The Effect of Story Contexts on Complex Verb Learning in Third Grade Students

By

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Abstract

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The purpose of this study was to compare the impact of more and less connected semantic contexts on third graders' learning of complex verb meanings. An experimental design was used. Middle class SES third grade students (*N*=40) were assigned to one of two conditions to learn complex verbs. Students were matched based on word reading ability (WRMT) and members of pairs were randomly assigned to one of the two conditions. The experimental group (cohesive story context) was presented with four sets of sentences. Each set consisted of a brief synopsis of a story followed by six connected sentences containing target verbs telling the story. The comparison group (unconnected context) was exposed to the same sentences without the synopsis and with different agents presented in a different order to minimize connections between the sentences. Based on connectionist theories, it was hypothesized that students presented with target verbs in a cohesive story context would learn more verb meanings than those assigned to the unconnected context. Students completed word reading and receptive and expressive vocabulary pretests prior to being assigned to a learning condition. Performance during learning as well as on five posttests one day after training were examined in order to assess students' abilities to spell, define, and use target verbs in sentences. The contribution of students' existing vocabulary knowledge and word reading skill to their verb learning was also examined. Students in the cohesive context condition outperformed students in the unconnected

condition on most learning and posttest measures. Significant differences between the groups were detected on the more demanding posttest measures (definition production and sentence generation), with students in the connected context condition outperforming those in the unconnected condition. Word reading skills but not vocabulary explained significant unique variance on several measures. Results are discussed in regard to various learning theories, and recommendations are made for vocabulary and general reading instruction.

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Chapter 1

Introduction

Many researchers have investigated language development during the early, pre-school years (Bloom, Margulis, Tinker & Fujita, 1996; Hart & Risley, 1995; Hirsh-Pasek & Golinkoff, 2006). It is equally important to investigate how older children continue to learn language as the demands of written and spoken language increase during the school years. Vocabulary knowledge is closely connected to reading comprehension skill (Biemiller & Boote, 2006; Ebbers & Denton, 2008; Muter, Hulme, Snowling & Stevenson, 2004; Stahl & Nagy, 2006) so it is especially important to identify the most effective methods for teaching vocabulary to enable students to achieve their academic potential. Whereas there is a great deal of research on the acquisition of verb meanings in young children, research has not yet focused specifically on the nature of verb learning in school age children or its role in reading comprehension. It is commonly accepted that, in general, children learn nouns earlier and more easily than they learn verbs (Golinkoff & Hirsh-Pasek, 2006).

Various vocabulary instruction techniques have been investigated (Bryant, Goodwin, Bryant & Higgins, 2003; Penno, Wilkinson & Moore, 2002). One important finding is that different contexts provide varying degrees of support in helping students to acquire new vocabulary. Beck, McKeown and McCaslin (1983) distinguished two types of context, pedagogical context, as was explored in the current study, and natural context. Pedagogical context is specifically designed to help a student learn an unknown word through specific clues, while natural contexts are those in which a word appears without the specific intent to help a reader learn an unfamiliar word. The current study explored methods of direct vocabulary instruction and therefore, was concerned with developing and identifying effective pedagogical contexts. Vocabulary acquisition is complicated and nuanced and while many educators

understand the importance of context in vocabulary instruction, this is often interpreted so broadly as to be an ineffective instructional recommendation (Beck, McKeown & McCaslin, 1983).

One common method of vocabulary instruction involves dictionary usage. This method has not been found particularly effective and researchers recommend that this method be used in tandem with other strategies. In order for vocabulary instruction to be effective, students must not only learn definitions but also have the word modeled in sentences, receive multiple exposures, and participate in guided practice writing sentences (Biemiller & Boote, 2006). There is a need to extend the research regarding language acquisition in general and verb acquisition specifically to include the nature of verb learning in school-age children in order to better understand and implement effective practices of vocabulary instruction.

In general, young English-speaking children learn nouns earlier and more easily than they learn verbs (Golinkoff & Hirsh-Pasek, 2006). Nouns, particularly those learned in the early years, tend to be concrete, whereas verbs and other word classes tend to be more abstract. Words that have concrete referents are typically learned earlier and more easily than more abstract words (Sadoski, 2005). Monolingual English speaking children often produce nouns prior to words from other form classes but these early utterances can be highly idiosyncratic and one or two words may imply more complex messages such as when a child says, “Milk” to indicate a request, preference or direction rather than simply a label.

To define verbs as action words is to oversimplify their role in language (Behrend & Scofield, 2006). Verbs express relations among the various elements within a sentence, and therefore are more complex than many other word classes (Gentner, 1978). In order to learn a word fully, one must understand its semantic and syntactic characteristics, but these are rarely

taught completely or directly (Cassidy & Kelly, 2001). Complex verbs lack concrete referents and have arguably more nuanced semantic and syntactic characteristics, making them more difficult to learn. It is therefore necessary for children to learn the constraints of more complicated verbs in order for them to understand and use these words correctly in order to enhance their overall learning and vocabulary. For example, in order to learn the word *protrude*, a student must understand that *protrude* is generally accompanied by the word 'from' plus a base or location and that the subject is generally an object whose movement is static rather than active. This information is not necessarily present in a simple definition of, 'to stick out'.

Word knowledge is complex making it difficult to say that one either knows the meaning of a word or does not. Rather, we understand words in varying degrees, a principle known as incrementality (Nagy & Scott, 2000). According to Nagy and Scott (2000), words are represented in memory as part of a rich semantic network so that each time a word is encountered, this event adds to the knowledge of the word based on the new context in which it appears. Word meanings are multidimensional; in order to truly understand a word, one must understand it in all of its forms, in multiple contexts and be able to understand its relationship to other words (Nagy & Scott, 2000). This leaves open the question of whether it is more efficient to teach new verb meanings in a cohesive story context or in an unconnected context condition. The current study aimed to address this question.

The principles of incrementality and multidimensionality are particularly evident in verb learning. Verb learning requires an understanding of the interrelatedness of words as well as the ability to recognize such differences as tense and number (Gentner, 1978). Because verbs are generally considered more complex than nouns, they demand more complex instruction (Stahl & Nagy, 2006). Of course, not all verbs are equally complex, and other word classes present

nuanced meanings as well, but that is beyond the scope of this study. As reading material becomes more complicated and students begin learning more intricate concepts, subtle differences in verbs are needed to convey information accurately. This subtlety is often overlooked by students in the middle and upper grades. This may be because they have only a very general understanding of the verb itself or because they are unable to infer its meaning and relevance to the understanding of a new concept due to the elaborate sentence construction needed to use the verb correctly.

The increasing complexity of reading material requires an increasingly sophisticated ability to understand and apply the many facets of language, including vocabulary. How such abilities are developed and organized was a question addressed by the current study. Reichle and Perfetti's (2003) word-experience model states that word knowledge increases with experiences with individual words. The more encounters a learner has with a word in any form (i.e. spoken vs. written, derived vs. non-derived etc.) the better the word and all its related forms are represented in memory. The lexical quality of a word's representation in memory refers to the degree that orthographic, phonological and semantic features of a word are represented and connected in memory. This model raises questions about the degree to which semantic relatedness affects lexical quality of unfamiliar, complex verbs. It seems logical that the quality of the semantic context would affect the lexical quality of any given word; the more complex the word, the greater the need for high-quality semantic context. What does such high-quality semantic context look like?

Latent Semantic Analysis (LSA) is a mathematical model that has been used to simulate word learning. This model has demonstrated word learning capabilities that closely resemble that of humans and underscores the influence of context in learning new words. LSA has shown

that new words can and should be learned in context and that often, knowledge of word meanings is strengthened even when the words do not appear in the text presented to a learner (Landauer & Dumais, 1997). This raises important questions about how to develop and access connections among various knowledge domains within a learner and among prior and new knowledge. The authors point out that acquiring knowledge about a concept enhances knowledge of known and new words and vice versa, indicating the inextricable connection between vocabulary knowledge and reading comprehension.

The purpose of the current study was to investigate the influence of semantic connectedness on verb learning in third grade students. The principal research question was whether children learn complex verbs better when verbs are taught in a cohesive story context or in an unconnected control condition. The importance of context in vocabulary learning has been demonstrated by many researchers (Biemiller & Boote, 2006; Landauer & Dumais, 1997; McDaniel & Pressley, 1989; Nagy & Scott, 2000; Nelson & Stage, 2007; Rodriguez & Sadowski, 2000), but the type of semantic context and the role of the cohesiveness of such contexts have yet to be investigated. It was expected that students who were exposed to complex verbs and their meanings in a cohesive semantic context would learn the verbs better than students who were exposed to the same verbs in an unconnected context. A second purpose of this study was to examine the relationship between word reading skill and complex verb learning. It was expected that students with better word reading skill would learn more vocabulary words than students with poorer word reading skill. Additionally, it was expected that students with larger vocabularies would learn more vocabulary words than students with smaller vocabularies.

Chapter 2

Literature Review

Overview of Language Development:

Language learning is constant and ever-changing, where both quantity and quality are important factors. Spoken language begins in a pre-linguistic period with children crying. Crying becomes differentiated as early as six to eight weeks to indicate various needs, such as being hungry or wet. Next, babies begin to coo, making a full range of noises with their vocal chords. Then babbling emerges, when babies make word-like sounds, beginning with repetitive production of sounds from their linguistic environment and gradually introducing intentional sounds and sound combinations. Spoken language emerges next, sometime around a child's first birthday. Children say their first words, which tend to have high communicative value, be quite idiosyncratic and very context-dependent. Children then move on to create phrases, stringing words together to express relationships between labels of things that are meaningful to them. They may express ownership, negation or possession by saying something such as, "My doll." Again, these phrases may be idiosyncratic in sound or usage and highly dependent on context (Stark, 1989).

Although the emergence of spoken language as described above seems to be a generally reliable and universal pattern, the content and context of first words and phrases is not without variability. Much of the content of early words and phrases is dependent on the nature of the input the child receives. The quantity and quality of the linguistic input a child receives has a tremendous and lasting impact on the nature of their linguistic ability. The types of words that children learn and use are related to the types of words their caretakers teach and use with them, the input they receive.

While many English speakers label objects, speakers of other languages provide alternative linguistic input and this affects the nature of children's language acquisition. Goldfield and Reznick (1990) conducted a longitudinal study of eighteen children with English-speaking caregivers and found that at around eighteen months of age most of these children underwent a rapid increase in their vocabulary, largely adding nouns to their lexicon. As children begin to use words to describe the world around them they are linking words with known objects or concepts, largely described by concrete nouns in English (Gopnik & Meltzoff, 1992). One explanation for this so-called noun-bias in early language development is that children understand nouns conceptually better than they understand other word classes such as verbs. This is because nouns often have clear referents on which children can easily map new words. While research indicates that many English-speaking children tend to learn and use nouns before other word classes and that a young child's vocabulary is often dominated by nouns, this is not necessarily a universal phenomenon, nor does it indicate an inability to understand other word classes. English-speaking children may produce nouns and noun-phrases early to indicate possession, action, desire among other things, implying verbs rather than stating them.

Cross-linguistic studies of language acquisition indicate that there are differences between the linguistic developments of children from different linguistic backgrounds. Tardif (1996) studied children born in Beijing, China to Mandarin-speaking families. Children were between 20 and 22 months of age at the beginning of the study. The study examined two socioeconomic groups of families; 'workers' who had formal schooling of a high school level or below, and 'intellectuals' who had formal schooling of a college level or above. In this study, natural language samples were recorded and transcribed in order to determine the nature of the

language used by children and caregivers. Five children were included in the 'workers' group and five children included in the 'intellectuals' group, equated for age and gender.

Results of the study indicated significant individual differences across all children in terms of vocabulary size and syntactic development. Children in the 'intellectuals' group had larger vocabularies than children in the 'workers' group. In contrast to studies conducted with native English-speaking children, the Mandarin-speaking children from both socioeconomic groups produced more verbs than nouns in their early vocabularies. One possible explanation for the predominance of verbs in the early vocabularies of young Mandarin-speaking children is the syntax of Mandarin, although Tardif asserts that this is not likely to be the only explanation of these differences. Instead, the study concludes that the predominance of nouns in English-speaking children's early vocabularies or other word classes in the early vocabularies of children from different linguistic backgrounds cannot be explained by a cognitive predisposition toward a particular type of word learning. The role of input, specifically the characteristics of frequency, perceptual salience, morphological simplicity and interactional qualities of the language learning process, must be considered as an important factor in word learning.

Similar results from other cross-linguistic studies have been found. Tse, Chan and Li (2005) confirmed Tardif's (1996) findings of verb-dominated expressive vocabularies of young Cantonese-speaking children and closely examined the aspects of input described in the earlier study. In explaining their findings, the authors stress the need to consider cultural, linguistic and contextual influences in language learning. They state that nouns have greater perceptual salience in English than in Cantonese or Mandarin, making nouns easier to learn for English-speaking children. The authors cite research finding that Korean-speaking and Mandarin-speaking caregivers produced more verbs in their speech than English caregivers, who were

more likely to engage in naming activities with young children. These characteristics of input clearly influence the early expressive vocabularies of young children and this has lasting effects on the development of children's vocabularies as they enter school.

In another cross-linguistic study, Choi and Gopnik (1995) studied Korean-speaking children in order to investigate the nature of their language development. They too were interested in the lexical development of children and compared Korean-speaking children with English-speaking children. They found that Korean-speaking children's early vocabularies could be better characterized as having a 'verb spurt' rather than a 'noun spurt' as described by Goldfield and Reznick (1990). Choi and Gopnick (1995) drew similar conclusions as Tardif (1995) and Tse et al (2005), stating that differences in language development of young children across languages and cultures could be attributed to the nature of the input caregivers provided. They found that Korean-speaking caregivers were more likely to provide activity-oriented words (i.e. verbs) than their English-speaking counterparts. Again, it is possible that the structure of these languages influences the type of input the caregivers provide to their children, but it is essential to study the changing nature of input over time more closely in order to better understand word learning, specifically differences in learning words from different word classes.

The studies above indicate that input is clearly a critical factor in early word learning. Cross-linguistic studies also support the importance of perceptual salience, morphological simplicity and interactional features of the language learning process, but frequency also has a tremendous impact on early vocabulary development. A seminal study conducted by Hart and Risley (1995) found that very young children from lower socioeconomic backgrounds had far fewer experiences with words than children from more advantaged backgrounds. The linguistic gulf between children of lower and higher socioeconomic backgrounds was present by the time

children entered school and then did not diminish significantly over time, in spite of continued school instruction and life experiences. While this study highlights the far-reaching effects of poverty it also underscores the importance of understanding the nature of word learning and identifying the most effective methods of instruction so as to help counteract the effects of poverty on school achievement. With more research into the nature of vocabulary learning it may be possible for schools to make a greater impact on children's lives, possibly breaking devastating cycles of poverty and neglect.

The importance of Hart and Risley's work (1995) cannot be overstated as it helped lay crucial groundwork for understanding vocabulary acquisition in young children from different socioeconomic backgrounds and the importance of better understanding methods of instruction. Biemiller and Slonim (2001) also studied the vocabularies of normative and advantaged children. They note that there are differences in the vocabularies of young children of different socioeconomic backgrounds prior to formal education and cite evidence that school experiences do not appear to significantly influence vocabulary growth in kindergarten and first grade. However, the authors make an interesting point by stating that it seems likely that children *do* make vocabulary gains in these early grades, but do not necessarily reach a common grade level vocabulary as they begin with vocabularies of varying sizes. This means that in spite of progress being made in both groups of children, the gap does not close. This conclusion is rather bleak, particularly for teachers and caregivers of children from disadvantaged linguistic backgrounds and underscores the importance of better understanding the nuances of effective vocabulary instruction.

One perspective on language learning is that children learn either nouns or verbs more easily depending on the type of input they receive as preverbal children, and this is likely to

impact their ability to learn new words of different word classes as they get older. However, another perspective is that word learning is not dependent on the syntactic class but on the complexity of the word, regardless of the class. Maguire, Hirsh-Pasek and Golinkoff (2006) contend that words that label "more perceptually accessible concepts" might be learned earlier and more easily than words that represent more abstract concepts. They state that all word classes have words that vary in complexity so that words within and across syntactic classes are learned differently based on this complexity. The Emergentist Coalition Model (ECM) states that children have access to different sources of input including perceptual, linguistic and social. These sources of input help children discover referents for new words. Words that have the most perceptually salient referents are those that populate a child's earliest vocabulary and more complex words that rely on more complex social and linguistic cues are the ones that emerge later in a child's vocabulary. Therefore, concrete nouns such as 'table' and simple verbs such as 'run' appear in a child's vocabulary before more abstract words such as 'freedom' and 'think'. Children understand perceptual information earlier and more easily than social and linguistic information as helps guide word-to-world mapping. As children get older they rely more heavily on social and linguistic cues in order to expand their vocabulary.

The above research describes early word acquisition, which lays an essential foundation to understanding later vocabulary learning. There is still a need to understand the complex nature of vocabulary learning in school-age children if we are to help improve the vocabularies of all children and to help close the gap between children from higher and lower socioeconomic backgrounds. Understanding the nature of learning one type of word class can only improve our understanding of learning other word classes, which is one purpose of the present study.

Vocabulary and Reading Acquisition:

Decoding and Vocabulary

The simple view of reading states that reading is the product of decoding and comprehension (Gough & Tunmer, 1986). In this equation decoding is the ability to decipher print and comprehension refers to linguistic comprehension. Therefore, if an individual struggles to decipher print (decode) he or she will struggle to understand the text, and likewise, if an individual is unable to understand words, sentences or discourses within the print, then he or she will also be unable to understand the text. From this perspective it is clear that developing a child's vocabulary will have a direct effect on his or her linguistic comprehension and therefore his or her reading comprehension.

Oulette (2006) examined the role of oral vocabulary in explaining individual differences in literacy acquisition. Specifically, the study looked at the distinction between depth and breadth of vocabulary knowledge and its effects on literacy acquisition. The study examined the contributions of depth and breadth of vocabulary to different reading processes, predicting that the breadth of one's vocabulary knowledge can influence decoding ability while the depth of vocabulary knowledge assists sight word acquisition. The study also anticipated that vocabulary depth would predict reading comprehension.

Fourth grade students were selected for the study due to the importance of vocabulary in reading material at this point in school. Students' receptive and expressive vocabulary breadth and depth were assessed as well as decoding, visual word recognition and reading comprehension. The results supported the hypothesis that depth of vocabulary knowledge is a significant predictor of reading comprehension. The current study will investigate ways to

deepen students' knowledge of specific complex verbs with an intervention involving the comprehension of text.

Learning to decode print is the focus of instruction during the primary grades. At this point, if children struggle with skills such as phonemic awareness or letter knowledge they are likely to struggle to decode and are often identified as needing special assistance. Some children may learn to decode relatively easily in the primary grades and begin to struggle with reading in the later grades. Once children have mastered learning to read they begin reading to learn new material, typically beginning in third or fourth grade (Chall, 1983). At this point, children who have mastered the decoding process may or may not necessarily be able to master reading comprehension in the same way and therefore they may struggle to learn from text, with obvious negative implications throughout their education.

Oral Language and Reading Skills

Children who struggle to master the decoding process often receive specialized reading instruction. This includes direct, systematic instruction in various phonological awareness skills such as phoneme segmentation, blending and the alphabetic principle. There is a great deal of research to support such interventions (see Ehri, 2004, for example) but little research to describe the profile of students who do not respond to this type of intervention (Duff, Fieldsend, Bower-Crane, Hulme, Smith, Gibbs & Snowling, 2008). Duff and colleagues (2008) conducted a study in order to better understand such non-responders and made a closer investigation into factors such as oral vocabulary and grammar in order to better understand their contributions to the reading process.

Oral language skills include vocabulary knowledge and grammar knowledge. These skills are related to word reading but the nature of the relationship is not entirely clear. What is clear however is the fact that there is high comorbidity between language disorders and reading disorders. It is likely that children who struggle with various oral language disorders will also struggle with reading and may not respond to typical reading interventions as they may suffer from dual deficits in phonology and oral language. Duff and colleagues (2008) had two major goals in their study: 1) to investigate the oral language skills of children who did not respond well to typical reading interventions which relied on increasing phonological skills, and 2) to design an intervention that might better meet the needs of these non-responders.

The authors designed their intervention for non-responders based on the lexical restructuring hypothesis. This hypothesis states that vocabulary growth causes lexical representations to become increasingly specific and segmented. Based on this hypothesis, the intervention tested in this study aimed to approach reading in a broader context of language intervention, so that it would include training in phonological skills much like more typical reading interventions, but would also include vocabulary training based on the belief that increasing one's vocabulary leads to increased phonological awareness. They hypothesized that this intervention that combined phonology with vocabulary instruction would increase children's phonological awareness, vocabulary, expressive language and reading abilities.

Participants in the study were chosen based on their response to a previous reading intervention in which they did not make adequate progress and were therefore deemed to have more severe reading difficulties. Twelve children between five and six years of age participated in the study. Literacy skills, oral language skills and phonemic awareness skills were assessed and then students were provided with 'Reading with Vocabulary Intervention'. Children

received nine weeks of instruction in vocabulary, oral reading and phonological training. At the end of nine weeks their literacy, oral language and phonemic awareness skills were assessed again.

As was described earlier, children in the study demonstrated significant impairments in phonological awareness and literacy levels. Oral language skills were also significantly impaired with expressive vocabulary scores in the fifth percentile and poorer than expected grammar, expressive language and processing speed. Children showed significant gains after the intervention. They improved in phoneme segmentation, letter-sound knowledge, oral language and vocabulary. Although the children made impressive gains it is important to note that the intervention remains at the lower end of efficacy as they gained approximately 0.13 standard score points in reading per hour of the intervention, with the average being approximately 0.20 standard score points per hour of intervention (Duff et al, 2008). In spite of this finding, there are many important implications of this study for further reading and vocabulary intervention.

Duff and colleagues (2008) found that the non-responders included in their study demonstrated weaknesses in phoneme awareness as well as vocabulary, grammar and expressive language. Other studies have not found the same relationship between semantic or syntactic skills and response to typical phonologically based reading interventions. The authors point out that their study included children from a lower socioeconomic background than other studies investigating relationships between phoneme awareness and oral language skills, and that this may have been an important factor in the study. Children who have less exposure to vocabulary and complex language at home are at a significant disadvantage if they have a phonemic awareness deficiency such as those seen in many children who struggle with reading in the early grades. These children may be less likely to respond to typical reading interventions that focus

almost entirely on decoding skills. The study by Duff and colleagues (2008) underscores the importance of including robust vocabulary instruction in reading interventions so as to meet the needs of the neediest in a comprehensive manner. Results from my pilot study in which students learned complex verbs in more and less connected semantic contexts indicated a strong relationship between word reading skill and vocabulary learning, consistent with the findings of Duff and colleagues (2008). Taken together these results indicate that the relationship between decoding, reading comprehension and vocabulary is complex and likely not unidirectional. The current study aims to build on the research described above in order to emphasize the importance of including vocabulary instruction in effective literacy instruction. In order to this we must better understand the components of effective literacy instruction at various stages of development, including vocabulary learning.

Nation (2008) asserts that one's ability to read words is deeply rooted in more global language capacity. This larger language system includes a complex network of semantic and episodic knowledge. That is, many sources of information are available to readers as they read, understand and make connections within and among texts. Harm and Seidenberg (2004) describe a computational model of word reading known as the triangle model. In this model, orthographic, semantic and phonological components contribute to skilled word reading. These components provide different types of input to a reader about words, and over time work together to create sets of semantic units. These units are activated based on ongoing input from the three components. Therefore, readers can access word meanings and/or semantics. Which component contributes the most to skilled word reading is a subject of great interest and debate and one which has implications for how reading should be taught. These will be discussed in greater detail below. Research indicates that orthographic and phonological inputs together

mediate the semantics of words and further, these contributions vary in relation to reader skill, word frequency and spelling transparency. This model gives yet another instance in which stronger readers are better able to rely on the various components of word reading than weaker readers.

Early reading difficulties are often difficulties mastering the alphabetic principle and other phonological skills necessary to master the decoding process. As such, early remedial reading instruction tends to focus on developing these skills, sometimes to the exclusion of other important literacy skills. As described above, not all children respond to this remediation but many do master the decoding process as a result of systematic instruction in phonological skills. There are also children who decode with relative ease but struggle with reading comprehension. Reading comprehension can become particularly difficult for students in the upper elementary years as text becomes more complicated and as they become more responsible for learning new material from text. Such students are often not identified by school systems as having specific reading difficulties until the later elementary grades, often making remediation more difficult (Leach, Scarborough & Rescorla, 2003). Early reading instruction can either ignore or assume comprehension, but it is clear that word reading skills and comprehension is intimately connected. The current study shines a light on how vocabulary instruction must be incorporated into general reading instruction to strengthen readers of many backgrounds and levels, rather than keeping vocabulary instruction isolated at best and haphazard at worst. Specific vocabulary instruction techniques are discussed in more detail below.

Decoding and Reading Comprehension

Decoding and comprehension rely on different, yet related, cognitive processes. In order to understand the link between reading comprehension and vocabulary it is important to first understand the link between decoding and comprehension. Children who struggle to decipher print are likely to struggle to understand what they 'read' because too much mental effort is allocated to deciphering print rather than attending to meaning. This is a relatively straightforward finding and implies that further intervention on word attack skills will remediate both decoding and comprehension. However, some children master the decoding process and still do not understand text at the level they are able to decode it. Leach, Scarborough and Rescorla (2003) conducted a study with children identified as having reading disabilities during the upper-elementary grades. The authors wanted to determine the similarities and differences between children identified as having reading disabilities early in the elementary years and later in the elementary years.

Fourth and fifth-grade students from various schools volunteered to participate in the study. Leach et al. (2003) examined parent reports and school records and were able to group the participants into five different categories; 1) early school-identified: Persistent, 2) Early school-identified: Transient, 3) Late school-identified, 4) Parent concern and 5) No history. Children in the Early school-identified: Persistent group had been identified by the school as having difficulty with reading prior to fourth grade and continued to receive remedial reading instruction up to and/or including during fourth grade. Children in the Early school-identified: Transient group were identified by the school as having difficulty with reading prior to fourth grade but no longer received remedial reading instruction after third grade. Late school-identified children were first identified by the school as having reading difficulties in fourth or

fifth grade; Parent concern children had never been identified by the school as having a reading difficulty but had parents who expressed concerns about their reading at some point during the early elementary years and children in the No History group had no history of reading difficulties with the school and no parental concerns about reading.

After examining parent reports and school records and determining the five categories described above, the authors administered a battery of reading, spelling, cognitive and language tests in order to better understand the profiles of the participants. Based on these tests children were assigned to reading ability groups according to various reading skills and deficits. Testing revealed several different reading profiles. One group of children demonstrated reading comprehension deficits but not word-level deficits, indicating trouble with comprehension only. A second group of children demonstrated word-level deficits but no comprehension deficits. A third group demonstrated deficits in both word-level reading and comprehension while a fourth group did not demonstrate any deficits in word attack skills or comprehension.

