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Partial Word Knowledge Growth through Incidental Learning from Text by School-Age Children with Normal Language Abilities
(Under the direction of MARILYN NEWHOFF)

Incidental exposure to vocabulary through reading is a primary means by which children develop new vocabulary. Because this process of incidental word learning is incremental, however, traditional measures of receptive or expressive word mastery would likely underestimate vocabulary growth. As an alternative, measures of partial word knowledge might better detect slight changes in knowledge growth.

Previous research in this area has focused on detecting word knowledge growth, rather than describing the type of growth that occurs. This research has, nevertheless, paved the way for examinations of the type of word knowledge accrued once linguistic factors and participant performance factors are considered. The purpose of the present study, then, was to examine the types of partial word knowledge growth that occurred from one exposure to unfamiliar words in text. In particular, the roles of individual ability-related factors, context, and part of speech were examined.

Sixth grade children with normal language, cognition, and hearing were recruited for the three-session study. Participants read stories containing unfamiliar nouns and verbs. The children then completed checklist and multiple choice posttests designed to be sensitive to partial word knowledge growth.

Results suggested that only word discrimination knowledge was detected from the children's single exposure to words through independent reading. None of the ability measures was significantly related to word learning. Moreover, the word discrimination knowledge growth that occurred for verbs was not significantly different from that for

nouns. Finally, there was not a significant relationship between contextual richness and word learning. Results were interpreted to suggest that one exposure to unfamiliar words is insufficient for demonstrations of a range of types of word knowledge growth. Given the nature of the word learning that was observed in the present study, the hypothesized relationships among the word learning observed and language abilities, reading abilities, as well as contextual support of the words in the passages, might not be expected.

INDEX WORDS: Word learning, Partial word knowledge, Reading

PARTIAL WORD KNOWLEDGE GROWTH THROUGH INCIDENTAL LEARNING FROM TEXT BY SCHOOL-AGE CHILDREN WITH NORMAL LANGUAGE ABILITIES

by

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DEDICATION

To Phillip, the love of my life

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CHAPTER 1

LITERATURE REVIEW AND STATEMENT OF THE PROBLEM

Introduction

For the past two decades, researchers have been intrigued by school-age children's seemingly effortless acquisition of vocabulary during the school-age years. Nagy and colleagues (Nagy & Anderson, 1984; Nagy & Herman, 1987), for example, have estimated that children acquire about 3,000 words per year between the 3rd and 9th grades. Clearly, one means by which children acquire new words is through vocabulary instruction. A large body of research exists that probes the effectiveness of various forms of vocabulary instruction (e.g., Gipe & Arnold, 1979; Pany & Jenkins, 1978; Pany, Jenkins, & Schreck, 1982; Stahl & Fairbanks, 1986; Stahl, Burdge, Machuga, & Stecyk, 1992). Nonetheless, given the large amount of growth that occurs over the school-age years, it is likely that more natural exposure to vocabulary, through oral and written contexts, is the primary means of lexical growth (see discussions by Nagy, Herman, & Anderson, 1985; Nagy, Anderson, & Herman, 1987).

Oral and, as they pertain to this study, written contexts can offer word learning opportunities that are intentional, in which children are made aware of words in the text and are asked to derive their meanings (e.g., Shefelbine, 1990; Sternberg & Powell, 1983); the sheer number of words learned in this age range, however, suggests that most words are likely acquired through incidental exposure. Word knowledge acquired through written exposure develops incrementally (e.g., Carey & Bartlett, 1978; see Carey, 1978, for a discussion). A new word presented only once in context is not likely to be

mastered, either receptively or expressively. Rather, word knowledge, after a single presentation, might consist of the knowledge that the item is, in fact, a real word, as opposed to a nonword. Moreover, this knowledge might consist of information about the syntactic category of the word and/or basic information about its general semantic category.

Theoretical Bases of Word Learning from Text

A variety of theories and models have been developed to address the processes of word recognition and reading, as well as learning from reading among skilled readers. Part of this process, although not addressed by all models of skilled reading, is the means by which readers learn new words from text. Several of the more common models of skilled reading and reading comprehension are discussed below. This discussion is followed by a description of the major fast mapping theories; these might indirectly offer insight into the word learning process for school-age children acquiring words from reading.

Skilled Reading Models of Word Recognition

A variety of models have been developed over the past 35 years to address word recognition processes. Early models, such as Forster's (1976) lexical search model and LaBerge and Samuels's (1974) model, were among the first formal attempts to explain processes of word recognition through oral and written encounters. Forster suggested that words stored in the mental lexicon could be accessed beginning with either *orthographic* (visual) or *phonologic* analysis. The product of one of these analyses was then sent to the *semantic processor*, then the *syntactic processor*, and finally the *message processor*.

This “bottom-up” model distinguishes itself from many other models because it stipulates that lower-level processors do not receive information from higher-level processors (that is, the *message processor*, for example, only receives information from the lower-level processors; it does not send information to them). Moreover, although the model was intended to account for the lexical access that occurs during listening, speaking, reading, and writing, it allows for the use of only one access route at a time, suggesting a system of relative inefficiency.

LaBerge and Samuels’s model is similar to Forster’s (1976) in that information-sharing among levels, called *codes*, is unidirectional. It differs from the Forster model, however, in that the reader has more than a single processing route from which to choose. Forster suggested that information obtained through reading was processed through orthographic analysis and that information obtained auditorily was processed through phonological analysis. Conversely, LaBerge and Samuels posited that word recognition could occur directly in reading, with the use of orthographic (visual) codes or, if needed, indirectly with the use of phonological codes. This model also attempted to account for the transition from early reading to skilled reading, stipulating that, over the course of development, “lower-level” codes merge, so that fewer codes are necessary within the hierarchy for word recognition to occur.

Morton (1969) proposed a third model of lexical access, in which he emphasized the simultaneous access of a lexical entry, using *auditory*, *visual*, and *contextual* analyses of a word. In contrast to the two models above, his model was interactive, rather than “bottom-up” or “top down,” such that communication between different levels of the model was bidirectional. According to Morton, auditory or visual input would initially

result in the activation of lexical units, or *logogens*, that are similar to the orthographic, phonologic, or semantic information provided in the input. Specifically, a word encountered in reading undergoes a *visual analysis* – whereas one encountered in listening would undergo an *auditory analysis* – the results of which are sent to the *logogen system*, where logogens with similar semantic, visual, or acoustic characteristics respond to varying degrees. During this stage, the *logogen system* interacts with the *context system*, exchanging information with it such that contextual information informs the selection of logogens receiving activation. Logogens for which the response is strong enough to reach the pre-established threshold are then available to be received by the *output buffer*. Because the output buffer can only receive one response, however, the first response (that is, the one that reaches threshold first and, presumably, has the most in common with the stimulus word) is sent to the output buffer, which then enables recognition of the word.

Though these early models lead to more comprehensive ones, they themselves only provide a limited framework for understanding processes of learning through reading, because they emphasize how a word can be recognized as existing in the mental lexicon, but not necessarily the process that occurs when a word is not recognized, such that lexical access is not possible. In comparison to earlier models, the model proposed by McClelland and Rumelhart (1981) is more efficient. It assumed bidirectional interaction between lower-level ("bottom up") and higher-level ("top down") processes. It also assumed *parallel processing*, such that several letters of a word, for example, could be processed at the same time, and that processing could occur simultaneously at multiple levels.

McClelland and Rumelhart (1981) defined three levels, incorporating two processing routes, visual and auditory. A *feature/acoustic* level, a *letter/phoneme* level, and a *word* level were identified. The authors made it clear that other potential levels exist, but they limited the model to these three main ones. They acknowledged, for example, that higher-level processes, such as context and prior knowledge, play a role in word recognition, as well.

The authors explained that, when a visual stimulus is encountered (as in the case of reading), the stimulus causes activation to be spread throughout the system and across levels. Each "relevant unit" in the system (i.e., word, letter, letter string, etc.) is represented as a node that receives activation from its connection to other nodes. Each node has a numeric value. The value can be positive, indicating that the node is active, or negative, indicating that it is inactive. The connections between the nodes can be excitatory (carrying a positive value) or inhibitory (carrying a negative value). As activation is spread throughout the system, the values of the nodes change as a function of the connections between them. The result of the spreading of activation is that node values are changed from their *resting levels*, to a value above or below that, based on the nature of the connections between them. Nodes related to the input are strengthened, while those not related are inhibited. The system ultimately converges to arrive at the appropriate letter, letter string, or word.

McClelland and Rumelhart's (1981) model of word recognition is similar to that of Seidenberg and McClelland (1989). The primary difference is that the latter model dispenses with word-level nodes, including instead nodes representing three-letter strings within a word. The model also omits the role of higher-level processes, such as phrase

and sentence-level context. It was designed to explain word recognition without a level of lexical processing.

These models of word recognition that attempt to address the processes undergone among skilled readers are helpful to a point. They do not, however, address larger issues of comprehension beyond the word level, and they do not tend to address the word learning process directly. That is, these models do not focus on the situation in which a word is not recognized within the mental lexicon. Though models of word recognition acknowledge that unfamiliar words will not be recognized (or will be recognized incorrectly), they do not offer insight into the process by which the knowledge of a word grows, from the point of initial exposure to the point at which the word is represented as a new lexical entry. Theories of comprehension seem to address this more directly.

Skilled Reading Comprehension Models

Information processing models, such as those provided by Just and Carpenter (1987) and Adams (1990), attempt to explain the process by which reading leads to understanding. Though these models focus on processes beyond mere word recognition, they are similar to the models discussed previously in that they, too, incorporate processing levels, nodes, and the connections and relationships among nodes.

Just and Carpenter's (1987) Cognitive Theory of Reading includes four processes: *perceptual* (for encoding), *lexical* (for accessing), *semantic/syntactic* (for organization of word-level meaning), and macro, text-level processes (for text-level organization of meaning). After encoding a word, subsequent processes are presumed to happen simultaneously in skilled reading. All processes release the initial results into

"working memory," where processes "collaborate" in order to arrive at a final, integrated interpretation.

A simulation designed to test Just and Carpenter's (1987) theory, called *READER*, addresses the word learning process. For any known or unknown word, the program first performs a *structural analysis* of the word in which the pattern of the graphemes in the word is analyzed. If the pattern of graphemes does not correspond to a known word in the mental lexicon, the word is then stripped of any affixes, and the pattern is again compared to known words. If there is no match, a *contextual analysis* is undergone to derive meaning from the syntactic and semantic cues the context provides about the word. The model predicts that richness of context will impact the extent to which the word is learned. Thus, this model is different from the preceding word recognition models in that, once it is determined that a word is unknown, the model goes a step further in providing a means by which a word might be learned and then entered into the mental lexicon.

Adams (1990) proposed a model, based on the work of Seidenberg and McClelland (1989), that is similar to that of Just and Carpenter (1987). She described the process by which unfamiliar words are encountered, read, and eventually processed for semantic information. According to Adams (1990), an *orthographic processor* accepts visual input, processing the spelling of an item and comparing it to the spelling of other, known items. In the case of reading, a *phonological processor* is available to analyze the string as sound, although skilled readers may bypass it. A *meaning processor* receives input from the *orthographic* and/or *phonological processors*, as well as a *context processor*, that holds information about the text. For a known word, the *meaning*

processor activates the vocabulary store and, based on information provided by the other processors, identifies a match.

In the case of an unfamiliar word, then, Adams's model predicts that the word would still be analyzed orthographically, and possibly phonologically, sending information to the *meaning processor.* The *meaning processor* would not be able to activate a meaning from the vocabulary store, but it would receive input from the *context processor*. This input would be sent from the *meaning processor* to the *orthographic processor*. This process would then result in a greater likelihood of the unknown word being recognized by the *orthographic processor* the next time it was encountered.

This model is similar to Just and Carpenter's (1987) model in explaining how unknown words become part of the lexicon. Both models require an analysis of a word's structure and comparison of the structure to words stored in the mental lexicon. Moreover, both rely on semantic, syntactic, and contextual cues to infer word meanings. Neither model requires that processing be indirect, where words read must undergo phonological encoding, but neither rule out this possibility for use as an additional reading strategy. Both suggest that, for skilled readers, the more efficient strategy in most cases is to bypass phonological encoding, although there are situations in which it may be necessary. Because these models address the word learning process directly, they appear to be reasonable theoretical models for considering the interaction among various processing domains in learning new words from reading.

Fast Mapping Theories

One element that is missing from the models reviewed in the preceding sections is a description of the learning process from an initial encounter with a word to eventual mastery. Theories of fast mapping, though typically used to describe the word learning processes of young children in the very early stages of language development, address part of this issue, providing hypotheses about the learning that occurs following the initial exposure to a new word.

There are numerous hypotheses offered to account for young children's somewhat mysterious ability to acquire words quickly and with remarkably few exposures. In general, researchers in this area agree, as their studies suggest, that young children acquire words quickly and very naturally (i.e., without formal teaching), but they disagree about the mechanisms that allow children to learn at such a fast pace. Although these theories seem to focus on explaining vocabulary development of children from ages 1½ to 3 years, the explanations may be applicable to vocabulary development across the life span. The theories refer to a “fast mapping” phenomenon, in which new words are “mapped” onto real world referents in just one or two exposures. The occurrence of fast mapping has been well documented (e.g., Au & Glusman, 1990; Markman & Wachtel, 1988; Merriman & Marazita, 1995; Merriman & Schuster, 1991; Merriman and Stevenson, 1997; Mervis & Bertrand, 1994; Savage & Au, 1996; Taylor & Gelman, 1988).

According to one theory related to children’s fast mapping skills, Mutual Exclusivity, children apply novel labels to objects or actions in their environment for which they do not have labels, rather than applying a second label to a known object or

action (Barrett, 1977; Markman & Wachtel, 1988). Golinkoff, Mervis, and HirshPasek (1994) have offered some valid criticism of Mutual Exclusivity. They made the point that there has been research demonstrating that bilingual infants are able to comprehend two words, one from each language's vocabulary, that mean exactly the same thing. According to Golinkoff et al. (1994), if the research demonstrates that infants are completely comfortable with the notion that an object can have two names, then Mutual Exclusivity is disproved.

A second theory of fast mapping is the Contrast theory, developed by Clark (1983). This theory is associated with "lexical gap filling," a second idea proposed by Clark (1983). According to this view, part of the motivation for children's word learning is that they want to be able to talk about things for which they do not have names. Thus, children are motivated to learn new words in order to fill the lexical "gaps" in their vocabularies. Additionally, Clark stated, children make an assumption that novel words represent a contrast to the words they already know. This assumption leads children to conclude that an unlabeled object, rather than a familiar one, is the target of the novel word.

Clark's theoretical position is similar but not identical to Mutual Exclusivity. Both fast mapping hypotheses attempt to explain how children are able to fast map new words, and both state that children do not like two labels attached to the same thing or meaning. The distinction between the two theories is evident in their answers to the question, "Why do children dislike the notion of two labels for one object?" Mutual Exclusivity offers the answer that, for the most part, children believe that an object can have only one name. The Contrast theory of fast mapping states that children dislike two

labels for one object because they believe that there is a one-to-one correspondence between words (labels) and meanings. Accordingly, children believe that two words applied to the same referent must have at least slightly different meanings.

One criticism of the Contrast theory, provided by Golinkoff and colleagues (1994), is that it incorrectly suggests that children should have little difficulty accepting multiple labels for an object, as long as each label carries with it a slightly different meaning. In other words, the theory suggests that if two labels can still be contrasted with each other, the child will accept both. As discussed above, however, research suggests that, in general, children will not accept both, unless each label is on a different level of the categorical hierarchy (Au & Glusman, 1990). Golinkoff et al. (1994) also pointed out that the Contrast theory does not address the means by which a child attaches a novel referent to an unfamiliar item. It is not clear what conclusions the child is able to reach following the realization that each word has a distinct meaning.

Gathercole (1989) also provided a critical review of the Contrast theory. Her strongest argument against it was the observation that, even if studies proved that the null hypothesis (that children willingly accept multiple labels for an object) were true, the Contrast theory could still be true. In other words, even if a child has no difficulty accepting multiple labels for the same object, the child could still be mentally contrasting labels. The central problem, as Gathercole points out, is that the Contrast theory cannot be proved wrong.

A third theory of fast mapping is attributed to Golinkoff (Golinkoff et al., 1994). Known as the Novel Name-Nameless Category (N3C) theory, this model states that a child, when told a novel word, will map the new word to an unfamiliar object. Clearly,

this theory is broader than Mutual Exclusivity or Contrast. As discussed above, the first two theories focus on the question, "Why do children dislike the notion of two labels for one object?" As Gathercole (1989) pointed out, though, the question central to those theories can never really be answered given that the children's preferences are internal. By contrast, N3C does not attempt to describe the internal preferences of the child but, rather, it focuses on the observable, which is that children map novel names to unfamiliar items. Since this theory is broader, studies that provide support for Mutual Exclusivity and Contrast also provide support for N3C.

It is possible to speculate that these fast mapping theories, developed to explain earlier vocabulary development, might also adequately describe potential learning constraints for older children as they encounter new words in reading. In particular, N3C, which does not attempt to provide the internal rule by which children map words to concepts, may provide a basis for studies that examine word knowledge development through reading. Specifically, this theory may guide investigations probing the assumptions that children make given a specific context and word type.

As mentioned earlier, though fast mapping theories may offer some guidance in the study of vocabulary knowledge growth from reading, they do not provide a theoretical foundation for the process of word learning, from initial encounter to eventual receptive or expressive mastery of a written word. Early on, Carey (1978) provided an often quoted description of what is learned following the first exposure to a new word:

> Minimally, the child learns that it is a word: he enters it into his mental lexicon. Also he must learn its syntactic properties – its part of speech and its syntactic subcategorizations. He must learn its place in lexical

> structure – its relations to other words. He must learn its semantic properties, its roles in determining entailments, and its referential properties. Finally, the conceptual underpinnings that determine its place in the child's entire conceptual system must also be learned. (p. 264)

Some researchers of partial word knowledge development (e.g., Durso & Shore, 1991; Shore & Durso, 1990; Shore & Kempe, 1999) have used descriptions as the basis for the development of tasks that examine the types of word knowledge displayed, from no knowledge, to knowledge that the word is actually a real word, to knowledge of the word's syntactic category, to general semantic and detailed semantic knowledge.

Carey's listing of word knowledge types does not include phonological knowledge. Clearly, though, phonological knowledge of a word is yet another type that is necessary for the child to demonstrate expressive mastery of a word. Indeed, theories of reading comprehension have suggested that the phonological component is important in some aspects of skilled reading and word learning, though not necessarily essential. In theory, that is, one could have formed a complete and accurate concept of a word's meaning and be able to demonstrate receptive mastery, relying only on the orthographic representation of a word. Therefore, it seems that, unless the criterion for word learning is *expressive* mastery, phonological knowledge of the word would not be required for the word to be learned from silent reading.

Carey's (1978) description, then, seems to be a useful attempt to define the constituent learning types that undergird mastery of a word, at least receptively:

(a) determination that the word is an actual lexical item, (b) knowledge of its syntactic category, and (c) knowledge of the various semantic categories (both general and detailed) to which the word belongs. As such, this description in particular has served to inform the development of this investigation.

As will be seen, "word knowledge" is an elusive term, defined largely by the task used to test it. In other words, word knowledge can be knowledge that the word is an actual word, or identification of the concept to which a word refers, or identification of the correct use of the word in a sentence, or the selection of a general or more specific definition of a word. Rather than take for granted what it means to "know" a word, the challenge of researchers focused on partial word knowledge is to define and test for specific types of word knowledge.

Partial Word Knowledge Growth through Incidental Exposure in Reading: A Critical Review of the Literature

A number of studies have examined, in some form, incidental vocabulary knowledge growth in children through text exposure (Dickinson, 1984; Gordon, Schumm, Coffland, & Doucette, 1992; Herman, Anderson, Pearson, & Nagy, 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1985; Schwanenflugel, Stahl, & McFalls, 1997; Shu, Anderson, & Zhang, 1995), employing different means of assessing partial word knowledge. As a review and critical examination of the literature in this area will demonstrate, however, it seems that less than careful measurement of vocabulary knowledge growth, in both the texts selected and the tasks used to measure growth, has hindered efforts to understand the process of vocabulary learning from text.

In this chapter, the literature in partial word knowledge growth will be reviewed. It will be evaluated critically in terms of four areas that are of particular importance for a better theoretical understanding of incremental word knowledge accretion through independent reading: (a) the type of incidental word learning task (i.e., the learning condition); (b) the word and text variables considered in the development of the task; (c) the information provided about the population studied; and (d) the type of learning assessment and analyses of word knowledge growth. This review will provide the basis for the study that follows, which was designed to improve upon the empirical evidence of the occurrence of partial word knowledge growth through incidental learning from independent reading by school-age children with normal language abilities.

Incidental Word Learning Tasks

Incidental word learning tasks that have been employed in the past have varied considerably (e.g., Konopak et al., 1987; Nagy et al., 1985; Schwanenflugel et al., 1997). Target words have been presented orally or in written texts. Moreover, studies using written texts have varied in the type of passage used, from narrative passages, to expository passages similar to children's textbook or newspaper reading, to a combination of both. Each of these factors related to text is discussed below.

Oral versus Written Exposure

Studies of incidental word learning have consisted of either oral exposure or written exposure tasks. Oral exposure tasks might include fast mapping tasks that set up a play situation in which the child sees an array of items, hears an unknown label in the course of play, and makes the assumption that the unknown label must apply to the one

unfamiliar object, rather than any of the other objects for which the child has labels already (e.g., Carey & Bartlett, 1978; Markman & Wachtel, 1988). Fast mapping theories were briefly discussed in the Introduction because they have served as a theoretical foundation for studies related to young children's processes of lexical acquisition. A review of such studies, however, is beyond the scope of this review for several reasons. First, the term *fast mapping*, as it is used predominantly in the literature, refers to a developmental phenomenon that begins at approximately 18 months, in which children typically exhibit a vocabulary spurt. Fast mapping is one explanation for this quick, seemingly effortless development of vocabulary. Though a portion of this literature in normal lexical development has focused on older children, the interpretation of findings is largely developmental (i.e., providing explanations of how this early language learning mechanism continues to aid vocabulary growth in the preschool and early elementary school years). Fast mapping studies of children with language disorders do tend to focus on older children, but typically in an attempt to compare the children's performance to language-matched peers (e.g., Oetting, Rice, & Swank, 1995).

A second reason that the fast mapping literature is beyond the scope of this review is that fast mapping, as commonly understood in the literature, is an oral phenomenon. Although it is possible to argue that a form of fast mapping occurs during the natural, independent reading process of skilled readers, it seems likely that this advanced form of fast mapping is quite different from the fast mapping that might occur in early language development.

Of course, it could be argued that a reason for including the fast mapping literature in this review is that studies of this type sometimes examine types of word

knowledge, such as detection of a word as real, demonstrating receptive knowledge of the word, and retrieving all or some of the phonemes of a word (e.g., Dollaghan, 1987). Still, given substantial differences in both the ages of children participating in these studies and the age of those in the present study, as well as the notable differences in a traditional fast mapping task and an incidental, independent reading task, discussion of the fast mapping literature is considered beyond the scope of the current review.

One set of experiments that seems to fall in the middle, between traditional fast mapping studies and studies of incidental word learning from independent reading, is that of Dickinson (1984), who explored partial word knowledge through incidental learning in oral exposure tasks. In the first experiment, Dickinson provided first and sixth grade children a single exposure to three novel words, one in conversation (adjective), one in a story (noun or adjective), and one with a definition (noun or adjective). Of the three presentations, only the conversation and the story could be considered incidental; the definition task provided the cue that the purpose of the task was to learn a word, rather than simply to participate in a conversation or listen to a story. Results showed that sixth graders seemed to benefit more from the definition condition than the story condition, as indicated by significantly greater accuracy both in identifying the words as real words and in providing definitions for the words in which the students were told definitions explicitly. The first graders did not demonstrate this performance difference between the story and definition conditions.

Dickinson's (1984) second experiment, also incidental, used a conversational setting in which two novel adjectives were presented to children ranging in age from 4 to 9. Some developmental differences were noted; only the older children, 6 to 9 years of

age, responded that items were or were not actual words significantly better than chance. In addition, when asked to select sentences that used the target words correctly (from a field of five), all age groups performed better than chance, but the 6 to 9 year olds performed significantly better than the 4 to 5 year olds.

One apparent problem with Dickinson's (1984) learning conditions is that learning was limited to one unfamiliar word per task; it is difficult to generalize the learning process involved in the acquisition of one target, with specific syntactic and lexical characteristics, to that involved in the acquisition of other words. In Dickinson's defense, however, adding more unfamiliar words to learning conditions that were designed to be representative of typical learning opportunities in the child's environment might add an element of unnaturalness and likely cue the child that the emphasis of the activity is learning words, rather that merely conversing or listening to an interesting story. Despite the limitations of these experiments, it seems Dickinson can be credited for his use of a partial word knowledge measure to assess incidental word learning in an oral task.

Many researchers have examined partial word knowledge growth through incidental exposure in reading (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1987; Nagy et al., 1985; Schwanenflugel et al., 1997; Shu et al., 1995). Studies that examined children's ability to *derive* word meanings are beyond the focus of this review; such studies call attention to the target words and ask participants to use the context to determine word meanings. Incidental word learning studies, by contrast, do not call attention to target words within the text. In fact, it might be argued that the strongest of these studies (Konopak et al.,

1987; Shu et al., 1995) are those that do not even alert participants that anything more will be expected of them after reading the text. Rather, these studies instruct participants at the outset that the focus is simply on reading. It is assumed that participants who expect to be tested in some way after they read a text may be more apt to engage in "study" behaviors, rather than natural reading behaviors (see Swanborn & de Glopper, 1999, for a discussion).

A study by Konopak et al. (1987) is representative of an incidental learning task in which participants were not alerted in the instructions to the vocabulary-learning focus of the study. Eleventh graders were recruited and assigned to either an incidental learning group, an intentional learning group, or a control group. Following a vocabulary knowledge pretest, the incidental group participants were informed that they should "read and study" a U.S. History passage, instructions presumably similar to that of a typical classroom reading assignment. The students were not alerted to the fact that the focus of the study was word learning. The intentional learning group members, after completing the same pretest, were given passages in which the target words were underlined and were told to "read and study" their passage. After reading the passage, the intentional learning group was asked to use the passage to write definitions for each of the underlined words. Results of the posttest, administered the next day, revealed a significant main effect for learning group ($F(2, 62) = 8.95$, $p < .0004$). The post-hoc analyses necessary to discern differences between pairs of groups were not performed. Descriptively, however, the intentional learning group provided an average of 28.86 (out of 40) accurate definitions for the target words, whereas the incidental learning group provided an average of 21.62 accurate definitions, compared to the control group's 15.82

accurate definitions. Though this study is a good example of the type of instructions necessary for a true incidental learning task that does not to alert participants to the vocabulary focus of the activity, it is nonetheless flawed. For example, and relevant to the immediate discussion, the choice to administer the pretest immediately before the reading condition may have alerted the participants not only to the purpose of the study but also to the target words themselves.

Narrative versus Exposition

Research that has measured partial word knowledge growth through incidental exposure in reading has focused on children's learning words in narrative passages (Schwanenflugel et al., 1997; Shu et al., 1995), expository texts (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987), or both (Nagy et al., 1985). Overall, these studies demonstrated that incidental word learning occurs whether passages are expositions or narratives. The one study that compared incidental word learning of narratives to exposition (Nagy et al., 1985) only examined passage type as a between subjects factor; eighth grade students demonstrated partial word knowledge growth whether the passage read was narrative or expository. Unfortunately, there was no attempt to compare the word learning of the narrative group to that of the expository group.

A study by Shefelbine (1990), though not considered an incidental word learning project, probed sixth grade children's learning from context using narrative and expository passages in a within-subjects design. Participants were first given a short training in deriving word meanings from context, then given paragraph-length passages and told to determine the meanings of words they did not know from each of the

passages. Assessment required students to have derived word meanings from the passages, but not necessarily to have "learned" those meanings; the students were asked a set of open-ended questions and two sets of multiple choice questions with the passages in front of them. It is apparent that this study focused on children's abilities, following training, to glean meanings of words from contextual cues, a task different from those that require children only to read passages without any direction relative to the vocabulary in the passages. Tasks of the latter type are an attempt to explore word learning as byproduct of natural reading conditions (for discussions see Jenkins, Stein, & Wysocki, 1984; Nagy et al., 1985). The findings of Shefelbine's study, as they pertain to learning differences across genres, were that students' abilities to derive words were comparable for expository and narrative passages. The results are complicated, however, since the authors found performance differences even between the two narrative passages and between the two expository passages, both pairs of which were presumed to be similar at the onset of the study.

Word and Text Variables within Passages

Another important aspect of the study of word knowledge growth is understanding the word and text variables that may impact the accrual of word knowledge. Indeed, models of reading comprehension (Adams, 1990; Just & Carpenter, 1987) would suggest that these variables play a role in ease of reading comprehension, as well as the ease with which unfamiliar words within a given text might be learned. Despite this, researchers of incidental word learning from text have generally opted either not to attempt to control these variables, or to control them minimally (e.g., variables

such as word length, number of occurrences of the word in the passage, word frequency within the language, the density of target words within the passage, richness of the context surrounding the word). This decision seems to have been made because controlling these variables tends to change the passages, so they become substantially unlike those that children typically encounter. Nagy et al. (1985) suggested that ecological validity is compromised when participants are asked to derive words consciously from text or read texts that are contrived to be unusually rich in context; these tasks lack resemblance to the natural reading conditions under which children are exposed to new words. In addition, Nagy and colleagues argued, the word learning task is made unnaturally easy when target words represent known concepts, as opposed to representing concepts unknown to the child. Accordingly, both the use of pseudowords and the use of contrived texts are perceived to be threats to the validity of incidental word learning measurement, a process that should be observed using tasks that most closely resemble situations in which children would, unsuspectingly, begin to acquire new words and meanings from their everyday reading.

As a consequence of this general sentiment that texts must be as natural as possible, word and text variables have sometimes been examined through statistically partialing out the effects of these variables. In other instances, word and text variables have been controlled or manipulated, but by modifying pre-existing texts, rather than by experimentally constructing texts, so that the resulting materials retain their similarity to the types of texts the children typically read. Arguably, among the most important word and text factors to be addressed in research of incidental word learning from reading include the number of exposures to target words, word length, part of speech, the density

of unknown words within the passages, the frequency of words selected as targets versus the frequency of nontargets, the contextual richness of the text surrounding each target word, and the overall readability of the texts.

Number of Exposures to Target Words

Among studies of partial word knowledge growth in incidental word learning through reading, most have not controlled or manipulated the number of occurrences of target words within texts (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Nagy et al., 1985; Shu et al., 1995). Considering that relatively early Carey (1978) presented a theoretical argument for the measurement of learning from "a single exposure," it is surprising that more work has not been dedicated to the measurement of vocabulary knowledge growth from the smallest possible unit of exposure. It is possible, however, that the rationale for providing multiple exposures was that one exposure was presumed to be insufficient for measuring any amount of knowledge growth. If this were the case, though, it would not explain why the investigators of these studies did not provide the same number of exposures for all target words.

Of the three investigations that have taken the number of exposures into account, none of them appear to have reconstructed texts to address this issue. Konopak et al. (1987) analyzed the number of exposures by comparing words that occurred only once to words that occurred more than once (two to four occurrences). Their analysis of this variable suggested that the number of exposures (i.e., one versus more than one) was not a significant factor for either performance on a self-report measure, in which participants indicated they did or did not know individual words, or a definition task, in which

participants offered definitions that were rated on a four point scale for correctness and completeness.

Schwanenflugel et al. (1997) also examined the impact of the number of exposures on word learning as one of several word and text variables. The number of word exposures in their passages ranged from one to five. Their findings relative to this issue suggested that partial word knowledge growth was not affected by the number of exposures in the texts. As with Konopak et al. (1987), though, the investigators of this study did not systematically manipulate the number of target word exposures. They stated that, in fact, most of the targets occurred only once in the texts (mean number of occurrences = 1.14, SD = .68).

Nagy et al.'s (1987) investigation, though not a partial word knowledge study, also considered the relationship between the number of exposures to the target words and their likelihood of being learned, and they obtained similar findings. For their third, fifth, and seventh grade participants, number of exposures did not significantly affect their learning as measured by a multiple choice posttest. The authors did not provide descriptive information about the range or the average number of exposures per word, however, which limits the interpretability of their findings with respect to this variable.

In sum, on the surface it appears that, across studies, the number of exposures does not impact word learning from text. This conclusion seems counterintuitive, though, and perhaps premature. We know that learning a word from reading is an incremental process that typically requires multiple exposures before mastery is achieved. To argue, then, that a greater number of exposures does not increase the likelihood of a word being "learned" is probably an overstatement. It is more likely that the post-hoc

analyses or the posttests incorporated to address this issue have not been sensitive enough to detect changes in knowledge growth with increased exposure. Jenkins, Stein, and Wysocki (1984), for example, in their study of fifth grade students that more resembled a vocabulary enrichment activity than an incidental word learning task, found marked differences in learning among participants who were exposed to words 2, 6, or 10 times.

Of the studies of incidental word learning through reading, then, apparently none presented texts in which the target words occurred only once. Dickinson (1984), whose study did not involve reading but a set of listening tasks, controlled exposures such that participants heard each word only once. The tasks employed (conversation, listening to a story, and listening to a definition) were quite different from traditional tasks of word learning from text, however. Since school-age children encounter much of their new vocabulary from reading, it would seem that there is a need to examine, as Dickinson did, the potential for learning from one exposure, but within the context of a reading task.

Word Length

Word length would seem to be an important variable in the process of learning for at least two reasons. First, given the rather robust finding of word length effects on short term memory (e.g., Baddeley, Thomson, & Buchanan, 1975; Cowan et al., 1992; Morra, 2000), all else being equal, it seems possible that a word's length could impact its being learned. Second, since children have the option of "skipping over" words they perceive as difficult (see Stahl, 1991, for a discussion), they may be more likely to try to attach meaning to shorter words that are more easily decoded than longer words.

It appears that none of the studies on partial word knowledge growth from incidental word learning have addressed this issue of the effects of word length on learning. None of the studies attempted to either control or systematically manipulate the length of target words. In fact, most of the research has included one or more phrases as "target words" (Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1985; Shu et al., 1995). Although it is clearly difficult to construct texts that, for example, limit the number of syllables in words, it seems that this is a necessary control because of the indisputable involvement of memory in learning.

One study of incidental word learning from text, although not through measurement of partial word knowledge, has provided some support for the notion that target word length is a factor in word learning. Nagy et al. (1987) examined a number of passage-level variables that could impact incidental word learning in third, fifth, and seventh grade students. In the analysis relevant to word length, these researchers computed the average length of the target words in syllables within the passage. Using hierarchical linear regression they found that the interaction between the average amount learned from a passage (measured through a multiple choice task not sensitive to partial word knowledge) and the average length of the target words in the passage contributed to a significant amount of their model's variance. Though word length was demonstrated to be a significant factor at the passage level, findings were not significant when the analysis focused on an individual word's likelihood of being learned based on length. In other words, though word length did not predict learning by itself, less word learning occurred when passages contained a large number of longer words, as compared with passages that contained fewer long words. Given evidence that target word length could

be a confound, length becomes an important variable to control in subsequent investigations of word learning.

