **NO** Ben can not find any whales that are just like him.
6. **YES** **NO** Many times hungry killer whales tried to kill Ben.
7. **YES** **NO** The only thing he knew for sure was that his mother was gone.
8. **YES** **NO** Ben Blue Whale has a lot of friends.
9. **YES** **NO** It had been made by the men on the boat.
10. **YES** **NO** He looks in all parts of the oceans.
11. **YES** **NO** Like all whales, Ben was born under water.
12. **YES** **NO** He doesn't see many different kinds of whales.
13. **YES** **NO** He still remembers that day even though he was very young.
14. **YES** **NO** Each day he swims a long way looking for another blue whale.
15. **YES** **NO** Ben's mother helped him to the top of the water.
16. **YES** **NO** Ben has not been looking for other blue whales because his mother is with him.

Appendix 4

Scoring Rubric For Vocabulary Task.

	Score			
Criteria	0	1	2	3
	Completely Wrong	Wrong but indicating some understanding of the concept (“An attic is where you park your car” demonstrates understanding that an attic is a component of a house)	Correct, but missing some information (“A visitor is someone who visits you.”)	Completely Correct (“A mother is a person who gave birth to you”; “Trade is when you give someone something and they give you something back.”)
	“I don’t know”	extremely vague response (I have a mother.”)		

Appendix 5

CAAS word lists, 3rd and 4th grade

3rd Grade Real Words

Category 1	Category 2	Category 3	Category 4
Air	Move	Rough	Tongue
Too	Work	Heard	Afraid
Eat	Clue	Shiny	Father
Our	Live	Trade	Poison
	Help	Light	
	Said	Claws	
	Want	Sheep	
	Keep	Chief	

3rd Grade Pseudowords

Category 1	Category 2	Category 3	Category 4
Zob	Lumb	Frace	Decede
Fid	Weeb	Doddy	Thatue
Bap	Gade	Gudge	Retson
Bry	Gerk	Dreer	Couble
	Glus	Snote	
	Nesk	Loast	
	Yash	Fleeb	
	Prue	Thurd	

4th Grade Real Words

Category 1	Category 2	Category 3	Category 4
Lap	Draw	Favor	Cellar
Fry	Wave	Ripen	Bottle
Tax	Base	Spoil	Shower
Odd	Nail	Drive	Bright
	Best	Train	
	Vote	Place	
	Meal	Brain	
	Road	Speed	

4th Grade Pseudowords

Category 1	Category 2	Category 3	Category 4
Yag	Tose	Icorn	Pongue
Bok	Telk	Sweer	Yondar
Mib	Wook	Blash	Clurch
Tae	Twim	Yight	Tettle
	Kird	Fover	
	Nock	Saxty	
	Pize	Jilly	
	Yamb	Fleeb	

Appendix 6

CLPT

INSTRUCTIONS
Say:
I am going to read you some true and false sentences. After each one, I want you to say "yes" or "no". After we have done a group of sentences I will ask you to tell me the last word of each sentence in that group. Don't worry about getting them in right order. As we go on, the groups will have more sentences. It will get hard and you won't be able to ask any questions, but I want you to keep on trying to do the best you can. Remember to say "yes" or "no" after each sentence. Then, when I ask you, please say the last word of each sentence you just heard. Do you understand? Let's try some for practice.

Group		Correct Response	Child's Response		Word Recall
	PRACTICE ITEMS				
A	Children can play	Y	Y	N	
B	Apples are black	N	Y	N	
	TEST ITEMS				
	Level 1				
1	Trees have leaves	Y	Y	N	
2	Trains can fly	N	Y	N	
	Level 2				
1	Pumpkins are purple	N	Y	N	
	Buses have wheels	Y	Y	N	
2	Boys can eat	Y	Y	N	
	Bananas are blue	N	Y	N	
	Level 3				
1	Carrots can dance	N	Y	N	
	Water is dry	N	Y	N	
	Sugar is sweet	Y	Y	N	
2	Buckets tell jokes	N	Y	N	
	Horses have tails	Y	Y	N	
	Milk is white	Y	Y	N	
	Level 4				
1	Feathers can tickle	Y	Y	N	
	Babies drive trucks	N	Y	N	
	Birds can fly	Y	Y	N	
	Cars build bridges	N	Y	N	
2	Snails have shells	Y	Y	N	
	Chairs eat cake	N	Y	N	
	Giants are small	N	Y	N	