The authors were interested in understanding the differences between children who were identified as having reading difficulties early in school and those identified later. They hypothesized that children who were identified as struggling with reading later in school would demonstrate comprehension-based difficulty primarily, rather than primarily word-level deficits as demonstrated by many children identified earlier in school. The majority of children in this study who were identified later in school as having reading difficulties demonstrated comprehension deficits, but more than half of these children also demonstrated word-level deficits. Among children with only comprehension deficits, vocabulary and listening comprehension scores were lower than those of their non-disabled peers. Leach and colleagues (2003) concluded that reading comprehension is connected to factors such as oral language

proficiency, vocabulary knowledge, organizational skills and general reasoning skills, but the nature of this relationship is not entirely understood. This is similar to Nation's (2008) claim that children retrieve lexical representations of words based on the depth and breadth of their oral vocabulary. She cites evidence that semantic properties of words influence word recognition. She also states that general language skill influences the development and functioning of the reading system more than specific knowledge of discrete skills. The current study is intended to improve our understanding of factors such as the cohesiveness of semantic contexts, word reading skill and existing vocabulary knowledge, by investigating how children are able to learn new vocabulary words in general, complex verbs specifically. It is clear that there are many factors underlying successful word reading and comprehension, vocabulary being just one of the building blocks, and there are many theories to describe the important and complex relationship between vocabulary and reading comprehension.

Vocabulary and Reading Comprehension: 6 Hypotheses

It may seem obvious that one who is a better reader will have a bigger vocabulary and that, conversely, one who has a bigger vocabulary will be a better reader, as they are able to understand more words than someone with a smaller vocabulary. However, the relationship between reading comprehension and vocabulary is more complicated than it might seem and many researchers have proposed hypotheses by which to describe this relationship. Stahl and Nagy (2006) outline five of these hypotheses. The *instrumental hypothesis* initially put forth by Anderson and Freebody states that knowing more words makes a person a better reader. This hypothesis assumes a direct and linear relationship between vocabulary and reading comprehension.

Another possible explanation for the reading comprehension-vocabulary connection is the *knowledge hypothesis*. This hypothesis states that it is not necessarily only knowledge of words that makes someone a stronger reader, but rather the understanding of the concepts that these words represent. In this hypothesis vocabulary is a proxy for the understanding of concepts. Children who read passages about a particular concept are likely to know many words related to that concept, making vocabulary and concept knowledge virtually indistinguishable. The knowledge hypothesis is based on the idea of words being a connectionist network, linked by a semantic network to other words representing various concepts, facts and experiences. This hypothesis lends support to the notion put forth by the current study that learning new verbs in a cohesive story context will develop stronger understanding than learning the same words in an unconnected context. This is because the new verb is more likely to become embedded in a network of ideas when presented in a cohesive story to illustrate the meaning of and connections among the sentences, helping to link the target verb to an established framework of prior knowledge as opposed to learning the verb in an unconnected context.

The *aptitude hypothesis* states that vocabulary and reading comprehension are highly correlated because both are representative of an underlying aptitude. In this case, vocabulary and reading comprehension have no causal relationship but are different faces of an underlying linguistic aptitude. According to this idea, students with a high verbal aptitude are going to learn words more easily than those with a lower verbal aptitude. Students with a high verbal aptitude are also likely to be better able to understand what they read than their peers with a lower verbal aptitude. The manner in which verbal aptitude is measured is not stated explicitly.

It may be that the relationship between vocabulary and reading comprehension is connected by one's ability to draw inferences. Another variation of the aptitude hypothesis is the

metalinguistic hypothesis, which states that the relationship between reading comprehension and vocabulary knowledge is mediated by one's metalinguistic awareness, such as phonemic awareness or morphological awareness. This version of the aptitude hypothesis explains that a person with a larger vocabulary not only knows more word meanings but has a better understanding of the subtle differences in word meanings, allowing them to understand complex concepts in more sophisticated and complete ways than those with smaller vocabularies.

The *access hypothesis* focuses on the automaticity of word knowledge in comprehension. Like the metalinguistic hypothesis, the access hypothesis claims that those with larger vocabularies have both a deeper understanding and automatic access to their knowledge of these words. As these individuals read they are able to quickly bring their knowledge of individual word meanings to mind and this leads to better reading comprehension than those with smaller vocabularies. This hypothesis also indicates a direct, linear relationship between vocabulary knowledge and reading comprehension.

As stated above, some researchers believe that the relationship between vocabulary knowledge and reading comprehension is less than direct. The *reciprocal hypothesis* makes the case for a circular relationship between vocabulary and comprehension. Like the instrumental hypothesis, the reciprocal hypothesis states that having a larger vocabulary leads to better reading comprehension, but also acknowledges the impact that reading comprehension can have on vocabulary knowledge as well. According to this hypothesis, individuals with stronger reading comprehension are likely to read more than those with weaker reading comprehension and this expanded exposure to text leads to an expansion of vocabulary. In turn, an extensive vocabulary enables one to be able to read and understand more complicated text, further improving vocabulary. The reciprocal hypothesis is not only limited to vocabulary knowledge,

but like the knowledge hypothesis, it states that if one is gaining more vocabulary knowledge then one is also gaining a better understanding of various concepts, further enhancing vocabulary knowledge as well as reading comprehension.

Each of these hypotheses highlights the strong relationship between vocabulary knowledge and reading comprehension. There is also a great deal of overlap among these ideas. Taken separately however, each hypothesis has a slightly different instructional implication. It is essential therefore to remember that vocabulary instruction is likely to be at least as complex and nuanced as the relationship between vocabulary knowledge and reading comprehension. There is no doubt that difficulties with any aspect of reading at any point in a child's academic career can have a multifaceted impact on all areas of a child's learning.

Theories of Text Processing

A well-developed vocabulary may influence reading comprehension but exposure to print also influences vocabulary growth (Cain & Oakhill, 2007), again supporting the notion of a reciprocal relationship between reading and vocabulary knowledge. Cain and Oakhill (2007) cite research indicating that poor comprehenders have specific deficits with specific types of words, namely low-frequency words and irregular verb forms. This provides further evidence of the Matthew effect in which strong readers are exposed to more print, reinforcing and improving their reading skills, while weaker readers are exposed to less print, compounding their difficulties with reading and creating a widening gap between weak and strong readers (Stanovich, 1986).

Comprehension is at least as complex as decoding or word knowledge, relying on the coordination of many different cognitive processes (Cain & Oakhill, 2007). There are different

theories that try to explain how readers make sense of text and these theories fall into two general categories; top-down processes and bottom-up processes. Schema theory is one that explains comprehension processes being top-down in nature. In regard to reading comprehension, very simply, a reader accesses information from long-term memory or prior knowledge as he or she reads. Information already existing in long-term memory is organized into schemata, which are templates of events or situations. As a reader encounters a new situation, he or she has to reconcile the new information with the existing schemata in order to develop adequate understanding of the text (Schunk, 2004).

The Construction-Integration model of Kintsch (2004) describes comprehension processes as being bottom-up in nature. According to this model, readers generate several possible meanings of words, phrases and/or sentences as they read and these possible meanings are generated simultaneously. Once a rich enough context has been provided, the reader is able to select the appropriate construction and apply it to his or her greater understanding of the text. This selection occurs via a system of integration where each construction is submitted to a constraint satisfaction process. Constructions that do not fit with the given context are ignored or discarded and those that are consistent with the context are strengthened. When an appropriate construction is settled upon by the reader, activation of the construction is spread through the network of knowledge of the reader. This spreading activation works to connect similar ideas and information from the text and the reader's prior knowledge. This theory again emphasizes the importance of context in the construction of meaning and has clear implications for vocabulary learning as well.

Some of the factors that influence reading comprehension include word-level processes such as decoding ability, and semantic skills including vocabulary knowledge as described

earlier. Sentence-level skills also influence reading comprehension and are related to vocabulary knowledge and learning as well. Sentence level skills are similar to verbal aptitude, as described in the aptitude hypothesis above. Verbal aptitude includes syntactic awareness, the ability to understand and manipulate the grammatical structure of sentences, which influences and is influenced by vocabulary knowledge and reading comprehension. Again, it is not only knowledge and retrieval of individual word meanings that influences reading comprehension, but overall sentence meaning that is important (Cain & Oakhill, 2007). Verbs play a unique role in sentence meaning, making it of critical importance to understand individual verb meanings and the different ways in which they can and cannot be used in sentences. Children with limited vocabularies will struggle to understand language they hear and read making it essential to identify methods of vocabulary instruction that can help alleviate this difficulty.

Strong readers are able to use their understanding of individual words as well as sentences in order to interpret the meaning of text they read. They are also better able to use context to aid them when faced with unfamiliar words or phrases in a passage or to make connections between known and new material (Cain & Oakhill, 2007). Cain, Oakhill and Lemmon (2004) found that students with poor comprehension were less able to use semantic content to make important inferences. The authors conducted two studies to investigate the relationship between vocabulary and reading comprehension. The goal of their first study was to examine whether nine and ten-year-old children with good and poor reading comprehension differed in their ability to infer meanings of new vocabulary words from context. Children were presented with short stories containing nonsense words with novel meanings and asked to determine the meanings of these words based on the contexts in which they appeared. Children with poorer reading comprehension skills were less likely to infer the meanings of the

vocabulary words from the contexts provided than children with stronger reading comprehension.

The second study sought to investigate the impact of individual differences in vocabulary knowledge and reading comprehension on vocabulary learning. Using three groups of students (skilled, less-skilled comprehenders matched for vocabulary knowledge and less-skilled comprehenders with weaker vocabulary skills than the other two groups) the authors repeated the inference task from the first study and added a direct instruction task as well. Children with weak vocabulary and comprehension skills needed more repetitions to learn the definitions of the target words than children from the skilled comprehension group or from the skilled comprehension with good vocabulary skills group. This finding is indicative of the strong relationship between reading comprehension and vocabulary knowledge and learning. The authors are careful however, to state that although there is a strong relationship between vocabulary knowledge and reading comprehension, this relationship is complex and an increase in vocabulary knowledge does not necessarily lead to subsequent increase in reading comprehension (Cain, Oakhill & Lemmon, 2004). One important conclusion that can be drawn from this study is that students with weaker reading comprehension are also likely to have smaller vocabularies than their peers with stronger reading comprehension. In addition, students with weaker reading comprehension are less able to infer meanings of unfamiliar vocabulary words from context, in spite of having a greater need to do so. It is these students who are in greatest need for effective vocabulary instruction and the current study aims to identify at least one effective method.

Vocabulary Learning Processes:

In the first few years of life, children are learning many things rapidly, including new words. First words are often highly personal and idiosyncratic, reflecting the home environments of and input provided to young children. When children begin learning and producing words during the second year of life, they begin slowly, and at approximately eighteen-months of age they begin to increase their word knowledge rapidly. This vocabulary spurt has been assumed to represent a qualitative cognitive shift where a child changes from learning individual words to learning a language, including understanding constraints on lexical acquisition (Nazzi & Betoncini, 2003). But what happens when children arrive in school, how is vocabulary increased then? Is there a difference between adding words to one's oral vocabulary and increasing print vocabulary? New words are learned incidentally through conversations with teachers and peers and through class discussions and book reading. Direct instruction also plays a role in vocabulary learning, but there are many different ideas regarding the effectiveness of instruction in vocabulary learning.

The Living Word Vocabulary is the result of more than twenty years of research conducted by Dale and O'Rourke (1981) in which 44,000 word meanings were tested to determine the grade level in which they would be known by a majority of children. Using this impressive document, Biemiller and Slonim (2001) attempted to determine the numbers of words known at each grade level. Next, they wanted to determine whether the grade levels continued to have validity almost two decades later. After determining the answer to this question, the researchers wanted to find out how many root words must be learned per day in order for children to have a 'grade-level' vocabulary. Finally, the authors asked to what degree words were learned in similar sequences by children with different rates of vocabulary acquisition.

To address these research questions Biemiller and Slonim (2001) selected English-speaking children from a wide range of socioenomic backgrounds in grades one, two, four and five. These children were included in the 'normative sample'. Upper middle class English-speaking children from the same grades from a private university lab school were also chosen and included in the 'advantaged sample'. A second normative sample was also selected after the first study was completed in order to replicate the first comparisons. Children in first and second grade were asked meanings of words from the Living Word Vocabulary and children in the upper grades completed written testing regarding the words.

The authors found very large gains in vocabulary between first and second grade. They reported slower growth between the end of grades two and six, with the advantaged sample starting with larger vocabularies than the normative sample. By the end of second grade, the advantaged sample had a 20 percent larger root word vocabulary than the normative sample, but this difference was only 3 percent larger by the end of grade five. In the normative sample, by the end of second grade, children acquired a total of approximately 5,200 root words – an average of 2.2 words per day from one year of age.

Most of the differences between children with relatively low vocabulary and those with relatively high vocabulary occurred by the end of grade two. In all three samples, (one advantaged and two normative) there was a rapid increase in vocabulary in grade two, with children from the normative sample and lower quartile adding words *more* rapidly than children with greater vocabularies. Again, this reiterates the importance of early vocabulary instruction as well as the need to know more about vocabulary learning in older grades so as to address the gap that gets harder to close by the end of second grade. The authors concluded that by age seven children have an increased cognitive capacity and are therefore able to ask about words

that are unfamiliar to them. This means that children who are exposed to many new words either through reading materials, class discussions or life experiences, have an advantage similar to the one described by Hart and Risley (1995).

Biemiller and Slonim (2001) point out that at the end of grade two, children in the lowest quartile had as many as 2,000 fewer root words than children with an average vocabulary in spite of making progress in adding to their vocabularies. They conclude, reasonably, that the simplest way to reduce the differences that are apparent in second and third grades is to make an effort to foster vocabulary growth in preschool and the early primary grades. However, the study does not make any suggestions as to what can or should be done after these differences are already present. The current study aims, in part, to address this concern by identifying effective methods of vocabulary instruction for children past the point of typical rapid vocabulary growth. The findings of Biemiller and Slonim's (2001) study are encouraging in that they point out that a sequence of vocabulary instruction is both possible and necessary because vocabulary is critically important for school success. The authors address the need to learn root words, those that are not derived, inflected or compound words. However, they do not address differences between various syntactic roles of words, such as learning nouns or verbs. The current study aims to address this gap.

Biemiller and Slonim (2001) address the need for proper pacing and sequencing in vocabulary instruction, but they do not address other critical aspects of vocabulary acquisition. Reichle and Perfetti's (2003) word-experience model encompasses orthography, phonology and word meanings. They state that word knowledge increases with experiences with individual words. The more encounters one has with a word in any form, the better that word and its related forms are represented in memory, making words vary in their familiarity and availability

to the learner depending on the number and quality of the experiences he or she has with a word. The lexical quality of a word's representation in memory refers to the degree to which the orthographic, phonological and semantic features of a word are represented and connected within a reader's memory.

This model can be seen to lend support to the cohesive story context condition in the present study. Students in this condition learned complex verbs in a related context where they listened to a synopsis of the related sentences prior to listening to and following along with the related sentences that used the target verbs in context. It was hypothesized that this condition would help enhance the lexical quality for each of the target verbs more than the unconnected context condition because the cohesiveness of the sentences would build on existing knowledge of the words and concepts illustrated in the sentences.

One implication of the word-experience model is that wide readers will be more familiar with a greater number of words and word types than less experienced or less skilled readers. Becoming a skilled reader requires one to have multiple encounters with words that create high-quality representations in memory. Reichle and Perfetti (2003) raise some important questions regarding the implications of their model as well. They state that the role of experience with specific words is critical to building a broad knowledge of words in general. If a high-quality representation requires phonological, orthographic and morphological information about a word, what are the most effective means of creating such a representation? Clearly, wide reading will help build high-quality representations of words through phonological decoding and context. The current study closely examined the role of context, including how and whether the quality of the context impacts the quality of verb learning.

Constructivist Network

A robust and well-organized network of knowledge will likely enhance one's comprehension as appropriate constructions can be verified quickly and accurately through the process of spreading activation. Similarly, when one learns a new vocabulary word or encounters an unfamiliar word in text, a reader who encounters the word in a rich, helpful context is likely to be able to incorporate it into his or her existing network of knowledge more quickly and accurately than the learner who does not have the benefit of context. Without such context, unfamiliar vocabulary words can remain suppressed because there is little to help integrate the new vocabulary word into the existing network of knowledge. Enhancing the context in which a target vocabulary word appears by way of directing a learner's attention to the connections among sentences may further assist the reader in incorporating the new word knowledge into his or her existing network.

Reichle and Perfetti's model (2003) describes how individual words may be represented and enhanced in a learner's lexicon. The model discusses the importance of repeated and varied exposures to words in numerous contexts but does not adequately address the nature of the construction and organization of the lexicon itself. Nagy and Scott (2000) provide a broader explanation of the development of the lexicon, by describing the interrelatedness of words. Vocabulary instruction at all ages continues to rely on targeted instruction of individual words and this has been shown to have little impact on enhancing students' understanding and use of new words or their reading comprehension. The authors explain that such instruction ignores a constructivist understanding of knowledge which is particularly relevant to vocabulary learning,

in that words represent concepts that are linked to other words representing other concepts that may be closely, distantly or entirely un-related to one another. For example, a child's understanding of the word *small* is influenced by his or her understanding of the word *big*; a person's understanding of the word *slither* may be either impeded or enhanced by their knowledge (or lack of knowledge) of the words *snake* and *slide*.

Nagy and Scott's (2000) description of the interrelatedness of words rests upon the model of Latent Semantic Analysis (LSA), developed by Landauer and Dumais (1997). LSA is a statistical technique for, "extracting and inferring relations of expected contextual usage of words in passage of discourse." (p. 267, Landauer, Foltz & Laham, 1998). This model attempts to address the 'poverty of stimulus' problem of language acquisition or development: the input children receive is grossly inadequate to account for the language they develop. In LSA, the input consists of text which has been organized into a matrix. Rows represent individual 'event types' (i.e. words) and columns representing the contexts in which these event types occur. From this initial matrix one can calculate the similarity between words, between individual words and entire paragraphs and between paragraphs.

The model assumes that similarity between words is reflected in the manner in which they co-occur in various samples of text. The authors use the example of layers. Layer 1 consists of individual words or 'event types' and Layer 3 consists of various contexts or 'episodes'. The middle layer, Layer 2, then would be the connections between Layers one and two. The connections between Layers one and three vary in strength but of course these connections are not static. Much like we match a face to a name, we learn words to describe knowledge we may already possess and similarly, we may have vague understanding of

individual words that can be strengthened with exposure to new concepts represented in various contexts.

LSA is a mathematical model of human learning but simulations of learning have been performed with impressive and intriguing results. Landauer and Dumais (1997) tested the hypothesis that people rely heavily on both direct and indirect connections in word learning. People have different amounts of knowledge about many disparate and seemingly unrelated subjects, but these subjects actually have weak connections with each other and if we can locate these connections and use them, this will assist in promoting greater learning in general and improved word learning specifically. This was based on findings that most words are learned incidentally rather than by direct instruction. The question raised by the authors is, 'How do we learn new words through reading?'

The authors found that LSA acquired knowledge of word meanings from text at the same rate as students applying to U.S. colleges from foreign countries. Approximately three quarters of this word knowledge resulted from indirect learning, meaning new words were learned by drawing inferences from text regarding words that did not actually appear in the text. Finally, the authors concluded that the information that learners are exposed to via text provides adequate information for them to acquire knowledge of words not directly taught to them in order to perform well on multiple-choice vocabulary tests such as the Test of English as a Foreign Language (TOEFL). This lends support to the cohesive story condition of the current study. The synopsis provided prior to reading the sentences was expected to enhance the learners' ability to infer definitions and solidify connections between the synopsis, the sentences and the target verbs.

LSA does more than simply underscore the importance of context in word learning. It raises the question of which contexts should be presented to students and which connections can or should be highlighted in order to maximize vocabulary and other conceptual learning. Landauer and Dumais (1997) describe the intricate relationship between specific contexts and word learning, stating that it appears that retrieving a context from memory requires recalling one particular event, but retrieving a word from memory instantiates an amalgamation of many memories. Therefore, retrieving a word learned from a list might instantiate several isolated contexts, but retrieving a word learned in context might cause a learner to sort through various scenarios connected to the word and then judge the word's relationship to those scenarios.

This idea lends support to the cohesive story context condition of the current study because a learner can connect the target verbs to the given context as well as stored contexts triggered by those provided during instruction. During posttests, students were expected to be able to recall the contexts in which the target verbs were presented and be better able to apply and manipulate these words as required by the various posttests. It was also possible however, that the two different conditions might activate different types of learning as would be evidenced by differential performance on the various posttests. For example, the unconnected condition would provide a leaner context from which to infer meaning and use of the target verbs and therefore would more strongly resemble traditional methods of vocabulary instruction, such as definition only word learning.

LSA provides support for both the knowledge hypothesis and the metalinguistic hypothesis described earlier (Stahl & Nagy, 2006). The knowledge hypothesis states that knowledge of words rests on the underlying understanding of the concepts words represent. Increased understanding of concepts can therefore lead to new word acquisition, even if such

words are not present in a given text. The metalinguistic hypothesis purports that the relationship between vocabulary and reading comprehension is linked to a person's ability to draw inferences. Research by Cain and Oakhill (2007) that found that poor comprehenders were less able to use context to draw inferences than their more able peers is consistent with simulations performed in LSA. Learning new vocabulary words relies on strengthening existing connections among knowledge sources as well as creating new connections within a learner. Identifying the precise factors that can create and enhance these connections is one aim of the present study. The current study compared learning of complex verbs under two different semantic contexts in order to better understand the degree of cohesion required in order to connect novel complex verbs to existing networks of knowledge. A better understanding of how to design effective pedagogical contexts for verb learning can enhance overall vocabulary and reading instruction in the middle and upper grades.

Incrementality

One of the many challenges with effective vocabulary instruction has to do with incrementality. Word knowledge is not static, but instead grows and deepens with time and practice. Stahl and Nagy (2006) suggest that the complexity of a given word's meaning may correspond to how complex the instruction to learn that word may need to be. They describe a vocabulary growth pyramid in order to illustrate the levels of knowledge a student may have of different words and their related concepts, as well as the various levels of instruction required at different points.

At the base of the pyramid is level one, where children increase the breadth and depth of their vocabulary knowledge, largely through rich oral and written language experiences. This is

largely associated with young children's incidental word learning and developing word consciousness. At level two, children increase their knowledge of specific words, but they do so incrementally. This is achieved through independent word study and word learning strategies while reading and through teacher-directed vocabulary instruction. Finally, at level three, students have the greatest control over their vocabulary learning and know words at this level better than at the previous levels. At this level, students are able to use words correctly in writing and speaking and have automatic access to their meanings while reading. Each level requires different amounts of time and effort for each word depending on the nature of the words and the purpose of knowing the word. This raises new questions for instruction such as, when should words be taught in a simple, level one, manner and when do they require more intensive, level three instruction? Similarly, which words require which level of instruction, and at what time in a student's education? Children in the current study were in third grade, and actively transitioning from learning to read to reading-to-learn. This study examines how to introduce complex verbs to children so they may retain and recall them for academic purposes. This is aligned most closely with the level two type of instruction described above.

Vocabulary Instruction:

Various vocabulary instruction techniques have been investigated (Bryant, Goodwin, Bryant & Higgins, 2003; Ebbers & Denton, 2008; Penno, Wilkinson & Moore, 2002). Ebbers and Denton (2008) reviewed research regarding vocabulary instruction in older students with reading difficulties. They state that researchers tend to divide vocabulary learning into two primary categories: *learning specific word meanings* and *learning strategies for inferring word meanings* while reading. They also state that vocabulary instruction requires three primary

components: 1) an environment rich in verbal experiences that fosters 'word consciousness', 2) the careful selection and teaching of specific words and 3) teaching word learning strategies through contextual and morphemic analysis. The current study examined teaching carefully selected specific word meanings through contextual analysis. Each of these elements of vocabulary instruction will be discussed in greater detail below.

Word consciousness refers to a student's awareness of words in their environment. Word consciousness both requires and fosters a high level of metalinguistic awareness. Just as was demonstrated by Hart and Risley (1995), it is clear that vocabulary development is the result of a robust verbal environment in the home and this environment should be modeled and/or replicated in classrooms (Ebbers & Denton, 2008; Stahl & Nagy, 2006). Word consciousness allows learners to develop a broad foundation of language on which to build understanding of new concepts as well as individual complex words used to describe those concepts. Academic language requires more than an awareness of language as it does not necessarily mirror oral language. Specific instruction is essential in order to fully understand and use the complex words and syntax that is associated with formal, academic language. Word consciousness includes various components to help students build the bridge between informal spoken language and formal (i.e. academic) spoken and written language.

Understanding the inner workings of written language is one component of word consciousness. This means understanding that written language is largely decontextualized and therefore relies heavily on specific word choice in order to convey a clear message. Oral language can afford to be terribly imprecise because it has the support of gestures, intonation and shared context. Conversational participants are able to clarify intent and meaning. Written language requires greater precision because it cannot rely on such scaffolds. Therefore, the

writer must be careful in his or her word choice and the reader must understand the subtle differences in the words chosen by their author (Stahl & Nagy, 2006). This is one purpose of the current study. Educators must understand ways to foster strong connections between known concepts and sophisticated, novel words associated with them.

There are several other components of word consciousness. Students must understand syntax in order to infer the meanings of unfamiliar words in text. An awareness of morphology allows students to break words into their component parts (i.e. prefixes, suffixes and roots) in order to determine their meanings and also allows them to use these smaller components to build new words into their reading and writing. Finally, it is crucial for students to have a deep understanding of the words in their core vocabularies. A deep understanding of the words in one's core vocabulary allows a student to understand subtle differences between words with similar meanings. This knowledge allows a student to choose words precisely in their speaking and writing, matching their intent with words that have the appropriate meaning and tone for the specific context in which they appear (Stahl & Nagy, 2006).

Word consciousness creates an important tone in a classroom, one in which children are encouraged to notice and reflect on words, word parts and word choice. However, increasing vocabulary knowledge requires specific and direct instruction as well, which includes choosing specific words for instruction. The task of choosing which words to teach is one which leads many educators to believe that vocabulary instruction is a Sisyphean or even futile task. The task of increasing a student's vocabulary is certainly great and often daunting, but surmountable nonetheless. The current study sheds light on one effective method of instruction for novel, complex verbs.

Selection and Teaching of Vocabulary Words

Stahl and Nagy (2006) describe three major obstacles to vocabulary learning and instruction. First, the number of words children must learn is overwhelming. Next, the difference between academic language and spoken language is significant for many learners. Third, vocabulary knowledge is more complicated than simply memorizing definitions of unfamiliar words (Stahl & Nagy, 2006). Educators must choose words for instruction judiciously. Beck, McKeown and Kucan (2002) recommend choosing words for instruction based on their utility. This is more complicated than it may appear at first and requires more explanation. They recommend three general guidelines in evaluating the utility of words for instruction.