Part of Speech

Only one known study of partial word knowledge growth through incidental exposure in reading examined differences in learning across syntactic categories. Schwanenflugel et al. (1997) compared the learning that occurred on nouns (28 percent of the target words), and words other than nouns (in this case, verbs, adjectives, and adverbs), for their fourth grade participants. Schwanenflugel and colleagues found that non-nouns were actually more easily learned than nouns. They acknowledged, however, that this finding may have been confounded by the level of abstractness of the nouns versus the verbs selected; the nouns, most of which were not count nouns (e.g., vicinity), may have been more abstract than the verbs. Unfortunately, data were not provided to allow direct comparisons among noun, verb, adjective, and adverb targets.

Nagy et al.'s (1987) investigation of third, fifth, and seventh grade students, although not a partial word knowledge study, also examined the relationship between part of speech (including categories of noun, verb, adjective, adverb, and preposition in the analysis) and incidental word learning. They found that the relationship was not significant. These findings from school-age children are interesting in light of rather substantial evidence that, among younger children, nouns tend to be learned more easily than verbs (e.g., Bates et al., 1994; Gentner, 1982; see Gentner, 1978, for a discussion). From a psycholinguistic perspective, it would seem that, even with school-age children, examining learning within and across syntactic categories could allow insight into potential differences in the learning process. There is no reason to assume, in other

words, that the learning process, from initial representation to eventual mastery, would necessarily progress at the same rate across syntactic categories.

Unfamiliar Word Density

The ratio of unknown words to familiar words in a passage appears to impact not only the naturalness of the passage, but also the word learning that occurs from reading the passage. Browne (1989), for example, demonstrated that, even for college students, passages containing difficult (though not necessarily unknown) words made the nonwords embedded in the passage more difficult to learn than passages that contained easier words. The implication of this finding for incidental word learning from text is that unfamiliar word density is an important variable to consider because of its likely impact on the amount of word learning that occurs from reading a passage.

Sternberg and Powell (1983), in their "Theory of Decoding External Context," presented seven "mediating variables" (p. 883), or variables that interact with context and thus impact what is learned from context. Among these variables is the density of unfamiliar words in a passage. Swanborn and deGlopper (1999) performed a meta-analysis in which they reported that the target word density ratios in published studies of incidental word learning ranged from 1:42 (Shu et al., 1995) to 1:150 (Konopak et al., 1987; Konopak, 1988a). Studies in this area, then, vary widely in the amount of text providing a context for unknown words. As might be expected, Swanborn and deGlopper's meta-analysis revealed that the lower the target word to text ratio within a given passage, the greater the incidental word learning from the passage.

Word Frequency

One way to examine the difficulty of lexical items within a passage is to obtain estimates of their frequency of occurrence in the language. Words that occur more frequently are presumed to be easier to read and to process. Studies of lexical access time, for example, have suggested that retrieval of words that occur more frequently in the language requires less time than retrieval of words that occur less frequently (e.g., Forster & Chambers, 1973). It seems appropriate to use word frequency data in designing tasks of incidental word learning from texts in order to assure that non-target words are understood by children of a particular age and grade level, and to assure that target words are sufficiently above age and grade level that they are unlikely to be known by participants.

Uniformly, studies of incidental word learning from text have not, in any objective way, attempted to use word frequency data to control this aspect of lexical difficulty for non-target vocabulary. In fact, this issue is not even discussed in any of the previously mentioned literature in this area. In some sense, though, the frequency of occurrence of words may have been addressed indirectly because the texts used for these tasks are typically from grade-appropriate textbooks.

In some studies, not even target vocabulary appeared to have been selected using an objective reference of lexical difficulty (Gordon et al., 1992; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1987). In these cases, target words were selected by the investigators themselves or by teachers who were asked to indicate the most difficult words in the passages. One possible reason for this apparent oversight may have been that the focus of each of these studies was really the effects of context. Researchers may

have been more concerned with controlling or manipulating factors related to context than with controlling word characteristics.

Of those investigators who did consult an objective reference of word frequency, most used Carroll, Davies, and Richman's (1971) word frequency index. Herman et al. (1987) used this reference for the selection of some target words. They asked five judges to independently indicate which words from the texts might be considered "difficult" for eighth grade students (the population represented in this study). Target words were those that all five judges selected as difficult. Additional words were then added to the list of targets; any word with a frequency of less than 40 (using the Standard Frequency Index statistic, SFI, Carroll et al.) was also included.

More recently, Shu et al. (1995) used a similar procedure for the selection of target words. In this case, five teachers or researchers read the texts and selected words that they thought third and fifth grade children (their population) would not know. Any word on which three of the five agreed was adopted as a target word. The word frequency data of Carroll et al. (1971) were then used with the same cut-off score of below 40 SFI to select additional low frequency words as targets.

Nagy et al. (1985) also reported using the data from Carroll et al. (1971) to select target words, but sufficient detail was not provided to evaluate their procedure. The authors stated that raters with teaching experience were asked to select the difficult words within the passages. They reported that, in the process of target word selection, the data of Carroll et al. were "considered."

Schwanenflugel et al. (1997) used a different set of word frequency data: Dale and O'Rourke's (1976) vocabulary index. Rather than providing SFI data, which are

based on the occurrence of words in written material, Dale and O'Rourke's reference is an index of children's actual performance when tested on the words in the index. It lists the grade (4^{th} through 16^{th}) at which 68 percent of the children selected a correct definition from a field of three. Schwanenflugel et al. selected target words that were two to four years above the grade level of their fourth grade participants.

As one index of lexical difficulty, the frequency of occurrence in English of target and non-target words would seem to be an important factor in the development of stimuli. It is clear, however, that controls can be taken to an extreme, the consequence of which would be texts that strike the reader as extremely unnatural or contrived. If, for example, a sixth grade student read a text in which non-targets were determined to be of no higher than a second grade reading level, and targets were determined to be of at least an eleventh grade reading level, researchers clearly would run the risk of (a) substantially reducing ecological validity; and (b) alerting the participants to the purpose of the task because of the unnatural, contrived quality of the texts. Care should be taken, then, to assure that controls on any aspect of lexical difficulty (including characteristics such as word length and word abstractness) are not taken to such extremes that the task ceases to resemble a typical reading experience for the participants.

Contextual Richness

A number of partial word knowledge studies have examined, as their primary goal, the role of contextual variables or text structure variables in word learning (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b). Indeed, contextual richness would seem to be an important consideration in accounting for incidental word learning. Sternberg and Powell (1983) have discussed this issue at length, providing a set of seven

"mediating variables" that potentially contribute to our ability to glean meanings from context. Several have been addressed in the preceding discussion, but the authors also mention that, when a word is presented multiple times in the text, variability of the context across occurrences should allow word learners to continue developing and refining knowledge of the word as they read. In addition, as directly relates to this discussion, they point out that the richness or "helpfulness" of the context, in providing meaning about the unknown word, is an important factor for word learning.

All contexts are not equally informative, of course. Beck, McKeown, and McCaslin (1983) analyzed the context of words in two stories of two separate basal reading series. They developed a fairly widely used (e.g, Nagy et al., 1987; Schwanenflugel et al., 1997; Shu et al., 1995) system of classifying the helpfulness of contexts in determining words' meanings. The target words of their two stories were each classified as having contexts that were "misdirective," "nondirective," "general" (i.e., somewhat helpful in deriving meaning), or "directive" (i.e., providing the meaning for the word within the context). They provided some evidence for the validity of this rating scale by asking 13 adults to read the stories wherein the target words had been replaced with a blank. The adults used the contexts to complete the blanks with words. As might be expected, the adults were increasingly accurate in producing a word or synonym from misdirective contexts, to nondirective ones, to general ones, to directive ones.

Of the partial word knowledge studies that have addressed the role of context in word learning, probably the strongest methodologically was performed by Herman and her colleagues (Herman et al., 1987). These investigators sought to examine the effects

of three text features on incidental word learning from reading: macrostructure, microstructure, and conceptual elaborations. Manipulation of macrostructure involved modifying texts to include headings, topic sentences, and other organizational cues. Microstructure, defined as the logical and temporal relation words that connect propositions within a text, was manipulated by adding words, phrases, or sentences that explained the smaller, propositional relationships. Conceptual elaborations were those that made explicit the relationships among important concepts in the passage by providing more information about them.

In the Herman et al. (1987) study, eighth grade students received a checklist pretest. Two weeks later, they read one of eight passages (2 original, and 3 revisions of each original), completed a multiple choice task with two levels of questions, easy and difficult, to enable assessment of partial word knowledge, and completed an essay test to assess passage comprehension. Results suggested that partial word knowledge growth was greater for participants who read texts that had been altered in all three ways (macrostructure, microstructure, and elaboration), than for those who read the original texts. Of interest, children who read texts either altered in macro- and microstructure, or altered in macrostructure alone, did not differ significantly in their word knowledge growth from those who read the original passages. Thus, it appears that elaborated text, in particular, contributes to growth in partial word knowledge from reading.

The more common method for assessing the role of context has been to assign ratings to target words through the use of a scale such as that proposed by Beck et al. (1983), and then to determine the relationship between word knowledge growth and richness of context. Of the incidental word learning studies that have used this procedure

(Nagy et al., 1987; Schwanenflugel et al., 1997; Shu et al., 1995), results have been mixed. Although Nagy et al. and Shu et al. found that richness of context significantly impacted unfamiliar word learning, Schwanenflugel et al. found that contextual support did not significantly impact the learning of unknown or partially known words.

Several other studies in this area (Konopak, 1988a, 1988b; Gordon et al., 1992) have examined context differently by selecting target words that are presented in "inconsiderate" contexts. An "inconsiderate" context is operationally defined as "limitations in one or more of the following: completeness, explicitness, proximity, and clarity of connection" (Konopak, 1988b, pp. 4-5). The texts are then modified such that target words are presented in more "considerate" contexts, and partial word knowledge accretion of participants is compared across texts. Taken together, findings of these three similar studies have suggested that, given an expressive definition posttest, participants performed better on the "considerate" than "inconsiderate" versions of passages, whether they were fifth grade students (Gordon et al., 1992), eighth grade students (Konopak, 1988b), or eleventh grade students (Konopak, 1988a).

In summary, then, studies of incidental word learning from text have operationalized context as (a) macrostructure, microstructure, and conceptual variables; (b) the extent to which surrounding words are directive; and/or (c) the extent to which the surrounding words are considerate of the reader's lack of knowledge. Most of them (cf. Schwanenflugel et al., 1997) have found that richness of context indeed affects word knowledge growth. It appears then, based on these findings, that context should at least be addressed in future investigations of partial word knowledge growth.

Readability

The overall readability of a text also has potential to impact the extent to which word knowledge can be gleaned from it. Nagy et al. (1987) argued that texts that are easier to read may be easier to learn from, as well. Formulas of readability typically take into account sentence lengths and the frequency of occurrence of the words used.

It appears that only two studies of incidental word learning from text actually addressed the readability of the texts used (Herman et al., 1987; Nagy et al, 1987). Herman et al. used readability as a control to help assure that passages were similar in their difficulty. Nagy et al., however, found that the interaction between readability and learning from context approached significance for two of the four measures of readability employed, such that participants learned more from easier, more readable passages. It seems, based on these limited findings, as well as the relationship posited by theorists of reading comprehension (Adams, 1990; Just & Carpenter, 1987), that readability might be an important aspect of texts, with potential to impact word learning.

Conclusions Related to Word and Text Variables

The preceding discussion, focusing on evidence for the relative importance of specific word and text variables in characterizing word knowledge growth from text, has highlighted a need to consider a subset of linguistic variables (i.e., the number of occurrences of target words within the text, word length, part of speech of the target word, the density of unfamiliar words within a passage, the word frequency of target and nontarget words, the richness of context surrounding target words, and the readability of passages) in studies of this kind. It seems appropriate to consider each of these variables, whether by controlling them in texts or manipulating them to assess their impact further.

In the next section, the focus is switched to the participants employed in studies of partial word knowledge growth from incidental exposure in reading.

Participant Factors in Partial Word Knowledge Growth through Incidental Learning from Text

Participants recruited for studies of partial word knowledge growth overall have comprised a fairly wide age range, although those studies that measure learning from written materials have, by necessity, focused on children from the third grade and beyond who are presumed to have enough reading skill to be able to learn from text. In addition, research in this area has not been limited to average readers; high and low ability readers have also been included in some cases. In the sections that follow, this literature will be reviewed to elucidate word learning differences that have emerged as a function of both age and varying participant ability levels.

Developmental Evidence of Word Knowledge Growth

After presenting three oral tasks to assess partial word knowledge, Dickinson (1984) demonstrated that even children as young as age four can demonstrate word knowledge growth from listening to a story with a target word. Moreover, studies of booksharing among young children and their parents suggest a strong relationship between children's vocabulary knowledge and their exposure to reading (as well as other literacy-related variables, such as the number of books in the home) in kindergarteners (Senechal, LeFevre, Thomas, & Daley, 1998), as well as children as young as three years of age (Senechal, LeFevre, Hudson, & Lawson, 1996). Acquiring knowledge of words through independent reading, however, requires that the participant's reading skills be

advanced enough that the child is able to focus on the message of the text, rather than on decoding the words of the text.

Chall (1983, 1996) proposed a widely used set of reading stages (also see Ehri, 1985; Frith, 1985). Stage 0 focuses on preliteracy skills, such as phonological awareness. Stages 1 and 2 emphasize the process of learning to read with increasing fluency. By stage 3, beginning at age 9 (grade 4) and ending at age 14 (grade 9), the child has achieved reading fluency and uses independent reading as a means to learn new information. According to Chall, at this stage the child proficiently decodes and is able to focus on text comprehension. It is at this point, then, that presumably independent reading becomes a potentially powerful source for learning new lexical items. In stages 4 and 5, the young adult is able to read and understand differing viewpoints and incorporate reasoning skills while reading.

It seems apparent that, once children reach Chall's Stage 3 they should demonstrate the ability to learn words, albeit partially, through independent reading. Given our knowledge of the stages of reading, an important question becomes: "What is the lower age limit for which the phenomenon can be observed?" Several studies have examined incidental word learning in independent reading before age 12 (Gordon et al., 1992; Nagy et al., 1987; Schwanenflugel et al., 1997; Shu et al., 1995). All of these investigators found evidence of incidental word learning from independent reading, regardless of age; taken together, these studies have suggested that word learning from independent reading occurs at least as early as the third grade. Nagy et al., for example, examined incidental word learning among third, fifth, and seventh grade students. Passages appropriate for each grade level were selected, and target words were chosen

from within the passages without modifying them in any way. Participants received a checklist pretest and a multiple choice posttest not intended to be sensitive to partial word knowledge. Findings suggested that incidental word learning occurred for participants of each grade level, although no comparative analyses were performed to examine learning differences across grades.

Swanborn and de Glopper (1999), however, in their meta-analysis of studies of incidental word learning from independent reading, found a strong effect for grade level. They reported that the probability of a fourth grade student learning a word from text incidentally is approximately 0.08, whereas the same probability for an eleventh grade student is 0.33. Moreover, although grade level explained 46 percent of the effect size variance in their multi-level regression analysis, grade level and measurement of partial word knowledge (that is, whether individual studies opted to measure partial word knowledge) accounted for 66 percent of the variance. Based on these findings, it appears that, although incidental word learning from independent reading may be subtly observed earlier than the middle of Chall's Stage 3, the likelihood of word knowledge growth from this type of exposure increases with age.

The Impact of Ability Differences on Word Knowledge Growth

The impact of ability differences on incidental word learning from text would seem to be an expected finding; however, there has been conflicting evidence that "ability" relates to word learning from reading. One possible reason for this is the means by which investigators have examined individual differences related to various abilities. Sometimes "ability" is inferred, based on the participants' performance on the pretest vocabulary checklist of target words (Shu et al., 1995). More often, reading

comprehension scores from a standardized achievement battery are obtained from the schools from which participants are drawn, and the scores are used as estimates of overall "ability." Without exception, measurement of participants' overall language and cognitive reading abilities has not been sufficient to support any strong conclusions about the specific skills that contribute to word knowledge accretion though independent reading. Understanding which subset of abilities appears to contribute to the development of incidental word learning through reading is of more than just theoretical importance; it provides the underpinnings for later examinations of the presence or absence of incidental word learning abilities among special populations, such as children with specific language impairment.

Of the studies of incidental word learning from reading, two did not take into account students' individual abilities (Konopak et al., 1987; Schwanenflugel et al., 1997). Of the remaining seven studies, three demonstrated no significant interaction between incidental learning from context and ability level. Specifically, Nagy et al. (1985) identified average and above average eighth grade students by obtaining students' standardized reading comprehension scores. In their hierarchical regression analysis, there was no significant interaction between incidental word learning from context and the reading comprehension measure. Similar findings were obtained two years later by Nagy et al. (1987); among their third, fifth, and seventh grade participants, they found no significant interaction between learning from context and either reading comprehension scores or vocabulary scores obtained from the same battery of achievement tests. Finally, Shu et al. (1995) did not obtain a standardized measure of ability. Instead, they used their pretest vocabulary checklist (developed to assess prior knowledge of the target words

before exposure to the words in context) as a rough indicator of the vocabulary abilities of their American and Chinese participants. They did not find a significant interaction between the amount of learning from context and pretest vocabulary scores for either the Chinese or the American children.

Among the studies that did find effects that the authors attributed to the children's overall abilities, Herman et al. (1987) obtained eighth grade students' reading comprehension test scores from earlier in the school year. Using a statistical procedure similar to that used by Nagy et al. (1985; 1987), they found a significant interaction between comprehension test scores and word learning from context (as measured by a multiple choice posttest), such that students with higher reading comprehension scores learned more words from text than those with lower scores. The remaining three studies that found differences claimed to be related to overall ability are extremely similar methodologically and in the materials used to conduct the experiments. Konopak (1988a, 1988b) obtained participants' standardized reading scores from the schools. Based on these scores, they assigned eighth (1988b) and eleventh (1988a) grade participants to high and average ability groups. In both studies, findings revealed a significant main effect for ability, such that participants with high reading scores demonstrated greater vocabulary gains, on both an expressive definition test and a self-report vocabulary knowledge measure, than participants with average reading scores. In a similar fashion, Gordon et al. (1992) used reading achievement scores to group their fifth grade students into high and average ability groups. They found that the high ability group significantly outperformed the average ability group in an expressive definition posttest, as well as a

self-report vocabulary knowledge measure, both designed to be similar to Konopak's measures.

It seems, then, that information about the relationship between word knowledge growth and either reading comprehension abilities, vocabulary abilities, or generalized reading abilities is conflicting. As this review is intended to highlight, however, there are reasons to be concerned about several aspects of these studies' ability data. First, the studies have not always measured the same language domain in their ability measurement, so conclusions across studies about performance differences as a function of ability are not valid. Second, details of ability testing were often not provided in these studies; when the authors have stated that reading was tested, for example, it has not been clear what aspect of reading the scores represented. The general sentiment of the previous work in this area seems to be that ability contributes to individual differences and it, therefore, needs to be addressed before performing analyses of incidental word learning from context. By examining ability more completely, through individual testing across a variety of language domains, and including cognitive and general (world) knowledge measures, the focus can shift from "accounting for" ability differences to exploring the impact of children's individual abilities on their ability to acquire vocabulary through incidental exposure while reading.

Learning Assessment and Analyses of Word Knowledge Growth

The most important aspect of studies of partial word knowledge growth through incidental exposure in reading is the means by which these studies attempted to measure partial word knowledge growth. The method employed for measurement of partial word

knowledge stems from individual investigators' motivations for their work. Researchers of partial word knowledge have generally been motivated by either (a) the need to characterize children's word knowledge growth from minimal exposure, thereby addressing educational issues related to children's vocabulary development; or (b) the need to understand, a priori, how word knowledge develops, from an initial representation to ultimate mastery. Below, each of these rationales is discussed, and the resulting posttest designs are illustrated.

The Need to Characterize Children's Vocabulary Growth

Most of the papers reviewed herein (Dickinson, 1984; Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1985; Nagy et al., 1987; Shu et al., 1995; Swanborn & de Glopper, 1999) have presented the argument, either implicitly or explicitly, that children's vocabulary develops so quickly during the school-age years that direct vocabulary instruction provided by educators is not sufficient to account for such growth. Therefore, incidental exposure to words must be a primary means by which children learn new words. Because the amount of word growth from a single exposure is small, though, measures of partial word knowledge are necessary to describe it.

Investigators who used this rationale for their work have tended to focus less on potential types of word knowledge. Some (Herman et al., 1987; Nagy et al., 1985; Nagy et al., 1987; Shu et al., 1995) developed multiple choice questions of varying levels of difficulty, but without describing with enough detail the linguistic basis on which items were presumed to be more difficult. Others (Gordon et al., 1992; Konopak, 1988a, 1988b; Konopak et al., 1987) asked participants to offer definitions to demonstrate their

word knowledge growth. Definitions were then scored in terms of their completeness, neglecting the fact that, if participants have only partial knowledge, they may not be able to express the knowledge, even in terms of an incomplete definition. In other words, a child who offers no definition information for a word cannot necessarily be presumed to know nothing about the item.

An illustration of this problem is seen in the work of Gordon et al. (1992). They presented target words in a "considerate" version of the text, one that was modified to provide helpful context for learning target word meanings; and an "inconsiderate" text, one that was the original version of the text and did not provide a helpful context for learning. Their posttest required the children to state target word definitions that were then scored on a scale to allow partial credit for levels of incompleteness. The results for the "inconsiderate" text, the one most typical of reading materials encountered in school, were that there was not a significant learning effect for this condition (although there was for the "considerate" text condition). Arguably, though, if the posttest measure had been receptive, with different types of word knowledge taken into account, the children may have demonstrated very different patterns of performance, possibly reflecting the ability to glean knowledge at least that the words were actual, real words as opposed to nonwords, or maybe basic information about the word's syntactic and semantic properties.

Taken as a whole, these studies have had as their main concern children's incidental word learning as a means of vocabulary development. They represent the view that measurement of partial word knowledge is a means to an end; namely, it enables detection of word knowledge growth from minimal exposure through text. Evidence of

this is in the fact that findings were analyzed and reported in terms of whether or not word knowledge growth was detected, rather than the specific type (i.e., word discrimination knowledge, syntactic knowledge, general semantic domain knowledge, detailed semantic knowledge) of growth that was achieved for most words. Nonetheless, these studies have offered some very important insights into various avenues of partial word knowledge measurement.

The Need for an A Priori Understanding of Word Knowledge Growth

The other motivation for the development of studies that measure partial word knowledge is to examine the measurement process itself. Investigators motivated to examine measurement issues related to partial word knowledge have drawn on the work of Carey (1978), who offered a description of the types of word knowledge growth that a child much undergo before complete word mastery. Among other earlier investigations of partial knowledge, these studies have also drawn on the work of Trembly (1966), who coined the term "frontier word" to describe words that are familiar but whose meanings are not completely known by an individual. Other early investigations are the works of Hart (1965) and Eysenck (1979), who examined the "feeling of knowing" (FOK) phenomenon, in which a person feels somewhat confident of knowing an item but cannot express it. Still others (Brown & McNeill, 1966; Koriat & Lieblich, 1974) examined the very similar "tip of the tongue" (TOT) phenomenon, in which participants can demonstrate they know an item receptively but cannot retrieve the label.

The work of Shore and Durso (1990; Durso & Shore, 1991), though very different from the work described in previous sections of this paper, provides the best example of studies that emphasize the measurement of word knowledge types (or, as they refer to

them, *levels*). Detailed description and analysis of these studies are provided herein because of their potential to inform future work in more careful measurement of partial word knowledge growth through incidental word learning in children. In their 1990 study, Shore and Durso used a partial word knowledge paradigm to assess adults' word knowledge accretion from pre- to posttest, given a condition in which definitions of words were provided for study by the participants.

The motivation for the study was related to intentional, rather than incidental, word learning, and the focus was on adult learning. A group of college students were asked to complete a pre-assessment checklist, completing a lower-level word knowledge task on each pass through the list such that they wrote definitions for words they knew, then wrote sentences for any remaining words they “knew,” then check-marked familiar but unknown words, and then circled any remaining items that they believed were English words.

Next, participants in the experimental group read and studied definitions of 60 target words, while the control group completed a distractor task. Finally, participants completed one of two versions of a posttest. Both versions listed the target words in sentence pairs, one sentence of which used the word correctly and the other of which used the word incorrectly. In one set, the incorrect sentences required general semantic domain knowledge of the meaning of the target in order to detect that the sentences were incorrect (e.g., “The circus performer could juggle the *dowager* and two bowling pins.”). In the other set, knowledge of detailed semantic information was needed to judge correctly that incorrect sentences were, indeed, incorrect (e.g., "The *dowager* and her husband recently celebrated their fiftieth wedding anniversary."). One problem with this

task is that participants were informed that one sentence in the pair was wrong and the other was right. Sentence pairs were presented together so that participants needed only to compare the use of the target word in both sentences and decide which sentence was correct. The task could have been considerably more challenging had the sentences been randomized, instead of presented in pairs, and had the participants been blind to the fact that one sentence per word was incorrect.

Results suggested that, in general, when participants received dictionary definitions, more learning was observed for words indicated as unknown on the pretest checklist than those indicated as partially or completely known. In addition, of the participants who were assigned to the "dictionary definitions" condition, those who received a posttest, requiring detailed understanding of the target words, actually did better than those who received the other posttest, requiring general semantic constraint knowledge. This latter finding is somewhat surprising but, as the authors pointed out, probably suggests that dictionary definitions, though giving specific information about a word, do not give the sort of general semantic information that one might glean from reading or hearing a word in context. This contention is consistent with the work of Miller and Gildea (1987), who found a similar pattern in children's responses following their reading of a dictionary definition.

Unfortunately, Shore and Durso (1990) did not include detailed information about the posttest stimuli; the authors gave just one example. As such, this article is somewhat limited in its usefulness for informing future work in this area. In addition, their study would have been stronger if the dictionary definitions condition had been a within-subjects factor, rather than between-subjects, and if the posttest item type had been a

within-subjects factor, to enable stronger comparisons of the effects of the conditions and the differences in performance across item types.

Durso and Shore's (1991) study sought to examine partial word knowledge in adults in a similar manner to their 1990 study, but without a word learning condition. The investigation consisted of seven experiments, each of which probed an aspect of the 1990 findings. Five of the experiments were particularly relevant to the present discussion. In experiment 1, adults were given one of two types of sentence pairs, requiring either detail knowledge or general domain knowledge, to arrive at the correct sentence. Participants who were given sentence pairs that required only semantic domain knowledge performed better (and above chance) than participants given detail knowledge sentence pairs. This finding would be expected if domain knowledge is considered to be lower-level knowledge than detail knowledge. Of interest, as in the 1990 study, participants performed significantly better than chance on general semantic domain knowledge items for words they claimed were unknown in the pretest checklist. (The group that received detail knowledge sentence pairs did not demonstrate the same trend.) The implication of this finding is that more word knowledge growth occurs for completely unknown words than for partially known words. These findings are inconsistent with those of Schwanenflugel et al. (1997), who found similar word knowledge growth for unknown and partially known words. Of course, both sets of findings should be evaluated with caution since, at best, levels of word knowledge (if the task is designed such that word knowledge types can be characterized as levels) should be measured on an ordinal, rather than an interval or a ratio, scale.

In experiment 3, Durso and Shore explored the possibility that, when participants were given some words in checklist format, they listed them as unknown because they could not retrieve them. When given the words in context, however, some basic retrieval was likely triggered, enabling better than chance performance on the sentence selection task. To test this possibility, participants were given the pair of correct/incorrect sentences at the checklist phase. When asked if they knew each word, they were told to read the pair of sentences containing the word before responding. Even given the words in context, participants performed significantly above chance on words they reported as unknown on the checklist. These results suggested that the findings in experiment 1 were not merely attributable to poor retrieval of word knowledge at the checklist phase and better retrieval, once the context was given, in the sentence selection phase.

Experiment 4 (Durso & Shore, 1991) addressed an important problem with the 1990 study and experiments 1 through 3 as reported in 1991. This experiment removed the binary choice component of the sentence selection task, in which one sentence in a pair was always to be judged correct, while the other was judged, by default, to be incorrect. The participants in experiment 4 were asked simply to make yes/no decisions on individual sentences, requiring knowledge of the semantic domain, as to whether each was or was not a correct use of each word. On this task, participants did not perform significantly better than chance for unknown words. These findings suggested that the simplicity of the binary decision task in the 1990 study may have partly accounted for the seemingly disparate finding that “unknown” words are, in fact, known in many cases, at least in terms of their general semantic domain.

As experiments 6 and 7 (Durso & Shore, 1991) demonstrated, however, factors other than the nature of the sentence selection task also contributed to these findings. In experiment 6, participants completed the checklist, then performed a free association task in which, given each word, they were asked to generate things that came to mind. The list of associations for each word was then analyzed, and responses were categorized as "data–driven," which were responses that consisted only of associations related to how the word looked on the card (e.g., an association that had no relationship to the meaning of the word, but looked or sounded similar to it) or "conceptually–driven," in which at least some of the responses for a given word were related to the word in meaning. The primary finding of this experiment was that, even when the words were reported to be unknown, participants could still on occasion generate conceptually driven responses, suggesting partial knowledge of these items. The authors concluded that participants had poor "metamemorial sophistication," such that they were not always accurate in reporting whether they knew a word.

Experiment 7 probed this conclusion by offering participants money for each response they answered correctly. Participants were told that they could opt to skip sentences they were unsure of, but that they would have money taken away for each incorrect response. This way, the experimenters obtained a list for each participant of items on which the participant was unsure. In the second phase of the experiment, participants went back to items they had previously opted to skip and completed the sentence decision task for those. Performance was above chance for correct selection of words on which participants were "unsure," suggesting again that adults' knowledge of words was greater than they reported.

The findings of experiments 4, 6, and 7 seem to suggest that, although the binary sentence selection task contributed to the ease with which participants indicated knowledge of sentences, participants do, indeed, have knowledge about words they report as unknown. The implication for future work seems to be that, in a study of word knowledge gain, a control condition is necessary, in which knowledge of "unknown" words, to which the participant is not exposed in the learning condition, is compared to knowledge of words to which the participant is exposed, so that measurement of prior knowledge is not reliant entirely on participant report.

In sum, the work of Shore and Durso (1990; Durso & Shore, 1991) offers some important insights into partial word knowledge measurement. First, describing word knowledge growth in terms of knowledge types (i.e., word discrimination knowledge, syntactic knowledge, general semantic knowledge, detailed semantic knowledge) provides process-based information about the learning of an unknown lexical item. Applied to a study of incidental word learning in children, this means that results of learning should not be framed in terms of the number of words for which some knowledge growth was detected but, rather, in terms of descriptors about the state of knowledge before exposure to the word (e.g., no knowledge) and the state of knowledge after exposure (e.g., syntactic knowledge only). This level of description is needed, it would seem, to fully understand what a child truly gleans from one exposure to a word in context.

A second important insight from these studies (Durso & Shore, 1991; Shore & Durso, 1990) is that even adults are not very reliable in reporting whether or not they have any knowledge of a word. In Shore and Durso's 1990 study, for example,

participants who did not receive the definition training demonstrated detailed semantic knowledge on the sentence choice test, even for items that they had denied were real words on the pretest checklist. Moreover, participants in experiment 7 of the 1991 study were reticent to claim knowledge of a word when, in fact, later they were determined to have accurate knowledge of the word. In this case, "knowledge" referred to their ability to select the sentence in the pair that used the word correctly.

The studies discussed in previous sections have routinely relied on self-reports of knowledge, particularly as a pretest measure. Anderson and Freebody (1983) have discussed this issue at length, arriving at the conclusion that self-report measures are actually superior to multiple choice measures, mostly because multiple choice measures have the potential to lead participants to the correct answer, where as self-report measures do not. It seems that, in designing a pretest measure, multiple choice testing is, as Anderson and Freebody argued, too leading. The only alternative for the pretest is to administer a checklist, using a procedure such as Shore and Durso's, that includes a definition component, so that some objective data on participants' actual knowledge of the words is obtained. The disadvantage to this approach, as Durso and Shore's Experiments 4, 6, and 7 demonstrated, is that participants may not be accurate in their own estimates of the familiarity of specific words. A reasonable solution, as has been applied by others (e.g., Schwanenflugel et al., 1997), is to select stories to be as similar as possible, and then administer half the stories (and, therefore, half the target words) to one group of children, and the remaining half to the other group, while posttesting all of the children on all of the targets. Assuming that the stories and target words are, indeed, similar, prior knowledge of targets can be estimated without relying on children's self-

reports entirely. Moreover, as Schwanenflugel et al. have argued, using such a control condition as an alternative to computing the chance effects associated with a multiple choice test is actually the more conservative option.

A third insight, as mentioned, is that the binary decision task employed by Shore and Durso (1990; Durso & Shore 1991) is too simple, because the participant need only rule out one option to determine that the other is correct. This impression is strengthened by the findings of Durso and Shore's Experiment 4. When the binary choice was removed, for unknown words, participants were unable to select sentences with correct usages significantly more than chance.

So, the description of knowledge types as provided by the work of Shore and Durso (1990; Durso & Shore, 1991), and eluded to early on by Carey (1978), provides the framework for future investigations of children's incidental word learning, including that of the present study. Such a framework seems to resonate with the notion that word knowledge growth is a process, potentially operationalized as a set of word knowledge types that develop as one's knowledge of a word evolves from no knowledge at all to complete, expressive mastery of the word. Word knowledge types might include, although certainly not be limited to, knowledge to discriminate the word from nonwords, knowledge of the word's syntactic category, as well as general semantic and detailed semantic domain knowledge. These types, to complicate the issue, may themselves consist of subtypes (e.g., knowledge of a word's membership in a variety of semantic categories or knowledge that the same word may be classified as one part of speech in some contexts and another part of speech in others).

Summary and Statement of the Problem

Incidental exposure to vocabulary is a primary means by which children in the school-age years develop new vocabulary (Dickinson, 1984; Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1985; Nagy et al., 1987; Schwanenflugel et al., 1997; Shu, Anderson, & Zhang, 1995). Models such as those proposed by Adams (1990) and Just and Carpenter (1987) have described how unfamiliar words might become a part of the mental lexicon through exposure from reading. Because the process of incidental word learning is incremental, however, traditional measures of receptive or expressive word mastery would likely underestimate vocabulary growth (e.g., see Nagy et al., 1985, for a discussion). Measures of partial word knowledge, on the other hand, might better detect slight changes in knowledge growth (e.g., Swanborn & de Glopper, 1999).

Previous research in this area has focused on detecting word knowledge growth from reading, rather than describing the type of growth that occurs (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1985; Nagy et al., 1987; Shu, Anderson, & Zhang, 1995). This research has, nevertheless, paved the way for more in-depth examinations of the type of word knowledge accrued (i.e., word discrimination, syntactic, general semantic, detailed semantic), once linguistic factors and participant performance factors are considered. Linguistic factors, such as lexical difficulty (frequency of occurrence within the language), part of speech, and contextual richness of the text surrounding a word, are all important variables to address in any comprehensive description of incidental word learning processes, as the review of the previous literature showed. In fact, models of reading comprehension (e.g., Adams,

1990; Just & Carpenter, 1987) include linguistic factors such as richness of context, text readability, and word frequency, in their explanations of the relative ease with which words may be learned from reading. Moreover, knowledge of individual factors, such as performance on a variety of language, reading, and cognitive measures, can enable a better understanding of the effects of these factors on incidental word learning processes. By examining these factors in children with normal language, reading, and cognitive abilities, the basis is provided for studying incidental word learning processes among special populations, such as children with language impairments.