	Balloons can float	Y	Y	N	
	Level 5		Y	N	
1	Shoes have ears	N	Y	N	
	Fire burns paper	Y	Y	N	
	Robins eat worms	Y	Y	N	
	Cars can race	Y	Y	N	
	Hotdogs can bark	N	Y	N	
2	Horses have feet	Y	Y	N	
	Dishes can whistle	N	Y	N	
	Fish pull wagons	N	Y	N	
	Roses have thorns	Y	Y	N	
	Cats can talk	N	Y	N	
	Level 6		Y	N	
1	Apples are square	N	Y	N	
	Rabbits read books	N	Y	N	
	Houses can jump	N	Y	N	
	Pencils eat candy	N	Y	N	
	Airplanes can fly	Y	Y	N	
	Balls are round	Y	Y	N	
2	Fish can swim	Y	Y	N	
	Clouds wear slippers	N	Y	N	
	Sheep eat lions	N	Y	N	
	People have eyes	Y	Y	N	
	Dogs can run	Y	Y	N	
	Lemons are yellow	Y	Y	N	

Percentage correct- True/False
Percentage correct- Word Recall Score

Appendix 7

Teacher Interview Protocol

Teacher's Name _____

School _____

Room number _____

Grade taught _____

This interview is being conducted as a part of Lindsay Couzens' doctoral dissertation. Your participation is greatly appreciated. Your responses will be kept completely confidential. Your name and the name of your school will never be tied to the responses you give to these questions. Do you have any questions before we begin?

1. How many years have you been teaching?
2. How many years at this grade level?
3. Tell me about what kinds of continuing education courses you've taken.
    a. How many have focused on reading research?
4. Do you read research journals?
    a. Which ones?
    b. Any related to reading instruction?
5. What reading program do you currently use in your classroom?
    a. Did you have any input in selecting it?
    b. Does it meet the needs of all of your students?
    c. What do you like about it?
    d. What do you dislike about it?
    e. If you could change it, what would you change?
    f. Do you supplement it with other materials or activities?
        i. What supplements do you use?
6. Tell me about your **personal** philosophy towards reading instruction.
    a. What is the goal of reading?

   b. What are the basic requirements for learning to read?
   c. How do students best learn to read?
7. How would you teach reading if there were no restrictions placed on you?
   a. What would your ideal curriculum look like?
8. How do you determine which students are struggling to read?
   a. What assessments would you use?
   b. Why did you choose those assessments?
9. Define “fluent decoding”
   a. How did you come up with this definition?
10. Define “comprehension”
   a. How did you come up with this definition?
11. Define “word calling”
   a. How did you come up with this definition?
12. What interventions would you provide for a student who is a word caller?
   a. Why are those interventions appropriate?
   b. What about for other struggling readers?
   c. How would you determine whether the interventions were working?
13. Do you think students who are word callers will succeed in their educational careers?
   a. Why or why not?
   b. What about other kinds of struggling readers?
      i. Why or why not?
14. **Thank you for taking the time to complete this interview. Do you have any questions for me?**

Appendix 8

Table 3

Means And Standard Deviations Within Teacher-Assigned Category

	Proficient (N = 114)		Struggling (N= 54)		Word Callers (N = 10)	
Dependent Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Vocabulary	2.54	0.33	2.28	0.44	2.26	0.30
SVT	78.81	9.91	65.90	11.40	71.25	11.32
CLPT	23.44	3.95	21.15	4.40	18.50	4.77
Real Word Speed	0.74	0.30	0.93	0.56	0.93	0.23
Real Word Accuracy	98.41	2.85	91.54	10.48	90.16	12.18
Pseudoword Speed	1.19	0.74	1.41	0.71	1.64	0.88
Pseudoword Accuracy	85.99	17.19	70.08	18.91	75.15	31.38

Note: All categories (proficient, struggling, word caller) are teacher-identified.