Words chosen for instruction should have general utility, meaning they are words that a student may encounter frequently in other texts or be able to use orally or in writing to describe their own experiences. The contexts created for instruction in the target verbs in the current study were familiar to students (i.e. swimming, birthday parties), indicating the utility of the target verbs chosen. Next, it is helpful for instructed words to be related to other words a student already knows. That is, new words that are related to concepts being discussed in the classroom or other ideas with which students are already familiar help develop vocabulary knowledge as well as enhance concept development. Again, the ease with which the training contexts of the current study embedded the target words indicates that the target verbs were related to concepts familiar to the participants. Finally, it is important to consider whether a particular word is essential to understanding a text or discussing the meaning of a text. Even considering these reasonable guidelines it is clear that this process is far from simple and will need to vary from child to child and classroom to classroom. Once the words for instruction have been chosen, the

best methods of instruction must then be identified. Even with a carefully chosen list of words for direct instruction, the task is intimidating so it is essential that methods of direct instruction are as effective and efficient as possible.

Obviously, children cannot learn all the vocabulary they need to know through direct-instruction, regardless of the efficacy of the method. Learners vary greatly in their vocabulary strengths and needs and vocabulary words vary greatly in their characteristics. Vocabulary instruction techniques vary in their effectiveness depending on the type of learner they are presented to and the type of word or phrase they are applied to teach. Additionally, classrooms are full of diverse learners, led by teachers of diverse backgrounds. Clearly we must have a cadre of effective methods at our disposal in order to approach the tremendous task of vocabulary instruction for our students. The current study aims to identify one of possibly many effective methods for instruction in complex verbs in order to help add a tested method to a teacher's toolbox.

Key Word Method and Dual Coding Theory

One method of vocabulary instruction for specific vocabulary words that has been effective is the keyword method, which requires students to create a mnemonic image linking the phonological properties of the word with its meaning. This method, based on Dual Coding Theory, has been seen to be particularly effective with second language learners. Research suggests this method is most effective in conjunction with contextual analyses as this helps students merge verbal and nonverbal cues (Sadoski, 2005).

The keyword method requires students to choose an acoustically similar word to the target word. Next, students are told to imagine their image of the keyword interacting in some

way with an image of the meaning of the target word. This method seems to favor noun learning because the interaction between the keyword and the target word is the link between the known and the new. McDaniel and Pressley (1989) investigated the impact of the keyword method of vocabulary instruction in relation to contextual methods of instruction. They were interested in determining the impact of learning vocabulary with the keyword method versus a contextual method, and the effect of the type of instruction on text comprehension.

College students were randomly assigned to one of three conditions: 1) the keyword condition, 2) the semantic context condition, or 3) the no-strategy control condition. Students in the keyword condition were taught the two-phase procedure for learning definitions of target vocabulary words described above. Students in the semantic context condition were given short paragraphs consisting of three sentences in which the target words would appear in at least two of the sentences. Students were then asked to infer the meaning of the word based on the contexts provided. They were then provided with the correct definition of the target words. Students' abilities to recall the definitions of the target words was assessed as was their comprehension of two different types of text; embellished or unembellished. Embellished text included restatements of the target words' definitions embedded in the text and unembellished texts simply contained the target words in a natural context.

Several hypotheses were tested. First, the authors explained that students in the semantic context could be expected to perform better on the reading comprehension measures than students in the keyword condition. This is based on the fact that many researchers claim that determining the meaning of an unfamiliar word from context involves cognitive processes that are similar to those involved in reading comprehension. The alternative hypothesis tested was that the keyword method would be more effective for helping students retain the definitions of

the target words and this would lead to improved text comprehension. This is because the keyword method secures the definition-vocabulary word link in memory more strongly than contextual instruction, and therefore leads to better understanding of text even when the target word does not appear in an embellished text.

Results indicated that learning the target words in the context condition did not improve reading comprehension. The keyword method led to greater accuracy in text comprehension as well as improved recall of definitions as compared to the context condition. The authors concluded that vocabulary instruction that is aimed at improving reading comprehension need not rely only on contextual methods, but can in fact be improved by relying on definition-only methods such as the keyword method used in their study. At first glance the results of this study may raise doubts about the purpose and efficacy of the current study. However, there are several important caveats regarding the study conducted by McDaniel and Pressley (1989) as it relates to this study.

McDaniel and Pressley's (1989) semantic context condition asked students to infer the meaning of a word prior to being exposed to the correct definition. This method of using context to decipher the meaning of an unfamiliar target word may lead students to arrive at vague or incorrect conclusions regarding a word and these are difficult to unlearn upon learning the correct meaning. The current study presented children with the correct definition of a target word prior to presenting the target word in context. In this way, the context acted as a device to secure the definition in memory rather than provide a substitute for it. The contexts provided in this study did not act as mere clues to the meaning of the new words, but solidified the definitions learned with more or less semantically related sentences.

The success of the keyword method for various subsets of learners is well documented (McDaniel & Pressley, 1989; Rodriguez & Sadoski, 2000; Mastropieri, Scruggs & Fulk, 2001). Mastropieri and colleagues (2001) found that this method could be effective in teaching abstract words as well as concrete words. This is an encouraging finding for vocabulary instruction. The studies cited above appear to have taught students both concrete and abstract nouns only, rather than including other word classes and testing the effectiveness of this method for each class. It is unclear if the same results would be found for instruction with abstract, complex verbs as concerns the current study.

The keyword method has also been studied in regard to learning foreign language vocabulary. Rodriguez and Sadoski (2000) explored the difference between rote learning methods, the keyword method and a method that combined the keyword method with contextual methods of learning vocabulary words. Their study was based on Dual Coding Theory, which suggests that there are two separate but connected systems to process cognitive information. The verbal system manages language and the nonverbal system manages nonverbal information. According to this theory, information processed by one system can trigger information from the other system. Information processed by both systems is thought to be retained and recalled more easily than information processed by only one system. The authors state that the effectiveness of the keyword system lies in its reliance on both the verbal and nonverbal systems as described in Dual Coding Theory.

The authors selected four ninth-grade EFL classes and randomly assigned them to one of four learning conditions. Students were residing in Venezuela and spoke Spanish as their first language. Students were assigned to a rote rehearsal condition, a context condition, a keyword condition and a context/keyword condition. Students in the rote rehearsal condition were simply

told to repeat the English word and its Spanish translation several times to link the word's pronunciation and meaning. Students in the keyword condition received instruction in how to link English words with Spanish keywords by recognizing the acoustic similarities between the words and then imagining the two words interacting in a manner described by the instructors. The third condition was the context condition. In this condition, students read three sentences that used the English target word. They were then asked to infer the meaning of the English word and afterward, given the correct definition if necessary. Finally, students in the context/keyword condition were instructed using a combination of the context and keyword methods. These students read three sentences containing the English target word and were asked to infer its meaning, receiving the correct definition as needed. Next, they were instructed to link the English word with a Spanish keyword that acoustically resembled the English word. Last, they were told to imagine the two words interacting in a manner described by the instructors. Upon completion of the instructional condition, students were presented with a multiple choice test in order to determine how well they could recall the new foreign language words they had learned. Students were tested immediately after instruction or one week after instruction.

The authors hypothesized that students in the keyword and context/keyword conditions would recall the meanings of the English words better than students in the rote rehearsal and context only conditions. This was based on the notion that keyword methods of instruction activate both the verbal and nonverbal systems as described in Dual Coding Theory above. They also predicted that students in the context/keyword condition would perform better on both immediate and delayed recall tasks than participants in all of the other three conditions. This was based on the idea that providing context in addition to the keyword method would help activate the verbal system more thoroughly than instruction in the keyword method alone

because the context would provide "verbal associates". Therefore, the keyword component of instruction would activate both the verbal and nonverbal systems and the context method would provide greater activation of the verbal system, leading to better retention and recall of the target words. The authors were interested in determining to what extent combining the keyword method with context would add to greater retention and recall of the words above and beyond the other methods tested.

The study found that students receiving instruction in the context/keyword method performed significantly better on immediate and delayed recall. Students in the keyword and context/keywords outperformed students in the rote rehearsal and context conditions on immediate recall, but there was a significant difference between students in the context/keyword condition and the other three conditions on the delayed recall task. The effects of the keyword condition appeared to diminish over time, but students who received instruction in the combined keyword/context method were able to maintain their learning better than students in the other three conditions. This confirms the importance of context in vocabulary instruction with EFL students as well as native speakers, and also lends support to Goldinger's (1998) Episodic Theory of Lexical Access described earlier.

The results of Rodriguez and Sadoski's (2000) study provide a great deal of support for combining the keyword method with contextual instruction when teaching foreign vocabulary words. When these results are considered in tandem with the results of Mastropieri, Scruggs and Fulk (2001), Goldinger (1998) and McDaniels and Pressley (1989), it is clear that the keyword method of instruction has tremendous potential for effective vocabulary instruction with a wide range of learners. Again however, the results of the study conducted by Rodriguez and Sadoski (2000) raise some questions about the application of the keyword method of

instruction. The authors investigated the efficacy of keyword instruction combined with contextual instruction while instructing foreign language students in 15 English nouns. They did not test this combination of methods with verbs and this is an important question that remains open. They describe the nouns chosen for their study as being low frequency words but words that rated high on scales of imagery, concreteness and meaningfulness. Such a scale would likely demonstrate distinct challenges for complex verbs. One of the challenges of vocabulary instruction specifically related to learning complex verbs is that they often lack a concrete referent and can be difficult to imagine or link to other meaningful words in one's lexicon. The current study aims to address these specific difficulties related to complex verb learning by connecting new verbs to known concepts. In addition, the study further explores the importance of context in instruction and learning of these verbs.

Word Learning Strategies

There are limits to the amount of words we can teach our students directly. Relying solely on direct instruction of a carefully culled list of vocabulary words is both unrealistic and inefficient. It is therefore necessary that students learn general strategies for learning unfamiliar words such as through contextual and morphological analysis. Morphological awareness is the ability to analyze word parts including prefixes, suffixes and roots. Morphemes are the smallest units of a word to possess meaning, so that in the word *reviewing* there are three morphemes; the prefix *re* meaning *again*, the root *view* meaning *to look at* and the suffix *-ing* indicating present tense. Morphological or morphemic awareness has been linked to reading comprehension and is an important part of vocabulary learning (Stahl & Nagy, 2006). Morphemic analysis is particularly relevant in verb learning as verbs tend to be derived more so than other word classes.

Carlisle and Katz (2006) state that reading success is largely determined by students' abilities to read complex, derived words, accurately and efficiently and this ability is dependent upon their morphological knowledge. As described earlier, it appears that being a strong reader entails being strong in many component areas, such as vocabulary knowledge, which, again, includes having a heightened sensitivity to words in one's environment. The metalinguistic hypothesis assumes that students who have larger vocabularies will also possess greater metalinguistic awareness such as phonemic awareness and morphological awareness. However, the method by which students acquire this increased capacity to analyze words into their component parts is unclear.

Carlisle and Katz (2006) predicted that the "quality of the lexical representations of each morpheme as well as the whole word" would have an impact on the speed and accuracy with which derived words (i.e. those containing more than one morpheme) are recognized (p.670). The authors addressed two primary research questions in their study. First, they wanted to know whether family size and frequency of the base word, derived word and word family influenced speed and accuracy of recognition of derived words singly or in combination. Second, they were interested in the influence of frequency on the speed and accuracy of derived word recognition. Fourth and sixth-grade students were selected to address these questions, with each group being divided into good and poor readers.

Students' ability to read complex words was measured. Words were compared in terms of family size (large and small), and frequency of base words and derived forms. As students read the lists of complex words their accuracy and speed were measured by the examiner. The authors assert that students' ability to read derived words acts as an indicator of their knowledge of the words. They examined the differential performance of fourth and sixth graders and good

and poor readers. Results demonstrated that older students and stronger readers were able to read derived words faster and more accurately than younger and weaker readers. These results are in line with Reichle and Perfetti's (2003) suggestion that reading experience builds higher quality lexical representations as evidenced by faster, more accurate derived word reading. The results also support Goldinger's (1998) episodic theory of lexical access since stronger readers are more likely to possess richer linguistic histories than their less able peers.

Carlisle and Katz (2006) explain their results as follows. In order to build strong core knowledge of base words, one must read widely. Therefore, older children and better readers are likely to encounter many derived words with the same base word and are likely to have a greater knowledge of both base words and derived words than their younger or weaker counterparts. Extensive reading with reinforcement from multiple exposures to the same base word in different contexts influences derived word reading. This finding lends support to the hypothesis in the current study that students with better word reading skills will learn new target verbs better than their peers with weaker word reading skills. The pilot study indicated that word reading ability had a large impact on complex verb learning. Therefore, students in this study were matched based on word reading scores in order to determine the contribution of word reading ability to vocabulary learning.

Carlisle and Stone (2005) conducted two studies exploring the role of morphemic awareness on word reading. The authors conducted one study with lower and upper elementary students in order to determine whether their ability to read derived words suggested sensitivity to morphemes in words. They found that familiar morphemes constitute familiar spelling patterns, making these word parts easily remembered and accessed during word reading. However, the familiar morphemes appear to be more than just orthographic patterns. Instead, it appears that as

children read derived words they segment them into syllables, which are morphemes – a base word and a suffix, for example. This segmentation of the derived words leads to the creation of a mental representation of the base word and suffix that facilitates the speed and accuracy of word reading.

The second study was conducted with middle and high school students. Students read phonologically transparent derived words (i.e. maturity) and derived words that underwent a phonological shift (i.e. majority). Results indicated phonological transparency has a strong influence on a readers' ability to read derived words quickly and accurately. The authors conclude that the results of both studies indicate that morphemic awareness plays an important role in word reading. They state that exposure to complex words is how children create mental representations of words and word-parts (i.e. morphemes). This means that children who are better word readers will also be those who are most sensitive to the morphemic structure of words (Carlisle & Stone, 2005).

The studies described above by Carlisle and Stone (2005) have clear implications for vocabulary learning as well. The authors explain that successful analysis of unfamiliar words involves knowledge of morphemic structure and proper pronunciation in order to establish secure phonological representations in memory. Spelling, reading and vocabulary learning are interconnected and therefore instruction must be interconnected as well. Not only will children with the most exposure to complex words likely be better word readers, they are also likely to have stronger vocabularies. This was explored by the current study through the examination of word reading skill and vocabulary knowledge prior to instruction in the target verbs.

Traditional Vocabulary Instruction

Traditional vocabulary instruction often involves teaching children to locate a word in a dictionary and record the definition. This method has not been found particularly effective and researchers recommend that this method be used in conjunction with other strategies. Dictionary instruction as described above ignores the interrelatedness of words that is essential for understanding and using them appropriately (Nagy & Scott, 2000). This method seems particularly ineffective for verb learning, which entails understanding the relationships between actors and actions and various segments of a sentence or paragraph. Research has found that in order for vocabulary instruction to be effective, students must have the word modeled, receive multiple exposures and participate in guided practice (Biemiller & Boote, 2006).

Several key school experiences have been linked to children's vocabulary growth. Words can be learned through direct instruction or through incidental exposure. The greatest amount of vocabulary is thought to be acquired through incidental learning from verbal context, either oral or written. This means that children who engage in wide reading and discussions with many partners regarding a wide range of topics are likely to have bigger vocabularies than their peers who do not do this. Children also learn new words through a combination of these methods (Penno, Wilkinson & Moore, 2002). However, by school age, children learn most of their new words through encounters with written text (Bryant, Goodwin, Bryant & Higgins, 2003; Penno, Wilkinson & Moore, 2002). This puts various populations, such as struggling readers, at a disadvantage for learning the vocabulary necessary for academic success and underscores the need for effective vocabulary instruction in schools.

From their review, Jittendra and colleagues (2004) concluded that vocabulary instruction improves the vocabularies of children with learning disabilities. Intervention studies found that

mnemonic devices, cognitive strategy instruction, direct instruction, contextual instruction and computer-assisted instruction all improved vocabulary learning for students with learning disabilities. Vocabulary *instruction* appears to benefit children in upper elementary through high school more than children in early elementary years although there are clear differences in children's vocabularies at a very early age. None of the studies reviewed considered the nature of the type of words being learned and instead grouped all word classes together. It is likely that specific instructional techniques are not equally effective for all word classes, and as Ebbers and Denton (2008) point out, vocabulary is likely to develop only through a variety of methods that are persistent and long term.

Role of Context

Teaching students to infer the meanings of unfamiliar words from context is another well-researched method of vocabulary instruction. Different contexts provide varying degrees of instruction in helping students to acquire new vocabulary. The concept of context as an instructional tool is quite broad and merits closer attention. It is clear that readers of all ages and abilities rely on context at various points in their reading and for different purposes. Use of context can be considered another facet of verbal aptitude and children who are more adept at manipulating language will find it easier to utilize context in order to determine meaning while reading. Individual differences certainly exist in terms of one's verbal aptitude, but there are important questions to be answered regarding how to develop verbal aptitude in order to narrow the gap between children with weaker and stronger comprehension abilities. Improving one's vocabulary knowledge and perhaps teaching children how to learn new words may be one way to create more parity among readers of different ability levels. The current study aims to address

this by exposing children to different types of context in order to better understand its role in learning complex verbs. This knowledge may then be applied to improving reading comprehension as well.

Beck, McKeown and McCaslin (1983) describe several aspects of context; pedagogical context and natural context. Pedagogical context is specifically designed to help a student learn an unknown word through specific clues while natural contexts are those in which a word appears without the specific intent to help a reader learn an unfamiliar word. The authors describe four categories of natural context, arranging them on a continuum based on their effectiveness in teaching children new vocabulary words.

Mis-directive contexts are those that mislead readers in understanding the word, as in *The eloquent speaker stumbled on his words*. This sentence may lead the reader to believe *eloquent* means tongue-tied or inarticulate. Non-directive contexts do not provide any clues to understanding an unfamiliar word as in the sentence, *The raucous students went to class*. Here, *raucous* could mean any number of things such as happy, angry or tired. General contexts may give some inadvertent information about a word for a reader to categorize the word generally but not to infer a specific definition. This is certainly the case in the sentence, *Ravenous, the man finally sat down to eat his dinner.* Finally, directive contexts are much like pedagogical contexts because they provide enough information for a reader to infer the meaning of an unknown word. The only difference between words placed in a directive context and those in a pedagogical context is simply a matter of intent (Beck, McKeown & McCaslin, 1983). For Example, the sentences *The man was stoic when he heard the news, His face and actions revealed little evidence of his disappointment,* can be either directive context or pedagogical context depending on the intent of the author. The current study applied an adapted form of directive context in

order to determine the impact of this type of context on complex verb learning. In this way, the current study hopes to clarify the use of specific, supportive contexts in vocabulary instruction of complex verbs.

The value of contextually-based vocabulary instruction has been investigated by several researchers. Nelson and Stage (2007) assessed the impact of contextually-based multiple-meaning vocabulary instruction on the vocabulary knowledge and reading comprehension of third and fifth grade students. They hypothesized that teaching students that most words have multiple meanings depending on the context in which they are used should have a positive impact on their reading comprehension, as this information would push students "to attend more closely to the contextual clues that influence word meanings" (p.2). The authors describe contextually-based instruction as consisting of several key components that they used in their study. First, the target word is presented in clear, simple language. Great pains were taken in the current study to create clear and simple definitions of the target words, finding combinations of appropriate synonyms that captured the main aspects of the target verbs without simply reducing the definitions to synonyms that fail to embody the complexity of the target verbs.

In addition to the definitions, target words were also presented in sentences that clearly conveyed the multiple meanings of the target words in varying contexts (Nelson & Stage, 2007). Again, this is similar to the current study in which all target words were presented in multiple sentences in order to better illustrate the definitions and assist students in better understanding the manner in which the target words should be used in a sentence.

The results of Nelson and Stage's (2007) study demonstrated that children with lower vocabulary upon entering the study made significant gains in their vocabulary knowledge. Children with average or high initial vocabulary knowledge did not show significant gains in

their vocabulary knowledge after the study. Children with lower initial comprehension demonstrated greater gains from the instruction than their peers with stronger reading comprehension at the onset of the study. The authors conclude that because the students with initial lower vocabulary and reading comprehension have such limited knowledge stores in these areas, any direct instruction that addresses these needs will benefit them. The findings of this study underscore the importance of direct vocabulary instruction for poor readers and children with limited vocabulary knowledge.

Nelson and Stage (2007) conclude that contextually-based vocabulary instruction has positive outcomes on vocabulary knowledge and reading comprehension, particularly for students with lower vocabulary and reading comprehension. Their results are based on the ability of contextually-based vocabulary instruction to increase students' awareness that words can have different meanings in different contexts, a critical component of word-consciousness as described earlier. The current study aims to build on the method of contextually-based vocabulary instruction for complex verbs, knowledge of which requires awareness of syntax and semantics for proper use and full understanding. Participants were expected to be familiar with the other non-target words in the definitions of the target verbs as well as in the contexts in which the targets were presented. In this way, the study would increase students' awareness of other words as they related to the target words as well as several possible applications of individual words, helping children to broaden their knowledge of familiar words as they acquired new knowledge of unfamiliar target verbs.

Book Reading

As described above, school-age children increase their vocabulary a great deal through book reading. This is a vague recommendation for increasing a child's vocabulary however, as there are many factors to consider such as the frequency of the exposure, the explanation of the novel words if any, and the overall reading level of the texts. Penno, Wilkinson and Moore (2002) conducted a study comparing the effects of book reading to teacher explanation of vocabulary words. Five and six-year-old emergent readers participated in the study which had several purposes. The researchers asked five main research questions: 1) Does exposure to new vocabulary items within the context of a story result in vocabulary learning? 2) What effect does frequency of exposure to stories have on the use of a new vocabulary item? 3) What effect does teacher explanation of target words as they occur in context have on the learning of those words? 4) What are the effects of frequency of exposure and teacher explanation on children with different language abilities? And 5) Does the effect of explanation of target words generalize to other, non-target words?

Participants listened to stories in small groups and heard explanations of target words for one story but not for the other story. Results indicated that children acquired new vocabulary words from listening to stories. The more often a word appeared in a story (frequency) influenced its learning and teacher explanation of unknown target words also improved students' learning of the new words. However, the study highlights the persistence of the Matthew effect as children who entered the study with higher vocabulary levels also left the study with higher vocabulary levels than children who entered with less-developed vocabularies.

Theories of Cognition

It is clear that there are more and less effective methods of vocabulary instruction but these methods vary based on such factors as individual differences in beginning vocabulary knowledge, reading ability, and word class. Finding the most effective method of vocabulary instruction is difficult to say the least, but one place to begin may be to understand the assorted theories of cognition that describe the various networks constructed during learning.

As mentioned earlier, Dual Coding Theory suggests that words must be established verbally and non-verbally in order for students to develop a clear understanding of them. According to this theory, all knowledge is stored and processed in a verbal or non-verbal system, or in connection with both. Language is both abstract and concrete, often depending upon the concept it represents. Some words can be considered absolutely concrete labels for particular concepts, such as the word 'cat' representing a furry mammal with two pointy ears, four legs and a tail. Other words are more abstract, including many verbs, as they represent more complex concepts. Dual Coding theory posits that concrete language is easily visualized through sensory referents, while abstract language is more reliant on verbal associations. This theory raises important questions for the current study. It seems plausible that Dual Coding theory lends support for learning words in a cohesive story context, as this may make it easier for the learner to form an image of a target word based on the brief synopsis provided prior to the sentences containing the target verbs and the cohesiveness of the sentences. Constructing a non-verbal image in addition to coding the target verbs verbally is likely to enhance connections in the learner's linguistic network. The current study will shed more light on how this network is organized and strengthened by comparing learning under two different conditions in which the target verbs are presented.

Kintsch's (2004) Construction-Integration model of reading comprehension proposes that readers create situation models of the text as they read. A situation model is a mental image of the situation described in the text. These may be verbal but are not necessarily so and are more likely similar to the images described in Dual coding Theory above. It is possible that a reader may create a poor situation model of the text, in which case the image created by the reader is not properly integrated into his or her prior knowledge. This results in encapsulated knowledge, where a reader has a disjointed understanding of the text because he or she cannot link knowledge from the text to prior knowledge. Such knowledge therefore remains isolated and difficult to retrieve, failing to join the learner's general knowledge fund.

Goldinger (1998) describes another way of conceptualizing language processing that is consistent with LSA and the Construction-Integration model. Episodic theory describes a general theory of cognition which states that every experience, including perception of words, creates a unique memory trace. Each time an individual has a new experience with a word; all stored traces are activated, creating connections between new words and stored knowledge. The greater the similarity that exists between new words and stored knowledge, the stronger the connections will be among them. According to Goldinger's (1998) work, individuals' memories of new words is influenced by the presentation modalities (i.e. written vs. spoken) of the words. It stands to reason then that the context within which a new word is presented to a learner will heavily influence the connections a learner is able to make between new words and stored knowledge.

In the current study, it is possible that students assigned to the unconnected context condition would be more likely to develop encapsulated knowledge of the target verbs than students in the cohesive story context condition. The synopsis provided prior to the cohesive

story sentences should act as a trigger to activate students' prior knowledge, thus helping to embed the target words into this prior knowledge. On the other hand, students in the less-connected context condition risk developing encapsulated knowledge of the target verbs. Students in this condition were exposed to the target verbs in a more limited context and therefore had less chance of activating their prior knowledge and connecting target verbs to their existing network. The question addressed by the present study is whether directing a student's attention to the connectedness of sentences in which target verbs appear helps to activate an existing semantic network that in turn, helps students store and retrieve such verbs.

Complexity of Verb Learning

Given what is known about the challenges of general vocabulary instruction, it is important to consider the complexity of verbs and the additional challenges they present to learners. Verbs are generally considered more complex than nouns and therefore they demand more complex instruction (Stahl & Nagy, 2006). Of course, not all verbs are equally complex, but as reading material becomes more complicated and students begin learning more intricate concepts, subtle differences in verbs are needed to convey information accurately. This subtlety is often overlooked by students in the middle and upper grades because they have only a very general understanding of the verb itself or because they are unable to infer its meaning and relevance to the understanding of a new concept due to the elaborate sentence construction needed to use the verb correctly. It is also important to note that as students grow older, they continue to learn new words, including verbs, through exposure to oral language, but academic language becomes more complex and often assumes quite a different form from typical oral communication. Therefore, it may not be valid to assume that students will learn complex verbs

incidentally, and this makes it vital for educators to understand the unique challenges these words present for teaching and learning.