The literature on children's incidental word learning through reading has provided tremendous insight into the important factors that potentially impact informal word learning in children. Arguably, however, studies that focus less on children's vocabulary growth through incidental learning, and more on the process of learning new words, have provided process-based insights that have been lacking in previous work (Durso & Shore, 1991; Shore & Durso, 1990). Only through examination of both bodies of work can future investigations incorporate the necessary process-based approach to understanding partial word knowledge growth through incidental word learning.

The purpose of this study was to examine, in descriptive terms, partial word knowledge growth through incidental learning from independent reading by sixth grade children with normal language abilities. The word knowledge types investigated were word discrimination knowledge, syntactic knowledge, and general and detailed semantic knowledge. The types selected for study were not intended to represent an exhaustive list of word knowledge types, but only a subset. This investigation was not designed, for

example, to address phonological word knowledge growth or any type of expressive word knowledge.

Children with average to above average language abilities were selected because, based on the preceding review of the literature, it seemed that greater emphasis on the impact of children's language skills on their abilities to acquire words through incidental exposure in the course of independent reading was needed. Children with above average language abilities were included in the experimental sample in order to enable evaluation of partial word knowledge growth across children with a wider range of language abilities. Children with below average language abilities were excluded from this initial study of partial word knowledge measurement in order to focus on the process of word knowledge growth among children for whom normal development, across domains, can be assumed.

Sixth grade children were selected in order to be reasonably certain that the children had reached Chall's (1983, 1996) Stage 3 and were fairly sophisticated in their use of text as a source for learning. Narratives, rather than expositions, were used because, though expositions are most like the passages read in school, narratives would seem to be more like the reading most children do for enjoyment. It was thought that selection of narratives, then, might encourage more natural reading behavior and discourage the types of study behaviors that might be needed in expository reading. Nagy and colleagues (Nagy et al., 1985; Nagy et al., 1987) argued convincingly that texts that represent the most natural form of reading for the child are the best measures of incidental word knowledge growth because they disguise the behavior under scrutiny.

Passages that tell a story most likely represent the most natural reading situation for a child.

Specifically, this investigation focused on the impact of language variables on partial word knowledge growth. Both individual ability related factors and word and text factors were assessed within reading passages. Target words consisted of nouns and verbs in order to assess potential learning differences across syntactic categories. As an additional analysis, judgments of the richness of context for each target were obtained, so that the effect of context on learning potentially could be estimated. The rest of the language variables discussed in the preceding review (number of exposures to the target words in the texts, word length in syllables, density of target words within the texts, word frequency of target and nontarget words, and readability of the texts) were controlled. With these goals in mind, the following research questions were posed:

1. How do individual ability variables (receptive vocabulary, overall language ability, and reading ability) relate to types of word knowledge growth that occur as a function of incidental learning from reading?
2. How does the type of word learning (word discrimination, syntactic, general semantic, specific semantic) differ based on the part of speech (noun versus verb) of the target words?
3. How do ratings of contextual richness relate to types of incidental word learning?

CHAPTER 2

METHOD

The incidental word learning of school-age children is an incremental process, requiring measurement of partial word knowledge to detect growth (e.g., Swanborn & de Glopper, 1999). As discussed in Chapter 1, linguistic variables as well as individual participant variables seem to impact children's word learning. A rationale for the careful study of these variables, and a set of research questions to address them, was described in Chapter 1.

Chapter 2 provides a discussion of the method used to address the questions of the present study. It includes a description of participants, materials developed, and procedures implemented. To strengthen the design of this experiment, a pilot study was conducted to evaluate the adequacy of the testing procedure and instructions and to refine the experiment's stimuli. The pilot study is presented in Appendix A.

Participants

Participant Description

Because an exploration was needed of the types of word knowledge growth that occur as a function of individual and linguistic factors in children with normal language (that is, those without a language disorder), a total of 42 sixth grade children between the ages of 11:0 and 12:11 were recruited for the study. Of the 42, 31 participants met study eligibility criteria of (a) English learned as the first language, (b) no history of attention deficit disorder, (c) no history of language or learning disabilities, (d) no history of any

syndrome, head injury, or frank neurological impairment, (e) average to above average performance on all language measures, and (f) cognitive and hearing screening results within normal limits. In addition, parents of all participants reported that they believed their child to be "performing satisfactorily in school." Participants' age, gender, and performance on eligibility measures are reported in Table 1. A total of 17 females and 14 males, ranging in age from 11:8 to 12:10 (average age = 12:2 years, standard deviation = 3 months) participated in the experiment.

Participant Criteria

Participants eligible for the main experiment met each of the criteria listed in the preceding section. "Average to above average performance," required on all language measures, was defined as performance that is at least higher than one standard deviation below the mean. This range was selected to represent a continuum of performance, so that an evaluation of potential relationships among specific language skills and word learning performance could be obtained. Children who performed below this range on any of the measures were dismissed from the study, and their analyses were not included in the investigation. Table 1 provides individual test data, as well as the means and standard deviations for each measure.

Maternal and paternal education data, as well as the approximate number of books read by children in an average month as reported by their parents, are reported in Table 2. Both mothers' and fathers' education ranged from high school graduate to some level of post-graduate work. Most of the parents (94% of mothers and 90% of fathers) indicated at least completion of some college course work. In addition, 61 percent of mothers and 81 percent of fathers graduated from a four-year college. Parents' report of children's

Table 1. Age, gender, and standard scores (test mean = 100, standard deviation = 15) on the Peabody Picture Vocabulary Test, III (PPVT); the Test of Language Development – Intermediate, 3rd edition (TOLD); the Woodcock Reading Mastery Test, Revised (WRMT); and the Kaufman Brief Intelligence Test (K-BIT).

Participant	Age (Yr:Mo)	Gender	PPVT	TOLD	WRMT	K-BIT
1	12:04	F	134	121	116	124
2	12:04	F	115	110	102	109
3	11:08	F	118	117	98	110
4	11:10	F	110	99	96	109
5	11:09	F	113	118	114	114
6	12:05	F	120	111	100	114
7	12:01	F	89	102	97	109
8	12:05	M	111	118	103	115
9	11:09	M	128	120	116	119
10	12:10	M	102	100	94	112
11	11:11	M	108	106	100	107
12	12:04	F	120	101	103	106
13	12:03	M	105	93	97	87
14	12:09	M	121	116	109	105
15	12:01	F	112	106	105	113
16	12:00	F	117	107	99	99
17	12:07	F	105	103	102	107
18	12:07	F	118	115	116	118

19	12:03	M	123	107	110	113
20	12:00	M	115	121	105	104
21	11:11	M	120	99	103	98
22	12:02	F	133	118	118	128
23	12:03	M	131	135	116	123
24	12:05	F	124	126	114	122
25	12:04	M	141	123	107	110
26	12:04	F	112	118	110	109
27	12:02	F	116	107	106	114
28	12:01	F	115	101	101	108
29	12:01	M	112	102	99	111
30	11:10	M	125	105	108	107
31	11:11	M	125	120	111	119
M	12:2		117.4	111.1	105.6	111.1
SD	0:3		10.4	9.8	7.0	8.2

Table 2. Maternal and paternal educational background and average number of books read by children in a month, as reported by their parents.

Participant	Highest Educational Level Achieved by Mother	Highest Educational Level Achieved by Father	Number of Books Read by Children in a Month
1	2-yr college grad	4-yr college grad	5.5
2	some college	high school grad	1
3	4-yr college grad	4-yr college grad	5
4	some college	high school grad	4
5	post-grad	4-yr college grad	2.5
6	4-yr college grad	post-grad	3
7	4-yr college grad	4-yr college grad	2
8	some college	2-yr college grad	3
9	some college	post-grad	2
10	some college	2-yr college grad	4
11	post-grad	post-grad	1
12	post-grad	4-yr college grad	10
13	4-yr college grad	4-yr college grad	0
14	post-grad	4-yr college grad	1
15	4-yr college grad	post-grad	4
16	some college	post-grad	17.5
17	4-yr college grad	post-grad	3
18	4-yr college grad	4-yr college grad	3.5

19	4-yr college grad	post-grad	4
20	high school grad	some college	2
21	high school grad	high school grad	4
22	4-yr college grad	4-yr college grad	7
23	4-yr college grad	4-yr college grad	
24	post-grad	post-grad	3
25	4-yr college grad	4-yr college grad	2
26	post-grad	post-grad	6.5
27	4-yr college grad	post-grad	2.5
28	4-yr college grad	post-grad	2.5
29	2-yr college grad	4-yr college grad	1
30	some college	4-yr college grad	6
31	some college	4-yr college grad	6
M			4.0
SD			3.3

book reading revealed a wide range of response, from 1 book to 17.5 books per month. The average number of books the children in the sample read per month was 4.0.

Participant Recruitment

Participants were recruited through a local school system and two local libraries in Northeast Georgia. Specifically, a Letter to Parents that described the experiment was sent home with the sixth grade children of this county, and study flyers were placed in the libraries. The experiment was conducted with the child and experimenter seated at a table in a quiet room within one of three settings: a private library study room, a home, or The University Speech and Hearing Clinic.

A sample size of approximately 30 was selected based on a power analysis (Green, 1991). Cohen (1988) has suggested that within areas of behavioral research a power value of .80 is adequate. According to the power analysis, then, if power is set at .80 and alpha at .05, 30 participants should be sufficient for a multiple regression analysis with two or fewer sets of predictor variables; that is, this sample size should be sufficient to address the research questions of interest.

Test Selection and Rationale

In order to meet the criteria for participation in the study, two standardized assessment batteries were selected for complete administration: the *Test of Language Development – 3: Intermediate* (*TOLD-3:I*; Hammill & Newcomer, 1997) and the *Woodcock Reading Mastery Test – Revised* (*WRMT-R*; Woodcock, 1998). The *TOLD-3:I* was selected to provide a relatively comprehensive profile of language skills. This measure, though initially used to establish eligibility of participants for the study, enabled

an estimate of total language performance needed to address the issue of the extent to which language performance impacts partial word knowledge growth from the experiment (Research Question 1). The *WRMT-R* (Woodcock, 1998) was selected to provide a profile of participants' reading abilities. Again, though this battery was initially used to establish eligibility of the participant for the experiment, results were used subsequently to address the relationship between reading performance and lexical growth from the experiment (Research Question 1).

In addition to the language and reading batteries, receptive vocabulary performance was assessed using the *Peabody Picture Vocabulary Test – III* (*PPVT-III*; Dunn & Dunn, 1997), and the results were used to establish eligibility and to examine the relationship between receptive vocabulary knowledge and vocabulary knowledge growth from the experimental task (Research Question 1). Although one-word expressive vocabulary was not directly assessed, one could reasonable infer that expressive vocabulary ability in these children was normal, given the criterion of average to above average performance on both the receptive vocabulary measure and all quotients of the comprehensive language battery. Moreover, observation of the children's conversational language, not reported herein, and their written story summaries did not suggest the types of disfluencies characteristic of children with lexical retrieval difficulties. The primary rationale for not including an expressive vocabulary measure was that the emphasis of the study was on types of receptive knowledge; as such, in assessing the children's vocabulary, it seemed appropriate to characterize the children's vocabulary knowledge using a receptive measure, bypassing the word retrieval component in this case, and giving the children credit for words they know but may not use. It should be noted that

although an expressive vocabulary measure was not administered, the verbal portion of cognitive screening, which all participants were required to pass to be eligible to participate in the experiment, required a word or phrase in response to a line drawing, much like a traditional expressive vocabulary measure (e.g., the *Expressive One-Word Picture Vocabulary Test*, Gardner, 1990).

Two screenings were also administered for the sole purpose of establishing eligibility: a hearing screening and a nonverbal cognitive screening. The *Kaufman Brief Intelligence Test* (*K-BIT*; Kaufman & Kaufman, 1990) was selected for the cognitive screening. Prior to selection, a review of each measure was conducted to determine its reliability, validity, and appropriateness for measurement or screening.

Test of Language Development-3: Intermediate (*TOLD-3:I*)

The *TOLD-3:I* (Hammill & Newcomer, 1997), a comprehensive battery of language skills, is intended for children ages 8:0 to 12:11 for the assessment of skills across a variety of receptive and expressive language domains. The battery requires approximately one hour to administer and contains six subtests. "Sentence Combining" measures syntactic ability by requiring the child to listen to two simple sentences and combine them into one compound or complex sentence. "Picture Vocabulary" is a measure of lexical/semantic ability, requiring the child to listen to a two-word phrase (e.g., "tail wagger") and select the appropriate picture from a field of six. "Word Ordering" examines syntactic ability by requiring the child to listen to strings of words and reorder them into grammatically correct sentences. "Generals," a semantic task, requires the child to listen to three words and state their relationship or the category to which they all belong. "Grammatical Comprehension" is a measure of syntactic ability,

requiring the child to listen to sentences and state whether each is correct or incorrect. "Malapropisms" is a measure of semantics, requiring the child to listen to a sentence that contains a malapropism (e.g., "She added *beach* to her wash to get the clothing clean.") and correct the error. Though it has a phonological component, in that the child is cued to provide a word that sounds similar to the target, the task is semantic in the sense that, given a phonological cue, the child is required to retrieve the appropriate lexical item to complete the sentence. Subtests can be subgrouped to form composites for "Syntax," "Semantics," "Listening," "Speaking," and "Spoken Language" (total composite). Each of these composites was used to determine participants' eligibility for the study.

Though test-retest reliability for administration of the subtests in standardization studies ranged from r = .83 to .93, test-retest for the five composites ranged from r = .94 to .96. Inter-scorer reliability across subtests was r = .94 or above for standardization studies. The test authors noted that disagreements were typically due to errors in computing subtest ceilings. Authors reported criterion (concurrent) validity data, comparing composites of the *TOLD-I:3* to those of the *Test of Adolescent Language-3* (*TOAL-3;* Hammill, Brown, Larsen, & Widerholt, 1994). Coefficients ranged from r = .74 to r = .88.

The TOLD-I:3 probes grammatical constructions specific to General American Dialect. In cases in which children are determined to speak another dialect, the linguistic characteristics of the dialect should be taken into account when interpreting the scores of the test. Accordingly, oral and written language samples were examined by the investigator to determine the presence of a dialect. Almost all (30 of 31) participants, based on oral language samples, informal interaction with the examiner, and written story

summaries, were judged to speak General American Dialect, at least in the three sessions of the experiment. Of course it is likely that participants may use another dialect in other, more familiar situations. Of note, participant 12, who used Southern American dialect in interactions during the experiment did not score lower on the Grammatical Comprehension subtest than on the other tests; she received a score of 9 (subtest mean = 10, standard deviation = 3) on Grammatical Comprehension, compared to scores of 9, 11, 9, 13, and 10 on the other five subtests.

In general, the other participants showed the same pattern, with Grammatical Comprehension scores similar to their other subtest scores. For only one participant was this subtest score lower than any of the other subtest scores; participant 22 received a score of 10 (i.e., the mean for his age) on Grammatical Comprehension and scores of 14, 15, 13, 12, and 12 on the other subtests. It seems, therefore, even assuming that a larger subset of the sample speaks Southern American Dialect in more natural communication settings, that the Grammatical Comprehension subtest did not pose any greater difficulty for participants than did the rest of the test.

Peabody Picture Vocabulary Test – III (*PPVT-III*)

The *PPVT-III* (Dunn & Dunn, 1997) is intended to measure one-word receptive vocabulary. Given a word, the child is required to select the picture of the word from a field of four. The authors provided evidence for the internal consistency of the test, listing split-half reliability coefficients for each age range; coefficients ranged from r = .86 to .97, with a value of .96 for the 11 year old group. Test-retest reliability in standardization testing ranged from r = .91 to .94. The authors addressed construct validity by demonstrating the increase in raw score as a function of increased age. Data

for concurrent validity with intelligence and comprehensive language measures were provided. The "Verbal IQ" of the *Wechsler Intelligence Scale for Children, 3rd Edition* (*WISC-III*; Wechsler, 1991) and the *PPVT-III*, for example, had correlations of r = .91 to .92 (across the two forms of the *PPVT-III*). It should be noted, however, that none of the tests to which the *PPVT-III* is compared for evidence of concurrent validity assesses the same domain (i.e., receptive vocabulary) as the test in question.

Woodcock Reading Mastery Tests - Revised

The *Woodcock Reading Mastery Test – Revised, Form H* (*WRMT-R*; Woodcock, 1987; 1998) is intended to be a comprehensive assessment of reading skills. It consists of a total of four tests that cover the areas of basic reading skills ("Word Identification" and "Word Attack") and reading comprehension ("Word Comprehension" and "Passage Comprehension"). The entire battery requires approximately 30 to 45 minutes to administer.

The first two tests measure word reading in isolation. "Word Identification" requires the child to read single words as they increase in difficulty. "Word Attack" measures the child's ability to decode nonwords or extremely low frequency words.

The remaining tests focus on comprehension of written material. "Word Comprehension" consists of three subtests: "Antonyms," "Synonyms," and "Analogies." In each of the subtests, the child is required to read an item from the test plate, and then provide an answer. For example, on the "Analogies" subtest, the child first reads the incomplete analogy (e.g., "winter – summer, fall -) then completes the analogy. The purpose of each of these subtests, then, is to measure language processing in the context of a reading task. If the child is unable either to read the item or to respond correctly to

it, the item is considered incorrect. The author argued that the "Analogies" subtest is particularly useful because it requires the child to show "context-embedded word knowledge" (Woodcock, 1998, p. 7) much like that which is required in the natural reading process. From each of the three subtests in this section, it is possible to extract raw scores specific to general reading, science and math, social studies, and the humanities.

Finally, the "Passage Comprehension" test requires the child to read a passage containing a single blank, and then to use the context provided by the passage to complete the missing word. Passages are one to three sentences in length. The task is designed so that the child should need to demonstrate comprehension of the whole passage in order to provide the missing word.

Measurement of internal consistency was performed by the test developers through a split-half reliability analysis. This analysis, performed across the four tests in the battery, was determined to be r = .94 for fifth grade students and r = .98 for eighth grade students. (Data for sixth grade students were not provided.) Concurrent validity, comparing performance on the *WRMT-R* to that of a similar measure, the *Woodcock-Johnson Reading Tests* (Woodcock & Johnson, 1977), was determined to be r = .85 for fifth grade students and r = .85 for eighth grade students, using the total reading score from both measures. Updated normative data for the *WRMT-R* (Woodcock, 1987) was provided in 1998. The updated normative information, based on a total sample of 3,184 children, of which 216 were sixth graders, was used in the present study.

Kaufman Brief Intelligence Test (*K-BIT*)

The *K-BIT* (Kaufman & Kaufman, 1990) is intended as a screening of verbal and nonverbal intelligence. The entire test requires 15 to 30 minutes to administer. There are two subtests, "Vocabulary," which is administered in two parts, and "Matrices." The "Vocabulary" screening first requires the child to provide the correct word or phrase from a line drawing. The items of the second task in this section provide a definition (e.g., "place to learn") and a partially completed word (e.g., S_H_ _ _), requiring the child to provide the complete word (e.g., "school"). The "Matrices" subtest, a screening of nonverbal cognitive performance, requires the child to infer relationships, both among items that have meaning and among abstract drawings. All of the items are multiple choice; examinees select from fields of five to eight choices.

Authors reported that split-half reliability scores for the "Vocabulary," "Matrices," and "Composite" sections were r = .93, .88, and .94, respectively. The test-retest reliability in standardization studies for children ages 5 to 12 years were r = .86, .83, and .92, respectively. The authors provided evidence of construct validity by demonstrating that raw scores increase with age. They presented data on concurrent validity, providing correlations between several comprehensive intelligence tests and the *K-BIT*. The "Verbal," "Performance," and "Full Scale" scores of the *Wechsler Intelligence Scale for Children, Revised* (Wechsler, 1974), for example, relate to the "Verbal," "Matrices," and "Composite" scores of the *K-BIT* with correlations of r = .78, .50, and .80, respectively.

These correlations, particularly those relating the "Matrices" subtest to other cognitive measures, are of concern only in that they suggest that the *K-BIT* does not

necessarily measure the same cognitive skills as other, more comprehensive tests, such as the *WISC-R*. Nonetheless, the nonverbal and verbal skills measured in the *K-BIT* seem adequate for screening cognitive abilities among children for whom average to above average performance might be expected. Although participants selected for inclusion in the present study performed at or above the criterion of –1.0 standard deviation below the mean on both the *Vocabulary* and *Matrices* subtests, only the *Composite* score is reported herein; the composite score is the most robust of the three scores and is the one that test development data suggest is strongest in its reliability and concurrent validity. The *K-BIT* was viewed as a relatively attractive choice because it contains both a verbal and nonverbal component, each scored separately. Moreover, its efficiency was deemed more important than its comprehensiveness, given that the population selected for the experiment was not "at risk" for exhibiting any form of cognitive impairment.

Stimuli Development

To assess word knowledge growth from a single exposure to unfamiliar words, target words were selected, appropriate reading materials were selected and modified slightly, and pre- and posttests were designed. The selection and development of these experimental stimuli are described below.

Stories

Four stories were selected from sixth grade curriculum readers, in an attempt to insure that all of the stories were grade-appropriate and that the stories represent typical readings encountered in school. Using curriculum readers to obtain grade-appropriate stories is not a perfect solution, because it is unclear which criteria publishers use to

establish whether a particular story is appropriate for a given grade level. Arguably, however, whether or not rigorous linguistic criteria were used by publishers to select grade level-appropriate stories begs the question, because children of a particular grade are reading the stories in that grade, whether they are appropriate or not, given their placement in curriculum readers in the first place. Whether or not they are appropriate, then, they are at least typical of the stories sixth graders read in school.

An attempt was made to modify the stories as little as possible, while exerting some modest controls. Accordingly, two of the four stories were shortened, by removing non-essential detail, so that all four stories were of the same approximate length (2500 to 3000 words). The shortened stories were subsequently read by an independent adult evaluator, who was asked to report any confusion or perceived plot breaks within the stories; after reading each story, the evaluator reported no such difficulties.

In addition, the word frequency of all non-target content words was estimated using data provided by Carroll and colleagues (Carroll, Davies, & Richman, 1971). Using the Standard Frequency Index (SFI) value, that reports word frequency while taking into account the dispersion of a word across contexts, all non-target content words that fell below a value of 40.0 were changed to a higher frequency word. Few words required this adjustment (0.8% to 1.7% per story). A cutoff of SFI = 40.0 was selected because words registering values of less than 40.0 occurred less than once per million tokens. Words that register values of 40.0, for example, include *surfing*, *airways*, *wrapper*, *snore*, and *liar*. Although selecting a more conservative value (e.g., SFI = 50) might provide additional assurance that all non-targets are known by participants, it

would have required substantial revision of the texts, sacrificing their naturalness and the extent to which they are representative of sixth grade stories.

Measures of readability and grade level were also obtained as further assurance that stories were similar in their difficulty. No attempt was made to modify the difficulty level of the stories based on these data; the analyses were performed only to provide additional evidence of their similarity to each other. The Flesch Reading Ease score (Flesch, 1974) ranges from values of 1 to 100, with higher values indicating greater reading difficulty. The scores obtained for each of the stories were similar, ranging from 77.5 to 85.2. The Flesch-Kincaid Grade Level score (Flesch, 1974) assigns a grade level corresponding to the difficulty of the text. Again, scores obtained for each of the stories were similar, ranging from 4.4 to 4.9. The fact that the grade level analyses suggest that the stories are all at about a fourth grade reading level is of some practical interest, given that the stories were taken from sixth grade texts. Nonetheless, the importance of these analyses is in the extent to which they demonstrate that the stories are similar in their level of difficulty. It should be noted that both scores measure reading "difficulty" similarly, taking into account both the lengths of words (in syllables) and the lengths of sentences.

The stories, containing eight target words each (underlined within), are provided in Appendix B. Although slight modifications were made to add the target words, adjust story lengths, and control lexical diversity of the stories' vocabulary, no content central to the storyline was removed or changed in making these adjustments. Moreover, the macro-structure of each of the stories remained the same.

Story Summaries

Written story summaries were completed by the participants in order to assess the extent to which the stories were understood by participants. Story comprehension would seem to be a necessary outcome of the reading experience, even more so than incidental learning. The Story Summary form consisted of a full page of double-spaced lines, to encourage the children to write at least a page. Written rather than oral summaries were solicited in order to encourage thoughtful responses of a particular length. It was thought that, if oral summaries were obtained, some participants would provide only a sentence or two as a summary. To re-prompt a child at that point to "Tell me more," is not necessarily appropriate, because, unlike a description of some kind, telling more about a story would require either going back to the beginning of the story and retelling it or trying to add detail to some part of the story, both of which would seem to be rather unnatural.

Many similar studies have not addressed story comprehension as an aspect of incidental word learning; as a result, there is limited precedent for the present study's written story summary procedure. Nagy and his colleagues (Nagy et al., 1985; Nagy et al., 1987) addressed the overall comprehension abilities of participants through their performance on a standardized reading comprehension measure. In contrast, Schwanenflugel and her colleagues (1997), from whom the present story summary procedure was adopted, evaluated the participants' comprehension of the stories containing the target words by compiling a list of "main events" in each, and measuring participants' written story summaries against each list. They found that their fourth grade children wrote summaries containing an average of 27 percent of the main ideas in the

stories. There is no known precedent in the incidental word learning literature for adopting an oral story re-telling task as an alternative.

Target Words

As described in the presentation of the pilot study (see Appendix A), six target nouns and six target verbs were initially selected for each of the four stories. Each word had to (a) be two syllables in length; (b) be sufficiently rare that it did not occur as a statistical entry in Carroll and colleagues' (1971) word frequency dataset; (c) be consistent with the storyline, such that new information did not need to be added to the story in order to include the word; (d) be included as an entry in Mirriam Webster's Collegiate Dictionary, 10th edition (1994). In addition, because the target words could only occur once in the text, they tended not to be central to the passage as a whole. Words (i.e., non-targets) that were central to the stories, on the other hand, tended to occur more than once within the passages. Several dictionaries were consulted to arrive at definitions for each of the words. Provided in Appendix C are the list of the target words, their definitions, and the source used to obtain each definition.

Six nouns and six verbs were selected for the pilot, with the intention of discarding two nouns and two verbs per story following the pilot. Appendix A describes the procedure by which words were selected to be discarded. Once words were selected for removal, their meaning was paraphrased within the story, using words with a SFI value of 40.0 or higher (Carroll et al., 1971).

Checklists

Part of the assessment of word knowledge was performed through a checklist procedure similar to that employed by Durso and Shore (1991; Shore & Durso, 1990).

The procedure assessed full (expressive) knowledge, in that participants were first asked to go through the list of words and define or write sentences for words they knew. It also assessed a type of partial word knowledge not tapped by the multiple choice measure: knowledge that an item is a real word (as opposed to a nonword). To measure this knowledge type, participants were asked to review the checklist a second time and circle words for which they could not provide a definition or sentence, but that they were certain they had seen or heard before.

Three forms of checklists were composed. The checklists contained each of the target words, as well as 6 two-syllable nonwords and 12 two-syllable common words, for a total of 50 items. A list of the target words, nonwords, and common words is provided in Appendix D. Nonwords were added to assess the children's accuracy in stating that they had seen a word before. A child, for example, who states a familiarity with some of the target words but none of the nonwords, has demonstrated the ability to self-report vocabulary knowledge accurately. The children were told, in completing the checklist, that not all the words in the checklist were real words. Common words were selected from the stories and were added to insure that the child could provide a correct response when the word is known. The common words were also intended to bolster participants' confidence in their ability to complete the task.

The items on each of the three checklist forms were ordered using controlled randomization. Randomization controls insured that the target words from each of the four stories were equally distributed throughout the checklist, as were the nonwords and common words. Checklists were formatted with one word per line, and blocks around

each word and each response space. Words were double-spaced and a font of 20-point was used to enhance readability.

Multiple Choice Task

Another assessment of the types of word knowledge growth was accomplished through a multiple choice posttest. The target word and common word multiple choice items are listed in Appendix E. The multiple choice task consisted of a pair of questions for each of the target words and each of the common words contained in the checklist. Nonwords were not included on the multiple choice task. Their primary function on the checklist was to ascertain whether the children possessed the metalinguistic skills to self-report their lack of word knowledge; such a check was not needed for the multiple choice test, because it required only a response to the questions, rather than a statement by the children about their perceived knowledge of each word.

The first of each pair of items on the multiple choice test was designed to assess participants' (a) knowledge of the syntactic category of the word, and (b) knowledge of a general semantic domain of the word. For purposes of explanation, the first item of the pair for the target word *pelage* ("the coat of a mammal, consisting of hair, fur, wool, or other soft covering, as distinct from bare skin," *American Heritage Dictionary, 3rd ed.*, 1994) is provided:

pelage

a. a covering
b. an old song
c. to scream
d. to mock
e. none of the above
f. don't know

The correct answer, “a,” was designed to represent a larger category than the target implies. In this case, then, a child who had this understanding of the word’s general semantic domain might know that the word has some relationship to “a covering,” without knowing the specific nature of the covering that the word implies. The participant who selected choice “a,” then, has demonstrated one form of general semantic domain knowledge for the word. Choice “b” represents knowledge of the syntactic category of the word (in this case, knowledge that *pelage* is a thing as opposed to an action), whereas choices “c” through “f” represent no discernible knowledge. For each item, answer choices reflected two nouns and two verbs, in order to decrease the likelihood that answers could be discerned based on any perceived grammatical differences in one of the answer choices.

The second multiple choice item of each pair was designed to assess detailed semantic knowledge of the word. Each answer choice contained a sentence in which the usage of the word was (a) consistent with its argument structure, and (b) consistent with its general semantic domain. For the purposes of explanation, the second item of the pair for the target word *pelage* is provided:

pelage

a. The animal’s pelage would keep him warm over the cold winter.
b. We placed the bright red pelage over the table for the holiday meal.
c. The child’s plastic pelage kept him dry at the bus stop.
d. The book’s pelage should protect its outside for years.
e. None of the above
f. Don’t know

Each answer choice incorporates the word into the sentence in such a way that it is grammatically appropriate. In addition, each sentence is consistent with the general semantic domain of the word. In this case, for example, each choice implies that *pelage* is a type of covering. As such, a participant who responded correctly to the first item in the pair (i.e., selected "a. a covering") should not be cued in responding to the second item in the set. The typical pattern of response would be for participants who responded correctly to the second item to also have responded correctly to the first item, reflecting that detailed semantic knowledge is more advanced than the general category knowledge acquired about a word. This pattern does not have to occur in all cases for results to be meaningful, however. A child could have different semantic domain knowledge than the question probes and still respond correctly to the question that examines detailed semantic knowledge. Both the pilot results and the results of adult responses obtained during stimuli development suggest that the latter pattern of performance, in which the first question in a pair is missed and the second is answered correctly, occurs relatively infrequently (in 16.8% of items for pilot participants and 5.3% for adults).

To evaluate the possibility that specific answer choices, correct or incorrect, might serve as distracters, affecting results as an extraneous variable, an analysis of the multiple choice posttest was performed prior to the pilot study. Ten adults who were uninvolved in the project were asked to answer each of the multiple choice questions with the target word (e.g., pelage) removed. They were asked to "Choose which one you think might be the right answer even without knowing the question." For the second item in each pair, the word was blacked out in each of the sentence answer choices as well, so that the independent evaluators could not rely on their knowledge of the words in

providing answers. Results suggested that, overall, among the target words selected from the pilot for use in the main experiment, answer choices elicited a fairly even distribution of responses within each question. Where one answer choice, correct or incorrect, was selected by more than 5 of the 10 judges, minor revisions were made to adjust the perceived "attractiveness" of the answer choice. Ten additional judges were then asked to evaluate any revised questions in the same manner. As a result of this process, each of the 120 multiple choice questions used in the pilot, once revised as needed, met the criterion of no more than 5 of 10 judges selecting any one answer choice.

Three forms of the multiple choice measure were developed with items randomized in a similar manner to the checklist. Target words from each of the stories were evenly dispersed throughout the lists. The 12 common words, for which multiple choice questions were also devised, were also dispersed throughout the lists. Items were printed five per page in a 12 point font.

Selection of a multiple choice measure, in addition to the checklist measure, was deemed appropriate for two reasons. First, the multiple choice measure did not require self-report of knowledge but, rather, measured the participant's knowledge directly. In this respect, it was an appropriate complement to the checklist procedure. Second, it did not require the participant to demonstrate knowledge expressively, as a definition task (e.g., Konopak et al., 1987) would. A child who possesses partial knowledge of a word may not be able to demonstrate what he or she does know about it if the task is to give a definition or sentence of the word. Rather, if a child feels unable to respond at that level, the child might be more apt to give no response rather than try to state the incomplete notion. In contrast, on a multiple choice measure, the child might be more able to

demonstrate what is known by simply matching his or her knowledge to an answer choice that seems to best reflect that.

There are drawbacks to the use of a multiple choice procedure for measurement of word knowledge, however, as Anderson and Freebody (1983) have suggested. The main problem as relates specifically to the present study was that, as mentioned above, an individual participant's general semantic domain notion of a word may differ from the general semantic domain probed in the question. A child's general semantic domain for the item *pelage*, for example, might be "something to do with an animal," rather than the general semantic domain reflected in the item, "a type of covering." If that were the case, the child would likely select, for the first item of the multiple choice pair, "none of the above," and then also select the correct answer for the for the second item of the multiple choice pair, "The animal's pelage would keep him warm over the cold winter," because it is the only item that refers to an animal.

In theory, this problem would not be limited to general semantic domain knowledge. Rather, the demonstration of syntactic knowledge of a word could be impacted, as well. Because it is fairly common for a word to be correctly categorized within more than one syntactic category, a child could have a different notion of the syntactic category of a word than the question addresses. This issue is not as much of a concern for the present study because, if the child has some prior knowledge of a word's syntactic category, it would be hoped that that information would have been reflected in the pretest checklist. In the absence of prior knowledge, the children would only have been exposed to the words in the stories, which present the words in the same syntactic category as the question probes. In addition, an effort was made to select target words

either that belonged only to one syntactic category or that were to be used in the most common syntactic category for that word (e.g., if the first dictionary definition used the word as a noun and the second used it as a verb, the noun definition was used in designing the stimulus).

The limitation, then, is that studies of this type cannot possibly measure knowledge of all possible semantic domains or all possible syntactic domains. Rather, the study was limited in that questions were designed to probe specific semantic domain knowledge or specific syntactic knowledge – not all possible knowledge of each type. Two features of the experiment were designed to address this issue. First, the experiment was designed to discern when general semantic domain questions did not match a child's domain knowledge of the word by the examination of the pattern in which a child missed the first item in the set and yet received credit for the second item, indicating detailed semantic knowledge. (For the pilot study, described in detail in Appendix A, this pattern occurred within multiple choice question pairs 16.8 percent of the time across items and participants.) Such a pattern would suggest that the child did have general semantic knowledge of some sort, and that the question did not probe that knowledge.