Appendix 9

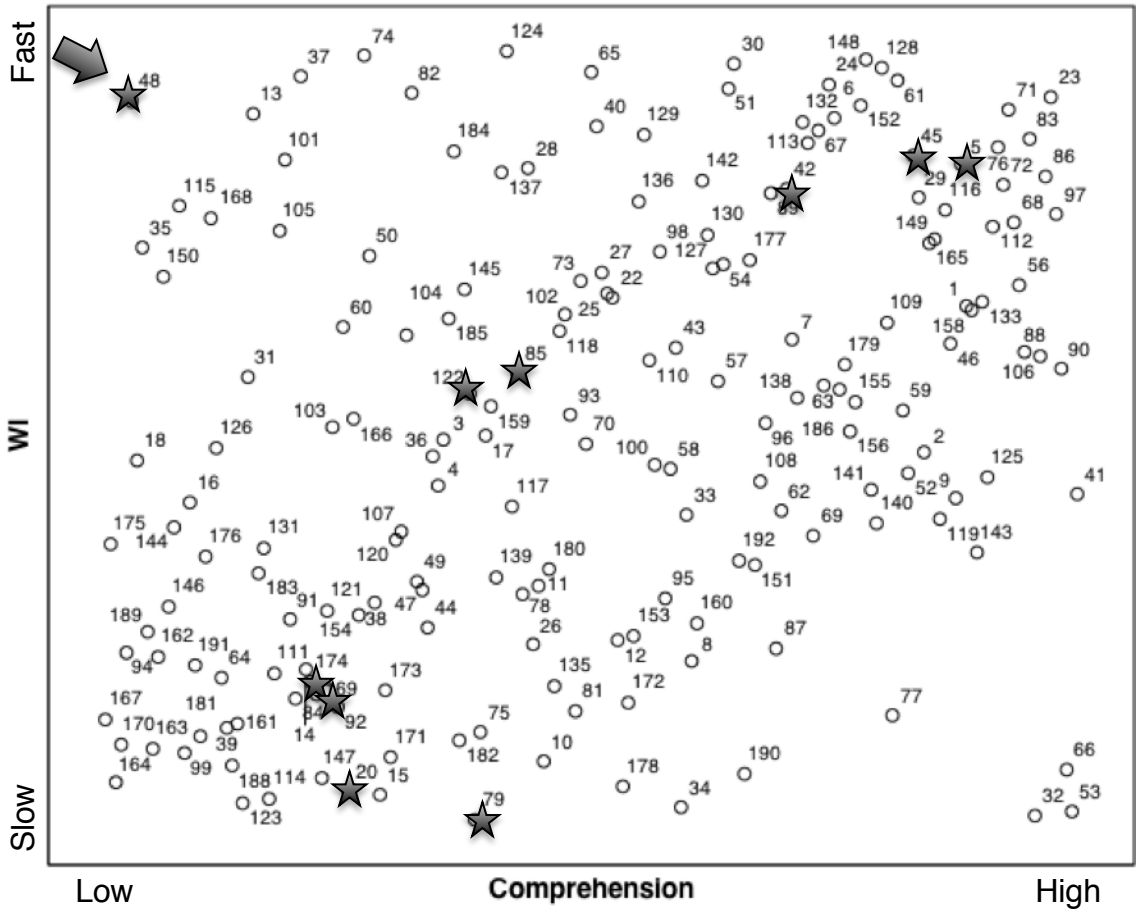

Figure 6. Scatterplot depicting the distribution of participants based on comprehension and pseudoword reading abilities. Teacher-identified word callers are signified by a star shape.

Appendix 10

Figure 7. Scatterplot depicting the distribution of participants based on working memory and pseudoword reading abilities. Teacher-identified word callers are signified by a star shape.

Emergent themes

Factors	N	Definition	Illustrative Quote
		Reasons for identifying word callers	
Classroom observation as assessment	6	Assessing reading through classroom observation	Teacher H, 3rd grade - "…just do some sort of volunteer reading, whether it's just to you or aloud to the whole class if they feel comfortable… and you'll very quickly figure out which ones are either faking it till they make it or the ones that will you know…"
Vocabulary	7	Knowledge of word meanings	Teacher D, 3rd grade: "pure and simple understanding of what you're reading and having an understanding of the vocabulary."
Reading assessments	11	The use of formal reading assessments including AIMSWeb	Teacher E, 3rd grade: "We use the AIMSWeb now to sort of get an idea of what level the kids should be able to read at…"
Motivation	7	Mention of the importance of student motivation	Teacher K, 4th grade: "If I've got kids that cannot maintain focus for a significant period of time, it's likely it's because they don't want to read what they're reading…"
Decoding speed/fluency	7	The importance of speed when measuring decoding ability	Teacher F, 3rd grade: "When they come to 3rd grade they should be reading 85 words per minute and when they leave, they should be reading 95 words per minute."
		Interventions	
Practice Reading	6	Spending time engaging in reading activities	Teacher I, 4th grade – "Really it's just practice. They have to read every day."
Increase Fluency	4	Interventions aimed an increasing both word	Teacher H, 3rd grade - "I've had them do timed reading to try to get them to beat their time, just to get them more