Word knowledge is complicated. It is difficult to say that one either knows the meaning of a word or does not. Rather, we understand words in varying degrees, a principal known as incrementality as described earlier (Nagy & Scott, 2000). In addition, word meanings are multidimensional; in order to truly understand a word, one must understand it in all of its forms, in multiple contexts and be able to understand its relationship to other words. Words can have more than one meaning and it is important that learners are able to develop a flexibility of understanding in learning new vocabulary words. Verbs are particularly slippery in this manner as they are subject to particular constraints such as tense and number.

Words differ in how much of a burden they pose for learning. Not all words are learned with the same degree of difficulty. The word class or part of speech to which the word belongs, influences its learning burden. For example, Nation asserts that nouns and adjectives are learned more easily than verbs and adverbs (On-Lai, 1993). Of course, many nouns can be considered to have a greater learning burden than some verbs, depending on the level of ambiguity and/or abstraction of the word. In general, however, verbs are seen to have a greater learning burden than other word classes. The more nuanced a word, the greater the learning burden.

Verb Features

How can we reduce the learning burden of complex words, specifically verbs? Webb (2007) suggests that synonyms may represent various components of acquired knowledge and this stored knowledge can assist in vocabulary learning. As a learner is able to substitute or connect a known synonym with a novel word, it is not only meaning and form that are linked but

also collocations and syntactic norms as well. This seems especially pertinent to verb learning, which requires attention to so many different aspects of knowledge. Verbs have many forms and a reader may encounter many different derived forms of verbs in the course of their reading. For example, a derived form of the verb *instruct* might include various verb forms *instruct, instructs, instructing*, or noun forms *instructor, instruction, instructions*. In a study examining knowledge of derivative word forms in second-language learners, Schmitt and Zimmerman (2002) found that exposure to various derivatives in word families did not guarantee learning. They suggest that teachers must pay direct attention to form, such as direct teaching of proper suffix use. This finding is directly applicable to complex verb learning.

To define verbs as action words is to oversimplify their role in language (Behrend & Scofield, 2006). Verbs express relations among the various elements within a sentence, and therefore vary in complexity (Brandone, Pence, Golinkoff & Hirsh-Pasek, 2007; Gentner, 1978). The more complex the verb, the more complex sentence structure it requires. For example, a relatively simple intransitive verb *sit* requires only an agent (***who*** sits?) and the verb itself to present the action. The more complex transitive verb *tickle* requires both an agent and an object (***who*** or ***what*** gets tickled?). Further, not all agents and objects are appropriate with all verbs. For example, the sentence, *The tree walks* satisfies syntactic but not semantic constraints. Violations of syntactic and semantic constraints may not always be so clear. Is the use of the verb *recede* equally appropriate in the following sentences: *1) The old man's hairline was receding. 2) The old man's bank account was receding.*? Clearly, simple rules of grammar are insufficient for complete understanding and use of complex verbs.

Brandone and colleagues (2007) point out that actions and/or events represented by verbs can be thought of in various parts. These components include 'path', meaning the trajectory of

the action related to any given reference point, such as ‘approach’, or ‘begin’. Another component is ‘manner’, which refers to the way an action or event happens, such as ‘jog’ or ‘scurry’. ‘Instrument’ is another conceptual component of verb learning, which refers simultaneously to an action as well as a noun as in, ‘hammer’ or ‘spoon’. Finally, there is the conceptual component of ‘result’, referring to the result of the verb such as, ‘fill’ or ‘color’.

The young language learner conceptualizes actions and events in these terms but must decide to which relationship a specific verb refers. This is no small task, and is often difficult for adults and experienced language learners as well as young children. The components described above do not occur in isolation and verbs, like most words, have many possible meanings. The cohesive story context condition of the present study is intended, in part, to address this complexity by clarifying the specific meanings and applications of complex verbs through a brief synopsis of context. This should leave the learner with a firmer understanding of the verb than if he or she were to hear it in context alone or without any contextual support at all.

Mapping and Syntactic Bootstrapping

As described earlier, language acquisition involves a great deal of word to world mapping. This process is more obvious for some words and word classes than others. For example, a child can attach the label ‘cat’ to the family pet with little confusion as the animal is a clear referent for the term. How do children find the correct referent for even the simplest action words, which tend to be invisible or fleeting at best? Several solutions to this problem have been suggested.

Children map verbs onto actions or events that are perceptually salient. That is, children link the new verb to the action or event that stands out to them, either because it occurred last

and therefore has a recency effect, or because it was especially engaging or novel and therefore memorable. This explanation of mapping verbs makes sense but does not provide a complete picture of verb learning, which requires learners to know where to attend as well as how to understand and use different aspects of the verb's meaning in various applications (Brandone, Pence, Golinkoff & Hirsh-Pasek, 2007). This is true of older learners as well and is an area addressed by this study through the examination of different contexts and their effect on verb learning. Which aspects of the contexts would be perceptually salient to learners and therefore better facilitate verb learning was the main question of this study.

Another method of verb mapping may be attention to linguistic and social information. In order to link verbs to events or actions or their components, the learner attends to information provided by the speaker. This information includes linguistic data provided in syntactic frames such as syntactic bootstrapping, to be described in greater detail below. The child also relies on social-pragmatic information such as understanding the speaker's communicative intent. These cues provide social and linguistic context that help constrain possible verb meanings. Research indicates that young children are able to apply two different forms of social-pragmatic knowledge when learning new verbs. First, they can infer the speaker's attentional focus and second, they are able to infer the intent of the actor or speaker (Brandone, Pence, Golinkoff & Hirsh-Pasek, 2007).

Learning verbs in an academic context and for an academic purpose eliminates some of the resources described above which are available to young language learners. When novel, complex verbs appear in a written, academic rather than a natural, spoken context, the forms of social-pragmatic knowledge as described above are absent. Verbs remain complex beyond the

initial mapping phase of language acquisition and therefore more research is needed to uncover the mechanisms by which older, school-aged children learn and use complex verbs.

Brandone and colleagues (2007) conducted several experiments in order to better understand the issue of verb mapping in young children between 21 and 36 months of age. They found that children learn verbs best when perceptual cues, such as the action taking place at the end of an event, are paired with social and linguistic cues that highlight the appropriate single action. For example, the researchers concluded that young children are only able to learn more ambiguous verbs when they learn to utilize speaker cues. This is based on the Emergentist Coalition Model described earlier (Maguire, Hirsh-Pasek & Golinkoff, 2006). In the present study, the brief synopsis of the contexts used in the cohesive story context condition may make the sentences, and therefore the target verbs, more perceptually salient to the learners than the sentences without the synopsis, helping them to better link the target verbs to familiar scenarios.

Nouns and verbs play different roles in the syntax of sentences and it is, arguably, more difficult to interpret sentences containing unknown verbs than to interpret sentences containing unfamiliar nouns. Verbs provide the action of the sentence and without adequate understanding of the verb in a sentence, comprehension of the sentence is severely compromised. As young children begin to acquire their native language they are not learning only individual words and word-classes, but syntax and semantics as well. Each of these components of language appears to influence the learning and understanding of the other components of language.

Syntactic bootstrapping is a theory of language acquisition that asserts that young children acquiring language use their developing knowledge of syntax in order to gain new and improved understandings of specific word meanings. Applied to verb learning, this theory states that children utilize the syntactic frames in which verbs are presented to them as a source of

knowledge about their meanings (Naigles & Hoff-Ginsberg, 1995). This means that when children hear a sentence with a novel verb, they search the surrounding extralinguistic context for clues to the verb's meaning, such as gestures or pragmatics. According to the syntactic bootstrapping theory, children can further narrow down their choices for the more precise meaning of the unknown verb based on the syntactic frame in which it appears. For example, upon hearing the sentence, *Are you holding the toy?* a child might interpret the verb 'hold' as 'carry' or 'lift', but not 'bring', since the sentence does not indicate transfer, which is generally required of the verb 'bring'.

While syntactic bootstrapping seems like a simple and plausible theory, there are still questions that remain to be answered. Naigles and Hoff-Ginsberg (1995) point out that it is unclear whether maternal input provides adequate information in order for syntactic bootstrapping to occur. They conducted a study to examine the input young children receive in order to determine whether maternal input consisted of syntactic frames with reliable cues to verb meanings. They were also interested in whether the frames provided to children were varied enough to allow children to distinguish between different verbs. They state that sentence structure or input provided to young children must meet two criteria in order to be a useful source of information about verb meaning as claimed by the theory of syntactic bootstrapping. First, different syntactic frames must be used for different categories of verbs so that these categories are reliably distinguishable by learners. This means for example, that motion verbs appear in different syntactic frames than internal state verbs. Second, verbs must appear in multiple frames in order to allow for unique mapping of verbs and to avoid confusion among verb meanings.

Naigles and Hoff-Ginsberg (1995) analyzed natural conversations of 57 mothers speaking with their eighteen to forty-two month old children. They reported four major findings from their analyses. They found that verbs were used in helpful syntactic frames providing adequate information for syntactic bootstrapping to occur. They also found that the frames were varied enough for children to distinguish classes of verbs (i.e. mental state vs. action verbs) from one another. Verbs did appear in multiple syntactic frames and these frames were closely spaced. The authors point out that this finding lends considerable support to the plausibility of syntactic bootstrapping because a great deal of evidence supports the notion that closely spaced, syntactically varied maternal speech contributes to children's syntactic development. Finally, the authors found that the syntactic frames were narrow enough so children could distinguish individual verbs from other verbs studied.

The researchers concluded that while their study lends support to the plausibility of syntactic bootstrapping, this theory does not provide a full account of either verb learning or syntax acquisition. Syntactic bootstrapping requires some syntactic knowledge in order for a child to make use of syntactic information to understand verb meanings. However, this theory does not preclude the use of other information in addition to syntactical knowledge to determine verb meanings. This is directly relevant to the current study which aims to uncover more about the specific nature of verb learning in school-age children.

Word Order

Gertner, Fisher and Eisengart (2006) point out that children learn the basic grammar of their native language relatively quickly, beginning as early as twenty-one months of age. Typically developing children appear to learn this grammar relatively easily but it is not fully

understood how they come to understand the importance of word order in English or the role that understanding this rule plays upon learning individual words. Gertner and colleagues (2006) conducted a study to investigate how children come to understand English word-order.

There are two general theories about how children learn the rules of English word-order, lexical accounts of language acquisition and early abstraction accounts of language acquisition. Lexical accounts of language acquisition state that young children understand sentences they hear by applying verb-specific knowledge to each sentence they hear. That is, they know the meanings of individual verbs and apply this knowledge to sentences in which they are used. Therefore, if a child does not know the meaning of a verb in a sentence, he or she is unable to understand the sentence because its meaning hinges upon understanding the verb. This perspective emphasizes the importance of verb knowledge in understanding sentence meanings. In contrast, early-abstraction accounts of language acquisition assert that children possess knowledge of individual words but also have knowledge of sentence structure which helps them understand sentences and generalize to unfamiliar verbs when interpreting sentences they hear. According to this perspective, because children have some understanding of the constraints on the possible relationships between sentence structure and meaning, they are able to identify general patterns, which allows for rapid rule formation. Both the lexical and early-abstraction accounts of language acquisition assume young children have some kind of abstract format they use to represent word sequences and their possible meanings (Gertner, Fisher & Eisengart, 2006).

The authors cite evidence of children being conservative in verb usage and state that children under three years of age have largely concrete vocabularies. This is similar to evidence described above of language acquisition of English-speaking children, where they are likely to

develop a core vocabulary of mostly nouns due to the concrete nature of the input they are likely to receive by English-speaking caregivers. Due to the evidence of conservative verb usage and the apparent ease with which young children acquire basic grammar, the lexical account of early language acquisition seems unlikely. Gertner and colleagues (2006) conducted several experiments to test the plausibility of these alternative accounts of language acquisition. They tested two main hypotheses. The first hypothesis stated that if two-year-old children represent their language experience entirely in verb-specific terms (lexical account), then they should not be able to apply word-order knowledge to novel verbs. Alternatively, the second hypothesis stated that if two-year-old children represent their language experience in abstract terms, such as knowledge of a basic sentence structure (early-abstraction account), then they should be able to apply this to novel verbs.

The authors found that children between twenty-one and twenty-five-months of age used word-order to interpret transitive sentences containing novel verbs, which supports the early-abstraction account of language acquisition and directly contradicts the lexical account of early language acquisition. Additionally, the findings support evidence of syntactic bootstrapping, the notion that children can and do apply their developing knowledge of syntax to learn verb meanings (Gertner, Fisher & Eisengart, 2006). Although this study did not examine syntax specifically, it does extend this knowledge by examining the role of context in verb learning in older children.

The vast body of research described above highlights many interesting view points and insights into the importance and complexity of vocabulary learning. One of the many challenges facing instruction and learning of vocabulary is that research regarding teaching and learning of different word classes is generally focused on very young children and/or English-Language

learners. There is a tremendous and pressing need to better understand and implement effective vocabulary instruction for children in our schools. The current study hopes to begin filling this inexplicable gap with a better understanding of complex verb learning in third-grade children.

Chapter 3

Rationale and Hypotheses

The purpose of the proposed study was to examine the influence of story contexts on the learning of new vocabulary words. Learning included remembering the pronunciations, spellings and meanings of words. The vocabulary words taught were complex verbs whose meanings included not only the 'action' referenced by the verbs themselves but also the satellite words or concepts that were required to complete their meanings. For example, the verb 'persist', meaning *to continue performing an action,* requires an animate agent as subject, an object in the form of an activity that the subject continues performing, and the notion that perseverance is involved. In order to convey meanings of complex verbs, definitions are insufficient. Rather, complete sentences are required. Such sentences provide instantiations of the verbs' meanings by giving examples of usage in specific real world contexts. Sentences facilitate the formation of connections between the unfamiliar verbs and other words whose meanings are already known. These connections serve to define the verbs by embedding them in a network of word meanings stored in memory. In addition to other words within sentences, connections are formed between new vocabulary words and the larger context and these connections add to the meanings that are established in memory for those words. As described by Nagy and Scott (2000), words are not isolated units but interrelated concepts that can only be fully understood in context.

In the present study, students in third grade were taught six complex verbs. Definitions of the verbs along with four sets of sentences instantiating the verbs once in each set were taught. Students learned the verbs in one of two conditions. In the cohesive story context condition, the six pairs of sentences in each set combined to form a cohesive story. The same agent recurred

across sentences within a set, and the sentences were ordered to convey the sequence of events in the story. Each verb was presented in a sentence followed by a companion sentence meant to enhance the meaning of the target verb, but without the target verb appearing in the second sentence. In the unconnected control condition, some of the same sentences were taught but relations among the sentences were minimized. Different agents appeared in each sentence in a set, and the sentences were ordered across sets so that each sentence pair was an isolated unit in each set rather than sentences within a set relating to one another. In spite of this, each sentence pair was fully meaningful. The question of interest was whether students would learn the pronunciations, spellings and meanings of the verbs better when they were embedded in cohesive contexts that included both meaning bearing sentences and stories connecting the sentences than when they learned the verbs only in sentences with isolated meanings.

Various theories of reading comprehension can be brought to bear on the study. Based on Schema Theory (Anderson, 2004), we would expect that embedding unfamiliar verbs in a story context would make them more memorable. Studies have shown that reading comprehension is improved when the meaning of text fits a schema. This might also enhance vocabulary learning when the new words are embedded in such a text. According to Dual Coding Theory (Sadoski, 2005), the effectiveness of a story that follows a schema arises not from the schema but rather from enhanced verbal and visual representations of the information in memory. Information that can be processed by both the verbal and the nonverbal systems is likely to be easier to retain and recall.

Based on the Construction Integration model (Kintsch, 2004), micro-level processing to extract propositions from the sentences should be equivalent in both the cohesive and unconnected conditions, but building a macro-structure of the text and recruiting background

knowledge to construct a situation model of the text would be enhanced by the cohesive story context. Not only comprehension of the text but also memory for the vocabulary words might be improved as well. In sum, both of these theories that predict superior reading comprehension resulting from sentences organized as a story compared to unorganized sentences would also predict superior vocabulary learning. It is important to note that the target verbs to be taught had abstract meanings and hence could be incorporated into many different concrete contexts. There was nothing inherent in the verbs' meanings that linked them to particular contexts. This contrasts with many nouns labeling components of specific contexts.

Several hypotheses were examined in this study. First, based on the theories and research described above, it was expected that students assigned to the cohesive story context would perform better on measures of verb learning than students assigned to the unconnected condition. Second, students were matched based on their word reading abilities because the results of a pilot study indicated that word reading influenced vocabulary learning. Therefore, the contribution of word reading ability to vocabulary learning was examined by matching students based on their word reading skill as measured by the Woodcock Reading Mastery Test and performing regression analyses in order to determine whether this skill explained unique variance. It was expected that students with better word reading abilities would be more successful than their peers with poorer word reading ability at learning the target verbs. However, it was unclear whether the influence of word reading skill on vocabulary learning would differ depending on the treatment condition to which students were assigned. It is important to note that students did not have to read the materials in order to learn the verbs because all written text was also read to students as they viewed it. Third, students were distinguished in terms of their general vocabulary knowledge as measured by the Peabody Picture Vocabulary Test (a receptive

vocabulary measure) and the Boston Naming Test (an expressive vocabulary measure). It was expected that students with more extensive vocabularies would outperform students with smaller vocabularies in learning the meanings of verbs. This was assessed using two measures of vocabulary; the Peabody Picture Vocabulary test measured students' receptive vocabulary and the Boston Naming Test measured students' expressive vocabulary. Regression analyses were performed in order to determine the influence of students' entering vocabulary knowledge on learning new vocabulary words. These measures and analyses are described in greater detail below.

Chapter 4

Methods

Participants

Forty third grade students from a middle class parochial school in the suburbs of Washington, D.C. participated in this study. No students in the school received free or reduced lunch but approximately 17% received some kind of financial aid for tuition assistance. The study was open to all third grade students in the school and all students who returned a signed parental consent form were included in the study. All students were proficient in English and no students had a diagnosed learning disability. Students were all given a pretest to determine their familiarity with the target verbs and none scored above chance level, indicating that they were unfamiliar with the words from the study. Four students (three girls and one boy, all Caucasian) were excluded from the study because their scores on the verb features pretest were above chance level, indicating that they were already familiar with at least some of the target verbs in the study. One Caucasian boy was dropped from the study because he was absent from school for the first week of data collection when students were matched and assigned randomly to treatment groups. Twenty-three girls and seventeen boys participated in the study (24 Caucasian, 11 Hispanic, 5 African-American). All racial and ethnic labels of students were provided by the students' teachers and these labels are used here as reported to the PI. The students were all in third grade for the first time and their ages ranged from 8 years, 3 months to 9 years 8 months. All students were proficient in English with only two being non-native speakers. Table 1 describes the students in greater detail.

Table 1

Characteristics, Mean Pretest Scores, Standard Deviations, and Test Statistics for Participants in the Cohesive and Unconnected Context Conditions

	Cohesive	Unconnected	*F*-Stat (1,38)
Gender			
Male	10	7	
Female	10	13	
Race			
Caucasian	14	11	
Hispanic	5	5	
African American	1	4	
Mean Age (yrs.; months)	8; 5 (.48)	8; 6 (.48)	0.08 n.s.
Pretests			
Verb Features (12 max)	5.90 (.31)	5.95 (.22)	0.02 n.s.
PPVT (Range: 86-135)	109.60 (11.6)	110.35(9.0)	0.05 n.s.
BNT (15 max) (Range: 7-13)	11.05 (1.2)	10.50 (1.4)	1.74 n.s.
WRMT-R Word Reading	505.35 (17.6)	506.05 (15.9)	0.02 n.s
Range: 474-545.			
Grade-equivalent	5.2	5.2	

Note. There were 20 third grade students in each condition. n.s. not statistically significant. PPVT Peabody Picture Vocabulary Test, standard scores. BNT Boston Naming test. WRMT-R Woodcock Reading Mastery Test Revised, W score.

Materials and Procedures

The Principal Investigator (PI) chose 100 verbs from Vanilla Vocabulary 2 (Bell & Lindamood, 1998) for a pilot study. The list was presented to two third grade teachers. Teachers were asked to eliminate verbs they thought would be familiar to a typical third-grade student. Verbs that were identified as possibly familiar by either teacher were eliminated, leaving a list of eighteen possible verbs. Six target verbs were randomly selected for this study.

All students completed several pretests and posttests that were administered individually by the (PI). Pretests were used for several purposes: to assess students' level of development in language and literacy; to match students prior to randomly assigning them to the two treatment conditions; to ascertain that there were no significant differences between the treatment groups in language and literacy skills; to use as predictors to determine whether word reading, expressive, and receptive vocabulary explain variance in students' performance on the vocabulary learning outcomes. Posttests were given following the vocabulary treatments to compare effects on outcomes. All measures are described in greater detail below.

The study took place over the course of three days for each student. On Day 1, children completed pretests described below. Students were matched on their word reading ability and then randomly assigned to one of the two treatment conditions. On Day 2, students received training in the cohesive condition or the unconnected condition described in greater detail below. On Day 3, students completed posttests described below.

Pretests: ***Day 1***

All pretests were given to each student individually by the examiner. Students were rank ordered from high to low based on their performance on the word reading pretest and pairs were formed based on the closest ranks. The first pair of students was randomly assigned to one of the two conditions (cohesive story context vs. unconnected control context). This process was repeated for the next pair of students until all students had been assigned to a condition. The purpose of this assignment procedure was to ensure that both groups included the same range of word readers and that the groups did not differ in word reading. Results from a pilot study indicated that word reading was a significant predictor of vocabulary learning so groups were formed to ensure that there were no differences on this skill. Once all students were assigned, the mean performance of groups was calculated in order to ensure that the groups did not differ significantly on any of the pretest measures.

1. **Word Reading**: Students completed the word-reading subtest of the Woodcock Reading Mastery Test (Woodcock, 1987) in order to assess decoding ability. This test required the student to read words in isolation. Students did not need to define or use the words they read. The examiner scored student responses 'correct' or 'incorrect'. This test was used to match pairs of students in order to randomly assign them to treatment conditions. The reported reliability of this test is .98.
2. **Receptive Vocabulary**: Students completed the Peabody Picture Vocabulary Test (Dunn & Dunn, 1997) in order to determine their receptive vocabulary ability prior to instruction. During this test the examiner presented the student with a sheet displaying four pictures. The examiner said a word and asked the student to point to the picture that

represented the word the examiner said. The student did not need to pronounce, define or use the word. According to the manual, reliabilities range from .91 to .94.

3. **Expressive Vocabulary Test:** Students completed the short form of the Boston Naming Test, which included 15 items, (Kaplan, Goodglass & Weintraub, 2001) in order to determine their expressive vocabulary ability prior to instruction. During this test the examiner presented the student with a picture and the student was given 20 seconds in which to identify the picture. If the student was unable to identify the picture, the response was coded '0' for 'incorrect'. The Cronbach alpha reliability coefficient calculated on the present data was .47, which is quite low. The reason for such low reliability is likely that there was little variability among scores (i.e. standard deviation of 1.3 items). Nevertheless, the test was strongly correlated with other measures used in this study including the PPVT (r=.43, p<.01), so it had some validity. Other studies have utilized the short form of the Boston Naming Test with larger samples and have reported much higher Cronbach alpha reliability. Graves et al. reported a Cronbach alpha reliability of .84 (Graves, Bezeau, Foogarty & Blaire, 2004).
4. **Verb Features Pretest**: The verb features pretest assessed students' knowledge of the six vocabulary words to be taught during the study. The pretest was used to eliminate students who scored above a chance level in order to exclude students already familiar with the target verbs. Students viewed several questions regarding each of the target verbs while the PI read the questions aloud. The PI then read the two choices for each question. For example, "A girl anticipates receiving something. Is it: a) a gold necklace she has always wanted or b) a gold necklace she was given last year?" The students responded orally by selecting one of the two choices. The test consisted of twelve items,

two testing knowledge of each of the six verbs. The PI recorded the answers and then scored responses ‘0’ or ‘1’ for ‘incorrect’ or ‘correct’. Students who received scores higher than 7 were excluded from the study. (See Appendix G, Verb Features Pretest).

Treatment Conditions

After students completed all of the pretests, word-reading scores were rank ordered from high to low. Students were matched based on their word-reading scores and then randomly assigned to either the cohesive-story context condition or the unconnected context condition. The treatment conditions are described in detail below.

1. Cohesive Story Context Condition: Students assigned to this condition received instruction in six novel complex verbs. The verbs, definitions, synopses of stories, and sentence contexts for the cohesive context condition are listed in Table 2. First students were presented with the written form of each verb, its definition and several synonyms for the verb. The PI read the definition while students followed along in print. Then the print was covered and students attempted to repeat what they just read from memory. Then the print was shown and they reread the print as before with the experimenter reading the print while they followed along silently and detected what they did not remember. They proceeded through each of the six definitions in this way.

Table 2

Vocabulary Words Taught, Synopses of Stories and Sentence Contexts in the Cohesive Context Condition

Target verbs and definitions:

1. **Anticipate**: When a person anticipates something, he expects and looks forward to that thing or event happening in the future. He predicts it will happen in the future. **Other words that mean the same thing are**: expects, looks forward to, predicts.

2. **Attain**: When a person attains something, he achieves or accomplishes it by working hard. **Other words that mean the same thing are**: achieves, accomplishes, win, reach, succeed, earn, gain.

3. **Devise**: When a person devises something, he creates a plan or he invents it so that it serves a purpose. **Other words that mean the same thing are**: Creates, invents, produces.

4. **Restrain**: when a person or thing restrains someone, that someone is held back to control him or stop him from doing something he shouldn't do. **Other words that mean the same thing are**: hold back to control, stop, prevent.

5. **Wield**: When a person wields something, he handles and uses it or maneuvers it easily and skillfully. **Other words that mean the same thing are**: handle, maneuver, manipulate, use, shake, wave.

6. **Persist**: When a person persists at something, he continues doing it and perseveres or refuses to stop or give up. **Other words that mean the same thing are**: continues, perseveres, refuses to stop.

Cohesive Story Context Sentences:
Set 1: This story is about a birthday party. *(163 words)* This story is about a girl who wants a birthday party very much and what she has to do in order to get the party. It also tells us how she plans her party and what she does at the party.

(Note that verbs were NOT underlined for students in any of the sets of sentences they read.)

1. Jane persisted in begging her mother every night for a birthday party. She wouldn't stop till her mother said, "yes."

Table 2 (Continued)

Vocabulary Words Taught, Synopses of Stories and Sentence Contexts in the Cohesive Context Condition

2. Jane attained all A's on her report card by studying hard after school every day. Because she was successful in getting good grades, her mother said she could have a party.

3. Jane devised a list of her best friends to invite to her birthday party. She wrote out the names and gave the list to her mom.

4. Jane anticipated getting lots of nice presents at her birthday party that would happen in two days. She looked forward to opening them.

5. Jane restrained her big dog by locking him in the bedroom on the day of the party. This would keep him from barking and scaring her friends.

6. Jane wielded a large knife to slice her very big birthday cake into many pieces for all her friends. She handled the knife very carefully so she didn't cut herself.