A second feature of the study that addressed this issue was the "none of the above" option on the multiple choice measure. If the child did not see a response that looked correct, but the child was relatively certain of the meaning of a word, rather than circling "don't know" or taking a guess, the child could circle "none of the above," to indicate that his or her understanding of the word was inconsistent with the question choices. As such, an analysis of the pattern in which the child circled "none of the above" for the general semantic item (especially if the child then proceeded to answer the

detailed semantic question correctly) would suggest a different but possibly correct general semantic domain knowledge construct.

Clearly, though, a child could have had an entirely different, but correct, notion of the general category (semantic domain) of a word, and the child's pattern for demonstrating that would not be predictable. At the same time, if a definition rating procedure (e.g., Konopak et al., 1987) were incorporated to evaluate partial word knowledge instead, it seemed unlikely that a child would give such partial information. Certainly the results of the pilot (see Appendix A), suggesting that children are not inclined to give partial definitions for words for which they clearly demonstrated some partial knowledge on the multiple choice measure, supported this contention.

In sum, it was acknowledged that the use of a multiple choice measure would not be perfect in detecting a child's internal notion of the general semantic domain of a word. Further, it was assumed that it would be impossible to detect with certainty when a child's notion differed from that reflected in the item. The logical result of this uncertainty was that the measurement of word knowledge through multiple choice selection could potentially be inaccurate. Despite this problem with the measurement of general semantic domain knowledge in particular, it seemed that the alternative, that is, the child's expression of knowledge in the form of a definition, was simply not sufficient to capture word knowledge types. As a consequence, though data were collected at this expressive definition level through the posttest checklist, the multiple choice measure was adopted with the acknowledgment that the general semantic domain word knowledge type in particular is susceptible to incomplete measurement of general semantic domain knowledge.

Comparison of Partial Word Knowledge Assessments

To evaluate the extent to which multiple choice test performance is consistent with that obtained with the checklist procedure, an analysis was performed to compare the two measures. It would seem that the most rigorous test of performance across measures would require selection of people who have a range of familiarity with the target words, such that a wide range of knowledge of the target words could be assessed across measures. Such a range would not be expected from the children for whom the assessments were designed. Toward that end, 10 adults were asked to respond to the checklist and the multiple choice test (without reading the stories), to compare responses between measures.

Results indeed suggested similarity in the responses, such that, when the adults indicated mastery on the checklist, they generally completed both multiple choice items correctly (89.1%, across adults and across items). Moreover, when they indicated no knowledge on the checklist, they typically demonstrated no discernible knowledge on the multiple choice test (on 86.8% of target items), occasionally demonstrating syntactic knowledge (1.0%), general semantic domain knowledge (7.5%), or detailed semantic knowledge (5.0%). Of interest, when the adults indicated familiarity (circling the words as familiar but not known to them) on the checklist, the adults demonstrated some type of word knowledge (syntactic, general semantic, and/or detailed semantic) on the multiple choice test only 63% of the time.

Though these results could suggest that adults are poor self-raters of their word knowledge, this interpretation can be refuted because of findings that, in general, the adults did not underreport (by indicating no knowledge of target words) or overreport (by

indicating knowledge of nonwords) word knowledge of nontargets. Rather, the adults indicated knowledge of the common words 99.2% of the time, and no knowledge of the nonwords 96.7% of the time. Another explanation of these findings is that the adults reported familiarity with words for which knowledge could not be detected on the multiple choice measure. This seems plausible; it seems reasonable that the adults might circle a specific word for which they had no knowledge other than that they were sure that the item was an actual word. The multiple choice measure was not designed to assess a discrimination type of word knowledge. These results, then, with the exception of the latter finding of greater knowledge reporting than is indicated by the multiple choice measure, suggest overall consistency across measures.

Procedures

Participation in the experiment required three sessions. Each participant determined to be eligible for the study completed all three sessions. Participants who did not meet the criteria for inclusion were dismissed following this determination, and data were not included in any analyses. Participation required approximately four hours over three sessions, with the second session occurring two to three days following the first, and the third session occurring two to three days from the second. Of the 31 participants, most (28; 90.3%) completed the second session two days after the first, and most (26; 83.9%) completed the third session two days after the second. The total length of the experiment ranged from 5 to 6 days for all participants; each participant had no more than one three-day interval between sessions. As mentioned previously, sessions were held at

a table in a quiet room in one of three settings: The University Speech and Hearing Clinic, a home, or a private study room within a library.

Session One

The first session began with completion of the Parental Consent form, the child's Agreement to Participate, and Parent Questionnaire (see Appendix F). The Agreement to Participate was signed by the child after the examiner explained the basic layout and content of the experiment. Unlike the Parental Consent form, the Agreement to Participate form stated that, "This project is about how children read stories," rather than "…is about how children learn new words." The reason for this relatively minor deception about the nature of the tasks is that, in order for the study to be valid in terms of representing a normal classroom or home reading environment, the participants could not be alerted to the fact that vocabulary learning is the focus. If the participants were alerted to the actual purpose of the study, they would likely have paid more attention to the unfamiliar words in each passage than is typical in their everyday reading habits.

Following completion of these three preliminary forms, each child completed the following individually administered tests and screenings, in one of three counterbalanced orders:

1. A hearing screening was administered. The frequencies of 1000, 2000, and 4000 Hz were screened at 20 dB HL. These screening criteria are consistent with the American Speech-Language-Hearing Association's guidelines for hearing screenings administered in settings in which environmental noise might be a factor (American Speech-Language-Hearing Association Panel on

Audiological Assessment, 1997). Any participant who did not pass this screening was dismissed from the study.

2. The *K-BIT* (Kaufman & Kaufman, 1990) was administered as a cognitive screening. Children who scored below the average range on this or any of the measures that follow were dismissed from the study.
3. The *PPVT-III* (Dunn & Dunn, 1997) was administered as a measure of receptive vocabulary performance.
4. The *TOLD-3-I* (Hammill & Newcomer, 1997) was administered as a comprehensive measure of language skills.
5. The *WRMT-R* (Woodcock, 1998) was administered as a comprehensive measure of reading skills.

Following completion of these screenings and assessments, each child completed the pretest portion of the experiment.

Pretesting of the target vocabulary was performed in an attempt to insure that the target words were unknown to participants at the start of the experiment. One of the three versions of the checklist, as previously described, was given to each child with the following instructions:

> Some of the words on this list are real, and some of them are make believe. A lot of them are really hard words that you may never have seen before – And that's OK! I want you to go through the list, read each word to yourself, and if you know a definition or a sentence for the word, write it on the line. So if the word is "pizza", can you think of a sentence for the word pizza? (wait for response, then…) That's great. That's exactly what you do for this test. A lot of the words

> are harder than “pizza”, and that’s ok. Remember, I said that some of the items in this list aren’t even real words! Just go through the list, skip over the ones you don’t know, and write sentences or definitions for the ones you do. Use this piece of paper to help guide you.

The examiner monitored the child’s progress, providing redirection if necessary. Redirection included answering (or deflecting) questions about an item, encouraging a participant who seemed frustrated, or offering a short break to a participant whose attention started to wane. When the child reached the end of the checklist, the examiner instructed:

> Now I want you to go through the list one more time from the beginning, and just look at the words that you didn’t write anything for. And I want you to circle the word if you know you’ve seen or heard it before, but you just don’t know what it means.

The examiner was present to redirect the child as necessary, but the examiner did not say any of the words aloud for the child. Once the child had finished the second pass through the checklist, the first session was completed, and an appointment was scheduled for two to three days later.

Session Two

In the second session, each child read two of the four stories containing the target words. Pilot data suggested that the amount of learning that occurred from Stories 1 and 2, taken as a set, was similar to that which occurred from Stories 3 and 4 as a set. Moreover, analysis of story comprehension revealed the same pattern (see Appendix A). Because of the need for experimental and control conditions to be as similar as possible

on these two variables, the decision was made to group stories, such that Stories 1 and 2 served as the experimental stories for half of the participants, and Stories 3 and 4 served as the experimental stories for the other half. The order in which each story in the pair was administered was counterbalanced. Participants were instructed, "Here's the first story. Take your time reading it to yourself. Afterward, I will ask you to write a summary of the story."

Following the completion of each story, a written story summary was completed. The instructions for that task were, "Now I just want you to write a summary of the story. Pretend you are writing to someone who has never read the story before and wants to know about it." Participants were told to write at least a page. Following the second written story summary, Session Two was completed, and the participant was scheduled for the third session.

Session Three

In the third session, the child completed the checklist procedure a second time in the same manner as described above. Following completion of the checklist, the multiple choice posttest was administered. Directions were as follows:

> This is like the kind of test you take in school. There are two parts. In the first part, you read the word, and circle the letter next to the meaning of the word. It's ok to take a guess if you think you might know the answer, but if you really have no idea of the answer, you should circle, "Don't Know". Let's try one. (Sample Item) Great. Go ahead and do the first part of the test. Tell me when you get to the next sample item.

Following completion of the first section of the test, the child was asked to go back through the items for which “Don’t Know” or “None of the Above” was selected, and make sure that it was not possible to make a good guess. Pilot testing on this measure suggested that, overall, when children were given these instructions and prompts, upon a second pass through the list they selected responses that reflected at least some type of word knowledge growth 42.2 percent of the time.

The second section of the multiple choice test, in which the children were to select the sentence in which the word is used correctly, was completed in a similar fashion. After completing a sample item with the examiner, the child proceeded independently through the items with redirection provided by the examiner, as needed. Again, the children were asked to review any items for which they answered, “Don’t Know” or “None of the Above” and to select an answer that they think is right, where possible.

Even though the instructions for the multiple choice measure emphasized taking a guess rather than circling “Don’t Know” or “None of the Above,” these options were considered crucial, because they free the child from making a forced choice when the child’s most accurate representation of his understanding is that he or she truly doesn’t know or truly thinks that some other response, not listed, is correct. Other multiple choice studies of this kind have offered one of these options in their multiple choice measures (e.g., Herman et al., 1987; Jenkins et al., 1984; Nagy et al., 1985; Nagy et al., 1987; Schwanenflugel et al., 1997; Shu et al., 1995). Moreover, the pilot data for the present study suggested that, even when encouraged to try to take a guess, most children (11 out of 12), even after going back to the items a second time selected “None of the

Above" or "Don't Know" at least once, suggesting that children discern taking a "good" guess from having no idea of the answer (or being certain that none of the choices is correct).

The completion of the multiple choice posttest marked the end of the child's participation in the study. At that point, the actual purpose of the study, that is, the emphasis on vocabulary learning, was revealed to the participant. Given the transparency of the checklist and multiple choice measures, however, the vocabulary focus of the investigation should have been evident by the end of the experiment.

Data Preparation and Analysis

Following the experiment, data were tabulated and analyzed to evaluate aspects of the study's design, as well as to evaluate each of the research questions. This section provides agreement data for the standardized tests administered, the analysis of the participants' story summaries, and the analysis of the richness of context surrounding each target word. Assessments of the equivalence of group standardized test performance across the three test order assignments, the three forms of the checklist and multiple choice tasks, and the two story sets, as well as across gender, are also discussed. Finally, the means by which the data on word knowledge growth were tabulated and analyzed and the statistical methods used to address each research question are described.

Standardized Test Agreement

To assess the reliability of the scores obtained on the standardized measures administered, 20% of the administrations of each measure were scored by an additional examiner who was familiar with test administration and scoring procedures. Table 3 lists

the percent of items per subtest on which inter-examiner agreement was obtained. Items of the "Word Attack" subtest of the *WRMT* received the lowest agreement score (95.7%). Because this test requires examiners to listen to children pronounce nonwords, even when examiners are trained on the correct pronunciations of the words, slight deviations from the target, particularly in the case of vowel productions, may easily be perceived as correct or incorrect by the listener.

Story Summaries

Story summaries were evaluated by comparing the main ideas in each participant's summary to a pre-constructed set of main ideas developed in advance. The pre-constructed set of main ideas in each story is listed in Appendix G. The investigator and two other independent examiners compiled lists of "main events" within the stories. For each story, the three sets of main events were then compared, and a comprehensive list containing 11 events per story was compiled by the investigator. The resulting lists were used in the calculation of "percent of main story events included" to evaluate each participant's summary. A similar analysis of pilot data revealed that there was no one story on which participants demonstrated particular comprehension difficulties. Because participants in the pilot study tended to vary widely in the length of their story summaries, instructions for the main experiment emphasized the need for participants to write at least one page; as a result, all 62 summaries met this criterion.

Inter- and intra-rater agreement was evaluated using 100% of the samples. The investigator performed the story summary analysis twice, one month apart, and an independent rater provided an additional set of judgments. Agreement, in this case, was the percent of story ideas on which both judges scored the idea as being present or absent.

Table 3. Inter-examiner agreement, on 20% of participants, obtained in scoring standardized measures administered.

Test/Subtest	Percent Inter-rater Agreement
Kaufman Brief Intelligence Test	
"Vocabulary Section I"	98.3%
"Vocabulary Section II"	99.5%
"Matrices"	100.0%
Peabody Picture Vocabulary Test, III	99.9%
Test of Language Development-I:3	
"Sentence Combining"	98.5%
"Picture Vocabulary"	99.8%
"Word Ordering"	100.0%
"Generals"	97.9%
"Grammatic Comprehension"	98.9%
"Malapropisms"	100.0%
Woodcock Reading Mastery Test – Revised	
"Word Identification"	97.4%
"Word Attack"	95.7%
"Word Comprehension: Antonyms"	99.6%
"Word Comprehension: Synonyms"	99.2%
"Word Comprehension: Analogies"	99.6%
"Passage Comprehension"	98.1%

Agreement data are provided in Table 4. Inter-rater agreement across stories was 94.6%; on individual stories, agreement ranged from 92.2% to 97.0%. Intra-rater agreement across stories was 96.1%; on individual stories, it ranged from 92.7% to 97.6%. Both inter- and intra-rater agreement were lowest on summaries of story 4 (92.2% and 92.7%, respectively).

Contextual Richness

In order to measure contextual richness, as is needed for analysis of its impact on participants' partial word knowledge growth, 10 adults were asked to read each passage with the target words removed, and to provide a guess, in the form of a word or phrase, for each missing word. The adults' responses were evaluated independently by the investigator and another examiner involved in the study, scoring responses as "1" for an incorrect guess, "2" for a partially correct guess, and "3" for a correct guess. Inter-rater agreement and intra-rater agreement were computed. Inter-rater agreement, across all four stories, was 78.8%; inter-rater agreement scores for individual stories were 52.8%, 90.3%, 80.6%, 91.7%, respectively. Total overall intra-rater agreement was 91.9%, with individual story agreement scores of 91.3%, 86.3%, 95.0%, and 95.0%, respectively. Any word for which inter-rater reliability fell below 85% (agreement of less than 8 out of 9 judgments; the first adult's judgments were used for training and so are not included in agreement), or intra-rater reliability fell below 90% (agreement of less than 9 out of 10 judgments), were removed from the set of words to be included in the context analysis. This decision was made in an attempt to identify a subset of words for which there was some confidence as to the richness of their contexts. Of the 32 words, 17 were retained

Table 4. Inter- and intra-rater agreement of main events contained in participants' story summaries.

Story	Inter-rater Agreement	Intra-rater Agreement
1 (Aunt)	93.8%	97.2%
2 (Dog)	95.5%	96.6%
3 (Plane)	97.0%	97.6%
4 (Rain)	92.2%	92.7%
Overall	94.6%	96.1%

for the context analysis, 2 words from Story 1 and 5 words from each of stories 2, 3, and 4. Of the two sets of ratings, the investigator's ratings were used to compute the contextual richness score for each word; scores for each word across the 10 adult judges were averaged. The resulting average for each word served as an estimate of each its contextual richness.

Group Equivalence across Conditions

To assess the equivalence of groups receiving each order of test presentation (3), each order of checklist and multiple choice presentation (3), and each story set (2), groups were compared on their performance on each standardized measure. The first two analyses were obtained with one-way ANOVAs, and the third analysis was obtained with an independent samples t-test. Table 5 provides the results of these analyses, which suggest that, in each case, groups did not significantly differ in their test performance. In addition, an independent samples t-test was used to compare gender groups on their standardized test performance. Results, provided in Table 6, suggested no significant difference between males and females in their test performance.

Partial Word Knowledge Data Preparation

To address the research questions, data for each participant and for each word were tabled. Each participant's prior knowledge of the words (percent verbs known or familiar; percent nouns known or familiar) and the percent of words learned for each type of word knowledge was entered. Overall language scores, receptive vocabulary scores, and overall reading scores were also entered. Data entered for the words themselves included each word's contextual richness rating and part of speech.

Assessing Learning of Experimental versus Control Words

To assess the amount of knowledge gain that occurred from exposure to the words in the stories rather than any extraneous variable, each child was pre- and posttested on all target words, including those not encountered in the two stories read. Pretest checklist performance was consulted to record the number of words indicated as familiar or known by participants. Words indicated as known or familiar were not removed from consideration because that procedure would require the comparison of uneven proportions. As a solution, it was determined that the number of familiar or known words identified by each participant on the pretest checklist would be treated as a covariate in the multiple choice learning analyses. The multiple choice measure, then, was used to compare performance on control items to performance on experimental items, while taking into account the number of words indicated as familiar or known on the pretest checklist. The children's tendency either to indicate nonwords as familiar or to indicate less than complete knowledge of "common" words in the list or the multiple choice test was also evaluated.

Statistical Analysis of Research Questions

The analysis of partial word knowledge data was performed through several statistical procedures. The first analysis evaluated whether learning was detected by either of the measures. Based on the results of this first analysis, decisions were made about the appropriate means of hypothesis testing for use with (a) checklist word knowledge growth, and/or (b) multiple choice word knowledge growth. Specifically,

Table 5. Comparison of standardized test performance for groups assigned to each order of test administration (3), each multiple choice and checklist administration (3), and the story set assigned (2).

Test	**Test Order Assigned**	**MC and Checklist Order Assigned**	**Story Set Assigned**
K-BIT	$F(2, 28) = .17$, $p = .84$	$F(2, 28) = .58$, $p = .57$	$t(29) = .83$, $p = .42$
PPVT	$F(2, 28) = .96$, $p = .40$	$F(2, 28) = .14$, $p = .87$	$t(29) = 1.34$, $p = .19$
TOLD	$F(2, 28) = .75$, $p = .48$	$F(2, 28) = 1.38$, $p = .27$	$t(29) = 1.70$, $p = .10$
WRMT	$F(2, 28) = .35$, $p = .71$	$F(2, 28) = 1.21$, $p = .31$	$t(29) = 1.01$, $p = .32$

Note: K-BIT = Kaufman Brief Intelligence Test; PPVT = Peabody Picture Vocabulary Test, III; TOLD = Test of Language Development – Intermediate, 3rd edition; WRMT = Woodcock Reading Mastery Test, Revised.

Table 6. Comparison of standardized test performance for males and females.

Test	**Independent Samples *t*-Test Results**
K-BIT	$t(29) = 1.10$, $p = .28$
PPVT	$t(29) = .83$, $p = .42$
TOLD	$t(29) = .33$, $p = .74$
WRMT	$t(29) = .05$, $p = .96$

Note: K-BIT = Kaufman Brief Intelligence Test; PPVT = Peabody Picture Vocabulary Test, III; TOLD = Test of Language Development – Intermediate, 3rd edition; WRMT = Woodcock Reading Mastery Test, Revised.

to address the first research question, related to the extent to which (a) receptive vocabulary ability, (b) overall language ability, and (c) reading ability impact word knowledge growth, linear regression was selected as the appropriate procedure to use if the multiple choice measure demonstrated partial word knowledge growth. Through this statistical procedure, the amount of variance associated with the interaction between the type of word knowledge gain (the dependent variable) and each of these individual, ability related factors could be evaluated. If the pre- and posttest checklist tasks evidenced participant word learning, the relationship between ability and word knowledge gain would be evaluated similarly, comparing word familiarity (circled words) gain (posttest performance minus pretest performance) to the performance on each of the three ability measures.

The second research question was related to learning differences as a function of part of speech. It was determined that, for the evaluation of learning effects on either the checklists or the multiple choice measure, t-tests (with the appropriate Bonferroni adjustments) would be performed to compare total verbs learned to total nouns learned for any of the knowledge types. It was thought that, through these analyses, it would be possible to elucidate an overall difference in ease of learning, as well as to obtain information about differences across categories in the types of word knowledge acquired.

The third question, designed to address directly the relationship between a word's richness of context and the likelihood of its being learned, would be evaluated through a correlation analysis. Specifically, using each word as a unit of observation, the contextual richness score (described above) would be compared to the percent of participants (exposed to the word) who evidenced learning on the checklist and/or

multiple choice measure. A statistically significant result, then, would suggest that the context was a factor in children's partial learning of unfamiliar words.

Interpretation

By emphasizing word knowledge types, more accurate measurement of slight growth in word knowledge seemed possible. The present method was developed with the intent to examine a set of word knowledge types for use in detecting slight knowledge growth, such as would be expected from only a single exposure to an unfamiliar word. Indeed, the pilot study for this project suggested that the use of items that probe types of word knowledge growth resulted in detectable word knowledge gains (see Appendix A).

An additional emphasis of the investigation was the exploration of individual, ability related factors and word/text related language factors that could impact learning. Participants' individual factors, such as their language ability and, in particular, vocabulary and reading abilities, have largely been neglected in prior studies of incidental word learning in children to date. Moreover, it was thought that within-word and within-text language factors would likely play a large role in acquiring knowledge about words. By examining the impact of these factors on children's word knowledge growth, it seemed possible that our understanding of their interaction in word learning processes would be enhanced.

CHAPTER 3

RESULTS

In this chapter, the data collected from the experiment are described and results are presented from analyses applied to address the research questions. Statistical analyses consisted of analysis of variance, linear regression, and t-test procedures. The first section is a presentation of descriptive statistics for the checklist, multiple choice, and story summary data. The second section is a report of word learning observed through the checklist and multiple choice tasks. Subsequent sections address each of the research questions, all of which probe this finding of partial word knowledge growth through one exposure to words in independent reading.

Descriptive Statistics

Before addressing results pertaining to demonstrations of learning in the present experiment, it is necessary to summarize participants' checklist, multiple choice, and story summary data. This information is central to addressing issues related to the adequacy of the design selected for the present study.

Checklist Data

Participants completed a pre- and posttest checklist, as described in Chapter 2. Table 7 lists the average number of target words indicated as familiar on the pretest checklist versus the posttest checklist, as well as the average number of target words for which a definition or sentence was attempted. As can be seen from Table 7, few target

Table 7. Average (SD) and percentage of experimental and control words, out of 16 each, (a) for which a definition or sentence was attempted or (b) circled as familiar. "Gain" is defined as familiar-plus responses on the posttest minus those on the pretest.

Target Word Analysis Type	Pretest	Posttest
Experimental Targets - Defined	0.29 (0.53)	0.45 (0.62)
	1.8%	2.8%
Control Targets - Defined	0.35 (0.61)	0.45 (0.68)
	2.2%	2.8%
Experimental Targets - Familiar	1.97 (1.94)	2.84 (2.35)
	12.3%	17.7%
Control Targets - Familiar	2.12 (1.82)	2.19 (1.89)
	13.3%	13.7%

Table 8. Average (SD) number of common words, out of 12, and nonwords, out of 6, (a) for which a definition or sentence was provided or (b) circled as familiar, for pre- and posttest conditions.

Word Analysis Type	Pretest	Posttest
Common Words - Defined	11.55 (96.3%)	11.68 (97.3%)
Common Words – Familiar	0.32 (2.7%)	0.26 (2.2%)
Nonwords - Defined	0	0.03 (0.5%)
Nonwords - Familiar	0.42 (7.0%)	0.45 (7.5%)

word definitions or sentence responses were attempted on the pre- and posttest checklists, as expected. When asked to circle familiar items, however, the average gain, defined as the average number of words circled on the posttest minus those circled on the pretest, was 5.4% for experimental words, compared to 0.4% for control words.

Data pertaining to nonwords and common words are provided in Table 8. In general, participants were able to provide definitions or sentences for the common words. In addition, overall, they refrained from circling nonwords as "familiar." Individual participant checklist data are provided in Appendix H.

Multiple Choice Data

Participants completed a multiple choice posttest, probing three types of word knowledge, as described in Chapter 2. Table 9 lists the average learning, for each knowledge type, of control versus experimental words. As can be seen, for all word types, comparing experimental to control word learning in this way, the amount of knowledge gain appears negligible. The participants understood and performed the task easily when they knew the word, evidenced by the high percentages across knowledge types of correct responses to common words. Data were also tabulated to reflect the elimination of words indicated as familiar on the pretest checklist, and the results obtained were similar to those from analyses that included all multiple choice items. The multiple choice data for individual participants are provided in Appendix I.

Table 9. Average percent correct (SD) for each type of word knowledge, comparing experimental and control words.

Knowledge Type	Experimental Words	Control Words	Common Words
Syntactic	59% (14%)	60% (15%)	99% (5%)
General Semantic Domain	39% (13%)	36% (14%)	98% (5%)
Detailed Semantic Domain	32% (14%)	29% (15%)	95% (10%)

Table 10. Average (SD) number of story details, out of 11 details per story, recalled for each of the four stories and each story set (Set 1: Stories 1 and 2; Set 2: Stories 3 and 4).

Stories	Story Details Recalled
Story 1	6.8 (1.9)
Story 2	8.2 (2.7)
Story 3	6.8 (2.0)
Story 4	6.7 (1.7)
Set 1	7.5 (2.4)
Set 2	6.7 (1.8)

Story Summary Data

Participants completed story summaries for each story read, and summaries were then compared to a pre-established list of story main events. These procedures, as well as the reliability data associated with scoring the summaries, are described in Chapter 2. Table 10 provides group data for the average percent main events for each of the four stories, and for each of the two-story sets. Descriptively, it appears that performance on the story summary sets was similar (Set 1 mean = 7.5, Set 2 mean = 6.7). An independent samples t-test revealed that the number of main events provided by those who read Story Set 1, compared to the number provided by those who read Story Set 2, was not significantly different ($t(29) = 1.2$, $p = .24$). Appendix J lists individual story summary data.

Occurrence of Partial Word Knowledge Growth

Because the study included a checklist procedure, as well as a multiple choice procedure, there are two means by which learning could be assessed. Both involved comparing performance on experimental words (encountered in the stories) and control words. The multiple choice task was an attempt to assess partial word knowledge growth by asking questions designed to elucidate word knowledge growth of several types: syntactic knowledge, general semantic domain knowledge, and detailed semantic domain knowledge. As a complement to this task, the checklist procedure provided information about whether the child, after one exposure, could identify a word as "real" as opposed to being a nonword. It could also provide some idea about the child's expressive

knowledge of the word. Partial word learning analyses pertaining to each task are presented below.

Pre- and Posttest Checklists

It was hypothesized that partial word knowledge growth would be detected through this pretest – posttest measure, by examining the items children circled as familiar before and after reading the stories. Further, it was hypothesized that few children would be confident enough to provide an expressive response (either a sentence or a definition) for words for which their knowledge was incomplete. As indicated in Table 7, on average, for experimental and control words administered on the pre- and posttests, children only responded to between 1.8 and 2.8% of the words with an attempted word or definition. Moreover, upon examining written responses to the target words, only 33.3% of the written responses to targets on the pretest, and 39.3% of the written responses to targets on the posttest, could be considered reflective of some knowledge of the word, compared to 100.0% of common words on the pre- and posttests.

Both the investigator and an independent evaluator, obtaining inter-rater agreement of 100.0% (21/21) and 89.2% (25/28) on the pre-and posttest target words, respectively, evaluated all written responses as (a) reflecting at least some knowledge of the meaning of the word, or (b) reflecting no knowledge of the word's meaning. Within the latter category were responses in which a child was, in almost all cases, clearly thinking of another, identifiable orthographically similar word. Examples of this error type are provided in Table 11. The percentages above reflect those of the investigator. Because the percentage of partial knowledge-rich responses is negligible, analyses of word knowledge growth through sentence or definition composition were not possible.

Table 11. Examples of errors in sentences and definitions on pre- and posttest checklists.

Target	Definition reflected the meaning of:
Inveigh	Envy
Bombast	Bomb, blast
Unguent	Urgent
Wintle	Whittle
Assuage	Persuade
Pelage	Plague, pledge
Truckle	Chuckle, trickle
Tyro	Trio

Participants' familiarity responses were much more robust; averages of 25.6% of all target words on the pretest, and 31.5% of all target words on the posttest, were circled. A comparison of the gains in the number of experimental words circled versus control words circled, from pre- to posttest, using a paired samples t-test, suggested that the participants, as a group, exhibited significantly greater gains on the experimental words than on the control words ($t = 2.81$, $p = .009$). Results represent a moderate effect size of $d = 0.51$.

Multiple Choice Posttest

It was hypothesized that partial word knowledge growth would be detected through this measure, designed to assess three types of word knowledge: syntactic, general semantic, and detailed semantic knowledge. One concern, raised in Chapter 2, was that children might have prior knowledge of the words, impacting results. This issue was partially addressed in the pilot (see Appendix A) by selecting a subset of words for removal from the stories, based on whether the words were indicated as known by the pilot participants prior to the study.

To address this issue further, the relationship between the total number of words indicated as familiar, or for which a definition or sentence was attempted on the pretest checklist, and performance on the target words of the multiple choice posttest, was assessed. For this analysis, performance on the multiple choice test for each knowledge type was defined as the percent of experimental words for which credit was received minus the percent of control words for which credit was received. In theory, if prior knowledge played a role in performance on the multiple choice measure, a significant positive relationship should be present. Results of Pearson Product Moment Correlations

revealed that the relationships between checklist performance and syntactic performance (r = 0.04, p = 0.83), general semantic performance (r = -0.19, p = 0.30), and detailed semantic performance (r = -0.13, p = 0.50), were nonsignificant. Given these results, subsequent analyses did not include pretest checklist data as a covariate.

Table 12 provides the results of the paired samples t-tests (with Bonferroni adjustment of p = .016), assessing differences between control and experimental word learning for each word type. Arcsine transformations, necessary when data are skewed, as is frequently the case with "percent correct" measures, were also computed; results, not reported here, were similar to the t-test results reported in Table 12. When all participants, regardless of the story set assigned, were included in the analysis, results for all three word knowledge types revealed no significant differences between the number of control words and the number of experimental words learned.

To probe these findings further, participants were divided into those who read Story Set 1 and those who read Story Set 2. With a Bonferroni adjustment of p = .005 (for a total of 9 t-tests), one comparison was significant: Participants who read Story Set 2 performed significantly better on experimental than control items that probed detailed semantic knowledge ($t(14)$ = -4.18, p = 0.001). Of some concern, however, was the performance of participants who read Story Set 1; their performance on the detailed semantic items approached significance, but in the opposite direction ($t(15)$ = 2.27, p = 0.04), with better performance on control items than on the experimental items.

It was reasoned that, if the group who read Story Set 1 performed markedly better on control items, either the words in the Set 1 stories were more difficult than those in Set 2, or the detailed semantic questions in Set 1 were more difficult than those in Set 2. To

test the first possibility, a one-way ANOVA was performed on the checklist data, comparing the circled items for both groups. Specifically, the gain in number of experimental and control words indicated as familiar, from the pre- to the posttest checklist by both story set groups was compared. Results revealed that the two story set groups were not significantly different either in their control word gain ($F(1, 29) = 0.04$, $p = 0.85$) or their experimental word gain ($F(1, 29) = 0.47$, $p = 0.50$). Results of this analysis suggested that the words, themselves, across story sets, are not responsible for the greater difficulty participants were observed to have with Story Set 1 multiple choice items.

To examine the percent of detailed semantic control items "learned" by the Story Set 1 group (35.6%), subtracting that number from the percent of detailed semantic experimental items "learned" by the Story Set 2 group (38.0%) is one way to put in perspective the highly significant difference observed in control and experimental detailed semantic items for the Story Set 2 group. In essence, doing this more fairly assesses learning for the Story Set 2 group by taking into account the performance of the group who never read Story Set 2. When that difference (2.4%) is compared to the differences between control and experimental conditions for each word type, results appear similar to those of the other word types (see Table 9).

Results of the multiple choice measure, then, revealed no discernible knowledge of the syntactic domain, the general semantic domain, or the detailed semantic domain. Perusal of the responses of participants on individual items, within and across learning types, did not elucidate clear patterns of performance across participants to explain the findings of no discernible knowledge on this measure. Checklist results, however,

Table 12. Learning detected on multiple choice measure: Comparison of word knowledge (syntactic, general semantic, and detailed semantic) detected on experimental versus control words.

Comparison	Paired Samples T-Test
All participants:	
Syntactic	$t(30) = 0.48$, $p = 0.63$
General Semantic	$t(30) = -1.33$, $p = 0.19$
Detailed Semantic	$t(30) = -0.82$, $p = 0.42$
Story Set 1 Participants:	
Syntactic	$t(15) = 1.37$, $p = 0.19$
General Semantic	$t(15) = -2.16$, $p = 0.05$
Detailed Semantic	$t(15) = 2.27$, $p = 0.04$
Story Set 2 Participants:	
Syntactic	$t(14) = -0.59$, $p = 0.57$
General Semantic	$t(14) = -0.09$, $p = 0.93$
Detailed Semantic	$t(14) = -4.18$, $p = 0.001$*

*Significant at $p = .005$ level of significance

revealed a significant learning effect for words indicated as familiar from pre- to posttest. Given these findings, each of the three research questions posed in Chapter 2 was addressed using checklist data as the measure of partial word knowledge growth.

Relationship between Measures of Ability and Partial Word Knowledge Growth

It was hypothesized that measures of ability would strongly relate to the amount of partial word knowledge growth occurring from exposure to unfamiliar words in independent reading. Pearson Product Moment correlations were used to examine two sets of relationships: the relationship between ability factors and performance on the pretest checklist, and the relationship between ability factors and learning, as demonstrated by checklist performance. The procedures and results of each set of analyses are provided below.

It was thought that participants of relatively higher ability would tend to perform better on the pretest checklist, circling and responding to more target items. To determine whether or not a relationship existed between the participants' performance on the three ability measures, the PPVT, TOLD, and WRMT, and their performance on the pretest checklist, checklist performance was evaluated by summing the number of target words each participant circled and the number of words to which each participant responded with at least some partially correct response. Agreement data for judgments of sentence and definition responses are provided in the previous section. (Of importance, only 7 responses of 992 total, across participants, actually met this criterion of being a partially correct response; those responses that met the criterion were added to the

number of circled responses for each participant.) Correlations between pretest checklist performance and the PPVT (r = 0.03, p = 0.89), the TOLD (r = -0.07, p = 0.72), and the WRMT (r = -0.05, p = 0.78), were each nonsignificant. Pretest data were also converted to ratios and subjected to the arcsine transformation; results, not reported here, were nonsignificant.

To address the relationship between ability factors and checklist learning, data were first tabulated into columns of pretest and posttest experimental and control performance, reflecting the number of words either circled or given a partial definition. Next, pretest values were subtracted from posttest values to reflect a gain score for experimental words and a gain score for control words. The control word gain score was then subtracted from the experimental word gain score, to reflect the total learning that occurred, while controlling for both prior knowledge of the words and "learning" not attributable to the experimental condition.

The relationships between learning, as defined above, and the PPVT (r = -0.07, p = 0.69), the TOLD (r = -0.18, p = 0.35), and the WRMT (r = -0.09, p = 0.64) were all nonsignificant. Again, arcsine transformation results supported these findings. Figures 1 – 3 depict learning that occurred in relationship to performance on the PPVT (Figure 1), the TOLD (Figure 2), and the WRMT (Figure 3). Participants who completed Story Set 1 are compared graphically to those who completed Story Set 2. (Statistically, the relationships between learning and performance on the three measures of ability were also nonsignificant when Story Set groups were considered separately.)