		identification speed and accuracy	fluent and speed up."
Increase Comprehension	11	Interventions aimed at increasing comprehension	Teacher I, 4th grade - "…things like making predictions, using graphic organizers but also kind of chunking the text and breaking it into pieces so that they can comprehend one small part at a time then put it together as a whole."
Reading Instruction	6	General reading instruction strategies that help all readers	Teacher G, 3rd grade - "I use Making Meaning [a reading program that is comprehension-strategy intensive] within the Daily Five structure, and then I teach guided reading every day."
		Forecast for success	
Learning to read vs. reading to learn	3	Acquiring reading skills vs. reading for the purpose of learning content	Teacher K, 4th grade - "…prior to fourth grade the kids are trying to learn how to read and now fourth grade and beyond they are reading to learn facts and figures and story lines and so forth."
Teacher factors	6	Success of readers may depend in part on teaching ability of future teachers	Teacher J, 4th grade - "By the time kids get to the fourth grade, most of the fourth grade teachers don't know how to teach reading, so they assume that their kids can already read these books and novels and comprehend them… and they don't know how to teach phonics."
Differentiated instruction	7	Instruction/intervention strategies tailored for students' specific needs	Teacher A, 3rd grade: "All students should be in a small group guided reading so they get that support to grow from where they are, to go wherever they need to be."
Home life	6	The ways in which parental/family support impact student learning	Teacher E, 3rd grade: [asked how do students best learn to read] "I think with their parents, because I think at a young age they are getting their attention that they need but also

			doing something constructive."
Outlook	5	Specific mentions of the forecast for success for word callers and struggling readers	Teacher D, 3rd grade: [referring to word callers] "From what I've seen, they're the least likely to make progress. They're more likely to not be reading at grade level in 4th grade and 5th grade too."

Other findings

Factor	N	Definition	Characteristic response
Vocabulary	7	Knowledge of word meanings	Teacher D, 3rd grade: "pure and simple understanding of what you're reading and having an understanding of the vocabulary."
Practice Reading	6	Spending time engaging in reading activities	Teacher I, 4th grade – "Really it's just practice. They have to read every day."
Learning to read vs. reading to learn	3	Acquiring reading skills vs. reading for the purpose of learning content	Teacher K, 4th grade - "...prior to fourth grade the kids are trying to learn how to read and now fourth grade and beyond they are reading to learn facts and figures and story lines and so forth."
Teacher factors	6	Success of readers may depend in part on teaching ability of future teachers	Teacher J, 4th grade - "By the time kids get to the fourth grade, most of the fourth grade teachers don't know how to teach reading, so they assume that their kids can already read these books and novels and comprehend them... and they don't know how to teach phonics."
Classroom observation as assessment	6	Assessing reading through classroom observation	Teacher H, 3rd grade - "...just do some sort of volunteer reading, whether it's just to you or aloud to the whole class if they feel comfortable... and you'll very quickly figure out which ones are either faking it till they make it or the ones that will you know..."

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CURRICULUM VITA

Lindsay S. Couzens, Doctoral Candidate

Rank: Doctoral Candidate, UNLV; Coordinator of Academic Assessment, Department of Academic Assessment, Office of the Vice Provost for Academic Affairs

Date of Current Appointment: August, 2006

Area of Interest: Academic Assessment; Early Literacy

I. EDUCATIONAL HISTORY

October, 2011 Advanced to doctoral candidate, University of Nevada, Las Vegas
2005- present Enrolled in Ph.D. program, University of Nevada, Las Vegas
2005 M.S. Educational Psychology, University of Nevada, Las Vegas
2002 B.S**.** Early Childhood Education, University of Nevada, Las Vegas

Honors and Awards
2011 UNLV Access Grant Recipient
2010 UNLV Access Grant Recipient
2007 Departmental nominee, UNLV President's Fellowship
2007 Invited to attend AERA Division C Graduate Student Seminar. Chicago, IL
2004 Alumni Association Scholarship Recipient