***Set 2*:** This is about winning ribbons. *(162 words)* This story is about a boy who swims in races and wins ribbons for coming in first. It also tells us what he does to get more ribbons and how he learns a lesson.

1. Johnny attained a shiny blue ribbon for swimming the fastest across the pool in the first race. He earned the prize because he was very strong and tall.

2. Johnny anticipated getting another blue ribbon in the next race. He expected he could do it again and swim faster than the other swimmers to make his family proud of him.

3. Johnny persisted in swimming in more and more races the same day even though he was tired. He continued swimming until his arms and legs wouldn't move any more.

4. Johnny devised a plan to get more blue ribbons without swimming. He invented a way to make them with ribbon he bought at the store.

5. Johnny wielded heavy scissors to cut the ribbon so it looked just like the swimming prizes. He handled the scissors without dropping them and cut the ribbon very well.

6. Johnny was restrained by his mother from keeping and wearing the ribbons. She took them away and told him this was cheating.

Table 2 (Continued)

Vocabulary Words Taught, Synopses of Stories and Sentence Contexts in the Cohesive Context Condition

Set 3: This is about getting a puppy. *(161 words)* This story is about a girl who wants a puppy and what she has to do to get the puppy. It also tells us what she does once she gets the puppy, how she takes care of the puppy and how she plays with the puppy.

1. Jessica persisted in begging her mother for a puppy. She wouldn't stop until her mother said yes.

2. Jessica attained her wish for a puppy by showing her parents that she knew how to take care of a dog. Her success was rewarded with a trip to the pet store.

3. Jessica devised a way to bathe the puppy when he rolled in the mud. The way she invented was to spray him with the garden hose in the grass.

4. Jessica anticipated that the puppy would grow very big. She expected he would need training, so she read lots of books about teaching dogs to behave.

5. Jessica restrained her puppy from jumping on people by keeping him on a leash. This would stop him from scaring or hurting anyone.

6. Jessica wielded a big stick for the dog to chase. She held it in her hand, waved it in the air, and threw it down the beach.

Set 4: This is about going on vacation. *(169 words)* This story is about a boy who is excited to go swimming in the ocean on his vacation and what he does to improve his swimming ability. It also tells us what happens once he goes on his vacation.

1. Jordan anticipated going to Florida during his spring break. He looked forward to swimming in the ocean even though he couldn't swim.

2. Jordan devised a plan for learning how to swim. The plan he invented was to take lessons at the nearby pool and practice hard.

3. Jordan persisted in practicing every day by moving his arms and kicking his feet. Even though he never gave up, he still couldn't swim all the way across the pool.

4. Jordan wielded a screw driver to break open a large wooden box that was nailed tight. The box held big rubber swim fins that he had ordered online.

Table 2 (Continued)

Vocabulary Words Taught, Synopses of Stories and Sentence Contexts in the Cohesive Context Condition

5. Jordan attained his goal of swimming across the pool by putting the swim fins on his feet. This helped him go faster and get to the other end.
6. Jordan was restrained by his mother from swimming in Florida, however. She took away his fins and said, "There are sharks in the ocean, so I won't let you go swimming."

Next, students applied the same sequence of steps to the four sets of context sentence pairs – hear/read, recall, check, and reread one verb context at a time. Students first heard a brief synopsis of the story formed by the sentences in order to highlight the sentences' relatedness. The synopsis did not contain any of the target verbs. After each set of 6 sentence pairs comprising a story was studied as described, students completed a cloze test. They were shown sentence pairs from the contexts practiced, read them silently as the PI read them aloud and were asked to provide the missing target verbs orally. Students recalled these from memory and were given no feedback. This assessed their memory for the verbs' pronunciations and occurrence in the sentence contexts that were practiced.

2. Unconnected Context Condition: Students assigned to this condition received instruction in the same six novel complex verbs as students in the cohesive story condition. They performed the same procedures performed by the cohesive story condition except that they did not hear a synopsis of the story, and a different subject agent headed each sentence pair in a set. Sentence pairs in this condition related to different subjects rather than a related theme as in the Cohesive Story Context. The verbs and sentence pairs for the unconnected context condition are listed in Table 3. The order of the target verbs in the sentence pairs was slightly different in this condition than in the cohesive condition so as to minimize the connections among the sentences. Although the order of presentation differed for the training sentences for both conditions, the order of presentation of the verbs on all five posttest measures was random and did not favor one condition over the other. The definitions were the same as in Table 2. Students completed the cloze test after each of the four sets of sentences.

Table 3
Sentence Contexts in the Unconnected Context Condition

Set 1: (Note that verbs were NOT underlined in any of the sets students read)

1. Johnny attained a shiny blue ribbon for swimming the fastest across the pool in the first race. He earned the prize because he was very strong and tall.
2. Henry anticipated getting a new skate board with the money he had saved. He expected he had enough money to get one that was very fast.
3. Bill persisted in wearing the same shirt day after day even though it was dirty and smelled bad. He continued wearing it until it ripped and fell apart.
4. Sally devised a plan to make colorful hats for her friends to wear. She invented a way to make them with ribbon she bought at the store.
5. Janet wielded heavy scissors to cut cardboard and make a house for her pet rabbit. She handled the scissors without dropping them or making a mistake.
6. Bob was restrained by his mother from driving her car because he was too young. She scolded him and took the keys away.

Set 2:

1. Jack persisted in begging his father every night for a new bicycle. He wouldn't stop until his father said yes.
2. Jim attained all As on his report card by studying hard after school every day. Because he was successful in getting all A's his mother said he could have a puppy.
3. Joan devised a list of her best friends to invite to see a movie with her. She wrote out the names and gave the list to her mom.
4. Susan anticipated getting lots of money by babysitting every Saturday night. She looked forward to counting it.
5. John restrained his big dog by locking him in the bedroom when his friend came to see him. This would keep the dog from barking and scaring his friends.
6. Helen wielded a large knife to slice her big birthday cake into many pieces for all her friends. She handled the knife very carefully so she didn't cut herself.

Table 3 (Continued)
Sentence Contexts in the Unconnected Context Condition

Set 3:

1. Howard wielded his wand when he performed the magic trick. He waved it carefully and skillfully over his magic hat.

2. Jerry restrained his little brother from running into the street. He held onto his little brother's hand so he couldn't get off the sidewalk.

3. Sherry anticipated getting a lot of homework now that she was in middle school. She expected that she would be too busy to play with her friends on school nights.

4. Nicole devised a new arrangement for her bedroom so she would have more room to play. She drew a picture of her plan and gave it to her parents.

5. Judy attained a student of the month award for doing community service and getting good grades. She worked hard to help others as well as get her own work done.

6. Alice persisted in begging her parents for a new puppy. She refused to give up until her parents agreed.

Set 4:

1. Betty was restrained from hitting the windshield when she was in a car accident. The seatbelt held her back in her seat and kept her safe.

2. Joseph wielded his flute to play a beautiful solo in the concert. He played skillfully and didn't make any mistakes.

3. Stan devised a plan to build his own sandbox. He created a picture to show all of the materials he would need.

4. Brian persisted in calling his little sister names even though his parents continued to punish him. He refused to stop until one day his sister began to cry.

5. Hannah anticipated having fun with her grandmother when she came to visit. She looked forward to playing lots of games with her and showing her lots of places.

6. Ellen attained a gold trophy for being the fastest runner in her class. She worked hard at practicing running every day until she got faster and faster.

Scoring of Performance during Learning. Several aspects of performance were scored to assess effects during the word learning sessions: the accuracy of students' memory when they repeated definitions and sentences; students' accuracy in completing the cloze task by pronouncing the vocabulary words correctly. Performance of the two groups on each measure was compared across the four sets of sentences to determine whether the story context made it easier to remember the definitions, sentences and the pronunciations of the words, and whether memory improved as more sentence contexts were studied.

In order to determine the accuracy of students' memory for definitions, the PI recorded the definitions students provided and assigned them a 1 for 'acceptable' or a 0 for 'unacceptable'. In order to determine the accuracy of students' memory for the sentences right after they read each one, the PI recorded the sentences provided by students and marked them as 1 for acceptable (i.e., the majority of the words and meaning of the sentences were preserved) or a 0 for unacceptable (i.e., the majority of the words or the meaning of the sentence were not preserved). Students did not have to remember definitions verbatim and did not have to recall all synonyms presented during training. Inter-rater reliability was determined for 20% of the definitions. A second rater blind to the hypotheses of the study was shown the definitions that were taught plus a transcript of students' recall and asked to read a random selection of 20% of the student responses. The rater was asked score them a '1' if the provided definition demonstrated acceptable knowledge of the definition of the target verb and '0' if it did not. Examples of acceptable knowledge were provided, for example, *wield: he pulls something or holds the handle*; as well as unacceptable responses: *anticipate: like something.* Inter-rater agreement for definition recall during training was 88%.

Similar to the definitions learned during training, sentences recalled during training were also scored as 'acceptable' (1) or 'unacceptable' (0) by the PI. Correct responses were those that preserved most of the same words with all of the original meaning and proper use of the target verbs. Again, the PI used a random number table to select 20% of the students' responses and asked the independent rater to read the responses, scoring them a '1' if the provided sentence demonstrated a reasonable understanding of the sentence and its use of the target verb, and '0' if it did not. Examples of acceptable and unacceptable responses were provided. For example, an acceptable response for the training sentence, *'Jane persisted in begging her mother every night for a birthday party. She wouldn't stop till her mother said, "yes."* could be, *Jane persisted in begging her mother for a party and wouldn't stop until she said, "yes."* An unacceptable response could be, *Jane kept begging her mother for a birthday party* or *Jane persisted for a birthday party.* Inter-rater agreement for sentence recall during training was 84%.

Posttests

Students completed several posttests in order to measure the impact of the instructional conditions on complex verb learning. All posttests were completed individually by each student and administered by the PI. Posttests occurred one day after instruction. Posttests can be found in Appendix J, Posttest Procedures.

1. **Spelling and Sentence Generation:** The PI dictated the target verbs one at a time and the student wrote them. Students were asked to spell the target verbs one at a time in the same order that the verbs were presented in the definition training. Spellings were coded by the PI '0' for incorrect and '1' for correct. After students had written each word, the PI asked the child to orally provide a sentence for the target verb. For example, the examiner said, "Can you use the word *anticipate* in a sentence?" The PI recorded

students' responses. Responses were coded by two independent raters, who were blind to the hypotheses of the study and to the treatments students received. Because sentences were scored by two independent raters, sentences that had been used to teach the target verbs were considered acceptable as long as they were recalled in a manner that used the target verb appropriately. This test determined how well students were able to use the target verbs in sentences. To be acceptable, sentences had to be coherent and the target verb had to be used correctly. Unacceptable sentences were those that did not use the target verb at all, did not use the verb correctly or were grammatically incorrect. Inter-rater agreement was 85%.

2. **Definition Production**: The PI asked each student to provide a definition of each target verb. The order of presentation of the verbs was random and did not favor either condition. Students responded orally and the PI recorded answers. Responses were coded 1 for 'acceptable' and 0 for 'unacceptable'. Students received a rating of 1 if the definition they provided preserved most of the meaning and words used in the training definitions and 0 if it did not. Inter-rater agreement was determined for 20% of the definitions similar to the method described above for definition learning during training. An independent rater was shown the definitions presented to students during training as well as a copy of the definition production posttest. The rater read the student responses and scored them a '1' if the provided definition demonstrated acceptable knowledge of the definition of the target verb and '0' if it did not. Again, examples of acceptable knowledge were provided, for example, *restrain: to keep something or hold someone back*. Examples of unacceptable responses were also provided, for example, *persist: she thought of something*. Inter-rater agreement for these 20% of responses was 88%.

3. **Prompted Sentence Generation**: The PI showed the student the beginning of a sentence using each of the target verbs while reading the sentence starter aloud. For example, the examiner presented the student with the beginning of the sentence, "The mountain climber attains…" and asked the student to finish the sentence so it made sense. Sentence stems were not drawn from or related to the study sentences during training. The student listened and then orally provided an ending for the sentence that used the target verb correctly. This test determined how well students were able to apply their knowledge of the target verbs to new sentence contexts. The sentences were recorded by the PI. Sentences were scored '0' for 'unacceptable' or '1' for 'acceptable' by the same two independent raters who scored the sentence generation posttest. To be acceptable, sentences had to be coherent and the target verb had to be used correctly. Sentences were counted as acceptable if both raters scored the sentences as acceptable and as unacceptable if only one or neither rater scored the sentence as acceptable. Inter-rater agreement was 92%. The order of presentation of the target verbs on this measure was random and did not favor either condition.
4. **Verb Features**: This test was in the same format as the Verb Features Pretest described above, but with different questions and answers about the target verbs. The order of presentation of the verbs was random and did not favor either condition. The purpose of this test was to determine students' understanding of the nuances of the target verbs. As in the pretest, students viewed several questions regarding each of the target verbs while the PI read the questions aloud. The PI then read the two choices for each question. For example, "A man has devised something here. Which is it? A) a plan for building a house or b) a plan that his boss gave him?" The students responded orally by choosing

one of the two choices. The test consisted of twelve items, two testing knowledge of each of the six verbs. The PI recorded the answers and then scored responses ‘0’ for ‘incorrect’ or ‘1’ for ‘correct’.

Chapter 5

Results

Pretests. Descriptive statistics regarding age, gender and performance on pretest measures are reported in Table 1. Analyses of variance were conducted to determine whether the groups differed on any of these measures. Results revealed that there were no significant differences in age or performance on pretest measures between the treatment groups. Mean scores on the verb features pretest indicate that the two treatment groups performed at a chance level in their knowledge about meanings of the target verbs. The groups were equivalent in vocabulary and word reading skill. Inspection of mean performance in Table 1 reveals that students performed above the average expected for their age and grade levels on the PPVT vocabulary and WRMT-R word reading measures.

Word Learning Trials. The word learning trials were conducted with four sets of six sentences with each set covering the six target verbs to be learned. Each trial involved the presentation and review of six verb definitions and sentences for that set. Three measures of recall were taken: recall of the definitions after hearing each, recall of the sentences after hearing each, and recall of the verbs in a cloze task comprised of all six sentences that had been studied. The hypothesis tested was that students would be more successful recalling the definitions and sentences containing complex verbs when the verbs were presented in a cohesive semantic context rather than in an unconnected semantic context. Although students repeated each definition or sentence right after they heard it, because the items were lengthy (see Tables 2 and 3), it was not possible to parrot back the items. Students had to process the meaning and then remember the majority of the words to be credited with a correct response. For this reason, responses are considered to measure recall rather than just repetition of the definitions and

sentences. Analyses of variance were conducted with condition (cohesive vs. unconnected context) as the independent variable and the learning measures as the dependent variables. Significant differences favoring the cohesive group would be interpreted as support for this hypothesis.

Students' memory for definitions of the target verbs during training was analyzed. At the beginning of each of the four sets of sentences, the definitions of words were reviewed. Children heard each definition and were asked to repeat it. A two-way ANOVA was conducted with treatment condition and trials 1-4 as the independent variables. Memory for definitions of target verbs served as the dependent variable. Results of the ANOVA are reported in Table 4. A significant main effect of trials was detected but the main effect of treatment and the interaction between treatment and trials were not significant. Mean performance reported in Table 5 and shown in Figure 1 reveals that students' recall of definitions improved on successive trials. This shows that both groups improved as a result of practice recalling the same definitions from the beginning of Set 1 to the beginning of Set 4. Although the mean performance for remembering definitions during training was slightly higher for students in the cohesive context group (see Figure 1), the difference fell short of significance. This shows that students in the two treatments recalled definitions equally well during the learning trials and that the cohesiveness of the verbs' contexts had little effect on this measure. By the fourth trial, they were able to repeat on average 73% of the definitions correctly.

Table 4

Analysis of Variance of Performance during Word Learning on the Definition Recall, Sentence Recall and Cloze Tests as a Function of Treatment Condition (Cohesive vs. Unconnected) and Trials (1 through 4)

Source	*df*	Mean Square	*F*-stat	*p*-value	Partial Eta Squared
Definition Recall					
Treatment	1	12.66	1.85	.182	.05
Error	38	6.84			
Trial	3	18.51	31.53	.000	.45
Treatment x Trial	3	.44	.75	n.s.	.02
Error	114	.59			
Sentence Recall					
Treatment	1	8.56	1.45	n.s.	.04
Error	38	5.92			
Trial	3	15.09	21.59	.000	.36
Treatment x Trial	3	.27	.39	n.s.	.01
Error	114	.70			
Cloze					
Treatment	1	60.03	11.53	.002	.23
Error	38	5.21			
Trial	3	24.35	31.04	.000	.45
Treatment x Trial	3	2.01	2.56	n.s.	.06
Error	114	.78			

Table 5

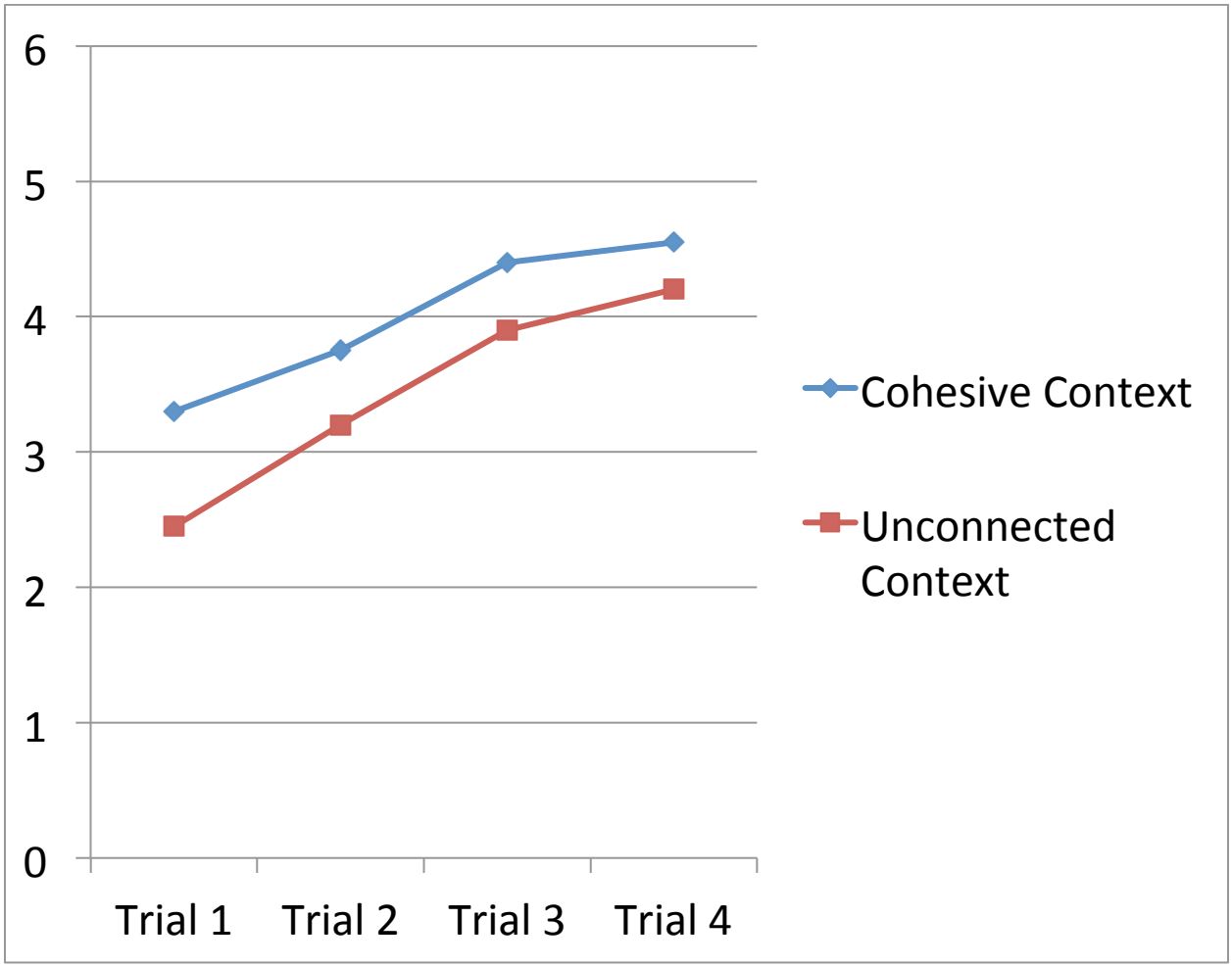
Mean Performance during Word Learning on Definition Recall, Sentence Recall and Cloze Tests as a Function of Treatment Condition (Cohesive vs. Unconnected) and Trials (1 through 4)

	Overall Mean(*SD*)	**Cohesive Context** Mean(*SD*)	**Unconnected Context** Mean(*SD*)
Definition Recall			
Trial 1	2.88(1.67)	3.30(2.06)	2.45(1.05)
Trial 2	3.48(1.40)	3.75(1.59)	3.20(1.15)
Trial 3	4.15(1.33)	4.40(1.50)	3.90(1.12)
Trial 4	4.37(1.50)	4.55(1.67)	4.20(1.32)
Sentence Recall			
Trial 1	3.38(1.43)	3.70(1.63)	3.05(1.15)
Trial 2	3.98(1.53)	4.10(1.59)	3.85(1.50)
Trial 3	4.52(1.30)	4.75(1.29)	4.30(1.30)
Trial 4	4.75(1.41)	5.00(1.56)	4.50(1.24)
Cloze			
Trial 1	2.73(1.49)	3.55(1.19)	1.90(1.29)
Trial 2	3.95(1.58)	4.50(1.15)	3.40(1.79)
Trial 3	4.48(1.32)	4.80(1.28)	4.15(1.31)
Trial 4	4.25(1.61)	5.00(1.03)	3.50(1.76)

Note: There were 20 third graders in each condition. The maximum score was 6 correct.

Figure 1

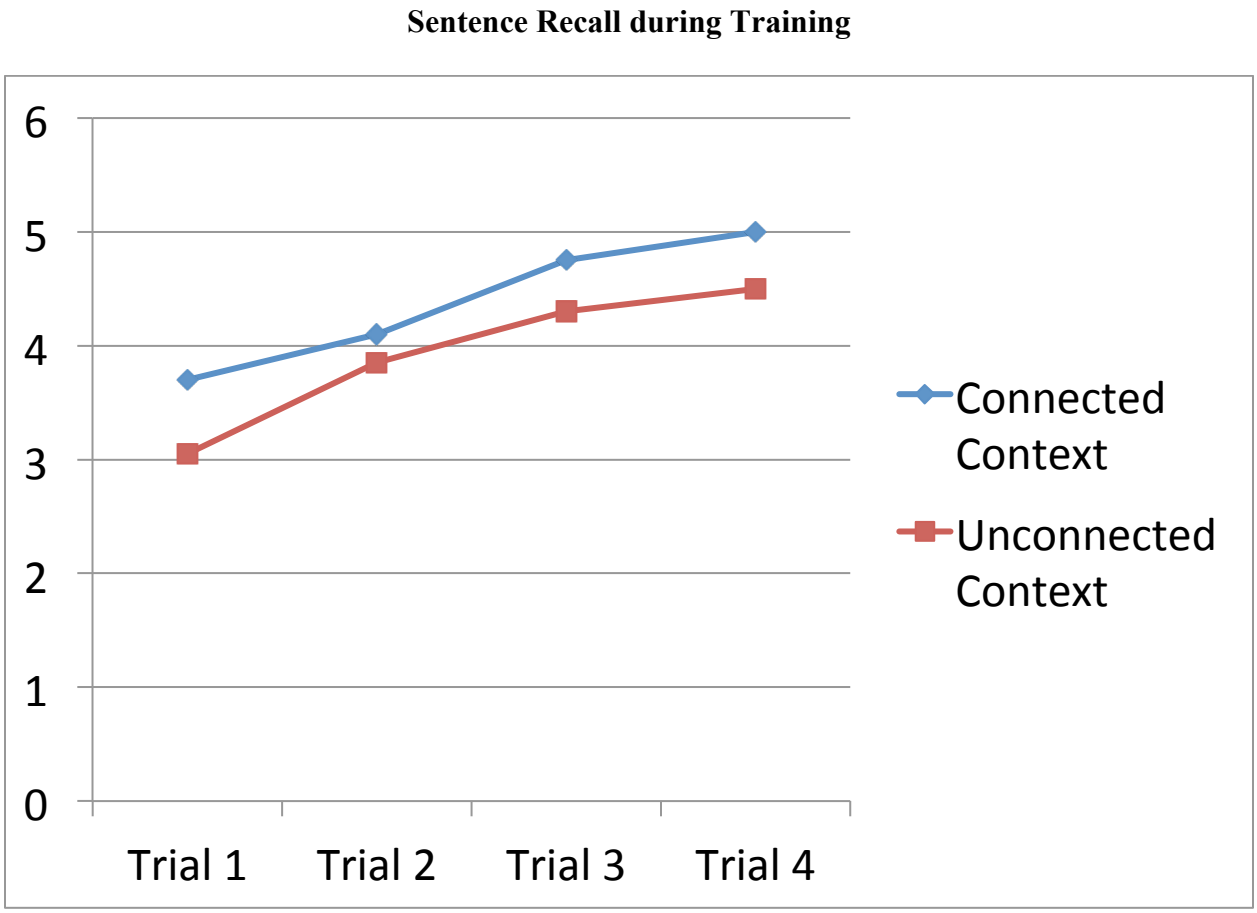
Mean Recall of Definitions During Word Learning as a Function of Treatment Condition



Students' recall of sentences during learning was subjected to an ANOVA. Students repeated each sentence orally after they saw and heard the experimenter read it aloud. The independent variables were treatment group and trials. A significant main effect of trials was detected but the main effect of treatment and the interaction between trials and treatment were not significant. Results of the ANOVA are reported in Table 4. Mean performance is presented in Table 5 and portrayed in Figure 2. This shows that both groups improved in their ability to recall sentences as learning progressed from Set 1 to Set 4, despite the fact that the sentences being recalled were new in each set. This suggests that meanings of the verbs were taking hold in memory and helping students remember their contexts. A slight though not significant difference favoring the cohesive group is evident in Figure 2. This shows that students in the two treatments were equally able to repeat individual sentences accurately during the learning trials and that the contexts exerted little influence on their performance. By the final trial, they could repeat on average 79% of the sentences correctly.