Figure 1. Relationship between receptive vocabulary (PPVT) and word learning as measured by the checklist.

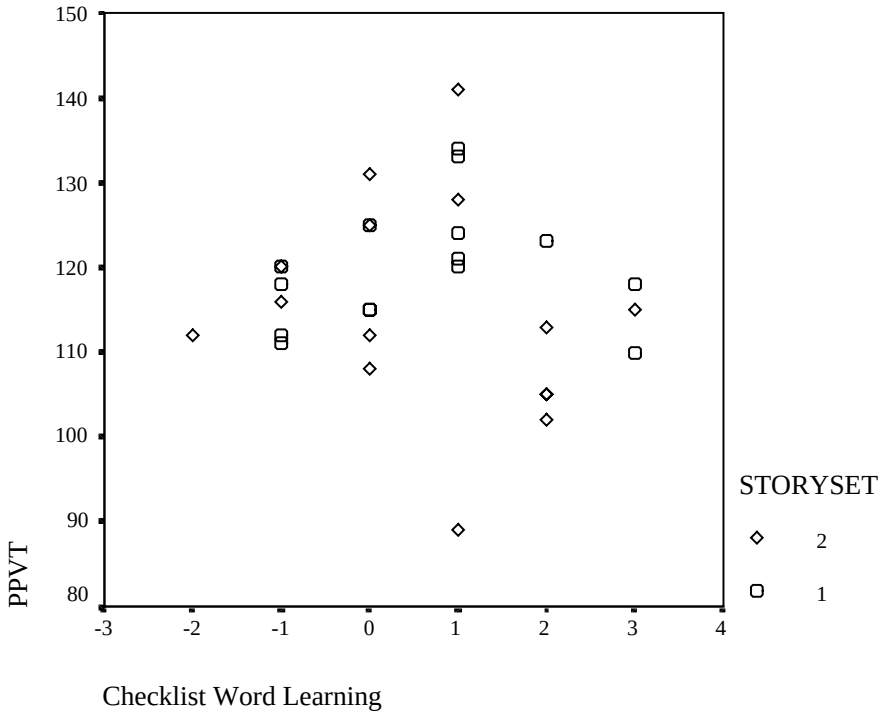


Figure 2. Relationship between language composite scores (TOLD) and word learning as measured by the checklist.

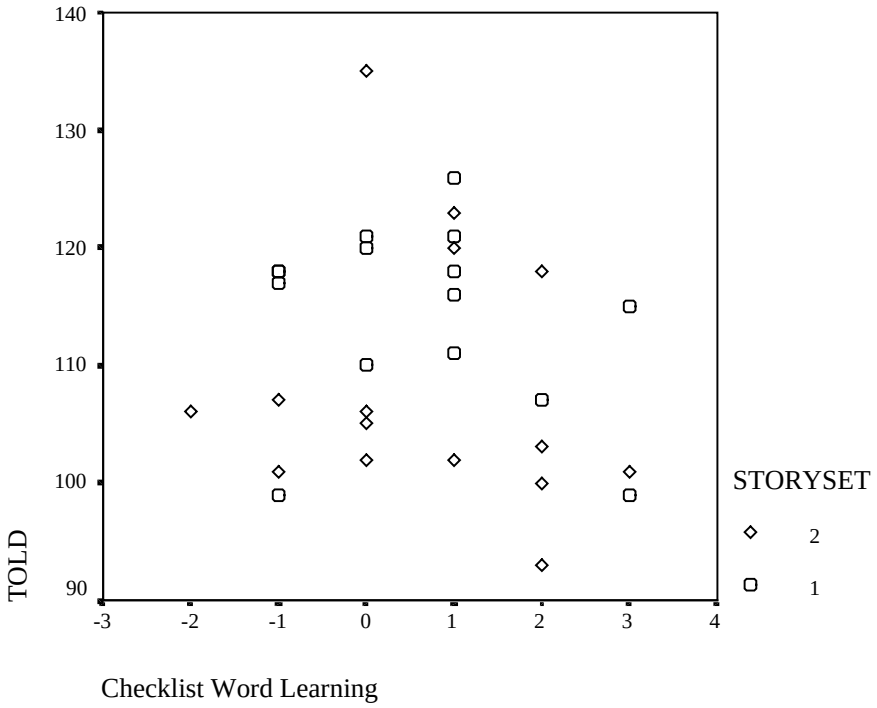


Figure 3. Relationship between reading composite scores (WRMT) and word learning as measured by the checklist.

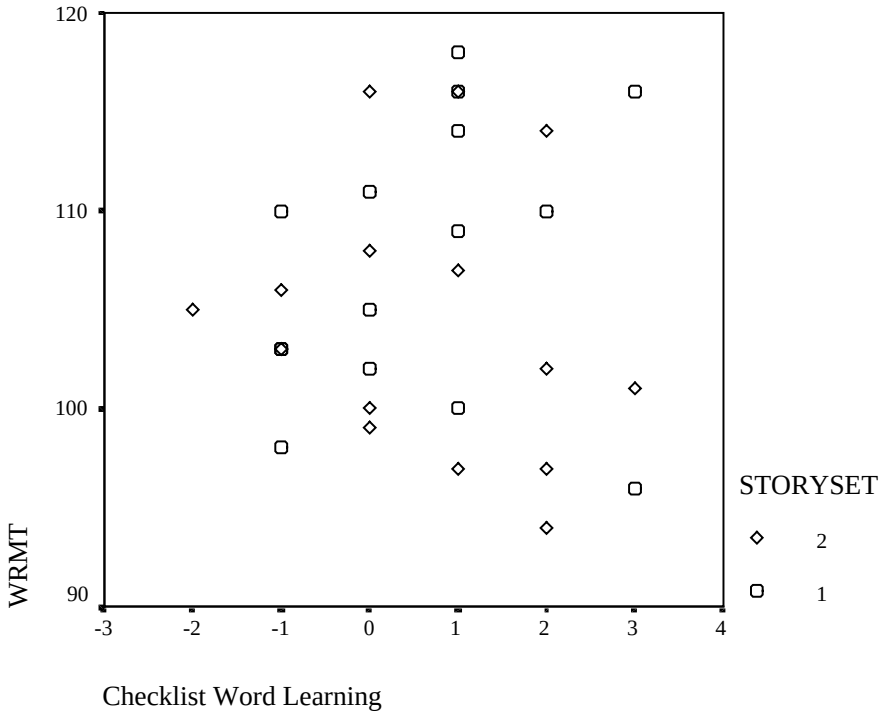


Table 13. Dependent samples t-test results for multiple choice task, comparing experimental word learning to control word learning for each word type (syntactic, general semantic, and detailed semantic) within each syntactic category (nouns and verbs). Results are separated into performance of the whole sample and performance of the Story Set 1 and Story Set 2 groups.

Analysis	***t*-Test**	***p* (α = .05/6 = 0.008)**
Story Set Groups Combined		
Noun Learning		
syntactic knowledge	0.54	0.59
general semantic knowledge	-1.00	0.33
detailed semantic knowledge	0.00	1.00
Verb Learning		
syntactic knowledge	0.12	0.91
general semantic knowledge	-0.63	0.53
detailed semantic knowledge	-1.2	0.24
Story Set Group 1		
Noun Learning		
syntactic knowledge	0.16	0.88
general semantic knowledge	-0.36	0.73
detailed semantic knowledge	2.59	0.02
Verb Learning		
syntactic knowledge	1.91	0.08

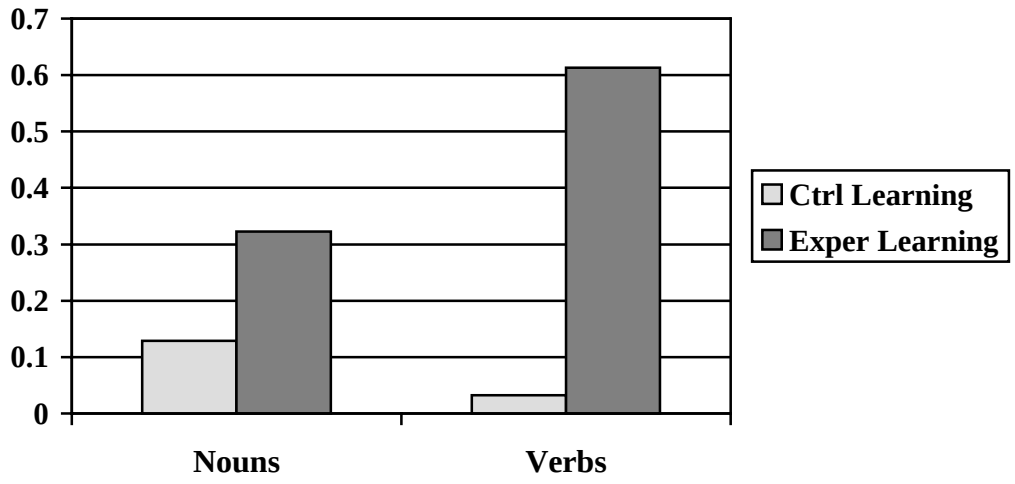
general semantic knowledge	-1.58	0.14
detailed semantic knowledge	0.25	0.81
Story Set Group 2		
Noun Learning		
syntactic knowledge	0.59	0.57
general semantic knowledge	-1.03	0.32
detailed semantic knowledge	-4.37	0.001*
Verb Learning		
syntactic knowledge	-1.55	0.14
general semantic knowledge	0.84	0.42
detailed semantic knowledge	-1.98	0.07

*Significant at $p = .008$ level of significance

Learning Differences across Syntactic Categories

It was hypothesized that different patterns of learning would be evident for nouns than for verbs. As might be expected based on results presented in the first section of this chapter, the multiple choice measure did not elucidate learning differences between nouns and verbs for any of the learning types. Results of these paired samples t-test analyses are provided in Table 13. As can be seen, when story set groups are combined, no significant difference in types of word learning, comparing experimental words to control words, emerged. Results of the Story Set groups considered separately, however, highlight differences, mentioned previously, related to the greater difficulty of detailed semantic items in Set 1 compared to those in Set 2. For the Story Set 1 group, detailed semantic "knowledge" of nouns and syntactic "knowledge" of verbs approached significance, but in the opposite direction, indicating that control word knowledge was greater than experimental word knowledge. At the same time, the Story Set 2 group demonstrated significantly better performance on the experimental words than on the control words; as described previously in relation to overall demonstrations of learning, that result would appear to have been impacted substantially by the fact that, for the Story Set 2 group, experimental items were easier than the control items. Administering the multiple choice measure as a pre- and posttest would have enabled a true analysis of the Story Set 2 group's performance on experimental items before and after reading the stories. Administering the multiple choice measure as a pre-test, however, could have cued the children as to the meanings of target words before they had encountered them in the stories.

Figure 4. Control and experimental noun and verb learning (items circled or partially defined) as measured by gain scores from pre-checklists to post-checklists.



To test the hypothesis related to differences in the ease with which verbs and nouns were learned, a paired samples t-test was used to compare noun learning gain and verb learning gain, as measured by the checklist. Noun learning gain was defined, for each participant, as the amount of gain from pretest to posttest for the experimental items minus the amount of gain from pretest to posttest for the control items. The difference between noun learning gain and verb learning gain was not significant ($t(30) = -1.14$, $p = .26$). Of interest, however, when performance on experimental verbs was compared to performance on control verbs, a significant difference emerged ($t(30) = -2.34$, $p = 0.02$), coupled with a small to moderate effect size of $d = 0.42$. This difference was not observed for nouns ($t(30) = -.97$, $p = 0.33$). Figure 4 illustrates the differences in the means for gains on control and experimental nouns and verbs from pretest to posttest. In addition, Appendix H provides individual participant data for verb and noun learning.

Relationship between Contextual Richness and Word Learning

It was hypothesized that words surrounded by richer, more supportive contexts would be more easily learned. As described in detail in Chapter 2, 17 words were selected to test this hypothesis. A Pearson Product Moment correlation was performed to assess the relationship between participants' word knowledge growth, as measured by the pre- and posttest checklists, and the contextual richness of the words, as measured by the context rating procedure described previously. Word knowledge growth was defined as the gain, from pre- to posttest, on experimental items, minus the gain, from pre-to posttest, on control items. Results revealed a nonsignificant correlation between word

knowledge growth and contextual richness ($r = 0.13$, $p = 0.61$). Results of this analysis are depicted as a scatter plot in Figure 5.

In addition, in order to examine the possibility that results were impacted by the small number of cases (number of words = 17), a second Pearson Product Moment correlation was performed using all 32 words and the first set of context ratings obtained from the investigator. Again, results revealed that the relationship between word knowledge growth and contextual richness was not significant ($r = -0.12$, $p = 0.50$). Results of this analysis are depicted as a scatter plot in Figure 6.

Figure 5. Words for which context ratings reached acceptable levels of agreement: The relationship between average ratings of words' contextual support and knowledge demonstrated on checklist (by circling or partially defining words).

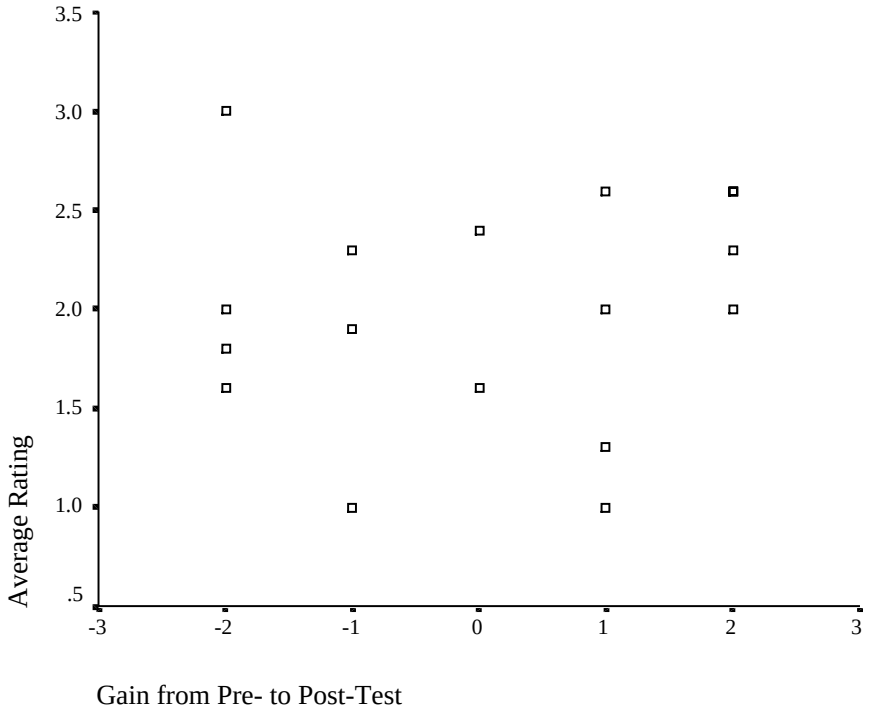
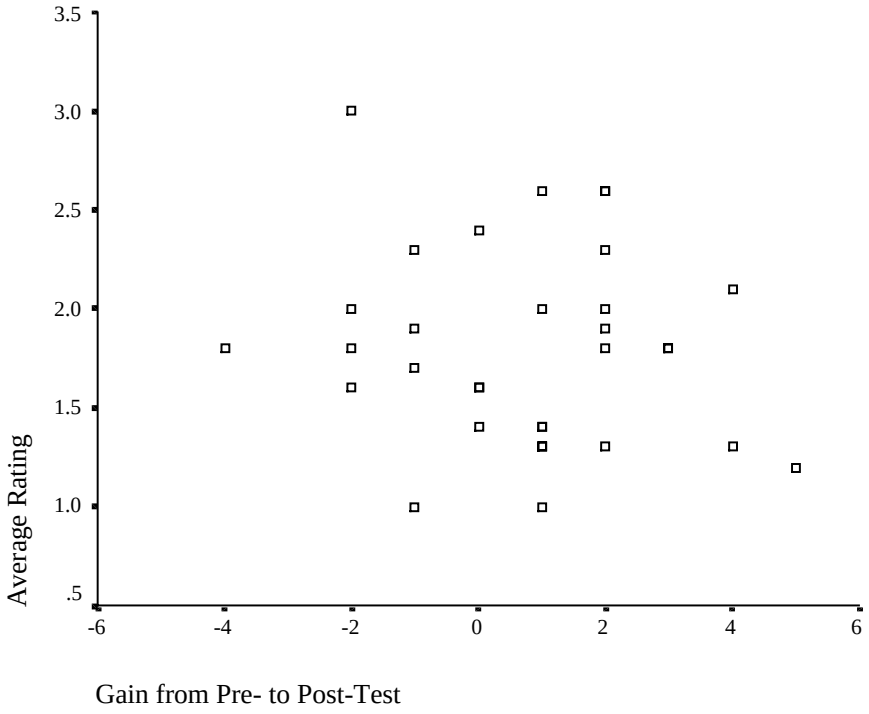


Figure 6. All words: The relationship between average ratings of words' contextual support and knowledge demonstrated on checklist (by circling or partially defining words).



CHAPTER 4

DISCUSSION

An important part of vocabulary acquisition in the school-age years is children's incidental word learning from independent reading (e.g., Swanborn & de Glopper, 1999; see discussions by Nagy et al., 1985; Nagy et al., 1987). Actual detection of the vocabulary learning that occurs as a natural by-product of the reading process is difficult, however, because word knowledge tends to develop slowly over time (e.g., Swanborn & de Glopper, 1999). In most cases, it is only through multiple exposures to a word that it can be considered "mastered," receptively or expressively.

Although a number of investigations have examined children's incidental word learning through independent reading (Dickinson, 1984; Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1985; Schwanenflugel et al., 1997; Shu et al., 1995), previous studies have not focused on the use of a partial word knowledge framework to examine the type of word learning that occurs from a single exposure to a word (see, for example, Carey, 1978; Durso & Shore, 1991; Shore & Durso, 1990). As mentioned earlier, a possible reason for this may have been the difficulty in detecting *any* word knowledge from just one exposure. Even though some knowledge might be present, finding a task to measure it might be more difficult than measurement of word knowledge following several exposures.

As discussed in Chapter 1, investigators that did examine the impact of the number of word exposures on the learning of words (Konopak et al., 1987; Schwanenflugel et al., 1997; Nagy et al., 1987) did not alter the texts to control for this

variable; rather, number of exposures was treated as a post-hoc analysis. It would appear that comparing different levels of exposure, within the same study, might be problematic in that, not only does the number of exposures vary, but the relative importance of the targets to the passage as a whole should also vary. That is, a word that occurs four times naturally in the text (without experimental manipulation) is likely more central to the storyline than a word that occurs only once. It would be difficult, therefore, to consider the impact of the number of exposures, while considering or controlling for a word's importance to the passage.

The present investigation consisted of an examination of the partial word knowledge growth that occurs from one exposure to unfamiliar words in text. By limiting the scope to a single exposure, it was possible to minimize the variable impact of word importance, as highlighted above. Moreover, of theoretical importance, to arrive at a greater understanding of partial word knowledge growth from text-based incidental learning, it must first be asked: What can be learned from just one exposure (Carey; 1978)? This investigation was undertaken, then, with the acknowledgment that, despite attempts to design tasks that would tap partial word knowledge growth, one exposure may not be sufficient for children to demonstrate word knowledge gains.

Within the context of probing learning that occurs from a single exposure, then, emphasis was placed on the relationship between measures of various aspects of ability (general language, vocabulary, and reading skills) and partial word knowledge growth. As discussed in Chapter 1, previous studies of this type (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Konopak et al., 1987; Nagy et al., 1987; Nagy et al., 1985; Schwanenflugel, 1997; Shu et al., 1995) did not probe this relationship with the

specificity that would allow analysis of the subskills relevant to incidental word learning from independent reading. Evaluation of this relationship would seem to be important because, from a practical standpoint, it allows one to begin to predict which students might benefit to the greatest extent from reading as a form of vocabulary enrichment. As will be discussed in the section on the relationship between ability factors and partial word knowledge growth, theories of reading comprehension (e.g., Just & Carpenter, 1987) would predict that children with stronger reading skills and with larger vocabularies would not only demonstrate greater comprehension of text, but would be able to glean the meanings of unfamiliar words from texts more easily than children with relative weaknesses in these areas.

In this study, emphasis was also placed on potential differences in the process of learning words incidentally from text, based on the syntactic category of the words. As discussed in Chapter 1, of the two previous studies of incidental learning that probed differences across syntactic categories, one reported no significant differences in the learning of five categories (Nagy et al., 1987), and the other reported greater learning of non-nouns than nouns (Schwanenflugel et al., 1997). Given that both of these studies seem to contradict robust evidence that, at least among younger children, nouns are learned more easily than verbs (e.g., Bates et al., 1994; Gentner, 1982; see Gentner, 1978, for a discussion), it seemed that the present study should be designed with this variable in mind. Of importance, the present study appeared to be the first in which noun and verb targets were selected, controlling for other word variables. The two prior investigations selected words from within the original texts, resulting in post-hoc analyses of the impact of syntactic category on learning; accordingly, these studies could not control for the

presence of other linguistic variables (i.e., word length, the frequency of occurrence of the word in the language, importance of the word to overall text comprehension).

Finally, the present investigation also focused on the role of context in word learning. Studies of incidental word learning from independent reading have generally found that context plays an important role in word learning (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Nagy et al., 1987; Shu et al., 1995; cf. Schwanenflugel et al., 1997). The present study sought to examine this variable, using a procedure similar to that of Beck et al. (1983), with the hypothesis that context would play an important role in learning and, therefore, might serve as an important covariate in evaluating partial word knowledge growth.

To address these questions related to the types of partial word knowledge that occur as a byproduct of the natural reading process, sixth grade children with average to above average language and reading skills, who passed cognitive and hearing screenings, and who were reported by parents to be progressing normally in school (see Chapter 2 for the complete list of study eligibility criteria), were asked to read one of two pairs of stories containing target words presumed to be unfamiliar to them. Stories were designed to contain eight unfamiliar nouns and eight unfamiliar verbs each. Chapter 2 provides a detailed description of word and story stimuli and the experimental controls associated with each.

To assess the partial word knowledge growth that occurred from one exposure to each word in the stories, two tasks were designed: a pre- and posttest checklist task and a posttest multiple choice task. The checklist task assessed whether, from pre- to posttest, children gained knowledge of the targets as real words, as opposed to nonwords. It also

had the potential to assess any partial word expressive knowledge, indicated by the children when they wrote sentences or definitions for the words. The multiple choice test, designed with two levels of questions for each target, probed three knowledge types beyond the knowledge that a target word was, in fact, a word: syntactic knowledge, general semantic domain knowledge, and detailed semantic domain knowledge. Items for both measures included those the children encountered in the stories, as well as those in the pair of stories the child did not read. Thus, each child served as his/her own control in the analyses of these tasks. Critically, however, because the multiple choice measure was only administered as a posttest, an assumption for the use of each child as his/her own control was that multiple choice control items and experimental items had to be of equal difficulty. Pilot analyses had indicated that, when knowledge types were considered as a group, the multiple choice measure yielded learning that was similar for participants who read Stories 1 and 2 and participants who read Stories 3 and 4 (see Appendix A for the details of this analysis).

As discussed in detail in Chapter 3, results were tabulated and subjected to group statistical procedures appropriate for addressing each research question. The remainder of this chapter provides detailed discussion of the implications of results presented in Chapter 3. Discussion of the results corresponding to each research question includes comparisons of findings to the predictions of the models described in Chapter 1. The chapter concludes with the provision of future areas of potential inquiry based on the present findings, as well as an acknowledgment of the present study's limitations.

Demonstration of Partial Word Knowledge Growth from One Exposure to Words in Independent Reading

As quoted in Chapter 1, Carey (1978) offered a description of what is entailed in learning a new word; as a start, the child must recognize the unfamiliar item as a word. It was this type of "discrimination" knowledge growth that, in the present study, the sixth grade children demonstrated in their one encounter with a set of unfamiliar words. As presented in Chapter 3, the participants did not demonstrate either syntactic or general semantic knowledge gain on the multiple choice measure. (As discussed, detailed semantic knowledge gain could not be assessed because of evident differences in item difficulty between story sets. Syntactic and general semantic domain knowledge gains across Story Set groups were not significantly different.)

The finding of discrimination knowledge is noteworthy in several respects. First, prior work has not emphasized this type of word knowledge. Even studies that employed definition tasks (Gordon et al., 1992; Konopak, 1988a, 1988b; Nagy et al., 1985) have not probed this type of knowledge, despite the fact that having children indicate whether words at least looked familiar would seem to be a logical first step. Yet, as Swanborn and de Glopper (1999) have demonstrated through their meta-analysis of incidental word learning studies, tapping word knowledge growth through independent reading generally yields small effect sizes, even when measures of partial word knowledge are included in assessments. A finding of a moderate effect size for this more basic learning type, then, would seem to strengthen the notion that some type of knowledge is detectable from the very first exposure.

It is possible, of course, that the children in the present study were responding to having seen the word twice (i.e., on the pretest approximately 4 days earlier and in the stories 2 days earlier, as was the case with the experimental words), as opposed to only once (i.e., on the pretest only, as was the case with the control words). This possibility cannot be entirely ruled out, but it seems unlikely for several reasons. The first two reasons relate to the child's perception of the checklist task. Given that the pretest task itself occurred at the end of two hours of testing, participants likely viewed the checklist as another measure, unrelated to an experiment thought to be about their reading skills. They were told in the instructions that they would not know many of the words. It is likely, then, that their inclination was to focus less on words that they did not recognize than on the words they recognized right away. Moreover, given that the target words in the checklist were interspersed with common words and nonwords, children had a tendency, on the second pass through the list, to scan the words they had left blank, rather than proceeding slowly through the list. Knowing that there were nonwords in the list may have made children focus less on individual words, perhaps assuming that words that they could not confirm as real were nonwords.

A third reason relates to observations of the children while reading the stories. Although the participants were not specifically asked this question, after reading the stories, none of the participants reported having seen the words in the checklist 2 to 3 days before. If they had remembered having seen the same unfamiliar word earlier in the experiment, arguably, they would have been anxious to share that observation. Of course the findings, both in the pilot and the main experiment that children did not, based solely on their pretest experience, tend to report control items as "familiar" on the posttest, also

lend some support to the notion that the children were not “learning” from just that one pretest exposure. Finally, in addition to these observations, it should also be noted that other studies of this kind implemented similar intervals between the pretest and the experiment (Gordon et al., 1992; Konopak, 1988a, 1988b; Nagy et al., 1985), under the presumption that this interval was sufficient for children not to have been impacted by pretest content.

Of interest in relation to the “incidental” nature of the children’s learning, none of the children, in the course of reading, indicated that they were unfamiliar with any of the words in the texts. Despite the presence of unfamiliar words, the participants appeared to have little difficulty understanding the stories; the number of main events recalled for each story ranged from 6.7 to 8.2 (out of 11). The participants were told that, after each story, they would be asked to write a summary of it. This instruction was intended to imply that assessment would be related only to each story’s content. None of the participants used any of the target words within their story summaries. All of this would suggest that, in reading, the children were focused on understanding the stories and likely processed the meaning of the story without an acute awareness of the unfamiliar words in the texts. Some models of reading comprehension (e.g., Adams, 1990) support this contention; when an unfamiliar word is encountered in the process of reading, the emphasis is on continued comprehension of the text, with word learning only a byproduct of text comprehension.

If it were demonstrated that the children were, in fact, focused on the target words while reading the stories, that observation would, in theory, be problematic in terms of the present findings of discrimination word learning. That is, if the participants were

focused on the target words while reading, their performance on the posttest checklist could be deemed nothing more than a test of word memory. It is the fact that the children were unaware of the words in the stories, and unaware that the learning of words was expected in the course of the study, that provides support for the notion that the children's word discrimination performance can truly be considered a form of word learning.

Relationship between Ability and Partial Word Knowledge Growth

Theories of reading comprehension, such as Just and Carpenter's (1987), seem to predict that children with stronger reading skills and with larger vocabularies would not only demonstrate greater comprehension of text, but should also be able to glean the meanings of unfamiliar words from texts more easily than children with relative weaknesses in these areas. In particular, theories of reading comprehension (e.g., Just & Carpenter, 1987; LaBerge & Samuels, 1974) also predict that stronger readers have stronger word recognition skills than weaker readers.

Despite these theoretical predictions, past studies of incidental word learning have provided mixed evidence about the relationship between measures of ability and partial word knowledge. Of the seven studies of incidental word learning from independent reading, three of them found that their ability measure was not related to learning (Nagy et al., 1985; Nagy et al., 1987; Shu et al., 1995). Of the remaining studies, three used reading achievement as a grouping variable, separating students into high and low ability groups. As a group, these investigators found that the high-ability students demonstrated more learning than the low ability students. In addition, Herman et al. (1987) assessed

the relationship between learning and reading ability and identified a significant relationship between reading comprehension scores, in particular, and word learning.

Results of the present investigation revealed no significant relationship between learning, as assessed with the checklist, and any of the measures of ability. Of interest in light of Herman et al.'s findings, there was also no significant relationship between the reading comprehension subtest of the *WRMT* and checklist learning. Based on theories of reading comprehension (e.g., Just & Carpenter, 1987; LaBerge & Samuels, 1974), one might expect that ability would play a rather prominent role in the word learning process as a whole, but it is not necessarily surprising that checklist performance did not relate to measures of overall language, vocabulary, and reading. Rather, given that from one exposure the children in the present study only demonstrated word discrimination knowledge, it may be the case that visual memory (or perhaps phonological memory) is a better predictor of word discrimination performance than language or reading measures. Although memory abilities were not assessed directly, two subtests of the *TOLD* ("Sentence Combining," and "Word Ordering") rely heavily on memory ability for performance. As part of an additional analysis, not reported herein, the relationships between each of these subtests and word knowledge growth as measured on the checklist were both determined to be nonsignificant.

In addition, it should be noted that this speculation that word discrimination knowledge might relate to memory ability is not consistent with the findings of Ewers and Brownson (1999). In their study of vocabulary acquisition through booksharing, kindergarteners with "high" working memory were no more likely than other kindergarteners to acquire new vocabulary, as measured by a one-word receptive

vocabulary measure containing words encountered in the stories. Their study is, of course, different in its population, task, method of assessment, and the type of word knowledge growth measured.

An additional explanation for findings of no relationship between measures of ability and partial word knowledge growth is that perhaps the range of scores for each measure was too restricted. As indicated, children with scores that fell beyond one standard deviation below the mean were eliminated from the study. In addition, participants who received scores below one standard deviation of the mean on any of the subtests (or language quotients, in the case of the *TOLD*) were also eliminated. This procedure resulted in composite scores that did not extend completely to the standard score cutoff (e.g., a child may have one subtest standard score that extended to 85, but other scores had to be the same or higher, such that the composite regressed at least somewhat to the mean). It is impossible to know whether a more liberal cutoff (e.g., -1.3 standard deviations) would have impacted findings.

Learning Differences across Syntactic Categories

Past findings of vocabulary learning in young children suggest that nouns tend to be more easily learned than verbs (e.g., Bates et al., 1994; Gentner, 1982; see Gentner, 1978, for a discussion). As discussed in Chapter 1, many studies of incidental word learning have not addressed learning differences across various syntactic categories. Of the two studies that did examine this variable, one (Nagy et al., 1987) suggested that the relationship between word learning and part of speech was not significant, and the other (Schwanenflugel et al., 1997) suggested that non-nouns were actually more easily learned

than nouns. As discussed in Chapter 1, Schwanenflugel and colleagues acknowledged that this finding may have been confounded by the abstractness of the words in each category.

In the present study, although word abstractness was not considered, word frequency and, indirectly, the importance of words to the content of the passage, were controlled. Results suggested that the learning gain (the amount of gain from pretest to posttest for the experimental items minus the amount of gain from pretest to posttest for the control items) for nouns versus verbs did not differ. However, when considered separately, significantly more learning occurred on experimental verbs than on control verbs. This finding was not observed for nouns.

The significant finding of verb learning on the pre- and post-checklists is of some interest, because the same was not found for noun learning. One explanation for the observed verb learning is that perhaps the semantic role of verbs, as actions, make them more salient to the reader than nouns. In other words, knowledge of the action conveyed in a sentence might be more critical for comprehension than the knowledge conveyed by the nouns. Moreover, unlike normal reading conditions, participants in the present study did not have to contend with target verb inflections; rather, the target verbs were all uninflected.

Another explanation is related to the argument structure that necessarily accompanies verbs in text, but not nouns. A verb's argument structure provides information about the relationship between the verb and its arguments. As a result, a child may have no knowledge of the meaning of a verb and yet, on reading it in a sentence, the child can glean information about it. Nouns, however, would seem to be

more reliant on context (as opposed to syntax) for providing clues about meaning. This difference between nouns and verbs, then, provides one potential explanation for learning differences between syntactic categories.

Again, it is important to emphasize that the type of learning observed in this study was discrimination knowledge. It is likely, therefore, that if other learning types had been identified, the profile of noun and verb learning may have been quite different. In the previous section, it was speculated that memory ability has an impact on learning of this type. If, indeed, comprehension of verbs plays an important role in overall passage comprehension, perhaps memory is aided by the importance of the target verbs to the passage as a whole.

The notion that nouns should be easier to learn than verbs, at least in relation to the present study, may be misguided. The facts that (a) participants are of school-age, well beyond early language development, and that (b) the present data suggested learning in the form of word discrimination, rather than the knowledge of syntactic or semantic information, may point to other factors of greater relevance to learning. As mentioned, memory ability may be one such factor. Another may be the importance of the word in understanding the text. Though word importance was informally controlled by selecting targets that would occur only once in the passages, this control does not rule out the possibility that verbs have a more important role in overall comprehension than nouns. The present findings are not completely consistent with those of Schwanenflugel et al. (1997). Unlike their study, participants in the present study did not learn significantly more verbs than nouns, although the descriptive difference is in the same direction (verbs > nouns).

Theories of reading comprehension, such as Just and Carpenter (1987), suggest that the stripping of affixes is an essential step in the process of determining the meaning of unfamiliar words. Under ordinary reading circumstances, it is possible that word classes that tend to receive affixes more often (e.g., verbs receive inflectional morphemes more often than nouns) are more difficult or slower to learn because more words in those classes undergo this stripping procedure before being analyzed for meaning. Even if this were a significant factor in the ease with which unfamiliar words begin to be learned, it should not have impacted the present findings since none of the nouns or verbs was presented with inflectional morphemes attached.

Role of Contextual Richness in Word Learning

Studies of incidental word learning from independent reading have generally found that context plays an important role in word learning (Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b; Nagy et al., 1987; Shu et al., 1995; cf. Schwanenflugel et al., 1997). Moreover, theories of reading comprehension, such as Just and Carpenter's (1987), would predict that the likelihood of learning a new word's meaning would increase as the supportiveness of the word's context increases. It is unclear, however, that this theory would necessarily predict a relationship between discrimination word learning and richness of context.