II. PROFESSIONAL HISTORY

August 2012 – Present Coordinator of Academic Assessment, UNLV
Duties include consulting with faculty to assist with assessment duties; development and implementation of faculty workshops; accreditation support
2006-August 2012 Graduate Assistant, UNLV Department of Academic Assessment, Office of the Vice Provost for Academic Affairs
2005- 2006 Intern, Clark County School District, Superintendent's Schools, Department of Research and School Improvement
2004-2005 Intern, Clark County School District, Curriculum and Professional Development, Department of Math, Science and Instructional Technology
2002-2004 Graduate Assistant, Department of Educational Psychology, UNLV
1996-2002 Preschool Teacher, University United Methodist Child Development Center

III. SCHOLARLY PUBLICATIONS

Technical Reports and Newsletter Articles (Non-refereed)

Pitch, L., Lewis, A., Edwards, O., Marchand, G., Jordan, M., & Hendricks, L.S. (2007). Full/extended day kindergarten longitudinal study: Effects of full day kindergarten in subsequent years: Second grade. Interim Report, Las Vegas NV: Clark County School District.

Reynolds, R.E. and Hendricks, L.S. (2004). Teachers' beliefs about word-calling. *NREA Notes, 2*(3), p. 2-3.

Dissertation Title: Word calling in 3rd and 4th graders: exploring student and teacher characteristics.

Dissertation Examination Committee:
Co-Chair, Ralph E. Reynolds, Ph.D.
Co-Chair, Gwen Marchand, Ph.D.
Committee Member, W. Paul Jones, Ed.D.
Committee Member, LeAnn G. Putney, Ph.D.
Graduate Faculty Representative, Cyndi Giorgis, Ph.D.

IV. SCHOLARLY PAPER PRESENTATIONS

Hendricks, L.S., Reynolds, R.E., Amoia, E.A. (2002, December). Teachers' beliefs about wordcalling. Paper presented at the meeting of the American Reading Forum, Sanibel Island, FL.

Hendricks, L.S., Reynolds, R.E. & Sinatra, G.M. (2004, August). Teachers' beliefs on word calling phenomena in their own classrooms. Paper presented at the annual meeting of the American Psychological Association, Honolulu. HI.

Hendricks, L.S., Reynolds, R.E. & Sinatra, G.M. (2005, April). Teachers' beliefs on word calling phenomena: A longitudinal case study of interventions and outcomes. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.

V. WORKSHOP AND CONFERENCE PRESENTATIONS

Bubb, D. K. & Couzens, L. S. (2013, July) Building a faculty-driven assessment culture: Making it meaningful at large institutions. Paper presented at the meeting of the Association of Assessment in Learning and Higher Education, Lexington, KY.

Babbitt, B. & Couzens, L.S. (2008, February). Analyzing assessment results Across colleges/schools or departments. Session conducted at the 6th Annual Northern Nevada Assessment Conference, Reno, NV.

Couzens, L.S. & Rodriguez, J. (2008, November). Survey Development. Roundtable session conducted at the 2008 UNLV Assessment Symposium, Las Vegas, NV.

Clark, R., Couzens, L.S., Juneau, G., & McGarry, E. (2008, November). UNLV student survey results. Panel discussion conducted at the 2008 UNLV Assessment Symposium, Las Vegas, NV.

Couzens, L.S. & Hill, A. (2009, May). Survey Design and Development. Session conducted at the 2009 UNLV Assessment Workshop, Las Vegas, NV.

Couzens, L.S. (2010, November). Graduating Senior Exit Survey Results. Roundtable discussion conducted at the 2010 UNLV Assessment Workshop, Las Vegas, NV.

VI. TEACHING

Courses Taught

Graduate Assistant for Educational Psychology, Proseminar in Educational Psychology and Theory and Philosophy in Educational Psychology

Proximal Mentor for Adolescent Development. Duties included mentoring a small group of students. Assisted students with course content, led and facilitated discussions.

VIII. SELECTED SERVICE

2012-Present Coordinator, Graduate Assessment Sub-Committee, UNLV
2006-Present Member, Academic Assessment Committee, UNLV
2011 Critical Thinking Assessment Test (CAT) Scorer, UNLV
2003 Student reviewer, American Educational Research Association