Figure 2

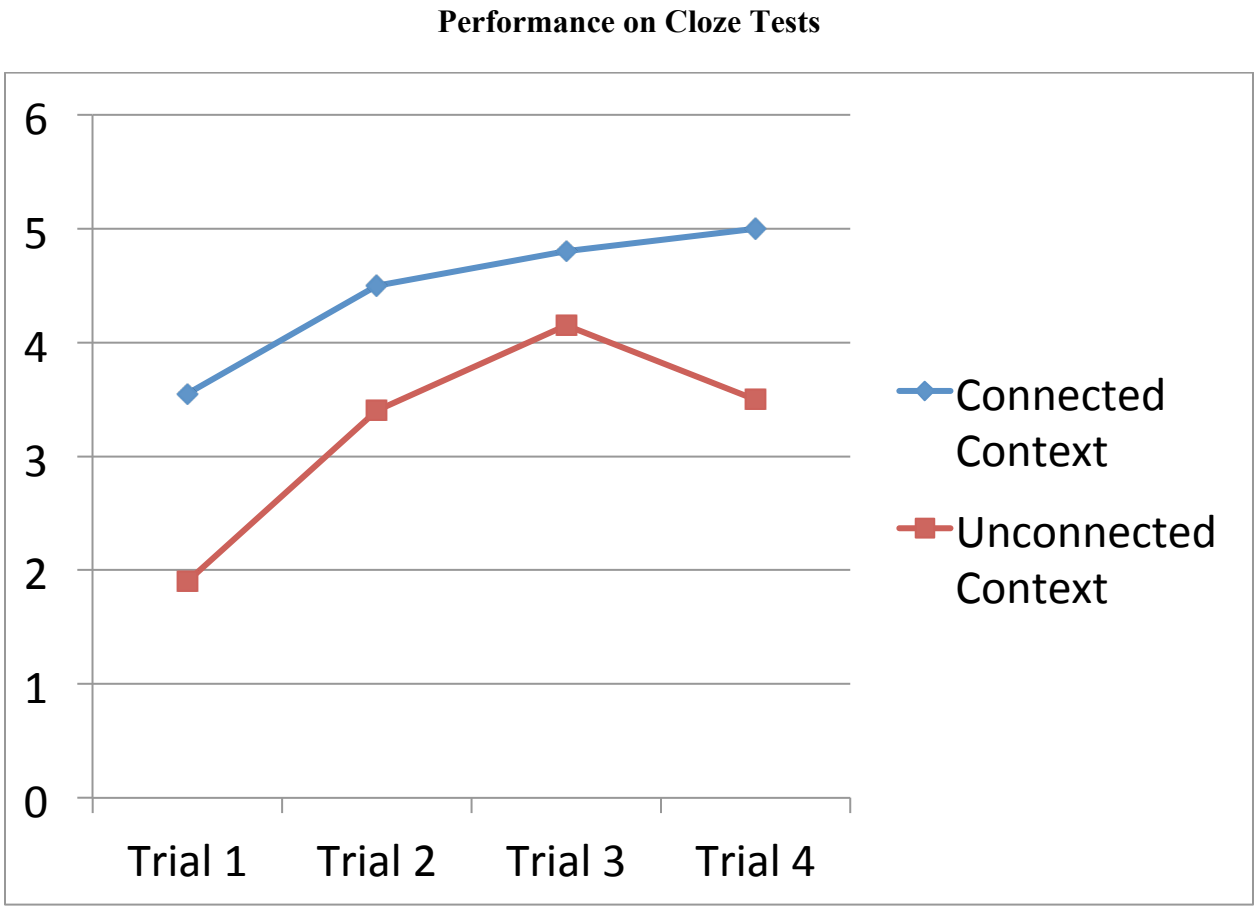
Mean Recall of Sentences During Word Learning as a Function of Treatment Condition



After each set of six sentences was studied, students were given a written cloze task consisting of the six sentences with the target verb deleted. They read each sentence silently as the PI read it aloud, recalled and pronounced the target verb. The PI recorded their answers. Correct responses were subjected to an ANOVA. The independent variables were condition (treatment vs. control) and trials (Sentence Sets 1 through 4). The number of correct verbs recalled was the dependent variable. Results of this analysis can be seen in Tables 4 and 5 and Figure 3. Significant main effects of treatment condition and trials were detected. The interaction between the two was not significant (see ANOVA in Table 4). As evident from the means in Table 5 and Figure 3, students in the cohesive context condition remembered significantly more verbs than students in the unconnected context. Also recall of the verbs increased across trials. These results support the hypothesis that cohesive contexts would improve vocabulary learning more than unconnected contexts. One possible reason why treatment differences were greater on this measure than on the other training measures is that recall demands were greater. Here, recall was tested at the end of each set of sentences rather than after each definition or sentence was presented.

Figure 3

Mean Performance during Word Leaning on Cloze Test as function of Treatment Condition



Posttests. After students had studied all four sets of sentences, they completed five posttests one day later. Students heard the words and wrote their spellings. Responses were scored as correct or incorrect. Students heard the verbs and were asked to construct meaningful sentences using the words. In addition the PI provided sentence beginnings containing the target verbs and students completed the sentences. Students' ability to use the target verbs correctly in sentences was judged as either acceptable or unacceptable by two independent raters (i.e., one former third grade teacher and one doctoral student) who were blind to the treatments the students had received. To be acceptable, sentences had to be coherent and the target verb had to be used correctly. Unacceptable sentences were those that did not use the target verb at all, did not use the verb correctly or were grammatically incorrect, such as, 'I devise broccoli.' Sentences were counted as acceptable if both raters scored the sentences as acceptable and as unacceptable if only one or neither rater scored the sentence as acceptable. There was 85% inter-rater agreement.

Students were asked to define each verb. Their responses were scored by the same two independent raters as acceptable or unacceptable. Definitions were considered acceptable if students preserved the meanings of most of the words that were included in the definitions that were taught during the learning trials, and they demonstrated a clear understanding of the target word. Definitions were considered unacceptable if they did not demonstrate an understanding of the target word and did not preserve the meaning of most of the definition that was taught. There was 94% inter-rater agreement for this task.

Students' ability to distinguish various nuances of the target verbs was measured by their performance on the verb features posttest. Responses on this multiple choice test were scored as correct or incorrect by the PI.

One-way ANOVAs were conducted on each of the five posttest measures with treatment condition as the independent variable. Mean performance and test statistics are reported in Table 6 and depicted in Figure 4. Significant main effects of treatment condition were detected on three of the measures. As evident in Table 6, mean performance favored the cohesive treatment over the unconnected treatment. Cohesive students generated significantly more correct sentences containing target verbs, they defined the verbs significantly more accurately, and they recognized correct sentence usage of the verbs in the features test significantly more often than students in the unconnected condition. On the two remaining measures, spelling, and prompted sentence generation, the cohesive group means were somewhat greater than the unconnected group means but the differences fell short of significance. These findings provide strong support for the value of teaching verbs in contexts that create greater connections between the verbs and other words and concepts.

Table 6

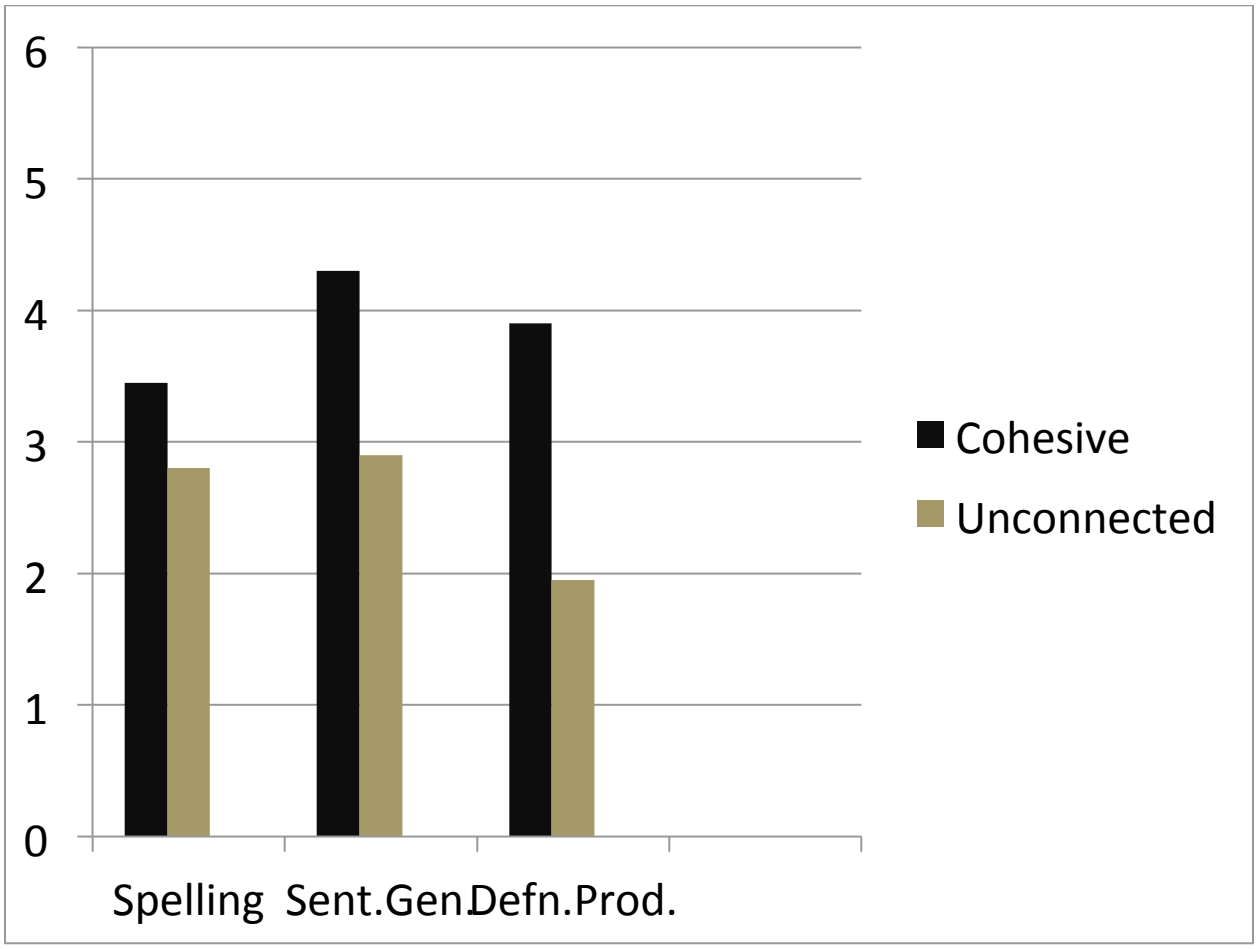
Mean Performance on the Posttests as a function of Treatment Condition

Posttest	Max Score	Cohesive *M (SD)*	Unconnected *M (SD)*	*F*-Stat (1,38)	Partial Eta Squared
Spelling	6	3.45 (1.85)	2.80 (1.51)	1.45 n.s.	.04
Sentence Generation	6	4.30 (1.56)	2.90 (1.62)	7.76**	.17
Definition Prod.	6	3.90 (1.71)	1.95 (1.23)	17.05**	.31
Prompted Sentence Generation	12	8.15 (1.66)	7.15 (1.95)	3.04 n.s.	.07
Verb Features	12	11.00 (1.08)	9.70 (2.06)	6.28 *	.14

Note. There were 20 participants in each condition. *p <.05; ** p < .01. n.s. not statistically significant

Figure 4

Mean Differences between two Treatment Groups on Spelling, Sentence Generation and Definition Production Posttests



It is noteworthy that one day after training students in the cohesive condition retained their memory for definitions better than students in the unconnected condition. Comparison of definition memory on the final trial during learning to definition memory the next day on the posttest reveals that the decline was much smaller for the cohesive group, *M*s = 4.55 correct (Trial 4) vs. 3.90 correct (posttest), decline of 0.65 items, than for the unconnected group, *M*s = 4.20 (Trial 4) vs. 1.90 (posttest), decline of 2.30 items (see Tables 5 and 6). These findings confirm that the cohesive treatment served to help students better secure meanings of the verbs in long term memory and ward off forgetting than the unconnected context treatment.

Further examination of responses on the sentence generation and definition production posttests revealed interesting differences in performance for individual target verbs. The percentages of students in each group who performed correctly on each verb are listed in Table 7. Results indicate that the pattern favoring the cohesive over the unconnected condition held across all six verbs. This confirms that results with participants as the unit of analysis also held for verbs as the unit of analysis. However, some verbs were easier to recall than other verbs. Students in both conditions were better able to define and use the verbs ‘restrain’ and ‘wield’ than the other target verbs, possibly because of their concrete nature in contrast to the other target verbs which are more abstract. The verb ‘anticipate’ was the most difficult to define for both groups, especially in the unconnected condition, with only 10% of unconnected students providing an acceptable definition compared to 40% of students in the cohesive condition.

Closer examination of the training sentences in both conditions offers a possible explanation for differential performance for individual verbs. Training sentences in both conditions consisted of one sentence for each target verb followed by a companion sentence

meant to further elucidate the meaning and use of the target verb. For example, a pair of sentences in the cohesive context read:

Jane *anticipated* getting lots of nice presents at her birthday party that would happen in two days. She *looked forward* to opening them.

The first sentence used the target verb correctly and the second sentence expanded on the meaning and used a synonym phrase (looked forward) that was presented in the definition training. Comparison of the sets of sentences for both conditions revealed that there were slight differences in the number of synonyms presented in the sentence pairs for each context. Students in the cohesive context had slightly more synonyms used in the companion training sentence for the words *attain* (3 synonyms) and *devise* (3 synonyms) than the unconnected context (2 synonyms). Students in the unconnected context had slightly more synonyms used in the companion training sentence for the word *restrain* (2 synonyms) than students in the cohesive context (1 synonym).

Independent ratings of graduate students (described below) did not find significant differences between the semantic value of the sentences for the two contexts and in fact, found that sentences in the unconnected context were slightly stronger than those in the cohesive context. In addition, students recalled sentence pairs equally well in the two conditions during learning, so it is unlikely that any differential presentation of synonyms had an impact on learning. Further, where differences were found in terms of learning of individual verbs (attain, devise and restrain), performance between the two contexts was not significantly different. There were no differences in terms of synonym presentation for the verb *anticipate,* which was significantly more difficult than the other verbs. Therefore, it seems unlikely that any

differential presentation of explicit synonyms in the companion sentences influenced individual verb learning.

Table 7

Percentage of Correct Responses Provided by Students in the Cohesive and Unconnected Context Conditions on the Sentence Generation and Definition Production Posttests

Verb	Sentence Generation		Definition Production	
	Cohesive	Unconnected	Cohesive	Unconnected
Wield	90%	70%	65%	60%
Restrain	85%	65%	85%	55%
Devise	75%	50%	65%	25%
Persist	65%	20%	70%	30%
Anticipate	60%	50%	40%	10%
Attain	50%	35%	65%	15%

Predictors of Vocabulary Learning. Correlations between pairs of scores on the pretests, training measures and posttests were computed in order to assess the extent of the relationships between them. Table 8 presents these findings. As is evident, many of the correlations were statistically significant.

Table 8
Correlations between Pretests, Posttests and Training Measures

Pretests	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. WRMT	1	.55**	.29	.31	.73**	.38*	.44**	.29	.21	.55**	.61**	.74**
2. PPVT	.55**	1	.43**	.14	.54**	.37*	.29	.04	.23	.35*	.33*	.41**
3. BNT	.29	.43**	1	.24	.40*	.37*	.23	-.06	.29	.18	.20	.40**
4. VFPT	.31	.14	.24	1	.19	.10	-.01	-.05	-.05	.10	.25	.27
Posttests												
5. Spelling	.73**	.54**	.40*	.19	1	.41**	.51**	.31*	.36*	.65**	.56**	.68**
6. Sent. Gen.	.38*	.37*	.37*	.10	.41**	1	.78**	.54**	.61**	.42**	.22	.35*
7. Defn. Prod.	.44**	.29	.23	-.01	.51**	.78**	1	.60**	.60**	.63**	.48**	.44**
8. Pr. Sent. Gen	.29	.04	-.06	-.05	.31*	.54**	.60**	1	.39*	.49**	.35*	.26
9. Verb Feat. PT	.21	.23	.29	-.05	.36*	.61**	.60**	.39*	1	.34*	.17	.24
Training Measures												
10. Cloze Total	.55**	.35*	.18	.10	.65**	.42**	.63**	.49**	.34*	1	.68**	.72**
11. Train.Defn.Total	.61**	.33*	.20	.25	.56**	.22	.48**	.35*	.17	.68**	1	.82**
12. Train.Sent.Recall	.74**	.41**	.40**	.27	.68**	.35*	.44**	.26	.24	.72**	.82**	1
Mean	505.70	109.98	10.78	5.93	3.13	3.60	2.93	7.65	10.35	15.40	14.88	16.63
SD	16.54	10.24	1.33	0.27	1.70	1.72	1.77	1.86	1.75	5.14	5.29	4.89

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Among the pretests, WRMT word reading was strongly related to the PPVT vocabulary test but not to the BNT pretest. The PPVT receptive vocabulary measure was moderately and significantly correlated with the BNT expressive vocabulary measure ($r = .43$) indicating that the two tests assessed related but not identical aspects of vocabulary knowledge. The verb features pretest was not related to any of the other pretest or posttest measures, not surprisingly because scores were at chance level by design.

Among the five posttests, statistically significant relationships ranging from moderate ($r = .31$) to strong ($r = .78$) were observed. This supports the conclusion that all of these tasks were assessing aspects of the word knowledge that students had acquired during the verb learning trials.

Three training recall measures were calculated. These consisted of the number of correct responses on each trial summed across the four learning trials. From Table 8, it is apparent that these measures were strongly correlated, with *r*s ranging from .68 to .82. Also these measures were significantly correlated with several of the posttest measures indicating that they were reflecting the extent of students' verb learning.

A question of interest was whether the students' word reading skill and their vocabulary knowledge would explain significant unique variance in their performance on the various vocabulary training and posttest measures, beyond that explained by the treatment condition. From Table 8, it is apparent that all three pretest measures of word reading and vocabulary knowledge were significantly correlated with two of the posttests, spelling and sentence generation, and in addition word reading was significantly correlated with the definitions posttest. Also word reading and PPVT scores were significantly correlated with all three

vocabulary learning measures. However, none of the pretests was correlated significantly with the prompted sentence generation or the verb features posttests. Because of this, regression analyses to assess predictors were not conducted on the latter two posttests.

In order to examine whether students' word reading skill and their vocabulary knowledge predicted how well they learned the new vocabulary words, beyond that predicted by the vocabulary learning treatment they received, hierarchical regression analyses were conducted on the various vocabulary learning measures, specifically, three training recall measures, and three posttests. The predictors were entered in a fixed order, with treatment condition entered first to eliminate variance explained by treatment differences on vocabulary learning. Entered next were either word reading (WRMT) second followed by vocabulary (PPVT and BNT) third, or vocabulary second and word reading third. Of interest was whether either of the two predictors explained significant unique variance not explained by the other predictors when entered last. It was expected that the extent of students' existing vocabulary knowledge would be a significant predictor of their ability to learn new vocabulary words. Other studies have found this including Robbins and Ehri (1994). Whether word reading skill would affect vocabulary learning was unclear. In a pilot study, I found that this was significantly correlated with vocabulary learning. However, in the present study, all of the words, definitions, and sentences were read to children as well as shown to them in print, so reading was not required to perform the tasks and learn the words.

Results of the hierarchical regression analyses are presented in Table 9. It is apparent that word reading skill was a highly significant unique predictor of vocabulary learning on five of the six outcome measures when it was entered last. In contrast, vocabulary knowledge never explained significant unique variance in any of the analyses when entered last. The amount of

unique variance explained by word reading skill ranged from 11% on the definition production posttest to 36% on the sentence recall task during the learning trials. One possible explanation is that the better readers paid more attention to the print than the weaker readers during the learning session and thereby enhanced their memory for the vocabulary words, their spellings, meanings and contexts. It is interesting that word reading skill did not explain significant unique variance on the sentence generation posttest when entered last. This measure required students to generate an acceptable sentence using each target verb, but responses were not drawn directly from the print that students read during training. This indicates that reading influenced performance when the information being recalled was seen in print during training as in the definition production and spelling posttests but not when performance was less dependent on print as in the sentence generation task.

Although vocabulary scores did explain significant variance when entered second in four of the six regression analyses, it was always reduced to non-significance by the prior entry of word reading scores, indicating that the latter was more centrally involved in students' vocabulary learning processes. It should be noted that there was substantial shared variance between vocabulary knowledge and word reading (i.e., r =.55 between WRMT-R and PPVT). Across most vocabulary learning outcome measures, word reading correlations were higher than PPVT vocabulary correlations (see Table 8). Because word reading was the stronger predictor, it won unique predictor status.

Table 9

Hierarchical Regression Analyses Displaying Order of Entry of Predictor Variables on Vocabulary Learning Posttests and Training Measures

Model	R^2	R^2 Change	β^a	*F* Change	*p*
Spelling Posttest					
1 Treatment Condition	.04	.04	.19	1.49	n.s.
2 Word Reading	.58	.54	.74	47.78	.000
3 Vocabulary	.62	.04	.16/.12	1.81	n.s.
2 Vocabulary	.36	.32	.48/.15	8.94	.001
3 Word Reading	.62	.26	.62	24.13	.000
Sentence Generation Posttest					
1 Treatment Condition	.17	.17	.41	7.76	.008
2 Word Reading	.32	.15	.38	8.00	.008
3 Vocabulary	.38	.06	.19/.14	1.64	n.s.
2 Vocabulary	.34	.17	.32/.16	4.54	.017
3 Word Reading	.38	.04	.24	2.17	n.s.
Definition Production Posttest					
1 Treatment Condition	.31	.31	.56	17.05	.000
2 Word Reading	.51	.20	.45	15.11	.000
3 Vocabulary	.52	.01	.12/-.05	0.31	n.s.
2 Vocabulary	.41	.10	.33/-.03	2.99	n.s.
3 Word Reading	.52	.11	.40	8.01	.008
Definition Recall (Training)					
1 Treatment Condition	.05	.05	.22	1.85	n.s.
2 Word Reading	.42	.37	.61	23.78	.000
3 Vocabulary	.42	.00	.01/-.02	0.01	n.s.
2 Vocabulary	.16	.11	.33/.02	2.42	n.s.
3 Word Reading	.42	.26	.61	15.72	.000

Table 9 (Continued)

Hierarchical Regression Analyses Displaying Order of Entry of Predictor Variables on Vocabulary Learning Posttests and Training Measures

Model	R^2	R^2 Change	*ß*[a]	*F* Change	*p*
Sentence Recall (Training)					
1 Treatment Condition	.04	.04	.19	1.45	n.s.
2 Word Reading	.59	.55	.74	50.05	.000
3 Vocabulary	.62	.03	-.06/.19	1.25	n.s.
2 Vocabulary	.26	.22	.32/.24	5.33	.009
3 Word Reading	.62	.36	.72	33.08	.000
Cloze (Training)					
1 Treatment Condition	.23	.23	.48	11.53	.002
2 Word Reading	.55	.31	.56	25.49	.000
3 Vocabulary	.57	.02	.14/-.14	0.78	n.s.
2 Vocabulary	.38	.14	.41/-.10	4.12	.025
3 Word Reading	.57	.19	.52	15.25	.000

Hierarchical Regression Analyses Displaying Order of Entry of Predictor Variables on Vocabulary Learning Posttest and Training Measures

Model	R^2	R^2 Change	*ß*[a]	*F* Change	*p*

Note. Standardized beta coefficients are given. n.s. not statistically significant at $p < .05$.

[a] The vocabulary predictor combined two measures, PPVT (Peabody Picture Vocabulary Test) and BNT (Boston Naming Test). Beta coefficients are listed separately, with PPVT first and BNT second.

The target verbs in the current study were not intrinsically or necessarily related to any of the story contexts. Instead, the contexts were imposed on the verbs. A question of interest was whether students in the cohesive condition had an advantage on the sentence generation posttest because the cohesive contexts provided better schemata from which students could draw in generating their sentences. In order to examine this question, sentences from the sentence generation posttest were examined to see whether students were relying on the contexts provided to them during the training. The PI as well as an independent rater examined the sentences to see if the contexts used in the training sentences were repeated during the posttest. The PI examined all sentences provided by the students, compared them to the training sentences, and coded each sentence as '1' if the sentence appeared to rely on the same subject or was an approximation of a training sentence, and as '0' if it was not. The independent examiner was provided with a list of all the training sentence pairs as well as sentences the students had generated and was asked to code each generated sentence as '1' if it duplicated a training sentence or used the same context as the training sentence pairs. Only sentences that had been deemed correct as described above for the sentence generation posttest were analyzed. A sentence had to receive a score of '1' by both the PI and the independent rater in order to be regarded as relying on the training sentences and or contexts. Inter-rater agreement was .84.

Results of this analysis revealed that students in the unconnected context generated slightly more sentences by drawing on those that they heard during training than those in the cohesive context, with *M* (cohesive) = 1.10, *SD* = 0.97, and *M* (unconnected) = 1.45, *SD* = 1.15. This was 26% of the total correct sentences generated on the posttest by the cohesive group, and 50% of the total sentences generated by the unconnected group. Thus, the potential availability of story schemata did not explain the superior performance of the cohesive group in generating

acceptable sentences containing the target verbs. In fact, the reverse was true. The unconnected group was more likely to draw from training sentences whereas the cohesive group was more likely to construct original sentences, possibly reflecting better knowledge of verb meanings.

Another question of interest was whether word reading ability and vocabulary knowledge might be correlated with the tendency to draw from training sentences when responding on the sentence generation posttest. Results revealed no relationship between PPVT vocabulary scores and the number of generated sentences resembling training sentences, r = -..05, p >.05, or word reading scores, r = -.14, p>.05. Better readers had better memory for the training sentences, as indicated by the strong correlation between WRMT scores and recall of sentences during the learning session, r = .74, p <.01 (see Table 8). However, they were only slightly less likely to rely on recall of these sentences than to generate original sentences than poorer readers one day later. The poorer readers fell back on memory for training sentences slightly more than their more skilled peers. It may be that better readers acquired more complete representations of verb meanings and hence were enabled to create novel sentences.

Chapter 6

Discussion

To summarize, the current study addressed several research questions regarding the effectiveness of story contexts in facilitating third graders' learning of unfamiliar verbs. Various aspects of performance during and after learning were assessed. Students were taught six complex verbs in one of two conditions: a cohesive semantic condition where target verbs were presented in coherent story contexts with a brief synopsis preceding them, or an unconnected semantic condition where target verbs were presented in unrelated sentences without a preceding synopsis. Results indicated that overall the cohesive contexts better supported learning and memory for the target verbs than the unconnected contexts, particularly on the more demanding verb memory tasks. Further analyses showed that word reading skill exerted a strong influence on vocabulary learning as well.

Training and posttest measures supported the main hypothesis that students who learned the target verbs in a cohesive context would be better able to define and use the verbs than students who learned the verbs in unrelated contexts. Several possible explanations for these results deserve consideration. The favored explanation is that the greater number of semantic connections that were created between verbs and other words and meanings by the story contexts enabled students to build richer semantic networks for the verbs in memory. Each of the four cohesive contexts began with a synopsis of a story (e.g., birthday party, swimming) that preceded the sentences and set the stage for creating connections among the sentences as they were encountered. The sentences within each story context contained the same agent who served as the main character in the story. In contrast, the sets of sentences in the unconnected contexts were not preceded by a synopsis, each sentence contained an agent with a different name, and the

topics varied across sentences within a set. These features served to limit the formation of connections between sentences in the unconnected condition. However, within each sentence meaningful connections between the verb and the other words were written to be just as rich as within sentences in the cohesive condition. (See Tables 3 and 4.)