As mentioned, the present study employed a procedure for determining contextual richness that was similar to that of Beck et al. (1983); that is, adults were asked to provide words in place of the targets that had been removed from the passages. The words provided were then rated for their similarity to the original targets. In contrast to

the procedure employed in the present investigation, Beck et al. rated contexts as being (a) "misdirective," (b) "nondirective," (c) "general" (i.e., somewhat helpful in deriving meaning), or (d) "directive" (i.e., providing the meaning for the word within the context).

Beck et al.'s (1983) classifications can be roughly compared to the ones in the present study, descriptive of the adults' correctness in approximating the meaning of the target words, in which a rating of "1" referred to an incorrect guess, "2" referred to a partially correct guess, and "3" referred to a correct guess. Specifically, ratings of "1" would seem to correspond roughly to the categories of *misdirective* or *nondirective*; ratings of 2 would correspond to the *general* category; and ratings of 3 would correspond to the *directive* category. Of the 17 words included for this analysis, then, 5 approximate a mean value of 1, 10 approximate a mean value of 2, and 2 approximate a mean value of 3. If the mode (less sensitive to regression to the mean) is considered, the number of words receiving ratings of 1, 2, and 3 were 8, 6, and 3, respectively. Either way, it appears that *directive* contexts were noticeably lacking among the target words selected for the present study.

The fact that most of the contexts in the present investigation were not *directive* should not be surprising. Repeatedly, researchers have found that texts, by themselves, tend not to provide the informative contexts that enhance learning, and that when texts are edited to make contexts more explicit, word learning improves (e.g., Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b). In the present study, contexts were not manipulated to inform readers of the meanings of words; rather, the intent was to modify passages only minimally, so that they continued to resemble in form the natural reading of sixth grade children.

Results of the present study suggested that context was not related to incidental word learning. Such findings may initially seem counter-intuitive, but there are at least two ways in which these results might be explained. First, perhaps the limited number of truly supportive contexts impacted findings. It seems plausible that, if there are few opportunities to learn from contexts that are truly *directive*, it would be difficult to observe any potential relationship between context and word learning. Of course, a remedy to this difficulty would be to manufacture a range of contexts within stories, such that contextual effects could be evaluated. Indeed, a number of studies have taken this tack (e.g., Gordon et al., 1992; Herman et al., 1987; Konopak, 1988a, 1988b), finding a relationship between context and word learning. Second, as has been discussed in relation to the previous questions, it would not necessarily be expected that there would be a relationship between word discrimination knowledge and contextual richness. The context, it would seem, is more useful in providing cues pertaining to semantic knowledge than to basic knowledge that a word is, in fact, a word.

Practical Implications

The present study was undertaken with the intent to simulate, as much as possible, the natural conditions under which children read and under which they learn from reading. Previous work in this area had demonstrated that, though children learn from incidental exposure to unfamiliar words, this means of learning is slow, compared to direct instruction, in most cases requiring multiple exposures within multiple contexts. Nonetheless, early on Carey (1978) posed the question as to what one acquires from just a single exposure. As this and other studies have demonstrated, detecting word

knowledge growth from a single exposure is difficult, requiring a partial word knowledge task that taps the types of word knowledge likely to develop early in the evolution of the child's notion of the new word.

The present study, though attempting to detect four types of word knowledge through the use of two tasks, in fact has demonstrated that only the first of Carey's list of word knowledge types was acquired from reading the words in the context of grade-level stories; that is, "minimally, the child learns that [the unfamiliar word] is a word: he enters it into his mental lexicon" (Carey, 1978, p. 264). This finding is not trivial, because it supports Carey's notion (and is consistent with much of the fast mapping literature) that learning begins from the first exposure to a word. The alternative, of course, is that children would require more than one exposure to a word (that is, they would need to reach a specific threshold) before they could be described as having any knowledge of the word at all.

If Carey's (1978) notion of the presence of word knowledge following one exposure is correct, as the present investigation would suggest, the practical significance of this study is, first, in the assertion that a single incidental exposure to a word in natural, independent reading is detectable and is therefore the appropriate unit for measurement of incremental word knowledge growth. Second, if it is clear that there is knowledge accrual from a single exposure to a word, then it is clear that the detection of partial word knowledge is inextricably linked to issues of partial word knowledge measurement. As this study demonstrated, careful analysis of the tasks used to probe partial word knowledge growth is crucial for its detection.

Limitations and Future Directions

The strengths of the present investigation include the selection of target words, their linguistic controls, and the story sets in which the words were embedded. The stories were selected and modified slightly to be similar in their length, word frequency of non-target words, and readability, while still maintaining a strong similarity to their original versions. The target words selected were of the same syllable length and were sufficiently infrequent so as not to be included in a common index of English words and their frequency of occurrence. In addition, across stories, the words would seem to be of similar importance to the passage, given that they occurred only once in the passages.

A potential limitation of the study, however, was the design of the multiple choice measure. As discussed, for at least the detailed semantic domain knowledge type, the difficulty of the questions associated with the words in each story set was not equivalent. As a result, this word knowledge type could not be assessed. This methodological problem did not extend to the syntactic and general semantic word knowledge types; rather statistical analysis, as well as visual inspection, suggested that the multiple choice questions related to syntactic and general semantic domain knowledge types across story sets were similar (or, at least, not significantly different), suggesting that findings of no significant knowledge gain for these types could not be attributed to methodological problems with the multiple choice questions.

The sentence-choice portion of the multiple choice test required more detailed answer choices than the other knowledge types, probing knowledge beyond the general semantic domains of words that differed in scope. Responding correctly to *pelage*, for example, required selecting the appropriate type of covering (i.e., an animal's covering),

whereas responding correctly to *bombast* required understanding that it refers to a specific form of pride (arrogance in the form of speech). Arguably, *bombast* is more abstract and narrower in the general semantic domain selected for the question.

Given that syntactic knowledge growth was not detected on the multiple choice measure, it is unlikely that participants would have demonstrated detailed semantic knowledge; in that respect, the inability to measure detailed semantic knowledge was not detrimental in terms of describing the learning that occurred as a function of independent reading. The measurement of general semantic domain knowledge, however, is important as a potentially early emerging (i.e., following relatively few exposures) knowledge type. Although word knowledge gain was not detected from the multiple choice measure, it would seem likely that participants developed some basic category information about some of the words, even after just one exposure. Perhaps a more open-ended multiple choice measure, in which the participant could circle one or more attributes believed to be related to the word, is a solution. Such a test would not rely only on one interpretation of the general category to which each word belongs.

In addition to a modification in the type of multiple choice measure administered, perhaps a modification in the instructions to participants is warranted as well. Participants in the present study were encouraged to guess if they were unsure of the correct answer. This was done in response to the observed tendency of some children to circle "don't know" for all target words. Children presumably exhibited this tendency because, in comparison to the common words, on which they appeared confident of the correct answer, on the target words, even when they had some knowledge, they appeared relatively less confident. It is worth noting that, if the multiple choice measure were a 4-

option, forced choice, the probability of responding correctly by chance for general and detailed semantic knowledge types is 25%; performance on the questions for these types, as can be seem in Chapter 3, was not much higher than that. The performance on syntactic knowledge was, but the probability of answering correctly by chance was 50% (i.e., 2 out of the 4 knowledge-based responses were considered correct) for that learning type.

It is unclear whether the inclusion of "don't know" and "none of the above" options is desirable. It is intuitively appealing to give children the opportunity to indicate that they cannot respond to any of the four choices, but including other options also requires consideration of individual children's response preferences (such as some children wanting to be almost positive of the answer before venturing a guess, and others guessing with relatively little confidence that the guess is correct). The multiple choice measure of the present investigation included the two additional options, based mainly on the precedent that other studies of this kind provided at least one additional option. Perhaps future investigators might rethink the inclusion of "don't know" and "none of the above" in multiple choice tasks.

The checklist measure served as a valuable means of examining word knowledge growth while controlling for prior knowledge. Unfortunately, as expected, participants were generally unwilling to give written responses for items for which they were not completely confident of the meaning. As a posttest assessment of partial word knowledge types, other than word familiarity and complete, expressive knowledge, it would appear to be of limited usefulness.

It could be argued that, to obtain a variety of types of word knowledge growth, a greater number of exposures to each word is needed. Previous work in this area, of course, has adopted this strategy. Rather than proceeding to a reading task with multiple exposures, however, a better "next step" might be to refine measures that detect word knowledge from a single exposure. Future studies, for example, might:

1. improve upon the multiple choice task, as described above, possibly including other knowledge types, such as the phonological knowledge growth that occurs from a single exposure;
2. include an analysis of words for which children indicate prior knowledge, to evaluate word knowledge growth once the child has some knowledge of the word;
3. evaluate the learning the occurs over multiple sessions (3 or more), given a variety of exposures to the words in different contexts;
4. employ a detailed semantic task similar to the present one, but that requires the child to rate the use of the word in a set of sentences, rather than forcing the child to select one correct answer;
5. employ a mixed method design that allows for "interviewing" the child, as an alternate means of probing word knowledge and the child's awareness of any unknown words in the passages;
6. use a "forced choice" measure, with no option for the child to indicate no knowledge;
7. incorporate shorter passages in an attempt to change children's reading strategies from "gist-ness" to more focused learning;

8. consider the impact of the placement of the words within the stories (i.e., target words placed in close proximity to each other versus target words evenly spaced throughout the passages), as well as primacy and recency effects;
9. vary the interval from reading condition to posttest, to evaluate the effect of time on word knowledge retention;
10. examine the role of memory ability on children's word learning from text.

Further inquiry into these areas has potential to provide a more complete understanding of the process of children's word learning from a single exposure through reading.

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APPENDIX A

PILOT STUDY

Introduction

Chapter 1 provides the basis for a study that will examine children's partial word knowledge growth through encounters with words in reading. A Statement of the Problem is presented, in which research questions related to individual and linguistic factors impacting partial word knowledge growth are provided. Before commencing the study, however, and in an attempt to address potential issues that might relate to the design, stimuli, and/or procedures, a pilot study was conducted. It led to a strengthening of the original conception of the study, resulting in the main experiment described in Chapters 2 and 3.

The first issue related to the selection of target words. Because the intent for the main experiment was to incorporate eight target, "unfamiliar" words (four nouns and four verbs) into each story, target words for the pilot were over-selected, to include six nouns and six verbs per story. On the basis of pilot results, then, words would be selected for removal if (a) pilot participants demonstrated prior knowledge of a word, more so than the others in the story; or (b) the word was structurally similar or similar in meaning to another target word. Several pairs of words were similar to each other (e.g., *disport* and *comport*; *perpend* and *forfend*), and were kept in the list of pilot words with the intention of removing one of the pair once it was determined which was more unfamiliar to the children. Pilot results would be used to select the final set of stimuli for the main experiment.

A second, very central issue concerned the question of whether partial word learning can be detected through the use of the present task. That is, once items for which individual children indicate prior knowledge (or prior familiarity) are removed,

how does learning of the experimental words (that children encountered in the stories) compare to learning of the control items (that children did not encounter)? If learning occurs as a result of exposure to the stories, each participant should evidence greater knowledge growth on words encountered in the stories.

A third issue related to the ability of the participants to complete the experimental tasks. Participants who are able to self-report their own word knowledge accurately should (a) write correct definitions or sentences for the "common" words in the checklist, and (b) indicate no knowledge of the nonwords in the checklist. In addition, participants who are able to demonstrate word knowledge on the multiple choice test should receive full credit for the common word items.

A fourth issue related to the equivalence of the four stories. Because the main experiment requires that participants read only two of the four stories but respond to the vocabulary from all of the stories, it is essential that the stories themselves be comparable. Issues of story length, readability, and the frequency of non-target vocabulary in the language have been addressed in the development of the stimuli; these procedures are discussed in Chapter 2. What could not be addressed in stimuli development, however, was (a) the equivalence of children's comprehension of the stories, and (b) the equivalence of partial word learning that occurred across stories. These latter issues were the subject of analyses in the pilot.

Participants

Twelve children, ages 9:8 to 12:2 (4^{th} through 6^{th} grade) were recruited to complete the pilot study. Though the main experiment is intended for sixth grade

children, younger children were included to insure that the demands of the experimental tasks could be performed by less able (in this case, younger) participants, and that these participants demonstrated learning as well. Essentially, the inclusion of younger children was viewed as a conservative means by which to pilot the main experiment.

Participants were recruited from the communities immediately adjacent to The University of Georgia. Parent questionnaires verified that the 12 participants were not receiving services for, or suspected of having, a learning disability, language disorder, neurological impairment, or hearing impairment. Rather, each was reported to be progressing normally in school. Participants were offered a monetary incentive for participation.

Stimuli

The stimuli for the pilot study were the same as those for the main experiment, described in Chapter 2, with one exception: target words (and accompanying checklist and multiple choice assessment items) consisted of six nouns and six verbs per story, rather than four. All of the target words and their definitions are provided in Appendix C. Because of these extra items, the pilot checklist consisted of 66 items (including 12 common words and 6 nonwords), instead of 50; the multiple choice measure consisted of 60 pairs of questions (including 12 common word question pairs), instead of 44. In addition, the stories for the pilot were modified to include 12 target words, instead of 8.

Three sets of multiple choice and checklist stimuli were developed using controlled randomization. Randomization rules, similar to those of the main experiment,

were developed to insure that nouns and verbs from each story, as well as common words and nonwords (in the case of the checklist), were evenly distributed across each form.

Prior to the development of the final multiple choice questions for the pilot, 10 adults were enlisted to locate potential distracters within each item. A discussion of this analysis is provided in Chapter 2. The multiple choice questions administered in the pilot, then, reflected the resulting refined questions.

Procedure

Pilot participants were asked to attend two sessions of approximately an hour each. The sessions were scheduled six (4 participants) to seven (8 participants) days apart. Although the main experiment required two to three days between sessions, a longer interval was selected for the pilot experiment, with the reasoning that, if retention of the words is demonstrated given this longer, more conservative interval, then retention should be demonstrated across the shorter interval of the main experiment. The participants were seen individually or in groups of four or fewer. Sessions occurred either at The University or in the children's homes.

In the first session, the Consent Form, Agreement to Participate, and Parent Questionnaire were completed (see Appendix F). Participants then completed the Pre-test Checklist, as described in Chapter 2, and read two of the four stories. Stories were counterbalanced across participants. Following each story, participants were asked to write story summaries of approximately one page.

In the second session, participants completed the Post-test Checklist, followed by the Multiple Choice measure. After participants completed the first section of the

Multiple Choice test (containing the first of each pair of items), they reviewed any item on which they had indicated “don’t know,” to be sure that they could not take a guess. The same procedure was followed for the final section of the test. This procedure was adopted following the testing of an initial participant (subsequently replaced), who, upon seeing a question that probed a “difficult” word, circled “don’t know” before reading the answer choices; that is, she appeared to be scanning items for common words for which she was confident she could provide an answer. Once this pattern was detected, that participant was asked to go back to items for which she had circled “don’t know,” and try to take a guess. Results suggested that in many instances (43.1%), her “guesses” resulted in detection of at least some knowledge growth. Based on this experience, the 12 pilot participants that followed were encouraged to guess with the revised procedure. Although there is a concern that random guessing could impact results, this concern is minimized, because random guessing should impact “experimental” items to the same extent that it impacts “control” items.

Results and Implications

Data were analyzed to address each of the four issues delineated at the outset of the pilot development. Specifically, the selection of target words for the main experiment, the extent of word knowledge growth detected in the pilot, the evaluation of participants’ ability to complete the tasks, and the extent to which equivalence was demonstrated across the four stories were addressed.

Target Word Selection

The first issue was related to the selection of target words from the pilot to be included in the main experiment. A series of steps was used to determine the subset of words to be adopted. First, after tabulating the results of the pretest checklist, any word for which none of the 12 pilot participants could either offer a definition or sentence or indicate familiarity by circling it was adopted. This step resulted in the adoption of *canard, brogan,* and *niggle* from Story 1 ("Aunt"); *truckle* from Story 2 ("Dog"); *tincture* from Story 3 ("Plane"); and *wintle* and *imbrue* from Story 4 ("Rain"). Next, any word for which no participant could offer a definition or sentence and for which no more than two participants indicated familiarity by circling it was adopted. This step resulted in the adoption of *onus, bombast, impugn, refel, adduce,* and *debase* from Story 1; *trammel, senna, surfeit, pelage, runnel, pathos, repine,* and *aver* from Story 2; *unguent, imbibe, forfend,* and *bedaub* from Story 3, and *welkin, torpor, foible, eschew,* and *assuage* from Story 4. At this point in selection, decisions to accept or remove items, in order for every story to contain exactly four nouns and four verbs, were made considering several factors.

For Story 1, the first two steps described above resulted in selection of exactly four nouns but five verbs. To decide which one of the five to eliminate, the verbs were examined for similarity in their structure and their meaning. Because it was determined that *impugn* and *debase* have similar meanings, they were both deemed candidates for elimination; ultimately, *debase* was eliminated because two children in the pilot study indicated its familiarity, whereas only one child indicated that *impugn* was a familiar word. Further, when 10 adults were asked to complete the checklist and multiple choice

tasks (without reading the stories), only 2 indicated no knowledge of *debase* across both measures, whereas 5 adults indicated no knowledge of *impugn* across both measures.

For Story 2, the first two steps described above resulted in selection of all six nouns and three verbs. To determine which two of the nouns might be eliminated from the set, again, the words were examined for similarities in structure and meaning to other words. As a result, *senna* was removed from the set because of its similarity in meaning to *unguent* (i.e., medicine versus ointment). Although *senna* and *unguent* are in different stories, a child who was assigned to read both stories may demonstrate greater difficulty in learning either word because of their similarity to each other. The target items *trammel* and *runnel* were considered for elimination because of their structural similarity to each other and to *truckle* within the same story. Pilot participants were not able to define or give a sentence for either word; two indicated familiarity with *trammel*, whereas one indicated familiarity with *runnel*. Of the 10 adults, only one demonstrated any knowledge of *trammel*, and only one of *runnel*. All else being equal, then, *trammel* was selected for removal, because fewer participants (although only by one) reported familiarity with the word. To select an additional target verb, the frequency with which each of the three (previously discarded) targets was indicated by pilot participants as known or familiar was evaluated. None of the pilot participants were able to provide correct definitions or sentences for any of the three words. The target *disport* was indicated as familiar by 7 participants, *accede* by 10 participants, and *inveigh* by 3 participants. In addition, *disport* appeared similar to *comport* from another story, suggesting its removal. And, in examining the performance of the 10 adult respondents on these three items, it was determined that of the three, *accede* was selected as the most

widely known, with only one adult indicating no knowledge of the word across the checklist and multiple choice measures. On these bases it was decided to include *inveigh* as the fourth verb in Story 2.

For Story 3, the first two steps described above resulted in selection of two nouns and three verbs. To select two additional (previously rejected) nouns from the set, the frequency with which each was selected as familiar or demonstrated as known was examined. None of the four targets could be defined by any of the pilot participants. The target *gumption* was selected by 3 pilot participants as familiar, *bauble* was selected by 6, and *egress* and *tyro* were selected by 4. Given these results, the target *bauble* was eliminated from consideration. The adults demonstrated a different pattern, selecting *gumption* as familiar on either measure 7 times out of 10, but *bauble, egress,* and *tyro* only 3 times out of 10. Based on these results, *gumption* was eliminated from consideration leaving, as targets, the two items for which neither group demonstrated excessive selection for familiarity. In selecting one additional verb for Story 3, *perpend* was eliminated because of its structural similarity to *forfend*, a target within the same story. Comparing *suffuse* and *convolve* (the remaining previously rejected targets), then, though none of the pilot participants were able to generate a definition or sentence for either word, 4 participants selected *suffuse* as familiar and 3 selected *convolve* as familiar. Similarly, 6 of the adults demonstrated at least some knowledge of *suffuse*, whereas only 4 demonstrated knowledge of *convolve*. Given these child and adult observations, *convolve* was selected as the fourth verb for Story 3.

For Story 4, the first two steps described above resulted in selection of four verbs but only three nouns. To decide which one of the three (previously rejected) nouns to

include, again, the pilot participants' pretest checklist data was consulted. Of the three words, *pauper* was correctly defined by two of the participants, whereas *proxy* and *precept* were not defined correctly by any. The participants' report of their familiarity with each of the words, however, yielded a different pattern, with 7 participants indicating familiarity with *proxy*, 6 with *precept*, and only 1 additional participant with *pauper* (not counting the two participants who defined the word). Among the 10 adults, all of them demonstrated some knowledge of *pauper* and *proxy*, and 8 of them demonstrated knowledge of *precept*. Based on the pilot participants' tendency to select *precept* and *proxy* as familiar words at least twice as often as they selected as familiar or defined *pauper*, the latter was selected for inclusion.

Although the selection of target words from the pilot is less than clear-cut and might seem arbitrary, all of the decisions made herein are a reflection of two main goals. First, items selected should be those least likely to emerge as partially known to the participants prior to the study. To address this first goal, data from the 12 children in the pilot study, as well as validity data obtained from adults were consulted. Second, items selected should be sufficiently different in meaning and structure from other words within and across stories, to avoid unnecessary confusion in the word learning task. This goal was addressed by examining the targets for such similarity.

Detection of Word Knowledge Growth

To estimate the detection of partial word knowledge growth as a result of encountering the words in the stories, as measured by the multiple choice task, each answer was first weighted according to the approximate difficulty, based on its likelihood of being answered correctly. For each word on which a participant indicated detailed

semantic knowledge, a score of 3 was recorded. General semantic knowledge received a score of 2, to account for the notion that detailed semantic knowledge would presumably be more difficult to demonstrate than general semantic knowledge. Syntactic knowledge received a score of 1 because, although it cannot be assumed that syntactic knowledge represents less knowledge than general semantic knowledge, the sheer probability of receiving credit for syntactic knowledge (2:6) exceeds that of the other knowledge types probed in this measure (1:6). Items were separated into those that were encountered in the stories by a particular participant (experimental items) and those that were not encountered (control items). Next, average scores for the experimental versus control words were computed, with any word for which a participant indicated prior knowledge on the pre-test checklist removed. Because only the 32 words selected for the main experiment were of interest (rather than the entire list of 48), only data from those words were included in this analysis. Individual participant results are presented below. Comparing each participant's learning of experimental words to the learning of control words, these data suggest that, for 8 of the 12 participants, learning that occurred on the experimental items exceeded that of the control items. Of interest, three of the four participants who clearly did not demonstrate learning were 4^{th} or 5^{th} grade students; the older children in the sample, with the exception of one (Participant 6) all demonstrated at least some learning of their experimental words. A paired (dependent) sample t-test of the group's performance on their experimental versus control words revealed a significant difference between conditions ($t=2.391$; $p=.036$).

As mentioned at the outset, the decision to include pilot participants younger than those to be sought for the main experiment was viewed as conservative, in that, if a group

Participants	Experimental Word Learning	Control Word Learning
1	0.93	0.31
2	1.81	2.13
3	1.86	1.63
4	1.73	1.44
5	1.50	1.53
6	1.64	1.08
7	1.88	1.25
8	2.00	1.06
9	1.25	1.13
10	1.71	1.86
11	1.25	0.77
12	1.63	1.79

that included younger participants could demonstrate lexical gains, a sample of only sixth grade students should certainly demonstrate gains as well. Furthermore, if the pilot participants, as a group, demonstrated gains 6 to 7 days following exposure to the words, then participants in the main experiment, with a 2 to 5 day interval between condition and post-test, should also evidence gains. Given these considerations, it appears that the experimental tasks and measures are sufficient to detect word knowledge growth for the intended population.

Performance on Common Word and Nonword Items

To evaluate the participants' ability to complete the multiple choice and checklist tasks, a series of common words, known to the children, were included in both measures. The children's performance on these items was evaluated, and results revealed that, as a group, the children were able to provide a correct sentence or definition for these words 95.8 percent of the time on the pre-test checklist and 93.8 percent of the time on the post-test checklist. When only the sixth grade children from the sample were considered (N=5), these percentages increase to 100 and 98.3, respectively. Moreover, the children demonstrated detailed semantic knowledge of these words on the multiple choice measure 92.4 percent of the time. Again, when only the sixth grade children's performance was considered, the percent correct increased to 93.3.

To examine further the participants' accuracy in reporting their knowledge of or familiarity with words, their self-reports of nonword knowledge was also examined. Results suggested that, across participants, nonwords were selected as familiar or known 8.3 percent of the time on the pretest checklist and 13.8 percent of the time on the post-test checklist. Two of the younger participants were observed to have particular difficulty with this part of the checklist, however. When only sixth grade participants were included in the nonword analysis, percentages decreased to 3.3 for both pre- and post-test checklists. These results suggest that the children in the pilot, and in particular, the older children, were fairly accurate in reporting their word knowledge.

Story Equivalence

The approximate equivalence of the story conditions was evaluated in two ways. First, the participants' written story summaries were compared across stories. The

procedure for compiling the lists of main events in each story is described in Chapter 2, and the final lists themselves are provided in Appendix G. The lists of main ideas ranged from 16 to 23 across stories. Each participant's story summary was analyzed by two raters independently, computing the percent of main ideas from the list that participants included in their summary. Inter-rater agreement was 80.7% (on 100% of the samples), and intra-rater agreement was 85.2% (on 50% of the samples). The ratings of the first judge and principal investigator were used in the analysis. Means and ranges across participants (N = 6 per story) are provided below for each story. In general, while performance across participants varied, participants tended to demonstrate equivalent understanding of the two stories each read.

Story	Mean	Range
Story 1 ("Aunt")	37.1%	22.2 – 55.6%
Story 2 ("Dog")	30.4%	13.0 – 52.2%
Story 3 ("Plane")	39.2%	23.5 – 58.8%
Story 4 ("Rain")	32.3%	12.5 – 62.5%

A second analysis to assess equivalence of the story conditions was the amount of word knowledge growth that occurred across stories. Below, the average learning, using the weighted average procedure described previously, that occurred from reading each of the stories is presented.

Story	Average Word Learning (standard deviation)
#1 (“Aunt”)	1.31 (.54)
#2 (“Dog”)	1.95 (.45)
#3 (“Plane”)	1.50 (.48)
#4 (“Rain”)	1.68 (.23)

These data suggest that, on average, participants demonstrated similar amounts of lexical learning from each of the four stories. The use of these stories as equivalent learning conditions in the main experiment, therefore, would seem appropriate.

APPENDIX B

STORIES WITH TARGET WORDS UNDERLINED

STORY 1 (“Aunt”)

“Aunt Millicent,” by Mary Steele

“I,” said Angelica Tonks, “have eight uncles and, eleven aunts.”

Mr. Starling dusted the chalk from his hands and sighed. “Well, Angelica, aren’t you a lucky one to have nineteen uncles and aunts. You’ll just have to choose the most interesting one to write about, won’t you?”

“But they’re *all* interesting,” objected Angelica.

The class squirmed.

“All right,” said Mr. Starling, “everyone, copy down this week’s homework assignment from the board.”

Jamie Nutbeam, sitting behind Angelica, leaned forward and hissed, “If the rest of your family is so *wonderfully interesting*, they must be a big improvement on you, Honky Tonks! And, anyway, I bet the aunt I write about will beat any of yours!”

“I bet she won’t,” Angelica hissed back. “She’ll be so *boring*. What’s her name, this boring aunt?”

Jamie finished copying and put down his pen. “Aunt Millicent, and she’s pretty special.”

“QUIET, you two!” barked Mr. Starling, “and start tidying up, everyone – it’s time for the bell.” *Oh joy*, he thought.

As the classroom emptied, Jamie lingered behind.

“What is it, Jamie?” asked Mr. Starling wearily.

“Well, the trouble is I haven’t any aunts or uncles to do a portrait of,” said Jamie, turning rather red, “so is it all right if I make one up? An aunt?”

"Oh, I see! Well, in that case . . . yes, perfectly all right," replied Mr. Starling. He gazed rather sadly out the window. "The most interesting characters in the world are usually the made-up ones, you know, Jamie."

"Does anyone need to know I've made her up? This aunt?" Jamie asked.

"Well, *I* won't say anything," promised Mr. Starling. "but the onus is on you to make her seem real so we all believe in her. You go home and see what you can dream up."

That evening, Jamie Nutbeam said to his family, "Did you know that awful Angelica Tonks has eight uncles and eleven aunts?"

"Well, everybody knows that they're a big family," replied his mother.

"We have to write a pen-portrait of an aunt or uncle for homework, and Honky can't decide which one to do because they're all so *wonderfully interesting*, she says. Urk!" He paused and then added, "I'm doing Aunt Millicent."

Jamie's father peered over the top of his newspaper. "Aunt who?"

"Who's Aunt Millicent?" demanded Jamie's sister, Nerissa.

"You haven't got an Aunt Millicent," said his mother. "You haven't any aunts at all, *or* uncles, for that matter."

"*I know* I haven't," Jamie snapped. "It's unfair – I mean, awful Honky has nineteen aunts and uncles and Nerissa and I haven't got any, not one." Jamie ground the pencil between his teeth.

"You won't have any teeth either, if you chew on pencils like that," remarked his father, who was a dentist.

Annoyed, Jamie spit out the wet pencil bits.

"Mr. Starling said to write about *an* aunt or uncle, not exactly *my* aunt or uncle. He says I can invent one."

"Will you explain that she's not real?" asked Nerissa, doubtfully.

"Mr. Starling says I don't have to, and he's not going to tell. He says I have to adduce enough information and description that people believe that she *is* real."

Dr. Nutbeam folded his newspaper; Jamie's project sounded rather fun.

"Jamie," Dr. Nutbeam said, "tell us about Aunt Millicent and let us get some facts straight. Is she my sister, or Mom's?"

"I can't decide," frowned Jamie. "What do you think?"

"She'd better be your sister, dear," said Mrs. Nutbeam calmly to her husband. "I grew up here and everyone knows I was an only child, but you came from another town. You're more mysterious."

Dr. Nutbeam looked pleased. "Mm…mm. That's nice…having a sister, I mean. Is she younger than me?"

"No, older," said Jamie.

"I don't mean to niggle," said Nerissa, "but where does she live? Has she a family of her own? Any cousins for us?"

"No way – she hasn't time for all that. And she doesn't live anywhere in particular. She's an explorer," said Jamie, proudly. "She works for foreign governments, and she's terribly busy."

There was something of a pause. Then Dr. Nutbeam said, "Ah," and stroked his head. "That explains why we haven't seen her for so long."

"What does she explore?" demanded Nerissa.

Jamie was beginning to feel a bit rushed. "Well, I'm not sure yet, but foreign governments need people like her to search for water in deserts and rich mineral deposits and endangered species and things."

Nerissa lay on the floor with her eyes closed and began to imagine her new aunt.

Dr. Nutbeam asked, "Do we know what Millie is actually exploring at present?"

Jamie chewed on his pencil for a moment and then said, "She's in Africa, somewhere near the middle, but I'm not sure where, exactly."

"In the middle of Africa, is she?" echoed Dr. Nutbeam. "Mm . . . then it wouldn't surprise me if she were in Cameroon. There's a lot of dense forest in Cameroon, you know."

Jamie fetched the atlas and found a map of Africa. His father stood behind him, peering at it. "There it is, in the middle on the left-hand side, just under the bump. Look – here's the equator just to the south, so it must be pretty hot and steamy at sea-level."

Jamie examined the map closely. "That's peculiar – the north border of Cameroon seems to be floating in a big lake . . . um, Lake Chad . . . it looks all swampy, with funny dotted lines and things. I bet that bit needs exploring. They've probably lost their border in the mud and Aunt Millicent could be on an expedition to find it."

"I wonder if she was good at Geography at school?" said Nerissa.

"Well, you'll be able to ask Grandma tomorrow. She's coming for her winter visit, remember?"

"How exciting!" Grandma Nutbeam exclaimed. "I always wanted a daughter! Just show me on the map where Millicent is at the moment, please dear."

Jamie pointed to the dotted lines in swampy Lake Chad near the top end of Cameroon, and Grandma stared in astonishment.

"Gracious heaven! What an extraordinary place to go to, the silly girl! Millicent was never very good at looking after herself, you know. Let me see – I think I'll get some wool tomorrow and knit her some good stout hiking socks. She can wear one underneath each brogan, to keep her feet protected."

Jamie blinked. "There's no need to do that, Grandma. She's not really real, you know."

"Well, she'll be more real to me if I make her some socks," Grandma declared.

"Was Aunt Millicent good at Geography at school?" Nerissa remembered to ask.

"Let me think – yes, she must have been because one year she won a prize for it, and the prize was a book called *Lives of the Great Explorers*."

"Well, there you are," remarked Mrs. Nutbeam. "That's probably how it all started."

Angelica Tonks had found it so difficult to select one of the nineteen aunts and uncles, that her portrait was left until the very last minute and then written in a hurry. She had finally chosen Aunt Daisy Blizzard, Mrs. Tonks's eldest sister.

Mr. Starling asked Angelica to read her portrait to the class first. Although she read her paper with notable bombast, Angelica's aunt sounded anything but wonderfully

interesting. She had always lived in the same street, her favorite color was purple and she grew violets on the bathroom shelf, but that was about all.

Mr. Starling saved Jamie's portrait until last, hoping for the best. Jamie cleared his throat nervously and began:

"I have never met Aunt Millicent and no one in my family knows her very well, as she hasn't been here to visit in a long time. This is because Aunt Millicent is an explorer . . ."

Mr. Starling smiled happily when Jamie explained how Millicent had gained her early training as an explorer by regularly running away from home. He sighed with pleasure as Jamie described the swampy region of Lake Chad, where Millicent was searching through the mud for the northern border of Cameroon. He positively beamed when he heard that Grandma Nutbeam was knitting explorer's socks for her daughter.

The rest of the class listened with fascination as Jamie read on, except for Angelica Tonks, whose expression grew darker by the minute. Jamie had barely finished his portrait when her hand was waving furiously. He knew she could hardly wait to impugn his creation.

Mr. Starling's beam faded. "What *is* it, Angelica?"

"I don't believe it. Women don't go exploring! I think Jamie's made it all up!" Before Mr. Starling had time to say anything, the other girls in the class rose up in a passion and rounded on Angelica to refel her jealous comments.

"Who *says* women don't go exploring?"

"Women can do anything they want to these days, Angelica Tonks! Don't you know that?"

"*I'd* really like to be an explorer or something – maybe a test-pilot."

"What does your aunt wear when she's at work?"

The boys began to join in.

"What kinds of tools does she use?"

"How many languages can she speak?"

The clamor was so great that hardly anyone heard the bell. Mr. Starling gathered up his books, giving Jamie a secret wink as he left the room.

The end of the assignment was not the end of Aunt Millicent. At home, she settled happily into the Nutbeam family, who all followed her adventures with great interest. Dr. Nutbeam brought home library books about Cameroon and Central Africa. Mrs. Nutbeam searched an old storeroom at the shop and began to collect exotic objects.

"Just the sort of gift Millicent could have sent us," she explained.

Word of Millicent Nutbeam began to spread through the town. Not every small town could claim to be connected to a famous international explorer – it was exciting news.

Angelica Tonks, however, told her mother that she didn't believe Jamie's aunt was an explorer at all. "I bet he just invented that to make his aunt seem more interesting than all the rest," she scoffed.

Mrs. Tonks sniffed a good deal and then decided it was time to have a dental check-up. "I'll get to the bottom of that Millicent Nutbeam, you mark my words," she told Angelica, as she telephoned Dr. Nutbeam's office for an appointment.

"Well, well – good morning Mrs. Tonks," said Dr. Nutbeam, a few days later. "We haven't seen you for a while! Just lie right back in the chair please, and relax!"