Alternative explanations for the difference favoring the cohesive treatment in vocabulary learning can be ruled out. Participants were randomly assigned to the two experimental conditions, and the two groups performed equivalently on the pretest measures, so differences did not result from superior student abilities in the cohesive group. Students were taught the same definitions of the verbs in both conditions, and they did not differ significantly in their ability to recall definitions during learning but only on the posttest given the next day, so cohesive contexts affected longer-term recall rather than immediate recall. Also the ease of recalling the sentences containing the verbs during learning did not distinguish the two groups, indicating that both sets of sentences were sufficiently meaningful and hence memorable individually. The time spent learning definitions and sentences were equivalent across conditions, so one group did not get more practice or time on task.

On the posttests, superior performance recalling definitions and generating meaningful sentence contexts in the cohesive condition was evident not only across participants but also across all six verbs, indicating that effects were not limited to a subset of verbs but generalized across all the verbs. The consistency of the cohesive context effect across all the vocabulary words strengthens support for the hypothesis.

Although sentences imposing meaning on the verbs were similar in the two conditions, they were not identical. Some were close in meaning, as in the following example:

Connected: Jane persisted in begging her mother every night for a birthday party. She wouldn't stop till her mother said, "yes." (20 words)

Unconnected: Jack persisted in begging his father every night for a new bicycle. He wouldn't stop until his father said yes. (20 words)

Others were not as close, as is evident below:

Connected: Johnny persisted in swimming in more and more races the same day even though he was tired. He continued swimming until his arms and legs wouldn't move any more. (29 words)

Unconnected: Bill persisted in wearing the same shirt day after day even though it was dirty and smelled bad. He continued wearing it until it ripped and fell apart. (28 words)

The number of words per training sentence was slightly greater in the cohesive condition than in the unconnected condition: 27.6 words vs. 26.6 words. However, this was not reflected in performance, as students in the cohesive condition did not have more difficulty recalling these sentences during the learning session than students in the unconnected condition. To determine whether the sentences might have differed semantically or conceptually, eight graduate students with expertise in literacy research and teaching read each sentence with the verb underlined and rated its probable effectiveness in helping third graders understand and learn the meanings of the verbs, from 1 (low effectiveness) to 5 (high effectiveness). The sentences were separated from their story contexts and grouped by verb (e.g., the eight sentence pairs containing *persist* were randomly ordered and printed on a page for rating). Results yielded ratings that did not differ significantly: M (cohesive) = 3.23, SD = 1.1 vs. M (unconnected) = 3.42, SD = 1.2, $F < 1$. In fact, the mean rating for unconnected sentences was slightly higher. This suggests that the semantic quality of individual cohesive sentence pairs was not greater than that of unconnected sentence pairs and hence does not explain why verbs in the cohesive sentences were learned better.

Synopses preceded the sets of sentences in the cohesive condition but not in the unconnected condition. Their purpose was to introduce the story context and strengthen the formation of connections between verbs and sentences. Synopses did not contain any vocabulary words, and students only listened and did not repeat them. It is not likely that this difference between the two conditions by itself offers an alternative explanation for the outcomes observed. Rather it is simply part of the independent variable that was manipulated and it contributed by strengthening the cohesion formed among sentences and their verbs to strengthen verb learning.

Findings are viewed as consistent with several theories. Landauer and Dumais' (1997) theory of Latent Semantic Analysis (LSA) holds that there is a complex relationship between specific contexts and word learning. Retrieving a *context* from memory requires recalling one particular event. This is different from retrieving a *specific word* from memory, which requires an amalgamation of many memories. LSA asserts that people rely on both direct and indirect connections among words when learning new words. Any learner has a multitude of existing knowledge and connections between different concepts and words that represent those concepts. Even though we may store information as we learn it, we are not always able to organize new and old information effectively for retrieval and application. Therefore we must identify and build connections between old and new information in our lexicon. In the present study, the cohesive context facilitated this and thus better supported vocabulary learning because it provided a larger swath of words and concepts by which to link the target verbs for storage and retrieval. The unconnected condition merely gave students contents without a container, leaving students in this context with isolated, unorganized novel verbs and sentences.

The idea that vocabulary knowledge involves more than just individual words is an essential tenet to bear in mind when trying to understand how learners process, store and retrieve

the meanings of new words. Vocabulary knowledge is critical to reading comprehension and represents an intricate understanding of concepts and their relationship to other concepts. The deeper a person's vocabulary knowledge, the better equipped they will be to incorporate new ideas and arrive at accurate interpretations of text. Kintsch's (2004) Construction Integration model of reading comprehension illustrates both the need for strong vocabulary knowledge and the role of context in applying this knowledge. According to this model, readers create mental images known as situation models of text as they read. The quality of the situation model that a reader constructs relies on how well the reader can access and synthesize relevant prior knowledge with new information. Successful construction of situation models leads to more accurate interpretations of text as well as enhanced understanding of old and new concepts. Likewise, unsuccessful creation of situation models results in encapsulated knowledge – disjointed understanding of text and inadequate connections between new and old knowledge.

The cohesive context in the present study facilitated successful construction of situation models because the links between the target verbs and the unified stories were provided to them, essentially supplying all the necessary tools for building a strong situation model. This condition minimized the likelihood that students would misunderstand the use of target verbs and strengthened appropriate connections between old and new vocabulary words. The reverse was likely true for the unconnected context. Here students were left to create a situation model from scratch with minimal guidance from the contexts in which the target verbs appeared. This made the cognitive load greater and left more room for error in this condition. Results of the present study showed that students in the unconnected condition had far greater difficulty generating acceptable sentences containing the target verbs and also greater difficulty defining the target verbs. This is perhaps surprising since students in both conditions were presented with exactly

the same definitions in exactly the same manner. Students in the cohesive condition were able to integrate the target verbs into their lexicons more easily, using the cohesive sentences as a situation model that assisted with integration of the definitions as well. Conversely, students in the unconnected condition appeared to rely on inefficient memorization strategies for the definitions and were less able to use the sentences to help remember the definitions of the target verbs. In this context the definitions and sentences were processed as many separate pieces of information.

Other aspects of the cohesive context may have made it a better vehicle for teaching complex verbs as well. Goldinger's (1998) description of episodic theory supports the notion that the manner of presentation of the target verbs would influence the storage and retrieval of the verbs on the posttests. Two parts of the episodic theory can be brought to bear directly on the results of this study. First, Goldinger (1998) states that voice, font, word frequency, semantic priming and context all exert a strong influence on word perception in laboratory tests. The perception of words is said to be stored in the episodic lexicon and each new perception contributes to the understanding of words and concepts. The episodic lexicon is far more than a collection of words, but rather is a complex linguistic history of words in different contexts including both major and minor details of presentation. Clearly the sentences in the cohesive context provided a stronger link for storing and remembering the target verbs because the connections were clear and they eliminated distracting and irrelevant details which can interfere with storage and retrieval.

A second part of Goldinger's (1998) theory that relates to the results of this study is that when we store words in various contexts, we establish many different routes to retrieve those words from memory. Many routes are desirable, but only if they are accurate, efficient and well-

organized. Students in the cohesive context could have created four well-worn paths back to the target verbs based on the four unified contexts in which the verbs were presented. In contrast, students in the unconnected context were faced with the task of creating new paths back to the target verb each time an individual training sentence was presented. If this was the case, then students in the unconnected context were being diverted from the goal of learning the target verbs while students in the cohesive condition were solidifying their understanding by linking the target verbs not only with the cohesive contexts but also with their existing episodic lexicon.

Knowing a word requires many layers of knowledge, ranging from superficial to intimate understanding. One purpose of the present study was to investigate methods of facilitating deep understanding of complex verbs. Posttests were designed to tap the depth of knowledge required for word learning. They varied in their complexity in order to reflect different degrees of knowledge of the target verbs. The five posttests in the study (spelling, definition production, sentence generation, prompted sentence generation and verb features posttest) tap into concepts described as incrementality and multidimensionality by Nagy and Scott (2000). Nagy and Scott also describe the inter-relatedness of words emphasizing the need for words to be taught in relation to other words and concepts.

The present study tested students' understanding of the network of words by creating different networks for instruction in the target verbs. It is clear that the cohesive context better supported storage and retrieval of the more demanding aspects of word learning. Results demonstrated that students in the cohesive context overwhelmingly outperformed those in the unconnected context on most measures, particularly those requiring deeper understanding of the target verbs (i.e., definition production and sentence generation). While all students were exposed to synonyms of the target verbs in the definitions, the cohesive contexts presented target

verbs in unified stories that enhanced memory via construction of broad and deep understanding of acceptable collocations. Just as learning the word 'slide' can be enhanced by one's knowledge of the words 'snake', 'slither' and 'slip', the various cohesive contexts enhanced students' knowledge of the target verbs by embedding them in sentences that solidified their connections to familiar concepts and phrases that properly and regularly utilized the target verbs more clearly than the sentences in the unconnected context.

The sentences in the cohesive context also helped clarify the target verbs in relation to the other verbs presented in the study. Because all sentences in a set centered on one topic (e.g., birthday parties), each target verb was seen as a unique event within the story, not to be mistaken for the action or event performed by a different target verb in the set. Since sentences in the unconnected context were independent of each other, the actions of the target verbs may have seemed more difficult to distinguish from each other. Student definitions from the Definition Production Posttest were examined by the PI and an independent rater in order to determine how frequently students confused one target verb for another. For example, a student provided the sentence *I will **attain** my dog from barking at my friends*, which appears to confuse the target verbs *attain* and *restrain*, where the verb restrain would be appropriate in the sentence generated by the student, but the verb *attain* is not. An independent examiner was presented with a list of the incorrect sentences generated by the students as well as the target verbs and their definitions. The independent rater, a third grade teacher not affiliated with the study, was asked to identify which definitions students seemed to confuse for other target verbs in the study. The PI did the same. Responses that both the PI and the independent examiner identified as being confused for other target verbs in the study were included in the analysis. Inter-rater agreement was high,(.94). Students did not appear to confuse target verbs for one another very frequently

(overall $M = 0.35$) but students in the unconnected condition did this significantly more than students in the cohesive condition (M(unconnected) = 0.60, SD = 0.94; M(cohesive) = 0.10, SD = .31; F<.05).

The verbs taught in this study were considered complex because they could not be reduced to simple synonyms that could be substituted for each other in sentences. One needed to understand various constraints in order to use them appropriately. The study took great pains to teach unfamiliar, complex verbs, but the definition of what constitutes 'complex' may need to be better defined. A closer examination of the results of the sentence generation and definition production posttests showed that two of the target verbs ('wield' and 'restrain') were far easier for students in both contexts to use and define. It is clear that while verbs may be considered more complex than other parts of speech, not all verbs are created equal and the nuances that make verbs complex are nuanced themselves. The reason for this can be understood in light of the Emergentist Coalition Model (ECM). Maguire, Hirsh-Pasek and Golinkoff (2006) describe the Emergentist Coalition Model of word learning in a broad way to include all word classes. This model describes early language acquisition as the result of several social and cognitive factors. ECM assumes that children draw from many available inputs at any given time in order to learn new words. These inputs vary over time so that younger children rely more heavily on perceptual cues than older children who are able to rely on social and linguistic information. Maguire and colleagues (2006) contend that words labeling concepts which are perceptually salient might be learned earlier and more easily than those that represent more abstract concepts. They state that all word classes have words that vary in complexity so that words within and across syntactic classes are learned differently based on this complexity. This range of

complexity as reflected in their learning ease was seen even in the relatively small set of target verbs taught in the current study.

Maguire, Hirsh-Pasek and Golinkoff (2006) describe a continuum of language learning that encompasses all word classes and places words on a scale ranging from simple to complex known as the SICI Continuum: Shape, Individuation, Concreteness, Imageability. The shape of a word is intuitive in concrete nouns but in verbs this can be interpreted to refer to the way in which children deduce the 'shape' of an action that they observe. Many nouns have tangible shapes as in the concrete noun, 'car', where one can imagine the shape of a car. Other word classes or even more abstract nouns have less clear shape. For example, the target verb 'attain' does not have a clear or finite action associated with it. Individuation refers to the idea that some words are more easily counted and observed in the world than others. For example, the noun 'dog' has a tangible referent, as does the verb 'walk'; the more abstract noun 'freedom' or verb 'think' would have lower individuation ratings on the SICI scale. The concepts of concreteness and imageability are similar to Dual Coding Theory (Sadoski, 2005) which states that information that can be coded both verbally and non-verbally (dually) is more easily learned than information that relies on only one coding system. The imageability of a word refers to the ease with which one can create a sensory mental image. The concreteness of a word refers to whether the word can be manipulated or observed in the world.

In considering the set of target verbs taught in the present study in light of the SICI Continuum, it is clear that not all of the verbs are equally complex. The verbs 'wield' and 'restrain' were easier to define and use in acceptable sentences, very likely because they rated more highly on a scale encompassing these factors. Two independent raters evaluated each of the target verbs on the four dimensions of the SICI scale. Raters were given a brief description

of the dimensions of the SICI scale and asked to rate each target verb from 1 to 5 with ‘1’ being ‘ unclear’ and ‘5’ being ‘ very clear’, so a lower rating on the scale would indicate a more complex verb. Results from the raters were averaged and are summarized in Table 10. Ratings of the complexity of the verbs are consistent with the findings that some verbs were more complex than others with attain and devise being the most complex and restrain and wield being the least complex.

Table 10

Ratings of Complexity of Verbs Based on SICI Scale

Verb	Rating
Attain	1.5
Devise	1.5
Anticipate	2.0
Persist	3.0
Restrain	4.0
Wield	4.0

Note: Scale ranged from 1-5, 1 = very complex, 5 = not complex

In addition to the context and differences between individual verbs, some other variables were found to influence vocabulary learning in the present study. Word reading abilities explained significant unique variance on both the definition production posttest and the sentence recall task during learning. One possible explanation for this is that better readers paid more attention to the print than weaker readers, even though the text was read to the students by the experimenter. It is interesting that vocabulary knowledge did not explain significant unique variance on any of the measures when entered after word reading, and that word reading ability appears to play a central role in vocabulary learning. The access hypothesis described by Stahl and Nagy (2006) claims that children with larger vocabularies have a deeper understanding and automatic access to their knowledge of words. It is possible that this accessibility rests on strong word reading skills and that word reading ability acts as an entry point to vocabulary knowledge. This would explain why word reading better explained vocabulary learning in this study than existing vocabulary knowledge.

The role of word reading skill in word learning can be understood through the Word Experience model described by Reichle and Perfetti (2003). This model states that our memory for words is comprised of orthographic, phonological and semantic features of words and these features are represented and connected in memory. Word knowledge increases with experiences with individual words and the more encounters one has with a word in any form, the better that word and its related forms are represented in memory. It is likely that students with stronger word reading skill possess orthographic and phonological representations of more words than their peers with weaker word reading skill. In the present study as a result, these students were better able to tap into existing and high-quality knowledge of familiar words' orthographic and phonological representations which assisted them in forming new, high-quality representations

of the target verbs. This is similar to findings of Rosenthal and Ehri (2008) who found that the spellings of words contributed significantly to vocabulary learning, although it continues to be a neglected part of vocabulary instruction.

In two experiments with second and fifth graders, Rosenthal and Ehri (2008) found that students who were taught new vocabulary words accompanied by spellings of the words learned the pronunciations and meanings of those words better than students who were taught the new vocabulary words without seeing their spellings. They also found that students with the strongest orthographic knowledge (those with the highest spelling scores in fifth grade) benefitted most from being shown spellings of new vocabulary words. Findings in the current study echo those of Rosenthal and Ehri (2008). In the current study all students were exposed to the spellings of words in an attempt to control for differences in this skill. However, the influence of exposing students to spellings was evident nonetheless. Better word readers took advantage of seeing the written forms of the target verbs and their contexts, more so than weaker readers. As a result, the orthographic, phonological and semantic representations of the words became better bonded in their memories. Evidence for this is found in Table 8. Students' word reading skill was significantly correlated with their memory for spellings of the verbs (r = .73) as well as their memory for definitions of the verbs (r = .44). Clearly there is a need to rethink vocabulary instruction to include all representations of words in addition to the contexts in which they appear.

Strengths and Limitations

Findings from the current study provide strong support for the use of a pedagogical cohesive context when teaching complex verbs. The present study has strong internal validity. The current study utilized random assignment of students, thus reducing the likelihood that individual characteristics of students explained effects of the treatment. In fact, pretest measures confirmed that the treatment and comparison groups did not differ in their word reading or vocabulary knowledge. Also pretests confirmed that students did not know the meanings of the target verbs to be taught. The third grade sample was reading at or above grade level without any reported special needs, so they were fully competent to perform the tasks that were given. Care was taken to form semantically equivalent sentences to teach verbs in the two conditions, and student performance recalling individual sentences during the learning session supported this. Students in both conditions spent equal time learning the target verbs, so differential time on task was not a factor. Superior effects of the cohesive context on vocabulary learning were observed not only immediately but also the next day, indicating the vocabulary learning effects persisted. Several measures of vocabulary learning were administered, and positive effects of the cohesive condition was evident on four different tests: defining the verbs, inserting verbs correctly in cloze sentences, generating acceptable sentences containing the verbs, and recognizing constraints imposed on verbs by their contexts (i.e., the verb features posttest). This is evidence that multiple aspects of vocabulary learning occurred. Also posttests that involved making judgments about the correctness of responses were scored by individuals who were blind as to the verb learning condition of students, thus precluding the influence of experimenter bias.

Generalizations drawn from the current study should be done so with some caution. Students in the present study were proficient English speakers from middle and upper-middle

SES backgrounds. Students did not have any reported needs and performed at or above grade level on pretest measures. The study examined the use of two different semantic contexts that were fictional and therefore may not hold for non-fiction contexts and this is an area that should be investigated in future research. Also, the current study investigated complex verb learning and results may be different for other parts of speech.

Some limitations should be addressed in future research. Closer examination of the differences between the sets of training sentences in both conditions revealed that some companion sentences were more explicit in presenting students with synonyms for the target verbs. Future studies should be careful to choose the same or equivalent synonyms for all training sentences in order to rule out the influence of differential synonym presentation on complex verb learning. The study took place over a short period of time with only one day between training and posttests. It would be important to see whether results hold when measured with a more delayed posttest that would better reflect how well students maintained knowledge of the target verbs in memory. A delayed posttest would also demonstrate whether the influence of the cohesive context was evident in the networks into which students incorporated the target verbs over time. Finally, defining complex verbs using a well-defined, research based criterion would help clarify how best to structure instruction for different types of verbs. The present study considered the target verbs complex because definitions could not be reduced to simple substitutions but instead required nuanced understanding of various syntactic and semantic constraints. The verbs ultimately chosen for this study were chosen randomly from a curated list of eighteen novel, seemingly complex verbs. However, closer examination of the individual verbs revealed that the verbs were not equally complex. This variation in complexity should be

examined more closely and better defined for future study utilizing the SICI scale described above (Maguire, Hirsh-Pasek & Golinkoff, 2006) .

Implications for Instruction

The significant main effects of treatment on posttests provided strong evidence for the need for high quality semantic contextual support for teaching complex verbs. Results indicated that teaching verbs in contexts that create greater connections between the verbs and other words and concepts leads to a stronger grasp of the target words than unrelated contexts. Results of this study provide support for the explicit teaching of complex verbs in carefully-constructed cohesive contexts. Multiple exposures to novel words in haphazard contexts or in unique sentences unconnected to other sentences are less sufficient for building a deep understanding of vocabulary words yet this is often how vocabulary instruction is conducted.

The current study also found that the effect of word reading skills is deep and far reaching in vocabulary learning. Even without requiring students to read target verbs during learning, word reading skills exerted a strong influence on vocabulary learning. This carries important educational implications for vocabulary instruction specifically and reading instruction generally. Reading instruction necessarily varies at different points in development. Early reading instruction tends to focus on basic concepts of print such as direction of text and norms of stories. The focus then moves to word reading, including phonological awareness and decoding skills. Often it seems that reading instruction is linear and assumes an accumulation of skills. Results of the current study are in line with other researchers' findings that skilled reading at all stages of development is the product of many coordinated components of reading (Cain &

Oakhill, 2007; Cain, Oakhill & Lemmon, 2004; Duff et al, 2008; Gough & Tunmer, 1986). Instruction must reflect the reciprocal nature of these components at all levels.

Conscientious teachers foster word consciousness through regular discussion and analysis of individual words. This helps lay a broad foundation for language learning but it is only part of the equation of word learning, which must be addressed from multiple angles. Discussion of new words and concepts is part of the fabric of any good classroom instruction, but vocabulary learning requires more than reliance on spontaneous conversation and randomly occurring teachable moments. The results of this study confirm that carefully planned direct instruction in complex verbs can be effective. Further, balanced and effective vocabulary instruction should include orthographic representations of words in carefully constructed cohesive contexts in order to secure high-quality lexical representations of words embedded in well-organized networks of knowledge.

The present study did not require students to do any writing during learning and only a minimal amount of writing during the spelling posttest. This was by design in order to eliminate the influence of spelling and writing on verb learning. However, including guided writing practice as recommended by Biemiller and Boote (2006) may enhance the learning of target verbs. As Rosenthal and Ehri (2008) found, orthographic knowledge contributes to vocabulary learning so incorporating writing and spelling into vocabulary learning is likely to increase knowledge of all aspects of new words.

The present study attempted to control for differences in word reading ability by not requiring students to read the words independently. However, it may be that controlling for word reading skill is not possible and that weak word reading skills are difficulties that scream

for attention, interfering with subsequent reading skills at a great cost. Findings that word reading skills strongly predict vocabulary learning highlight the far-reaching impact of the Matthew Effect (Stanovich,1986) . Students with stronger word reading skills read more and gain more vocabulary and develop better understanding of concepts. Conversely, students with poorer word reading skills read less, do not develop strong vocabularies and have more limited understandings of concepts learned through text. The gap between good and poor readers is not limited to word reading skill, but instead weaker word reading skills leads to many layers of deficits in reading skills, including but not limited to vocabulary knowledge. We need to discover and implement effective techniques for vocabulary instruction for all students, but especially for our weakest readers who are our most vulnerable learners. Vocabulary instruction cannot be separated from wider reading instruction.

Word reading skills should continue to be taught through the middle and upper elementary grades and possibly even later because strong word reading skills clearly provide a necessary foundation for vocabulary learning, among other essential reading skills. Likewise, high quality vocabulary instruction must include spellings and pronunciations of target vocabulary words in carefully composed contexts that facilitate strong and flexible networks to develop deep understandings of new words and concepts. Results of this and other studies (Cain & Oakhill, 2007; Cain, Oakhill & Lemmon, 2004; Duff et al, 2008; Rosenthal & Ehri, 2008) demonstrate that students with strong reading skills possess superior phonological and orthographic skills that cannot be suppressed when learning new material. It is precisely the fact that these skills are so well incorporated into the thinking of these students that all new word knowledge is more easily integrated into their lexicon. The processes of highly skilled readers

when learning new words needs to be better understood in order to make them more explicit and accessible to weaker readers.

Conclusion

Language is a powerful tool and words have consequences. Our ability to understand and convey subtle differences in word meaning has far-reaching effects both in and out of school. Knowing the different connotations of words such as ‘stare’ and ‘gaze’ allows a person to both understand and articulate events and ideas accurately. The deftness with which a person can do this is often a determining factor in their success in many spheres. Verbs are only one small component of a complex and beautiful language system, and of course one word class cannot be considered more important than another because words of all classes work together in elegant harmony. Language cannot and should not be reduced to the simplicity of word meanings but our understanding of how complex verbs are best learned can only improve our understanding of all language learning. The current study sheds light on the way we learn, store and retrieve information about complex verbs, helping to define effective instruction to better allow all students to broaden the palette of their vocabularies so that they may continue to improve in their ability to understand and be understood.

Appendix A
Parental Consent Form

Parental Permission Form

My name is Molly Welsh Chilton and I am a doctoral student in the Educational Psychology PH.D. Program at the City University of New York (CUNY) Graduate Center. I am the Principal Investigator (PI) of this research project, entitled, "Methods of Verb Learning." The goal of this study is to examine the effects of different types of vocabulary instruction. Vocabulary has been shown to help students succeed in school and it would be helpful to know more about the best methods of instruction.

I am asking you to give your child permission to participate in my study. If you decide to give your child permission to participate in the study, here is what will happen: The study is open to all interested students and will take approximately two months to complete. First, your child will complete several basic educational tests of word reading, passage reading and vocabulary (approximately one hour). Next, they will receive several different methods of instruction in unfamiliar vocabulary words (approximately 45 minutes). Finally, once instruction is completed, they will take several brief written tests (approximately 45 minutes) to determine how well they learned the new vocabulary words. Tests and instruction will take place during the school day outside of class over the two month period for a total of approximately two and a half hours.

My advisor and I will be the only persons examining the data so that your child's privacy is protected. All information gathered during this research will be kept confidential and will not affect his or her academic standing in school. All data collected throughout the experiment will be stored in a locked drawer, which only my Research Advisor, Dr. Ehri, and I will be able to access.

Participation in the study is voluntary and children who do not have parental consent to participate in the study or who do not agree to participate in the study will not be included in the study and will remain with their teacher. Also, you may withdraw your child from the study or your child may withdraw from the study at any time, without any consequence for doing so. Your decision to participate or not will have no effect on your child's standing in the school.

One potential risk posed by the study is a disruption of your child's school routine; however, instructional time will not be wasted because the participants of the study will constantly be asked to perform academic work. There is a possibility that your child may become anxious due to testing. This risk is minimal because testing is a usual procedure in school. However, your child's teacher and I will be alert to any sign of stress your child may display and will discontinue the testing if your child becomes anxious.

The benefit of this study is that it may contribute to the identification of instructional strategies that enhance students' learning of vocabulary. A possible benefit to your child is that it may

provide him or her with a better understanding of vocabulary words and help his or her reading, writing and general academic progress.

I may publish the results of this study, but your child's name, or other identifying characteristics, will not appear in the publications. If you wish to have a summary of the study results mailed or emailed to you in the future, please contact me. I will mail this summary to you when it becomes available. If you have any questions about this research, you can contact me at (718) 930-8281 or MWelsh@gc.cuny.edu or my advisor at (212) 817-8294 or LEhri@gc.cuny.edu. If you have any questions about your rights as a participant in this study, you can contact Kay Powell, IRB Administrator, CUNY Graduate Center, at (212) 817-7525, or at KPowell@gc.cuny.edu.