Mrs. Tonks lay back, but she didn't relax one bit. Her eyes were sharp and suspicious. "Good morning, Dr. Nutbeam. How is the family?" she inquired. "And how is your sister?"

Dr. Nutbeam pulled on his rubber gloves. "My sister? Which one? . . . Er, probe, please nurse."

Before he could say "Open wide," Mrs. Tonks snapped with obvious rancor, "Your sister the so-called explorer. Huh! The one in Cameroon."

"Ah, *that* sister. You mean Millicent . . . now, just open wider and turn this way a little. Yes, our Millie, she does work so hard!" He crammed six plugs of cotton wool around Mrs. Tonks's gums. "Have you ever been to Cameroon, Mrs. Tonks?"

Mrs. Tonks's eyes glared. She tried to shake her head, but water spilled down her chin.

"No, I didn't think you had. Such a fascinating place!" Dr. Nutbeam turned on the squealing high-speed drill and bored into her decaying tooth, spraying water all over her chin.

When he had told his family about this encounter with Mrs. Tonks, his wife complained, "It's all very well for you. *You* can just fill people's mouths full of cotton and metal instruments and suction tubes if they start asking awkward questions, but what am I supposed to do?"

The truth was that increasing numbers of people were calling at the antique shop where Mrs. Nutbeam worked. They were eager to know more about Millicent Nutbeam and her adventurous life. They felt proud of her.

“It’s getting quite tricky,” Mrs. Nutbeam explained. “People are asking to see photos of Millicent. I wish people weren’t so curious. Sometimes I don’t know what to say!”

Grandma found herself on slippery ground, too, when she met the postman at the gate.

“Morning,” he said, sorting through his bag of mail. “You must be Jamie’s grandmother, then.”

“Yes, I am,” Grandma replied, rather surprised.

“Mother of the explorer, eh?”

“Gracious!” exclaimed Grandma. “Fancy you knowing about that!”

“Oh, my girl Julie has told us all about it. She’s in Jamie’s class at school.” The postman held out a bundle of letters. “Here you are.”

Grandma glanced through the letters. “Goodness! There’s one from South America . . . Peru.”

“Is it from her?” asked the postman, eagerly.

“Her? Ah . . . Millicent. I don’t know. It’s for Dr. Nutbeam, my son, and it’s typed. Anyway, as far as we know, Millicent is still in Cameroon, although we’ve not had word for some time.”

“She could have moved on, couldn’t she?” suggested the postman, “Peru, eh? Oh well, I’d better move on, too. Good day to you!”

At school, Julie the postman's daughter said to Jamie, "Why has your aunt gone to South America? What's she exploring now?"

"Who said she's gone to South America?" demanded Jamie. He felt he was losing control of Aunt Millicent.

"My dad said there was a letter from her in Peru," replied Julie.

"Well, no one told *me*, " growled Jamie.

At home he announced, "Julie is telling everybody that our Aunt Millicent is in Peru! What's she talking about? What's happening?"

Grandma stopped knitting. "Julie. Is that the name of the postman's girl?"

"Yes – her dad said there was a letter for us from Aunt Millie in Peru, or somewhere mad."

"Oh, I remember – he asked me about it," said Grandma.

"Well . . . what did you *say*?" wailed Jamie.

"I just said I didn't know who the letter was from and that I thought Millicent was still in Cameroon, but that we hadn't heard for a while where she was. That's all."

"The letter from Peru," chuckled Dr. Nutbeam, "is about the World Dental Conference, which is being held next year in Lima. It has nothing to do with Millicent."

"Well of *course* it hasn't," replied Jamie angrily. "She doesn't exist!"

Mrs. Nutbeam sighed. "Listen, Jamie, perhaps the time has come to own up that Aunt Millicent is not real."

"We can't do that!" wailed Jamie. "Everyone would think we're crazy . . . and that Grandma's absolutely nuts, knitting socks for an aunt who isn't there. Anyway, I

can't let Honky Tonks find out now – she'd never stop talking about it and she'd be more awful than ever."

Jamie decided to lay the whole problem of Aunt Millicent Nutbeam before Mr. Starling. He finished by saying, "I think I might have to kill her off."

"That'd be a shame," sighed Mr. Starling. "She's quite a lady, your aunt!"

"It would be pretty easy to get rid of her," Jamie went on. "In her sort of job she could sink into a quick sand, or be trampled by a herd of elephants, or something."

Mr. Starling shook his head violently. "No, no – it would only make things worse if she died a dramatic death like that. No one would be likely to forget her if she was squashed flat by a stampeding elephant. She'd become more interesting than ever!"

"Well, she could die of something boring, like pneumonia," said Jamie. "Or . . . will I have to own up that she isn't real?"

"Do you want to own up?"

"Not really. I'd feel stupid, and I especially don't want Angelica Tonks to know I invented an aunt," said Jamie.

Mr. Starling quite understood. "I see! Anyway, a lot of people would be sad to discover that Millicent Nutbeam was just a big canard. The girls in your class, for example – she means a lot to them."

"What'll I do then?"

"If you want people to lose interest in her, you'll just have to make her less interesting. I think she should retire from exploring, for a start."

"Aw, gee!" Jamie felt very disappointed. "I suppose so. I'll see what they think at home."

"What he means," said Dr. Nutbeam, when Jamie had repeated Mr. Starling's advice, "is that it's time my dear sister Millicent settled down."

"I think she should get married," remarked Grandma.

"That sounds terribly boring," yawned Nerissa.

"Well, that's what we need," said Jamie, "something terribly boring to make people lose interest."

"How about marrying her to a retired account manager who used to work for a cardboard box company?" suggested his father. "That sounds pretty dull."

Everyone agreed, and Jamie passed on the information to his classmates. He explained about the letter from Peru and about how the ridiculous rumor had started. He told the class about Millicent's decision to retire and move to Bognor. The girls were shocked.

"She's what?"

"She can't be!"

"How boring for her!"

"Where in the world is Bognor? Is there really such a place?"

Angelica Tonks grinned. "See! Your Aunt Millicent is just like any other old aunt, after all!" Jamie caught Mr. Starling's eye. It winked.

Aunt Millicent Nutbeam retired, not to Bognor but to live quietly with her family. Nerissa and Jamie still had wonderful dreams about her adventures. Grandma Nutbeam's

holiday came to an end and she packed up to return home. She left a package for Jamie containing three pairs of socks and a card which read:

> Dear Jamie,
>
> Aunt Millicent won't have any use for these now that she has settled down, so you might as well have them for school camps. Isn't it lucky that they are just your size!
>
> With love from Grandma

STORY 2 (“Dog”)

“Lob’s Girl,” by Joan Aiken

Some people choose their dogs, and some dogs choose their people. The Pengelly family had no say in the choosing of Lob; he came to them in the second way, and without the slightest hesitation.

It began on the beach, the summer when Sandy was five, Don, her older brother, twelve, and the twins were three. Sandy was lying peacefully reading a comic and not keeping an eye on the twins. Father – Bert Pengelly – and Don were up painting the bottom boards of Father’s fishing boat. And Mother – Jean Pengelly – was getting ahead with making the Christmas puddings.

Sandy rolled onto her back to sure that the twins were not climbing on slippery rocks or getting cut off by the tide. At the same moment a large body struck her in the stomach and she was covered by flying sand. Instinctively she shut her eyes and felt the sand being wiped off her face by something that seemed like a warm, rough, damp flannel. She opened her eyes and looked. It was a tongue. Its owner was a large German shepherd, with black-tipped prick ears, a thick, soft pelage, and a bushy black tipped tail.

“*Lob!*” shouted a man farther up beach. “Lob, come here!”

But Lob, as if trying to apologize for the surprise he had given her, went on licking the sand off Sandy's face. His owner, a gray-haired man, walked over as quickly as he could and seized him by the collar.

“I hope he didn't give you a fright?” the man said to Sandy.

“Oh, no. I think he's *beautiful*,” said Sandy truly. She picked up a stick and threw it. Lob whisked easily out of his master’s grip. He came back with the stick, beaming,

and gave it to Sandy. At the same time he gave himself. With Sandy, too, it was love at first sight, and when, after a lot more stick-throwing, she and the twins joined Father and Don to go home for lunch, they looked back at Lob being led firmly away by his master.

"I wish we could play with him every day." Tess sighed.

"Why can't we?" said Tim.

Sandy explained. "Because Mr. Dodsworth, who owns him, lives far away, and he will only be at Fisherman's Arms till Saturday."

The Pengelly children went home, thinking they had seen the last of Lob. But they were much mistaken. The whole family was playing cards by the fire in the front room after supper when there was a loud thump and a crash of china in the kitchen.

"My Christmas puddings!" exclaimed Jean, and ran out.

It was Lob who had bounced in through the open kitchen window, where the puddings were cooling on the sill. Luckily only the smallest was knocked down and broken.

Lob stood on his hind legs and plastered Sandy's face with licks. Then he did the same for the twins, who shrieked with joy.

"Where does this friend of yours come from?" inquired Mr. Pengelly.

"He's staying at the Fisherman's Arms – I mean his owner is."

"Then he must go back there."

"I wonder how he found his way here," Mrs. Pengelly said.

Lob seemed to truckle as his owner scolded him. Mr. Dodsworth thanked Mr. Pengelly for bringing him back. Jean Pengelly warned the children that they had better not play with Lob any more if they met him on the beach, or it would only lead to more

trouble. So with great effort, they took no notice of him the next day until he spoiled their good resolutions by dashing up to them with joyful barks, wagging his tail.

They had a happy day, playing on the sand.

The next day was Saturday. Lob and Mr. Dodsworth left Fisherman's Arms, as planned. That day, Sandy was so cross and unlike herself that Tess and Tim were quite surprised, and her mother gave her some tea before bed.

A week passed. Then, one evening, Mrs. Pengelly and the younger children were in the front room playing.

Suddenly, history repeating itself, there was a crash from the kitchen. Jean Pengelly leaped up, crying, "My blackberry jelly!" She and the children had spent the morning picking and the afternoon boiling fruit.

But Sandy was ahead of her mother. With flushed cheeks and eyes like stars she had darted into the kitchen, where she and Lob were hugging one another in a frenzy of joy.

"Good heavens!" exclaimed Jean. "How in the world did *he* get here?"

"He must have walked," said Sandy. "Look at his feet."

They were worn and dusty. One had a cut on the pad.

"They ought to be bathed," said Jean Pengelly. "Sandy, run a bowl of warm water while I get the soap."

"What'll we do about him, Mother?" said Sandy anxiously.

Mrs. Pengelly looked at her daughter's pleading eyes and sighed.

"He must go back to his owner, of course," she said, making her voice firm. "Your dad can get the address tomorrow, and phone him or send a note. In the meantime he'd better have a long drink and a good meal."

Lob was very grateful for the drink and the meal, and made no objection to having his feet washed. Then he flopped down in front of the fire they had lit, with his head on Sandy's feet. He was a very tired dog. He had walked more than four hundred miles.

The next day Mr. Pengelly phoned Lob's owner, and the following morning Mr. Dodsworth arrived off the night train, decidedly put out, to take his pet home. Sandy crept up to her bedroom afterward and lay with her face pressed into the quilt, feeling as if she were bruised all over. She couldn't help but repine for this dog she loved so much.

In ten days' time, though, Lob was back – limping this time, with a torn ear and a patch missing out of his furry coat, as if he had met and tangled with an enemy or two in the course of his four hundred mile walk.

Bert Pengelly called Mr. Dodsworth again. He answered the phone wearily. He said, "That dog has already cost me two days that I can't spare away from my work. I'm too old for this. I think we'd better face the fact, Mr. Pengelly, that it's your family he wants to stay with – that is, if you want to have him."

"Is he a big eater?" Bert asked doubtfully.

By this time the children, breathless in the background listening to one side of this conversation, had realized what was in the wind and were dancing up and down with their hands clasped restlessly.

"Oh, not for his size," Lob's owner was quick to aver. "Two or three pounds of meat a day – he does very well on that."

Sandy's father looked over the telephone at his daughter's swimming eyes and trembling lips. He reached a decision. “Well, then, Mr. Dodsworth,” he said briskly, “we'll accept your offer and thank you very much. The children will be overjoyed and you can be sure Lob has come to a good home. But I can tell you,” he ended firmly, “in this house, we have a surfeit of fish. If he wants to settle in with us he'll have to learn to eat a lot of fish.”

So that was how Lob came to live with the Pengelly family. There was never any question who came first with him. He was Sandy's dog. He slept by her bed and followed her everywhere he was allowed.

Nine years went by, and Lob changed less than Sandy. As she went into her teens he became a little slower, and there was a touch of gray on his nose, but he was still a handsome dog. He and Sandy still loved one another deeply.

One evening in October, when the children came home from school, Jean Pengelly said, “Sandy, your Aunt Rebecca wants one of you to go and spend the evening with her. You go, dear; you can take your homework with you.”

Reluctantly Sandy tidied herself, took her school bag, put on the damp raincoat she had just taken off, fastened Lob's lead to his collar, and set off to walk through the dusk to Aunt Becky's cottage, which was five minutes' climb up the steep hill.

“Put some cheerful music on,” said Jean Pengelly. So Don, who had just come in, put on some rock music, loud. Which was why the Pengellys did not hear the truck speeding down the hill and crash against the post office wall a few minutes later.

Dr. Travers was driving through Cornwall with his wife, taking a late vacation.

"We must be nearly there," said his wife, looking out of her window. "I noticed a sign on the coast road that said Fisherman's Arms was two miles. What a narrow, dangerous hill! But the cottages are very pretty -- Oh, Frank, stop, *stop!* There's a child – by the wall over there!"

Dr. Travers jammed on his brakes. A runnel ran down by the road, and half in the water lay something that looked, in the dusk, like a pile of clothes – or was it the body of a child? Mrs. Travers was out of the car in a flash, but her husband was quicker.

"Don't touch her, Emily!" he said sharply. "She's been hit. Can't be more than a few minutes. Remember that truck that overtook us half a mile back, speeding like the devil? Here, quick, go into that cottage and phone for an ambulance. I'll stay here and do what I can to stop the bleeding."

Mrs. Travers was very quick. The first cottage she tried had a phone; in four minutes she was back, and in six an ambulance was wailing down the hill.

Its attendants lifted the child onto a stretcher carefully. The ambulance sped off to Plymouth – for the local hospital did not take serious accident cases – and Dr. Travers went down to the police station to report what had happened.

He found that the police already knew about the speeding truck – which had suffered from loss of brakes and ended up crashing through the post office wall. The driver was injured and in shock, but the police thought he was the only person hurt – until Dr. Travers told his tale.

At half-past nine that night Aunt Rebecca Hoskins was sitting by her fire thinking angry thoughts about rude nieces who were asked to supper and never turned up, when she was startled by a neighbor, who burst in, exclaiming, "Have you heard about Sandy

Pengelly? Terrible thing, and they don't know if she's likely to live. Police have got the truck driver that hit her. Poor Bert and Jean."

Horrified, Aunt Rebecca put on a coat and went down to her brother's house. She found the family with white shocked faces; Bert and Jean were about to drive off to the hospital where Sandy had been taken, and the twins were crying bitterly. Lob was nowhere to be seen.

"Thank goodness you've come, Beck," said her brother. "Will you stay the night with Don and the twins? Don's out looking for Lob and heaven knows when we'll be back."

"Oh, if only I'd never invited poor child," wailed Mrs. Hoskins. But Bert and Jean hardly heard her.

That night seemed to last forever. The twins cried themselves to sleep. Bert and Jean sat in a waiting room of the Western Counties Hospital, but Sandy was unconscious, they were told, and she remained so.

"I won't conceal from you that her condition is very serious, unless she shows signs of coming out from her unconscious state," the emergency doctor said.

But as hour succeeded hour, Sandy showed no signs of recovering consciousness.

The Western Counties Hospital is a large one, with three or four entrances. By that afternoon it became noticeable that a dog seemed to have taken up position outside the hospital, with the fixed intention of getting in. Patiently he would try first one entrance and then another, all the way around, and then begin again. Sometimes he would get a little way inside, following a visitor, but animals were, of course, forbidden, and he

was always kindly but firmly turned out again. No one seemed to own him or to know where he came from.

At lunch time Granny Pearce came through the pouring rain to bring a flask of hot tea to her daughter and son-in-law. Just as she reached the main entrance the guard was gently shoving out a large, agitated, soaking-wet German shepherd.

“No, old fellow, you can *not* come in. Hospitals are for people, not for dogs.”

“Why, bless me,” exclaimed old Mrs. Pearce. “That's Lob! Here, Lob, Lobby boy!”

Lob ran to her, whining. Mrs. Pearce walked up to the desk.

“I'm sorry, madam, you can't bring that dog in here,” the guard said.

Mrs. Pearce was a very determined old lady. She looked the guard in the eye. She did not hesitate to inveigh against such an unfair rule.

“Now, see here, young man. That dog has walked twenty miles to get to one of my grandchildren. Heaven knows how he knew she was here, but it's plain he knows. He ought to get to see her!”

“I'll have to ask the medical officer,” the guard said weakly.

“You do that, young man.” Granny Pearce sat down in a determined manner, shutting her umbrella, and Lob sat patiently dripping at her feet. Every now and then he shook his head, as if to try and remove something heavy that was tied around his neck.

Presently a tired, thin, intelligent-looking man in a white coat came downstairs.

“It's strictly against every rule, but as it's such a serious case we are making an exception,” he said to Granny Pearce quietly. “But only *outside* her bedroom door.”

Without a word, she rose and stumped upstairs. Lob followed close to her skirts, as if he knew his hope lay with her.

They waited in the corridor outside Sandy's room. Bert and Jean were inside. The door was half shut, and through it could be seen a high, narrow bed with a lot of gadgets around it. Sandy lay there, very flat under the covers, very still. Her head was turned away. All Lob's attention was focused on the bed. He strained toward it, but Granny Pearce clasped his collar firmly.

Lob let out a faint whine, anxious and pleading.

At the sound of that whine Sandy stirred just a little. She sighed and moved her head the least fraction. Lob whined again. And then Sandy turned her head right over. Her eyes opened, looking at the door.

“Lob?” she murmured – no more than a breath of sound. “Lobby, boy?”

The doctor drew a quick, sharp breath. Sandy moved her left arm – the one that was not broken – from below the covers and let her hand dangle down, feeling, as she always did in the mornings, for Lob's furry head. The doctor nodded slowly.

“All right,” he whispered. “Let him go to the bedside. But keep a hold of him.”

Granny Pearce and Lob moved to the bedside. She looked at the smile on Sandy’s face as the groping fingers found Lob's wet ears and gently pulled them. “Good boy,” whispered Sandy, and fell asleep again.

Granny Pearce led Lob out into the passage again. There she let go of him and he ran off swiftly down the stairs. She would have followed him, but Bert and Jean had come out into the passage, and she spoke to Bert fiercely.

"*I* don't know why you were so foolish as not to bring the dog before! Leaving him to find the way here himself–"

"But, Mother!" said Jean Pengelly. "That can't have been Lob–" she stopped, with her handkerchief pressed to her mouth.

"Not Lob? I've known that dog nine years! I ought to know my own grandchildren's dog."

"Listen, Mother," said Bert, overwhelmed with the pathos of this tragedy. "Lob was killed by the same truck that hit Sandy. Don found him – when he went to look for Sandy's school bag. He was – he was dead. Ribs all smashed. No question of that. Don told me on the phone – he rowed a half mile out to sea and sank the dog with a lump of concrete tied to his collar. Poor old boy. Still – he was getting on. Couldn't have lasted forever."

"*Sank him at sea?* Then what–?"

Slowly old Mrs. Pearce, and then the other two, turned to look at the trail of dripping-wet footprints that led down the hospital stairs.

In the Pengellys' garden they have a stone, under the palm tree. It says: "Lob. Sandy's dog. Buried at sea."

STORY 3 (“Plane”)

“Nickel – A – Pound Plane Ride,” by Gary Soto

Araceli slipped the rubber band off the morning newspaper. One eye closed, she shot it across the living room at her sleeping cat, Asco, who didn't stir.

“You lazy thing,” Araceli muttered, smiling and pushing her long hair behind her ears, and wiggling a little of her tongue in the gap between her front teeth.

She unfolded the newspaper and glanced at the front page. She winced at a photo of a car wreck on Highway 99. It was winter in California's San Joaquin Valley; cold air burned like ice pressed against a warm cheek, and sometimes the fog and rain caused cars to slide off the highway and buckle like aluminum cans.

But this morning Araceli didn't care about the front page. Her friend Carolina had called last night with more exciting news: she had heard about some airplane rides at Chandler Airfield for almost nothing. More than anything Araceli wanted to fly in an airplane. Everyone she knew had gone up in a plane and come down like an angel. Her mother and father had flown to Hawaii for their tenth wedding anniversary. Her grandfather flew to Reno once a month. Her cousin, who was the manager of a rock group, spent more time in the air between the clouds than on the black asphalt of Los Angeles, his hometown. Her brother, Eddie, a junior in high school and the drum major for the Roosevelt High School marching band, had flown to New York to be in the Macy's Parade. Even her baby cousin, Carlos, had flown from Los Angeles to Guadalajara, shaking a yellow rattle for hours, he was so happy.

Settling into the couch Araceli searched the paper for news of the plane rides. Toward the back of the paper near the gardening section, her eye caught the one-column

story: the American Legion was offering nickel-a-pound airplane rides to benefit the Children's Hospital.

“Finally,” Araceli beamed, rereading the story two more times. “I'm going to fly!” She spread her arms like wings and flew into the kitchen, where she fixed herself a bowl of cereal and made some coffee.

Her father came into the kitchen looking for the newspaper. His eyes were glazed from a hard sleep.

“Morning, Dad,” Araceli greeted him, not looking up from the comics. She automatically handed him the sports section.

“Morning, sugar,” he said sleepily, taking the section and staggering to the kitchen counter, where he poured coffee into his Raiders cup. He took the paper and coffee into the living room.

Araceli rinsed her bowl at the sink and straightened the newspaper. She knew she had to be extra good because she was going to beg her dad to take her to Chandler Airfield. She danced into the living room and asked, “Dad, do you want another cup of coffee?”

Still reading his newspaper, her father held out his half-empty cup. She took it to the kitchen, carefully poured the coffee adding a dash of half-and-half, and brought the cup back to him.

“Dad,” Araceli said, after he'd begun to imbibe the second cup. “Dad, we should do something special this weekend.”

Having turned to the front section of the paper, her father was reading about the highway accident. “Yeah, you can clean up your room. Mom will be home this evening.” Araceli's mother was away for the weekend with some neighborhood friends.

“It's clean already.”

“Clean it some more.” A smile played at the corners of her father's mouth. He was kidding her.

“No, Dad, I want to go flying.”

Her father put down the paper and gave Araceli a baffled look. He touched her forehead and asked in a playful voice, “Do you have a fever?”

“Dad,” she pleaded. “Dad, they have this thing where you can pay a nickel for every pound you weigh and then you get to fly.”

“You're gonna make me poor.”

“I'm not fat.” She knew she was halfway to convincing her father.

“Well, tell me more about this plane ride,” her father said.

“We're helping the world,” Araceli explained. “The money goes to Children's Hospital. Think of all the babies we will save if we go and get on the plane. The American Legion will be able to buy all these machines, and then everybody will be okay.”

Her father laughed. “How much do you weigh? They're gonna make a fortune off you.”

“Every little bit helps.”

“You're funny,” her father said. "I'm going to shave. We'll go in a minute.”

“All right!” Araceli yelled, jumping up and down and twirling around the room.

Araceli went into the bathroom and, still wearing her flannel pajamas printed with horses, stood on the cold scale. She weighed sixty-eight pounds. She stood on tiptoe, hoping it would make her weigh less. The needle twitched, but her weight remained the same.

Father and daughter dressed for the day.

“It's gonna rain buckets, I think,” Araceli's father said, stepping out onto the porch. The wind was shaking the top of the elm in front of their house. The sky was as gray as cement. The neighbor's chimney was sending up billows of smoke that immediately broke apart in the wind.

They settled into the Honda and drove west toward Chandler Airfield, which was at the edge of town. Araceli's father turned on the headlights and cleared the mist from the windshield. The heater warmed their feet.

“Are you sure you want to fly?” he asked. He wasn't teasing her now. He peered through the windshield at the dark sky. A few drops of rain blurred the glass.

“I'm not scared,” Araceli said, smiling stiffly at her father. She worked her tongue into the gap between her front teeth. She wanted to fly; she was determined to do it.

As they approached the airfield, they spotted a single-engine airplane taking off. It seemed so light and easy: a short run on the little runway, and then it was up, up, up.

The mist had become a soft, slanting rain. Araceli and her father got out of the car and – hand-in-gloved-hand, their jacket hoods over their heads – hurried across the parking lot to the long line of people waiting to fly.

After a few minutes in line her father said, “I don't know, sugar.”

“Come on, Dad. It's not that long.”

“Not long? There's only two planes and all these people.”

To the west, a feather of blue was showing between the dark clouds.

“See, it might even clear up,” Araceli argued, pointing to that faraway blue sky.

A few people in line gave up and raced back to their cars, and the line stepped ahead. Araceli's father, shuddering from the cold, suggested, “I have an idea. You can wait in the car and I'll wait in line. We'll take turns every ten minutes.” He looked down at his watch. “It's fifteen to twelve.”

Araceli nodded. “Fair enough.”

She raced back to the car, leaping over puddles, and immediately flicked on the heater. She held her hands up to the vents and sneezed.

She stayed in the car for exactly eight minutes, and then she raced back to the line. She was surprised how wet her father looked. The hood of his jacket was plastered to his head, and his eyeglasses were so covered with rain that he couldn't see her clearly enough to recognize her. She had to tug on his arm to get his attention.

“Dad, it's me.”

“Sugar, it's really starting to come down,” he said.

“It's not that bad.”

“It is. The man said they might cancel the flights.”

“Come on, Dad.”

A large family in front of them gave up, in spite of two of the children who burst into tears. They hurried back to their station wagon, and suddenly Araceli was almost to the gate.

“You go. I'll wait for you,” her father said.

“Come on, Dad," Araceli insisted.

“I weigh too much,” he chuckled. “I didn't bring that many nickels!”

At that moment Araceli's friend, Carolina, walked slowly out of the gate clinging to her father's arm. They had just landed with the latest load of passengers.

“Carolina,” Araceli shouted through cupped hands. “How was it?”

Carolina looked in Araceli's direction but didn't say anything. Her eyes seemed shiny, as if she had gotten a lot of rain in them.

“What's wrong with her?” Araceli asked her father.

“Maybe she's sick. I'm getting cold.”

“I'm not cold,” Araceli lied. “In fact, I'm hot,” she said, opening her jacket a little.

When they were finally next in line, her father turned to Araceli and said, “You can change your mind.”

“No way,” she said. She hopped up on the scale and smiled at her weight: 74 pounds, wet clothes and all. “See, Dad, I'm not fat.”

Her father paid and was given a receipt.

“Hold on,” Araceli heard her father say, but the advice that followed was eaten by the wind. A man walked her to the airplane, where a man, woman, and boy sat waiting. Araceli climbed on board next to the boy, who appeared not to notice her at first. She was glad to get out of the rain and wind, but she was shocked by how small the compartment was. There was hardly room for her to move her feet. Even the airplane's windshield was small, and had a gray tincture, making it difficult to see out.

“Buckle your seat belts,” the pilot said.

Araceli strapped herself in and smiled. She stopped smiling as the engine began to roar. The noise was ear-splitting. She held her gloved hands over her ears and saw that the other passengers were doing the same.

“This is going to be fun,” she said over the roar of the engine.

The boy looked doubtfully at Araceli.

The airplane maneuvered onto the runway. Araceli leaned forward between the mother and father opposite her. A tyro of flying, she wanted to watch the pilot as he turned knobs, flicked switches, and adjusted levers. She saw him pull back the throttle, and the airplane began to slip and slide down the runway.

The plane seemed to move slowly, and for the first time Araceli worried that they might crash. She closed her eyes and tried to get a sense of when the airplane left the ground. She wanted to memorize this sensation. She wanted to write in her diary later, “I was off the ground, and it was cool.”

But when she opened her eyes, she discovered that they were still rolling down the runway. She screamed, “Come on, get us in the air.” The airplane bumped twice on the runway, and then they were in the air, the wings tipping left, then right, as the airplane climbed.

I'm flying, Araceli thought. She said to herself, “I'm not scared.”

The airplane dipped and rocked, and Araceli's face slammed into the boy's shoulder. He turned and looked at Araceli but didn't say a word.

“Hold on to your hats,” the pilot said calmly. “Winds are out of the northwest.”

The airplane seemed to convolve over and under and around each cloud, vibrating and shuddering. Everyone except the pilot screamed when it bumped through an air

pocket. Araceli closed her eyes in fear. When she opened her eyes, blinking slowly because it all seemed like a dream, she saw a patch of blue in the distance.

The plane rocked again, and the left wing dipped. Araceli recalled the fast ride she'd gone on at the fair in Santa Cruz, a big wooden structure called the Big Dipper. She had been nine at the time and foolish – so foolish that as it sped faster and faster, she had closed her eyes and screamed. The wind had ripped the gum out of her wide-open mouth and tore a dollar bill from her fingers.

But now she was four thousand feet above her hometown. She was twelve, not nine, and still she was scared. She eyed the door, knowing it was her only means of egress. She wondered if the airplane was equipped with parachutes. She looked around. She saw only an old orange cotton shirt. If only I could find some string, she thought. I could make my own parachute.

When the airplane banked right, Araceli slid into the corner. The pilot pointed out landmarks: the Fresno Convention Center, the water tower, Kearny Park. The stadium stood out in the distance. He spotted a wreck on Highway 99. The pilot pointed with his gloved hand, but Araceli couldn't see the landmarks from the back of the plane.

Araceli once again saw a patch of blue sky. Hoping to forfend any possibility of a crash, she pointed a finger and screamed over the engine noise to the pilot, "Can't you fly over there?"

"What?" he yelled back.

"Don't you think it's better over there?" The blue patch was slowly filling with gray clouds. "Never mind." She fell back in her seat and chewed on a fingernail.

They circled once and then returned for landing. Araceli worried as the airplane kept wiggling and dropped suddenly.

“Hold on,” the pilot warned. His glasses had slid down across his face.

The airplane landed safely, and Araceli was glad it was over with just a few big bumps along the way. She couldn't hear because the sound of the engine continued to play over and over in her ears.

She jumped from the cockpit without thanking the pilot or even glancing at her traveling companions, who were shaking out their stiff legs. She raced to her father and hugged him, hard.

“How was it, sugar?” he asked, drinking coffee from a Styrofoam cup.

“Great! I love flying.” She tried to climb into his arms, but her father took her by the hand and walked her back to the car. She was glad when the car got going and the heater blew hot air on her cold toes. She took off her socks and shoes and saw that her toes were wrinkled, as if she had stayed in the bathtub too long.

They returned home to find Araceli's mother doing exercises to music.

“Hi, Mom, I went flying,” Araceli yelled. She threw her arms around her mother's waist and said, “I missed you.”

Her mother turned down the volume on the stereo. “You went flying?”

“Yeah, it was a special thing. We were helping children who are sick.”

“You weren't scared?”

“Of course not!”

She explained the nickel-a-pound airplane rides and the beautiful sensations of flying.

Araceli took a hot bath, relaxed, and stayed inside, occasionally hugging her father, then her mother, then Asco. She even smiled at her brother, who had come home wet as a duck after playing football with his friends and headed straight to the sink to wash and apply unguent to his scraped knees.

As she watched TV Araceli gripped the arms of the chair. When a United Airlines commercial came on, she changed the channel. She didn't want to think about flying – she wanted to think about being on the ground.

She ate dinner and went to bed early. Snugly and safely in bed, she thought about the day and about the rain in Carolina's eyes. They were tears, she realized, and then, to her surprise, Araceli felt her own big, hot, nickel-sized tears bedaub her cheeks. Flying was no fun at all.

STORY 4 (“Rain”)

“Rain, Rain, Go Away,” by Isaac Asimov

“There she is again,” said Lillian Wright as she adjusted the blinds carefully. “There she is, George.”

“There who is?” asked her husband, trying to get satisfactory contrast on the TV so that he might settle down to the ball game.

“Mrs. Sakkaro,” she said, and then, in answer to her husband’s inevitable “Who’s that?” added hastily, “The new neighbors, for goodness sake.”

“Oh.”

“Lying in sun. Always in the sun. I wonder where her boy is. He’s usually out on a nice day like this, standing in that tremendous yard of theirs and throwing the ball against the house. Did you ever see him, George?”

“I’ve heard him. It’s torture. Bang on the wall, bang on the ground, smack in the hand. Bang, bang, smack, bang, bang–”

“He’s a *nice* boy, quiet and well behaved. I wish Tommie would make friends with him. He’s the right age, too, just about ten, I should say.”

“I didn’t know Tommie was backward about making friends.”

“Well it’s hard with the Sakkaros. They keep so to themselves. I don’t even know what Mr. Sakkaro does.”

“Why should you? It’s not really anyone’s business what he does.”

“It’s odd that I never see him go to work.”

“No one ever sees me go to work.”

“You stay home and write. What does he do?”

"I dare say Mrs. Sakkaro knows what Mr. Sakkaro does and is all upset because she doesn't know what I do."

"Oh George." Lillian retreated from the window and glanced with slight disgust at the television. "I think we should make an effort; the neighborhood should."

"What kind of an effort?" George was comfortable on the couch now, with a king-size coke in his hand, freshly opened and frosted with moisture.

"To get to know them."

"Well, didn't you, when she first moved in? You said you called."

"I said hello but, well, she'd just moved in and the house was still upset, so that's all it could be, just hello. It's been two months now and it's still nothing more than hello, sometimes. – She's so odd."

"Is she?"

"She's always looking at the sky; I've seen her do it a hundred times and she's never been out when it's the least bit cloudy. Once, when the boy was out playing, she called to him to come in, shouting that it was going to rain. I happened to hear her and I thought, Goodness, wouldn't you know and me with a wash on the line, so I hurried out and, you know, it was broad sunlight. Oh, there were some clouds, but nothing, really."

"Did it rain, eventually?"

"Of course not. I just had to run out in the yard for nothing."

George was lost amid a couple of base hits and a most embarrassing slip that meant a run. When the excitement was over, George called out after Lillian, who was vanishing into the kitchen, "Well, since they're from Arizona, I dare say they don't know rain clouds from any other kind."

Lillian came back into the living room in a flutter. ‘From where?”

“From Arizona, according to Tommie.”

“How did Tommie know?”

“He talked to their boy, in between ball chucks, I guess, and he told Tommie they came from Arizona and then the boy was called in. At least, Tommie says it might have been Arizona, or maybe Alabama or some place like that. You know Tommie and his incomplete recall. But if they’re that nervous about the weather, I guess it’s Arizona and they don’t know what to make of a good rainy climate like ours.”

“But why didn’t you ever tell me?”

“Because Tommie only told me this morning and because I thought he must have told you already and to tell the absolute truth, because I thought you could just manage to drag out a normal existence even if you never found out. Wow–”

The ball went sailing into the right field stands and that was that for the pitcher.

Lillian went back to the window and said, “I’ll simply just have to make her acquaintance. She looks *very* nice. – Oh, look at that, George.”

George was looking at nothing but the TV.

Ignoring his obvious state of torpor, Lillian said, “I know she’s staring at that cloud. And now she’ll be going in. Honestly, the way they eschew the slightest bit of rain!”