_____ _____/_____/_____
Parent/Guardian Signature Date

_____
Child's name

_____
Child's teacher

_____ _____/_____/_____
Investigator's Signature Date

Appendix B
Student Assent Form

My name is Molly and I am trying to learn about how kids like you learn about verbs. Your parents said you would be willing to help me do this. We are going to meet together three times so I can ask you a lot of questions about words and teach you some new words. If you change your mind and want to stop working with me, please let me know and we will stop so you can go back to your classroom. Do you have any questions? Thank you very much for your help.

Appendix C
Verb Features Pretest and Script

Verb Features Pretest:
"I am going to read you some questions about some verbs. Think about what the verbs might mean and then I want you to point to and tell me the answer that makes the most sense." (Show child printed items, read each one aloud as child follows along; have child point to text with finger to indicate answer as well as say letter choice of answer).

1. A girl anticipates something. Is it:
    a. A gold necklace she has always wanted
    b. A gold necklace she was given last year
2. Which of these is something to be attained?
    a. Climbing into bed when you are tired
    b. Climbing to the top of a mountain
3. A man has devised something here. Which is it?
    a. A plan for building a house
    b. A plan that his boss gave him
4. Who is more likely to persist at something?
    a. A man looking for a job
    b. A man looking at a car speed past him
5. Which of these is more likely to be restrained?
    a. A lion who is sleeping
    b. A lion who is angry
6. Which of these is something that a person might wield:
    a. A sword
    b. A car
7. Which of these is more likely to restrain someone or something?
    a. A rope
    b. A chair
8. Who is persisting here?
    a. A student who goes to bed without finishing her homework
    b. A student who stays up late to finish her homework
9. Which is the thing that the boy has devised here?
    a. An idea that he thought up for a new story
    b. An idea that he read about in a book
10. Which of these is something that a person might wield?
    a. A hammer
    b. A nail
11. Which of these is someone more likely to anticipate?
    a. A movie that he has seen three times
    b. A movie that is coming out soon
12. Which of these is something to attain?
    a. A traffic light that stops cars
    b. A license to drive a car

Appendix D
Verb Training Scripts

Cohesive Story Context Condition – Training Script:
PI: Today we are going to learn some new verbs. I am going to show you the words and you will read the definitions and some other words that have similar meanings. Then you are going to read some sentences that use these words to help you understand and remember what each word means. I will read the words aloud to you as you follow along silently, while pointing to the words with your finger. You should try to learn these words because you will be tested on them later.

Study Definitions: Routine
1. "This verb is _____. You say that." (*Child repeats verb*)
2. "_____ means _____. Some words that mean almost the same thing as _____ are _____" (*read synonyms*).
3. "Now you read that." (*Child reads target verbs and definitions as seen below*.) "Great."
4. "Now I'm going to cover these words and I want you to remember and tell me what you just read." (*Cover sentences, child recalls*.)
5. (*Show definitions and synonyms again after child recites and point out corrections if needed*).
6. "Read it again so you remember it." (*Child rereads the definition and synonym.*)

Repeat for each verb.

Learn Verb Contexts
"Now we are going to read those verbs in a short story. This story is about _____" (*read title of set*). In this story _____ *(read brief synopsis).*
Routine:
1. (*Examiner reads context for first verb*).
2. "You read that for me." (Child reads). "Great"
3. "Now I'm going to cover these words and I want you to remember and tell me what you just read." (*Cover sentences, child recalls*.)
4. (*Examiner uncovers sentences when child is done and points out corrections if needed*)
5. "Now listen to that again so you remember it." *(Examiner rereads the sentence*).

Perform routine for each verb context in a set of 6 contexts once.

After the set of 6 contexts has been presented and rehearsed once by the student as described above, students will complete a cloze test described in detail below.

Unconnected Control Condition – Training Script:
PI: Today we are going to learn some new verbs. I am going to show you the words and you will read the definitions and some other words that have similar meanings. Then you are going to read some sentences that use these words to help you understand and remember what each word means. I will read the words aloud to you as you follow along silently, while pointing to the words with your finger. You should try to learn these words because you will be tested on them later.

Study Definitions: Routine
1. "This verb is _____. You say that." (*Child repeats verb*)
2. "_____ means _____. Some words that mean almost the same thing as _____ are _____" (*read synonyms*).
3. "Now you read that." (*Child reads*.) "Great."
4. "Now I'm going to cover these words and I want you to remember and tell me what you just read." (*Cover sentences, child recalls*.)
5. (*Show definitions and synonyms again after child recites and point out corrections if needed*).
6. "Read it again so you remember it." (*Child rereads the definition and synonym.*)

Repeat for each verb.

Learn Verb Contexts
"Now we are going to read those verbs in some sentences."
Routine:
1. (*Examiner reads context for first verb*).
2. "You read that for me." (Child reads). "Great"
3. "Now I'm going to cover these words and I want you to remember and tell me what you just read." (*Cover sentences, child recalls*.)
4. (*Examiner uncovers sentences when child is done and points out corrections if needed*)
5. "Now listen to that again so you remember it." *(Examiner rereads the sentence*).

Perform routine for each verb context in a set of 6 sentences once.

After the set of 6 sentences has been presented and rehearsed once by the student as described above, students will complete a cloze test described in detail below.

Appendix E
Cloze Tests & Scripts

Connected Context Condition
Cloze Test for Set 1:
PI: "Now I want you to try to remember which words fit in the blanks. I am going to *show* the sentences to you and I want you to read them silently as I read them out loud and tell me the word that fits in the blank."
Routine*:*
1. "Read this and tell me the missing word." *(Child reads sentences)*
2. (*Child tells PI the target verb)*
   (*If response correct*) "Good." (*Examiner rereads the sentence with correct verb)*
   (*If response incorrect, PI corrects the child, rereading the sentence with the correct verb.)*

1. Jane _____ in begging her mother every night for a birthday party. She wouldn't stop till her mother said, "yes."
2. Jane _____ all As on her report card by studying hard after school every day. Because she was successful in getting good grades, her mother said she could have a party.
3. Jane _____ a list of her best friends to invite to her birthday party. She wrote out the names and gave the list to her mom.
4. Jane _____ getting lots of nice presents at her birthday party that would happen in two days. She looked forward to opening them.
5. Jane _____ her big dog by locking him n the bedroom on the day of the party. This would keep him from barking and scaring her friends.
6. Jane _____ a large knife to slice her very big birthday cake into many pieces for all her friends. She handled the knife very carefully so she didn't cut herself.

Cloze Test for Set 2:

1. Johnny _____ a shiny blue ribbon for swimming the fastest across the pool in the first race. He earned the prize because he was very strong and tall.
2. Johnny _____ getting another blue ribbon in the next race. He expected he could do it again and swim faster than the other swimmers to make his family proud of him.
3. Johnny _____ in swimming in more and more races the same day even though he was tired. He continued swimming until his arms and legs wouldn't move any more.
4. Johnny _____ a plan to get more blue ribbons without swimming. He invented a way to make them with ribbon he bought at the store.
5. Johnny _____ heavy scissors to cut the ribbon so it looked just like the swimming prizes. He handled the scissors without dropping them and cut the ribbon very well.
6. Johnny was _____ by his mother from keeping and wearing the ribbons. She took them away and told him this was cheating.

Appendix E (Continued)

Cloze Test for Set 3:

1. Jessica _____ in begging her mother for a puppy. She wouldn't stop until her mother said yes.
2. Jessica _____ her wish for a puppy by showing her parents that she knew how to take care of a dog. Her success was rewarded with a trip to the pet store.
3. Jessica _____ a way to bathe the puppy when he rolled in the mud. The way she invented was to spray him with the garden hose in the grass.
4. Jessica _____ that the puppy would grow very big. She expected he would need training, so she read lots of books about teaching dogs to behave.
5. Jessica _____ her puppy from jumping on people by keeping him on a leash. This would stop him from scaring or hurting anyone.
6. Jessica _____ a big stick for the dog to chase. She held it in her hand, waved it in the air, and threw it down the beach.

Cloze Test for Set 4:

1. Jordan _____ going to Florida during his spring break. He looked forward to swimming in the ocean even though he couldn't swim.
2. Jordan _____ a plan for learning how to swim. The plan he invented was to take lessons at the nearby pool and practice hard.
3. Jordan _____ in practicing every day by moving his arms and kicking his feet. Even though he never gave up, he still couldn't swim all the way across the pool.
4. Jordan _____ a screw driver to break open a large wooden box that was nailed tight. The box held big rubber swim fins that he had ordered online.
5. Jordan _____ his goal of swimming across the pool by putting the swim fins on his feet. This helped him go faster and get to the other end.
6. Jordan was _____ by his mother from swimming in Florida, however. She took away his fins and said, "There are sharks in the ocean, so I won't let you go swimming."

Appendix E (Continued)

Unconnected Context Condition

Cloze Test for Set 1:

PI: "Now I want you to try to remember which words fit in the blanks. I am going to *show* the sentences to you and I want you to read them silently as I read them out loud and tell me the word that fits in the blank."

Routine*:*

1. "Read this and tell me the missing word." *(Child reads sentences)*
2. (*Child tells PI the target verb)*
   (*If response correct*) "Good." (*Examiner rereads the sentence with correct verb)*
   (*If response incorrect, PI corrects the child, rereading the sentence with the correct verb.)*

1. Johnny _____ a shiny blue ribbon for swimming the fastest across the pool in the first race. He earned the prize because he was very strong and tall.
2. Henry _____ getting a new skate board with the money he had saved. He expected he had enough money to get one that was very fast.
3. Bill _____ in wearing the same shirt day after day even though it was dirty and smelled bad. He continued wearing it until it ripped and fell apart.
4. Sally _____ a plan to make colorful hats for her friends to wear. She invented a way to make them with ribbon she bought at the store.
5. Janet _____ heavy scissors to cut cardboard and make a house for her pet rabbit. She handled the scissors without dropping them or making a mistake.
6. Bob was _____ by his mother from driving her car because he was too young. She scolded him and took the keys away.

Cloze test for Set 2:

1. Jack _____ in begging his father every night for a new bicycle. He wouldn't stop until his father said yes.
2. Jim _____ all As on his report card by studying hard after school every day. Because he was successful in getting all A's his mother said he could have a puppy.
3. Joan _____ a list of her best friends to invite to see a movie with her. She wrote out the names and gave the list to her mom.
4. Susan _____ getting lots of money by babysitting every Saturday night. She looked forward to counting it.
5. John _____ his big dog by locking him in the bedroom when his friend came to see him. This would keep the dog from barking and scaring his friends.
6. Helen _____ a large knife to slice her big birthday cake into many pieces for all her friends. She handled the knife very carefully so she didn't but herself.

Appendix E (Continued)

Cloze test for Set 3:

1. Howard _____ his wand when he performed the magic trick. He waved it carefully and skillfully over his magic hat.
2. Jerry _____ his little brother from running into the street. He held onto his little brother's hand so he couldn't get off the sidewalk.
3. Sherry _____ getting a lot of homework now that she was in middle school. She expected that she would be too busy to play with her friends on school nights.
4. Nicole _____ a new arrangement for her bedroom so she would have more room to play. She drew a picture of her plan and gave it to her parents.
5. Judy _____ a student of the month award for doing community service and getting good grades. She worked hard to help others as well as get her own work done.
6. Alice _____ in begging her parents for a new puppy. She refused to give up until her parents agreed.

Cloze Test for Set 4:

1. Betty was _____ from hitting the windshield when she was in a car accident. The seatbelt held her back in her seat and kept her safe.
2. Joseph _____ his flute to play a beautiful solo in the concert. He played skillfully and didn't make any mistakes.
3. Stan _____ a plan to build his own sandbox. He created a picture to show all of the materials he would need.
4. Brian _____ in calling his little sister names even though his parents continued to punish him. He refused to stop until one day his sister began to cry.
5. Hannah _____ having fun with her grandmother when she came to visit. She looked forward to playing lots of games with her and showing her lots of places.
6. Ellen _____ a gold trophy for being the fastest runner in her class. She worked hard at practicing running every day until she got faster and faster.

Appendix F
Spelling and Sentence Generation Posttests & Scripts

PI: Here is a pencil and some paper. I want you to think about the words that we learned yesterday and their meanings. I will say each word. You repeat it and then write the word on this paper. Write the spelling you remember seeing. Then I will ask you to put the word in a sentence that shows what it means. You can give me a sentence like the ones you read yesterday, or you can make up a new sentence. You can say the sentence orally to me. You don't need to write it.

Routine for Each Word:
Experimenter dictates word. "Say and write the word._____." Child repeats it and then writes it.

Experimenter says, "Now put the word _____ in a sentence to show what it means." Child speaks the sentence and experimenter records it.

Appendix G
Definition Production Posttest & Script

PI: I am going to ask you about the words we learned yesterday. I want you to tell me what the words mean as best you can." (Items are presented orally to the students and students respond orally as PI records responses).

- Wield. He wields something. Can you explain what that means?
- Persist. She persists at something. Can you explain what that means?
- Restrain. He restrains someone. Can you explain what that means?
- Devise. She devises something. Can you explain what that means?
- Attain. He attains something. Can you explain what that means?
- Anticipate. She anticipates something. Can you explain what that means?

Appendix H
Prompted Sentence Generation Posttest and Script

PI: I'm going to show you the beginning of a sentence and I want you to finish the sentence so it makes sense.

PI Presents the following beginnings to students and students respond orally while PI records responses.

- The mountain climber attains…
- The cowboy restrains…
- The baseball player wields…
- The soccer team anticipates…
- The witch devises…
- The lost boy persists…
- The police officer restrains…
- The little girl anticipates…
- The baby persists…
- The criminal devises…
- The butcher wields…
- The Olympic athlete attains…

Appendix I
Verb Features Posttest & Script

PI:"I am going to read you some questions about the verbs that we learned yesterday. Think about what the verbs mean and then I want you to point to and tell me the answer that makes the most sense." (Show child printed items, read each one aloud as child follows along; have child point to text with finger to indicate answer as well as say letter choice of answer).

1. A girl anticipates receiving something. Is it:
    a. A silver bracelet she has always wanted
    b. A silver bracelet she was given last year
2. Which of these is something to be attained?
    a. Running around at recess
    b. Running a marathon race
3. A man has devised something here. Which is it?
    a. A plan for baking a cake
    b. A plan that he reads in a cook book
4. Who is more likely to persist at something?
    a. A man looking at a dog in the pet store
    b. A man looking for his lost dog
5. Which of these is more likely to be restrained?
    a. An alligator who is sleeping
    b. An alligator who is angry
6. Which of these is something that a person might wield:
    a. A paintbrush
    b. A bus
7. Which of these is more likely to restrain someone or something?
    a. handcuffs
    b. bracelet
8. Who is persisting here?
    a. An athlete who skips practice
    b. An athlete that practices every day
9. Which is the thing that the boy has devised here?
    a. A story he read in the library
    b. A story he wrote in school
10. Which of these is something that a person might wield?
    a. A fish
    b. A fishing pole
11. Which of these is someone more likely to anticipate?
    a. A new TV show
    b. A re-run of a TV show
12. Which of these is something to attain?
    a. Good grades on a report card
    b. Losing a report card

References

Anderson, R. (2004). Role of the reader's schema in comprehension, learning and memory. In R. Ruddell & N. Unrau (Eds.), *Theoretical models and processes of reading* (5th edition). Newark, DE: International Reading Association.

Beck, I.L., McKeown, M.G. & Kucan, L. (2002). *Bringing Words to Life: Robust Vocabulary Instruction.* New York: The Guilford Press.

Beck, I.L., McKeown, M.G. & McCaslin, E.S. (1983). Vocabulary development: All contexts are not created equal. *The Elementary School Journal, 83*(3), 177 – 181.

Behrend, D.A. & Scofield, J. (2006). Verbs, Actions and Intentions. In K. Hirsh-Pasek & R.M. Golinkoff (Eds.), *Action Meets Word*. (pp. 286-310). New York, NY: Oxford.

Bell, N. & Lindamood, P. (1998). *Vanilla Vocabulary 2*. Gander Educational Publishing: San Luis Obispo, California.

Biemiller, A. & Boote, C. (2006). An effective method for building meaning vocabulary in primary grades. *Journal of Educational Psychology, 98*(1), 44-62.

Biemiller, A. & Slonim, N. (2001). Estimating root word vocabulary growth in Normative and advantaged populations: Evidence for a common sequence of vocabulary acquisition. *Journal of Educational Psychology, 93*(3), 498-520.

Bloom, L., Margulis, C., Tinker, E. & Fujita, N. (1996). Early conversations and word learning: Contributions from child and adult. *Child Development, 67*, 3154-3175.

Brandone, A.C., Pence, K.L., Golinkoff, R.M. & Hirsh-Pasek, K. (2007). Action speaks louder than words: Young children differentially weight perceptual, social, and linguistic cues to learn verbs. *Child Development, 78*(4), 1322-1342.

Bryant, D.P., Goodwin, M., Bryant, B.R. & Higgins, K. (2003). Vocabulary instruction for students with learning disabilities: A review of the research. *Learning Disability Quarterly, 26*, 117-128.

Cain, K. & Oakhill, J. (2007). Reading comprehension difficulties: Correlates, causes and consequences. In K. Cain & J. Oakhill (Eds.), *Children's comprehension problems in oral and written language: A cognitive perspective* (pp. 41-75). New York: Guilford Press.

Cain, K., Oakhill, J. & Lemmon, K. (2004). Individual differences in the inference of word meanings from context: The influence of reading comprehension,

vocabulary knowledge, and memory capacity. *Journal of Educational Psychology, 96*(4), 671-681.

Carlisle, J.F. & Katz, L.A. (2006). Effects of word and morpheme familiarity on reading of derived words. *Reading and Writing, 19*, 669-693.

Carlisle, J.F. & Stone, C.A. (2005). Exploring the role of morphemes in word reading. *Reading Research Quarterly, 40*(4), 428-449.

Cassidy, K.W. & Kelly, M.H. (2001). Children's use of phonology to infer grammatical class in vocabulary learning. *Psychonomic Bulletin and Review Journal, 8*(3), 519-523.

Chall, J. (1983). *Stages of reading development* (pp.9-39). New York: McGraw Hill.

Choi, S. & Gopnik, A. (1995). Early acquisition of verbs in Korean: a cross-linguistic study. *Journal of Child Language*, 22(3), 497-529.

Dale, E., & O'Rourke, J. (1981). *The living word vocabulary*. Chicago: World Book/Childcraft International.

Dunn, L.M. & Dunn, L.M. (1997). *Peabody Picture Vocabulary Test*. American Guidance Service: Minnesota.

Duff, F.J., Fieldsend, E., Bowyer-Crane, C., Hulme, C., Smith, G., Gibbs, S. & Snowling, (2008). Reading with vocabulary intervention: Evaluation of an instruction for children with poor response to reading intervention. *Journal of Research in Reading,* 31(3), 319-336.

Ebbers, S. M. & Denton, C. A. (2008). A root awakening: Vocabulary instruction for older students with reading difficulties. *Learning Disabilities Research And Practice, 23*(2), 90-102.

Ehri, L. (2004). Teaching phonemic awareness and phonics: An explanation of the National Reading Panel Meta-Analyses. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 13-186). Baltimore, MD: Brooks.

Ehri, L. & Rosenthal, J. (2007). Spelling of words: A neglected facilitator of vocabulary learning. *Journal of Literacy Research, 39*(4), 389-409.

Gentner, D. (1978). On relational meaning: The acquisition of verb meaning. *Child Development, 49,* 988-998.

Gertner, Y., Fisher, C. & Eisengart, J. (2006). Learning words and rules: Abstract knowledge of word order in early sentence comprehension. *Psychological Science, 17*(8), 684-691.

Gleitman, L. R., Cassidy, K., Nappa, R., Papafragou, A. & Trueswell, J.C. (2005). Hard words. *Language Learning and Development, 1*(1), 23-64.

Goldfield, B.A., & Reznick, J.S. (1990). Early lexical acquisition: Rate, content and the vocabulary spurt. *Journal of Child Language*, 17(1), 171-83.

Goldinger, S.D. (1998). Echoes of echoes? An episodic theory of lexical access. *Psychological Review,* 105(2), 251-279.

Gopnik, A. & Meltzoff, An.N. (1992). Categorization and naming: Basic-level sorting in eighteen-month-olds and its relation to language. *Child Development*, 63(5), 1091-1103.

Gough, P.B. & Tunmer, W.E. (1986). Decoding, reading and reading disability. *Remedial and Special Education, 7*(1), 6-10.

Graves, Bezeau, Foogarty & Blair. (2004). Boston naming test short forms: A comparison of previous forms with new item response theory based forms. *Journal of Clinical and Experimental Neuropsychology,* 26(7), 891-902.

Harm, M. W., & Seidenberg, M. S. (2004). Computing the meanings of words in reading: Cooperative division of labor between visual and phonological processes. *Psychological Review, 111* (3), 662-720.

Hart, B. & Risley, T.R. (1995). *Meaningful Differences in the Everyday Experience of Young American Children*. Baltimore: Brookes.

Hirsh-Pasek, K. & Golinkoff, R.M. (2006). *Action Meets Word*. New York, NY: Oxford.

Jittendra, A.K., Edwards, L.L., Sacks, G. & Jacobson, L.A. (2004). What research says about vocabulary instruction for students with learning disabilities. *Exceptional Children, 70*(3), 299-322.

Kaplan, E., Goodglass, H. & Weintraub, S. (2001). *Boston Naming Test – Second Edition.* Austin, Texas: Pro-Ed.

Kintsch, W. (2004). The Construction-Integration Model of Text Comprehension and its Implications for Instruction. In Ruddel, R. & Unrau, N. (Eds.). *Theoretical Models and Processes of Reading.* (5th Edition, p1270-1328). Newark, DE: International Reading Association.

Landauer, T. K. & Dumais, S.T. (1997). A solution to Plato's problem: The latent semantic analysis theory of acquisition, induction , and representation of knowledge. *Psychological Review, 104*(2), 21-240.

Landauer, T.K., Foltz, P.W., & Laham, D. (1998). An introduction to latent semantic analysis. *Discourse Processes, 25*(2&3), 259-284.

Leach, J.M., Scarborough, H.S., & Rescorla, L. (2003). Late-emerging reading Disabilities. *Journal of Educational Psychology, 95*(2), 211-224.

Maguire, M., Hirsh-Pasek, K & Golinkoff, R.M. (2006). A unified theory of word learning: Putting verb acquisition in context. In Hirsh-Pasek, K. & Golinkoff, R.M. (Eds). *Action Meets Word*. New York, NY: Oxford.

Mastropieri, M.A., Scruggs, T.E. & Fulk, B.J.M. (2001). Teaching abstract vocabulary with the keyword method: Effects on recall and comprehension. *Journal of Learning Disabilities, 23*(2), 92-107.

McDaniel, M.A. & Pressley, M. (1989). Keyword and context instruction of new vocabulary meanings: Effects on text comprehension and memory. *Journal of Educational Psychology, 81*(2), 204-213.

Muter, V., Hulme, C., Snowling, M.J. & Stevenson, J. (2004). Phonemes, rimes, vocabulary and grammatical skills as foundations of early reading development: Evidence from a longitudinal study. *Developmental Psyhology, 40*(5), 665-681.

Nagy, W.E. & Scott, J.A. (2000). Vocabulary Processes. In M.L. Kamil, P.B. Mosenthal, P.D. Pearson, & R. Barr (Eds.), *Handbook of Reading Research* (Vol., pp. 269-284). Mahwah, NJ: Lawrence Erlbaum Associates.

Naigles, L.R. & Hoff-Ginsberg, E. (1995). Input to verb learning: Evidence for the Plausibility of syntactic bootstrapping. *Developmental Psychology, 31*(5), 827-837.

Nation, K. (2008). Learning to read words. *The Quarterly Journal of Experimental Psychology, 61*(8), 1121-1133.

Nazzi, T. & Bertonicini, J. (2003). Before and after the vocabulary spurt: two modes of word acquisition? *Developmental Science, 6*(2), 136-142.

Nelson, J.R. & Stage, S.A. (2007). Fostering the development of vocabulary knowledge and reading comprehension through contextually-based multiple meaning vocabulary instruction. *Education and Treatment of Children, 30*(1), 1-22.

On-Lai, A.L. (1993). The variety and effectiveness of strategies employed in vocabulary explanations in EFL classrooms in Hong Kong. In Bird, N. (Ed)., Language and Learning. Papers Presented t the Annual International Language in Education Conference. (Hong Kong).

Oulette, G.P. (2006). What's meaning got to do with it? *Journal of Educational Psychology, 98*(3), 544-566.

Penno, J.F., Wilkinson, I.A.G. & Moore, D.W. (2002). Vocabulary acquisition from teacher explanation and repeated listening to stories: Do they overcome the matthew effect? *Journal of Educational Psychology, 94*(1), 23-33.

Reichle, E.D. & Pefetti, C.A. (2003). Morphology in word identification: A word Experience model that accounts for morpheme frequency effects. *Scientific Studies of Reading, 73*(3), 219-237.

Robbins, C. & Ehri, L. (1994). Listening to stories helps kindergarteners learn new vocabulary Words. *Journal of Educational Psychology, 86*, 54-64.

Rodriguez, M. & Sadoski, M. (2000). Effects of rote, context, keyword and context/keyword methods on retention of vocabulary in EFL classrooms. *Language and Learning, 50*(2), 385-412.

Rosenthal, J. & Ehri, L. (2008). The mnemonic value of orthography for vocabulary learning. *Journal of Educational Psychology, 100*(1), 175-191.

Sadoski, M. (2005). A dual coding view of vocabulary learning. *Reading and Writing Quarterly, 21*, 221-238.

Schmitt, N. & Zimmerman, C.B. (2002). Derivative word forms: What do learners know? *TESOL Quarterly, 36*(2), 145-171.

Schunk, D. (2004). *Learning Theories: An Educational Perspective.* (4th Edition). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.

Stahl, S.A. & Nagy, W.E. (2006). *Teaching Word Meanings*. Mahwah, NJ: Lawrence Erlbaum Associates.

Stanovich, K.E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly, 21*, 360-401.

Stark, R. (1989). Temporal patterning of cry and non cry sounds in the first eight months of life. *First Language*, 9, 107-36.

Tardif, T. (1996). Nouns are not always learned before verbs: Evidence from mandarin Speakers' early vocabularies. *Developmental Psychology,* 32(3), 492-504.

Tse, S. K., Chan, C. & Li, H. (2005). Is the expressive vocabulary of young Cantonese Speakers noun or verb dominated? *Early Child Development and*

Care, 175(3), 215-227.

Uberti, H.Z., Scruggs, T.E. & Mastropieri, M.A. (2003). Keywords make the difference! Mnemonic instruction in inclusive classrooms. *TEACHING Exceptional Children, 35*(3), 56-61.

Woodcock, R. (1987). *Woodcock Reading Mastery Tests – Revised*. Circle Pines, MN: American Guidance Service.