George was out two days later on a reference search in the library and came home with a load of books. Lillian greeted him with great excitement.

She said, “Now, you’re not doing anything tomorrow.”

"That sounds like a statement, not a question."

"It is a statement. We're going out with the Sakkaros to Murphy's Park."

"With–"

"With the next-door neighbors, George. *How* can you never remember the name?"

"I'm gifted. How did it happen?"

"I just went up to their house this morning and rang the bell."

"That easy?"

"It wasn't easy. It was hard. I stood there, shaking, with my finger on the doorbell, till I thought that ringing the bell would be easier than having the door open and being caught standing there like a fool."

"And she didn't kick you out?"

"No. She was sweet as she could be. Invited me in, knew who I was, said she was so glad I had come to visit. *You* know."

"And you suggested we go to Murphy's Park."

"Yes. I thought if I suggested something that would let the children have fun, it would be easier for her to go along with it. She wouldn't want to spoil a chance for her boy."

"A mother's psychology."

"But you should see her home."

"Ah. You had a reason for all this. It comes out. You wanted the grand tour. But, please, spare me the color-scheme details. I'm not interested in the curtains, and I can live without knowing the size of the closets."

It was the secret of their happy marriage that Lillian paid no attention to George. She went into the color-scheme details, was most specific about the curtains, and gave him an inch-by-inch description of closet-size.

"And *clean*? I have never seen any place so tidy."

"If you get to know her, then, she'll be setting you impossible standards and you'll have to drop her in self-defense."

"Her kitchen," said Lillian, ignoring him, "was so sparkling clean you just couldn't believe she ever used it. I asked for a drink of water and she held the glass underneath the tap and poured slowly so that not one drop fell in the sink itself. She did it so casually that I just knew she always did it that way. And when she gave me the glass she held it with a clean napkin. Just hospital-sanitary."

"She must be a lot of trouble to herself. Did she agree to come with us right off?"

"Well – not right off. She called to her husband about what the weather forecast was, and he said that the newspapers all said it would be fair tomorrow but that he was waiting for the latest report on the radio."

"*All* the newspapers said so, eh?"

"Of course, they all just print the official weather forecast, so they would all agree. But I think they do get all the newspapers. I've seen a bundle of newspapers on their porch in the mornings –"

"There isn't much you miss, is there?"

"Anyway," said Lillian severely, "She called up the weather bureau and had them tell her the latest and she called it out to her husband and they said they'd go, except they said they'd phone us if there were any unexpected changes in the weather."

"All right. Then we'll go."

The Sakkaros were young and pleasant, dark and handsome. In fact, as they came down the long walk from their home to where the Wright automobile was parked, George leaned toward his wife and breathed into her ear, "So *he's* the reason."

"I wish he were," said Lillian. "Is that a purse he's carrying?"

"Pocket-radio. To listen to weather forecasts, I bet."

The Sakkaro boy came running after them, waving something which turned out to be a barometer, and all three got into the back seat. Conversation was turned on and lasted, with neat give-and-take on a variety of lively subjects, to Murphy's Park.

The Sakkaro boy was so polite and reasonable that even Tommie Wright, wedged between his parents in the front seat, was subdued by example into an appearance of quiet maturity. Lillian couldn't recall when she had spent such a peaceful and pleasant a drive.

She was not the least disturbed by the fact that, barely to be heard under the flow of the conversation, Mr. Sakkaro's small radio was on, and she never actually saw him put it occasionally to his ear.

It was a beautiful day at Murphy's Park; hot and dry without being too hot; and with a cheerfully bright sun in a blue, blue sky. Even Mr. Sakkaro, though he peered high into the welkin, inspecting every quarter with a careful eye and then stared intently at the barometer, seemed to have no fault to find.

Lillian led the two boys to the amusement section and bought enough tickets to allow one ride for each on every variety of thrill that the park offered.

"Please," she had said to a protesting Mrs. Sakkaro, "let this be my treat. I'll let you have your turn next time."

When she returned, George was alone. "Where–" she began.

"Just down there at the refreshment stand. I told them I'd wait here for you and we would join them." He sounded gloomy.

"Anything wrong?"

"No, not really, except that I think he must be independently wealthy. Compared to him, I must seem like a pauper!"

"What?"

"I don't know what he does for a living. I hinted–"

"Now who's curious?"

"I was doing it for you. He said he's just a student of human nature."

"How philosophical. That would explain all those newspapers."

"Yes, but with a handsome, wealthy man next door, it looks as though I'll have impossible standards set for me, too," he said, suddenly feeling aware of every foible of his own.

"Don't be silly."

"And he doesn't come from Arizona."

"He doesn't?"

"I said I heard he was from Arizona. He looked so surprised, it was obvious he didn't. Then he laughed and asked if he had an Arizona accent."

Lillian said thoughtfully, “He has some kind of accent, you know. There are lots of Spanish-ancestry people in the Southwest, so he could still be from Arizona. Sakkaro could be a Spanish name.”

“Sounds Japanese to me. —Come on, they’re waving. Oh, good grief, look what they’ve bought.”

The Sakkaros approached each holding three sticks of cotton candy, huge swirls of pink foam consisting of threads of sugar dried out of syrup that had been whipped about in a warm vessel. It melted quickly in the mouth and left one feeling sticky.

The Sakkaros held one out to each Wright, and to be polite, the Wrights accepted. They went down the midway, tried their hand at darts, at the kind of game where balls were rolled into holes, at knocking wooden cylinders from their stands. They took pictures of themselves and recorded their voices and tested their strength.

Eventually they collected the youngsters, who had been reduced to a satisfactorily breathless state, and the Sakkaros led theirs off instantly to the refreshment stand. Tommie hinted the extent of his pleasure at the possible purchase of a hot-dog and George tossed him a quarter. He ran off, too.

“Frankly,” said George, “I prefer to stay here. If I see them biting away at another cotton candy stick I’ll turn green and get sick on the spot. If they haven’t had a dozen apiece, I’ll eat a dozen myself.”

“I know, and they’re buying a handful for the child now.”

“I offered Sakkaro a hamburger and he just looked grim and shook his head. Not that a hamburger’s much, but after enough cotton candy, it ought to be a feast.”

"I know. I offered her an orange drink and the way she jumped when she said no, you'd think I'd thrown it in her face.–Still, I suppose they've never been to a place like this before and they'll need time to adjust to the novelty. They'll fill up on cotton candy and then never eat it again for ten years."

"Well, maybe." They strolled toward the Sakkaros. "You know, Lil, it's clouding up."

Mr. Sakkaro had the radio to his ear and was looking anxiously toward the west.

"Uh-oh," said George, "he's seen it. One gets you fifty, he'll want to go home."

All three Sakkaros were upon him, each polite but firm. They were sorry, they had had a wonderful time, a marvelous time, the Wrights would have to be their guests as soon as it could be managed, but now, really, they had to go home. It looked stormy. Mrs. Sakkaro wailed that all the forecasts had been for fair weather.

George tried to calm them. "It's hard to predict a local thunderstorm, but even if it were to come, and it might not, it wouldn't last more than half an hour on the outside."

At which comment, the Sakkaro youngster seemed near tears, and Mrs. Sakkaro's hand, holding a handkerchief, trembled visibly.

"Let's go home," said George in resignation.

The drive back seemed like it would never end. There was no conversation to speak of. Mr. Sakkaro's radio was quite loud now as he switched from station to station, catching a weather report every time. They were mentioning "local thunder showers" now.

The Sakkaro youngster piped up that the barometer was falling, and Mrs. Sakkaro, chin in the palm of her hand, stared grimly at the sky and asked if George could not drive faster please.

"It does look rather threatening, doesn't it?" said Lillian in a polite attempt to share their guests' attitude. But then George heard her whisper, "Honestly!" under her breath.

A wind had sprung up, driving the dust of the weeks-dry road before it, when they entered the street on which they lived. The leaves rustled and lightning flickered.

George said, "You'll be indoors in two minutes, friends. We'll make it," George said, trying to assuage their fears.

He pulled up at the gate that opened onto the Sakkaros' spacious front yard and got out of the car to open the back door. He thought he felt a drop. They were *just* in time. The Sakkaros tumbled out, faces drawn with tension, uttering quick thanks, and started off toward their long front walk at a dead run.

"Honestly," began Lillian, "you would think they were–"

The heavens opened and the rain came down in giant drops as though some celestial dam had suddenly burst. The top of the car was pounded as the rain grew heavier, and as they made their way up the long drive, the Sakkaros slowed and began to wintle, as they looked upward in desperation.

The rain began to imbrue them. Their faces blurred as the rain hit; blurred and ran together. All three began to shrink, then collapse within their clothes, which sank down into three sticky-wet heaps.

And while the Wrights sat there, stiff with horror, Lillian found herself unable to stop the completion of her remark: “—made of sugar and afraid they would melt.”

APPENDIX C

PILOT AND EXPERIMENT TARGET WORDS AND DEFINITIONS

Target Word Definitions
(Target words selected for main experiment starred)

Accede - To give one's consent, often at the insistence of another. (American Heritage Dictionary, 3rd ed.)

*Adduce - To bring forward or offer, as an argument, passage, or consideration which bears on a statement or case. (Webster's Revised Unabridged Dictionary, 1998)

*Assuage - To pacify or calm. (American Heritage Dictionary, 3rd ed.)

*Aver - To affirm positively; declare. (American Heritage Dictionary, 3rd ed.)

Bauble - A small, showy ornament of little value; a trinket. (American Heritage Dictionary, 3rd ed.)

*Bedaub - To smear; soil. (American Heritage Dictionary, 3rd ed.)

*Bombast - Grandiloquent, pompous speech or writing. (American Heritage Dictionary, 3rd ed.)

*Brogan - A heavy, ankle-high work shoe. (American Heritage Dictionary, 3rd ed.)

Cabal - A conspiratorial group of plotters or intriguers. (American Heritage Dictionary, 3rd ed.)

*Canard - An unfounded or false, deliberately misleading story. (American Heritage Dictionary, 3rd ed.)

Comport - To conduct or behave (oneself) in a particular manner. (American Heritage Dictionary, 3rd ed.)

*Convolve - To roll together; coil up. (American Heritage Dictionary, 3rd ed.)

Debase - To lower in character, quality, or value; degrade. (American Heritage Dictionary, 3rd ed.)

Disport – To amuse oneself in a light, frolicsome manner. (American Heritage Dictionary, 3rd ed.)

Effuse – Give out or emit. (Word Net, 1997)

*Egress - A path or opening for going out; an exit. (American Heritage Dictionary, 3rd ed.)

*Eschew - To avoid; shun. (American Heritage Dictionary, 3rd ed.)

*Foible - A minor weakness or failing of character. (American Heritage Dictionary, 3rd ed.)

*Forfend - To keep or ward off; avert. (American Heritage Dictionary, 3rd ed.)

Gumption - Boldness of enterprise; initiative or aggressiveness. (American Heritage Dictionary, 3rd ed.)

*Imbibe - To drink. (American Heritage Dictionary, 3rd ed.)

*Imbrue - To saturate. (American Heritage Dictionary, 3rd ed.)

*Impugn - To attack as false or questionable; challenge in argument. (American Heritage Dictionary, 3rd ed.)

*Inveigh - To give vent to angry disapproval; protest vehemently. (American Heritage Dictionary, 3rd ed.)

Missive - A written message; a letter. (American Heritage Dictionary, 3rd ed.)

*Niggle - To be preoccupied with trifles or petty details. (American Heritage Dictionary, 3rd ed.)

*Onus - The burden of proof: The onus was on the defense attorney. (American Heritage Dictionary, 3rd ed.)

*Pathos - a quality that arouses emotions, especially pity or sorrow. (Word Net, 1997)

*Pauper - One who is extremely poor. (American Heritage Dictionary, 3rd ed.)

*Pelage - The coat of a mammal, consisting of hair, fur, wool, or other soft covering, as distinct from bare skin. (American Heritage Dictionary, 3rd ed.)

Perpend - To consider carefully; ponder. (American Heritage Dictionary, 3rd ed.)

Prattle - To talk or chatter idly or meaninglessly; babble or prate. (American Heritage Dictionary, 3rd ed.)

Precept - A rule or principle prescribing a particular course of action or conduct. (American Heritage Dictionary, 3rd ed.)

Proxy - A person authorized to act for another; an agent or a substitute. (American Heritage Dictionary, 3rd ed.)

*Refel - To refute; to disprove. (Webster's Revised Unabridged Dictionary, 1998)

*Repine - To yearn after something. (American Heritage Dictionary, 3rd ed.)

*Runnel - a small stream. (Word Net, 1997)

Senna - The dried leaves of *C. angustifolia* or *C. acutifolia,* used medicinally as a cathartic. (American Heritage Dictionary, 3rd ed.)

Suffuse - To spread through or over, as with liquid, color, or light. (American Heritage Dictionary, 3rd ed.)

*Surfeit – An overabundant supply; excess (Mirriam Webster Collegiate Dictionary, 10th ed.)

*Tincture -An imparted color; a tint. (American Heritage Dictionary, 3rd ed.)

*Torpor - Dullness; sluggishness; inactivity; as, a torpor of the mental faculties. (Webster's Revised Unabridged Dictionary, 1998)

Trammel - Something that restricts activity, expression, or progress; a restraint. (American Heritage Dictionary, 3rd ed.)

*Truckle - To be servile or submissive. (American Heritage Dictionary, 3rd ed.)

*Tyro - A beginner in learning something. (American Heritage Dictionary, 3rd ed.)

*Unguent - A salve for soothing or healing; an ointment. (American Heritage Dictionary, 3rd ed.)

*Welkin - The vault of heaven; the sky. (American Heritage Dictionary, 3rd ed.)

*Wintle – Stagger; reel. (Mirriam Webster Collegiate Dictionary, 10th ed.)

APPENDIX D

TARGET WORDS, NONWORDS, AND COMMON WORDS

Target Words
adduce
assuage
aver
bedaub
bombast
brogan
canard
convolve
egress
eschew
foible
forfend
imbibe
imbrue
impugn
inveigh
niggle
onus
pathos
pauper
pelage
refel
repine
runnel
surfeit
tincture
torpor
truckle
tyro
unguent
welkin
wintle

Nonwords
curnit
dinder
portic
remarn
slondy
trattle

Common Words
accept
adjust
cancel
explain
forest
highway
hurry
listen
moisture
photo
supper
trouble

APPENDIX E

MULTIPLE CHOICE ITEMS

Sample Items:

Cookie

(a) a sheet
(b) to blend
(c) a food
(d) to float
(e) none of the above
(f) don't know

Cookie

(a) If she couldn't finish her cookie, she would not be allowed to have dessert.
(b) Whenever he was hungry, he loved the salty taste of a cookie.
(c) She always had a cookie and a glass of milk before bed.
(d) They each went out and picked a cookie from the garden.
(e) None of the above
(f) Don't know

Target Word Items:

adduce

(a) to present
(b) words of caution
(c) a bridge
(d) to crawl under something
(e) none of the above
(f) don't know

adduce

(a) The company always would adduce an award to the person who sold the most cars that year.
(b) She meant to adduce her mother to her next door neighbors.
(c) In her speech she planned to adduce facts that would convince the others that she was innocent.
(d) She would adduce a gift to the woman who helped her find the book.
(e) None of the above
(f) Don't know

assuage

(a) a field
(b) juice
(c) to make feel better
(d) to ask for help
(e) none of the above
(f) don't know

assuage

(a) She tried to assuage their guilt by telling them the accident was her fault.
(b) She was eager to assuage her thirst following the long, hot walk.
(c) The doctor prescribed some medicine to assuage the child's cough and fever.
(d) She hoped the expensive lotion would assuage her dry, cracked skin.
(e) None of the above
(f) Don’t know

aver

(a) a painting
(b) to locate
(c) to tell
(d) a fence
(e) none of the above
(f) don’t know

aver

(a) The children hoped she would aver their favorite story about the magic princess.
(b) She would aver her boss’s story, stating that it could never really have happened.
(c) She would aver the joke and hope that her friends would find it funny.
(d) He did aver that everything he wrote in his book was completely true.
(e) None of the above
(f) Don’t know

bedaub

(a) a lake
(b) spread over
(c) a promise
(d) to repeat
(e) none of the above
(f) don’t know

bedaub

(a) Every spring the dog seemed to bedaub his fur with fleas.
(b) They watched as the washing machine would bedaub the dirty clothes with soapy water.
(c) As she swam, the water would bedaub her whole body.
(d) The boy would bedaub his face with paint to match his costume.
(e) None of the above
(f) Don’t know

bombast
(a) small rock
(b) to cook
(c) to lock up
(d) pride
(e) none of the above
(f) don’t know

bombast
(a) He did not have to say anything for the boss to realize his bombast.
(b) The bombast of his presence at the event made a lot of people uneasy.
(c) As he walked down the street with his head high and not appearing to see anyone, strangers noticed his bombast.
(d) The woman’s bombast, always telling stories of her great achievements, seemed to annoy everyone in her office.
(e) None of the above
(f) Don’t know

brogan
(a) a shoe
(b) to prove
(c) a fire
(d) to call out
(e) none of the above
(f) don’t know

brogan
(a) If it matched her dress, she would try on the blue brogan with the high heel.
(b) He put on each brogan before he went to work at the construction site.
(c) The salesman suggested a brogan as the best shoe for the tennis player.
(d) After putting on her pajamas, she was disappointed to find only one brogan for her feet.
(e) None of the above
(f) Don’t know

canard
(a) story
(b) to sing loudly
(c) dancer
(d) to laugh at
(e) none of the above
(f) don’t know

canard

(a) The canard was definitely true despite reports to the contrary.
(b) They invented a canard to explain why their work was not done.
(c) She heard the latest traffic canard on the news before she left for work.
(d) The book he read to them contained a well-known canard.
(e) None of the above
(f) Don’t know

convolve

(a) excitement
(b) pet store
(c) to arrive
(d) to roll
(e) none of the above
(f) don’t know

convolve

(a) The boy would convolve around until he got tired and fell.
(b) The couple seemed to convolve around the dance floor gracefully.
(c) The man spoke to his friend as the dog went to convolve around in the grass.
(d) The dice did convolve around in his hand before he dropped them on the table.
(e) None of the above
(f) Don’t know

egress

(a) curiosity
(b) to go behind
(c) a passageway
(d) to fall down
(e) none of the above
(f) don’t know

egress

(a) She ascended the egress to make sure the attic door was locked.
(b) The mother closed the egress above her child's bed.
(c) The puppets danced right off the stage and through the egress.
(d) The patron used the front egress to enter the building.
(e) None of the above
(f) Don’t know

eschew
(a) borrow money
(b) wooden desk
(c) stay away from
(d) body of water
(e) none of the above
(f) don’t know

eschew
(a) She would eschew large parties, preferring to be with a smaller group of friends.
(b) The mother warned the child to eschew the sweets until after dinner.
(c) The girl was told to eschew all phone calls until after she finished her homework.
(d) The woman planned to eschew the house for a week and go on a vacation.
(e) None of the above
(f) Don’t know

foible
(a) to catch
(b) to crash
(c) marble
(d) weakness
(e) none of the above
(f) don’t know

foible
(a) The girl spent many hours covering up the foible on her face.
(b) The man’s primary foible was stealing.
(c) The old woman’s foible was that she couldn’t walk faster.
(d) One foible of his was his need for constant attention.
(e) None of the above
(f) Don’t know

forfend
(a) to whisper a secret
(b) to keep from happening
(c) a mask
(d) pleasure
(e) none of the above
(f) don’t know

forfend

(a) When the police arrived, they could not forfend the loud music at the party.
(b) As the dog barked, the owner gave him a toy to forfend the noise.
(c) She kept dangerous objects out of the baby's reach to forfend an accident.
(d) After the argument had started, she tried to forfend it by suggesting a solution.
(e) None of the above
(f) Don't know

imbibe

(a) type of guitar
(b) to take in
(c) to organize
(d) a treat
(e) none of the above
(f) don't know

imbibe

(a) It's customary to imbibe some beverage during a wedding toast.
(b) They could not imbibe what their teacher said, because she talked to fast.
(c) His allergies made it hard for him to imbibe deeply, especially when playing outside.
(d) It was not reasonable to expect the boy to imbibe yesterday's stale sandwich.
(e) None of the above
(f) Don't know

imbrue

(a) to copy
(b) tragedy
(c) manager
(d) to fill
(e) none of the above
(f) don't know

imbrue

(a) The boy started to imbrue a can with soil so that he could plant his apple seeds.
(b) The child insisted that her father imbrue the big box with more sand to play in.
(c) When the house flooded, water did thoroughly imbrue the carpets, ruining them.
(d) At Thanksgiving, the family would always imbrue the table with food.
(e) None of the above
(f) Don't know

impugn
(a) a hole
(b) to feed
(c) stairway
(d) to attack
(e) none of the above
(f) don’t know

impugn
(a) She wanted to impugn him, but she respected everything about him.
(b) She did impugn the judge’s character by announcing his past crimes.
(c) He might impugn the garden if left outside in the mornings.
(d) They would physically impugn him if he did not find it.
(e) None of the above
(f) Don’t know

inveigh
(a) to pay a compliment
(b) large dining table
(c) to voice disagreement
(d) a list of items
(e) none of the above
(f) don’t know

inveigh
(a) She tried to politely inveigh against her husband's choice of dress for the ceremony.
(b) The mayor did inveigh against the suggestion that he'd once robbed a bank.
(c) Many people seemed to inveigh against the forecast for more rain this weekend.
(d) She would inveigh against her friend’s decision to buy the orange hat.
(e) None of the above
(f) Don’t know

niggle
(a) to worry
(b) jewelry
(c) sadness
(d) to ride
(e) none of the above
(f) don’t know

niggle

(a) The security guard would niggle if he saw someone stealing from the store.
(b) When the student realized she didn't know any of the answers on the test, she began to niggle.
(c) The mother approached the store manager to niggle about the slight change in price.
(d) He did niggle when he realized he had destroyed his parents' car in the accident.
(e) None of the above
(f) Don't know

onus

(a) to look for
(b) a responsibility
(c) to offer to repay
(d) a long discussion
(e) none of the above
(f) don't know

onus

(a) The onus was on him to prove he didn't take her shoe.
(b) She had the onus of receiving the award at the ceremony.
(c) The class had the onus of taking the test either today or tomorrow.
(d) The onus was to run the race in less than six minutes.
(e) None of the above
(f) Don't know

pathos

(a) a feeling
(b) a storehouse
(c) to separate
(d) irritate
(e) none of the above
(f) don't know

pathos

(a) The pathos of this day moved us all to tears, because we didn't know if we'd ever see each other again.
(b) Pathos filled the room following the news of the new baby's arrival.
(c) When she saw the beautiful woman win the prize, she had jealous feelings of pathos that would not go away.
(d) The woman who took their money generated pathos among the angry family members.
(e) None of the above
(f) Don't know

pauper
(a) athlete
(b) to cheer up
(c) to get lost
(d) poor person
(e) none of the above
(f) don’t know

pauper
(a) The businessman turned out to be a pauper in his consideration of others’ feelings.
(b) Although he was rich, the pauper was not a smart man.
(c) The pauper had lost all of his money and possessions when his house caught on fire.
(d) The pauper was successful, but his team members said he was never good at sports.
(e) None of the above
(f) Don’t know

pelage
(a) an old song
(b) to mock
(c) to wash
(d) a covering
(e) none of the above
(f) don’t know

pelage
(a) We placed the bright red pelage over the table for the holiday meal.
(b) The book’s pelage should protect the cover for years.
(c) The child's plastic pelage kept him dry at the bus stop.
(d) The animal's pelage would keep him warm over the cold winter.
(e) None of the above
(f) Don’t know

refel
(a) to carry
(b) garbage
(c) an apology
(d) to question
(e) none of the above
(f) don’t know

refel

(a) The lawyer provided evidence to refel the charge that his client committed the crime.
(b) She did refel the waiter about the cost of her meal.
(c) She always would refel the mailman before collecting her mail.
(d) The students would refel the guest speaker about how he began his career in show business.
(e) None of the above
(f) Don’t know

repine

(a) a small piece of fruit
(b) to want something
(c) an expensive car
(d) to write a poem
(e) none of the above
(f) don’t know

repine

(a) The woman would regularly repine for junk food after she ate her lunch.
(b) Occasionally, she would repine for cream in her coffee.
(c) He would repine for his work to be finished, so he could go out and play with his friends.
(d) She seemed to repine for the happier days, when she lived with her sisters.
(e) None of the above
(f) Don’t know

runnel

(a) a stream
(b) to solve
(c) a hat
(d) to repair
(e) none of the above
(f) don’t know

runnel

(a) The child grabbed some paper towels to clean up the runnel of milk pouring off the counter.
(b) The two friends spent several hours in a constant runnel of conversation.
(c) The runnel in between the two houses was just big enough for a toy boat to float through.
(d) The visitors were impressed as they observed the large waves in the runnel.
(e) None of the above
(f) Don’t know

surfeit
(a) a supply of something
(b) to promote
(c) to fasten
(d) a source of fuel
(e) none of the above
(f) don’t know

surfeit
(a) The grocery store had a severe surfeit of milk, so we had to go to another store.
(b) The surfeit of chairs in the classroom was just enough to seat every student.
(c) There was only a small surfeit of tickets available, so the whole family could not attend.
(d) With such a big turkey, they had a surfeit of food at Thanksgiving.
(e) None of the above
(f) Don’t know

tincture
(a) to lead
(b) pain
(c) to count
(d) color
(e) none of the above
(f) don’t know

tincture
(a) The tar produced a black tincture on the pavement.
(b) The diamond's yellowish tincture made it less valuable.
(c) The cotton ball had a white tincture.
(d) Drinking water should have a transparent tincture.
(e) None of the above
(f) Don’t know

torpor
(a) to order
(b) container
(c) lacking energy
(d) to get together
(e) none of the above
(f) don’t know

torpor

(a) Her torpor was obvious after she ran up three flights of stairs.
(b) After the long exam, she felt an overwhelming sense of torpor and went home to relax.
(c) I noticed the torpor of the scissors when I tried to cut the cardboard.
(d) When we saw the torpor on the guests' faces at the party, we immediately wanted to leave.
(e) None of the above
(f) Don't know

truckle

(a) to bend
(b) to comment
(c) a newspaper
(d) a statue
(e) none of the above
(f) don't know

truckle

(a) As a favor to her, he would truckle, canceling his plans, and pick her up from work.
(b) The screaming child did truckle when he saw his mom's look from across the room.
(c) I watched the man truckle to pick up a fifty-dollar bill lying on the sidewalk.
(d) The heavy ice storm caused the birch trees to truckle.
(e) None of the above
(f) Don't know

tyro

(a) map
(b) to speak
(c) to anger
(d) a beginner
(e) none of the above
(f) don't know

tyro

(a) The tyro was eager to learn everything he could about his new hobby.
(b) He noticed that the tyro was not interested in learning anything new.
(c) The dog watched over its tyro, feeding it and protecting it from harm.
(d) The mother knew that the tyro was unable to bathe or feed himself.
(e) None of the above
(f) Don't know

unguent
(a) a cream
(b) to give up
(c) to capture
(d) a kind of bag
(e) none of the above
(f) don’t know

unguent
(a) He put some unguent on his dry lips.
(b) She rubbed the unguent on his scraped elbow.
(c) We urged the guests to use unguent at the beach, to prevent sunburn.
(d) She decided to try a new unguent to wash her hair.
(e) None of the above
(f) Don’t know

welkin
(a) to undo
(b) sky
(c) to bake
(d) tree stump
(e) none of the above
(f) don’t know

welkin
(a) The welkin soaked us as we ran toward our cars.
(b) The welkin poured down and tapped loudly on the roof.
(c) They looked up and gazed deep into the welkin.
(d) It was cold and gloomy all day as the welkin blocked the sun.
(e) None of the above
(f) Don’t know

wintle
(a) move with difficulty
(b) calendar
(c) a large basket
(d) to beg
(e) none of the above
(f) don’t know

wintle

(a) The car seemed to wintle down the dirt road, kicking up dust and rocks as it went.
(b) He did wintle as he walked away, trying to recover from being hit with the ball.
(c) They would wintle as they quickly pushed their way through to the front of the crowd.
(d) She would wintle up the steep hill on her bike, trying not to lose her balance.
(e) None of the above
(f) Don't know

Common Word Items:

accept

(a) spider
(b) hammer
(c) to take
(d) to boss around
(e) none of the above
(f) don't know

accept

(a) She would accept the bus to the store.
(b) I will accept her apology.
(c) She would accept my dog for a walk.
(d) I will accept some of my soup to give to her.
(e) None of the above
(f) Don't know

adjust

(a) a pond
(b) to conquer
(c) to fix
(d) a machine
(e) none of the above
(f) don't know

adjust

(a) When the boy broke the vase, he tried to adjust it with glue.
(b) Mom will adjust the volume so they can all hear the show.
(c) They were able to adjust the hole in the roof before it rained.
(d) She could adjust her torn math paper with tape.
(e) None of the above
(f) Don't know

cancel
(a) winter
(b) to get rid of
(c) to polish
(d) sandwich
(e) none of the above
(f) don’t know

cancel
(a) He had to cancel the dog before his mom got home.
(b) They did cancel their markings on the blackboard.
(c) When her jeans got torn, she knew it was time to cancel them.
(d) She will cancel her appointment at the doctor.
(e) None of the above
(f) Don’t know

explain
(a) pencil
(b) to make clear
(c) a knot
(d) to snack
(e) none of the above
(f) don’t know

explain
(a) She wanted to explain the reason she was wearing his socks.
(b) When she asked him a question, he did explain a response.
(c) At dinner, the man was asked to explain his day at work.
(d) I had to explain my name several times before she recalled it.
(e) None of the above
(f) Don’t know

forest
(a) to keep in touch
(b) a fragrant candle
(c) a growth of plants
(d) to report
(e) none of the above
(f) don’t know

forest

(a) She thought that many of the trees in the forest must be at least a hundred years old.
(b) The forest in the kitchen had grown quite large, with about ten plants in each window.
(c) The forest did not have any trees, but there were plenty of plants and heavy layers of grass.
(d) In the forest in her backyard, she planted a variety of vegetable and herb plants.
(e) None of the above
(f) Don't know

highway

(a) a road
(b) a fair
(c) to deserve
(d) to return a good deed
(e) none of the above
(f) don't know

highway

(a) A highway is the fastest way to drive from state to state.
(b) The highway is intended only for bicycle riders.
(c) If the highway were wider, then cars could drive on it.
(d) The dirt highway was in need of stop signs.
(e) None of the above
(f) Don't know

hurry

(a) move quickly
(b) a wall
(c) to wonder about
(d) busy street
(e) none of the above
(f) don't know

hurry

(a) He dropped a rock out the window to watch it hurry to the ground.
(b) The winner of the race would be the one who could hurry the most.
(c) He would have to hurry if he wanted to catch the bus.
(d) The car would hurry to arrive at the store before it closed.
(e) None of the above
(f) Don't know

listen
(a) a cart
(b) to hear something
(c) a ski cap
(d) to warn someone
(e) none of the above
(f) don’t know

listen
(a) While she was asleep, she could listen to the TV in the other room.
(b) He liked to listen to the radio in the car as he drove.
(c) When he did listen to the door slam shut, he jumped in surprise.
(d) He would wake up as soon as he would listen to his alarm go off.
(e) None of the above
(f) Don’t know

moisture
(a) to climb
(b) to frighten
(c) wet quality
(d) puzzle
(e) none of the above
(f) don’t know

moisture
(a) The moisture of the bucket filled with water would help clean the car.
(b) She cleaned up the moisture of the milk that fell off the table and onto the floor.
(c) She could tell by the sidewalk’s moisture that it had rained last night.
(d) He felt the moisture of the puddle as he tripped off the curb.
(e) None of the above
(f) Don’t know

photo
(a) to scatter
(b) picture
(c) capitol
(d) to brush
(e) none of the above
(f) don’t know

photo
(a) I had painted a photo of the beautiful valley below.
(b) They took a photo of us standing on the cliff.
(c) The cartoon was a photo of a man standing next to his cat.
(d) He drew a photo of me and my new house.
(e) None of the above
(f) Don’t know

supper
(a) to doubt
(b) to enjoy
(c) a meal
(d) a book
(e) none of the above
(f) don’t know

supper
(a) We did not eat supper until later that evening.
(b) I bought my supper at school today.
(c) We try to eat supper before we go to school in the morning.
(d) My favorite supper is cereal and milk.
(e) None of the above
(f) Don’t know

trouble
(a) distress or need
(b) a large envelope
(c) to request
(d) to find out the truth
(e) none of the above
(f) don’t know

trouble
(a) If his trouble got too bad, she worried he might faint.
(b) His trouble in singing was the reason he didn’t go to music class that day.
(c) When he realized he was in trouble, he called a friend to help him.
(d) Her trouble for a knife was the reason she had not cut the cake.
(e) None of the above
(f) Don’t know

APPENDIX F

CONSENT FORM, AGREEMENT TO PARTICIPATE, AND PARENT QUESTIONNAIRE

PARENTAL CONSENT FORM

I agree to allow my child _____to take part in a study titled, "Partial Word Knowledge Growth through Incidental Learning from Text by School-Age Children", which is being conducted by Ms. Stacy Silverman from the Department of Communication Sciences and Disorders at UGA (542-4565), under the direction of Dr. Marilyn Newhoff from the Department of Communication Sciences and Disorders (542-4602). I do not have to allow my child to be in this study if I do not want to. My child can stop taking part at any time without giving any reason, and without penalty. I can ask to have the information related to my child returned to me, removed from the research records, or destroyed.

- The reason for this dissertation study is to examine how much children learn about the meanings of unfamiliar words when they encounter them in reading.

- Children who take part may learn some new words. In addition, they will be compensated for their time and effort with a gift certificate from a local movie theater or the cash equivalent.

- If I allow my child to take part, my child will be asked to complete a hearing screening, a cognitive screening, two language measures, and one reading measure. In addition, my child will be asked to converse briefly with the experimenter, read two stories, write brief summaries of the stories, and answer questions about the vocabulary in the stories. The experimenter will be present at all times to give instructions, offer encouragement, and answer any questions my child has.

- My child's conversation with the examiner will be audiotaped. Audiotapes will be kept confidential and will be available only to the researchers involved in the study. They will be housed securely within the Department of Communication Sciences and Disorders. Upon my request, my child's audiotape will be destroyed following its analysis; otherwise, it will be kept indefinitely for future use by the researchers.

- The experiment will require three sessions, each several days to a week apart. The first session will last approximately an hour and a half. The second and third sessions will require less than an hour.

- The experiment may be conducted within the Department of Communication Sciences and Disorders at The University of Georgia, or at the child's home or school. The experiment will not be conducted during school hours, so my child will not miss any class.

- The research is not expected to cause any harm or discomfort. My child can quit at any time.

- In order to make this study a valid one, my child will be told that the questions (s)he will answer following reading the stories will be "about the stories", rather than "about the vocabulary in the stories". This will be done so that your child will not pay special attention to the vocabulary in the stories. The investigator wants for this experience to resemble, as much as possible, the typical circumstances under which children read. After the study, the examiner will discuss with my child that the study has been about how children learn new words when they read.

- Any information collected about my child will be held confidential unless otherwise required by law. My child's identity will be coded, and all data will be kept in a secured location.

- The investigator will answer any questions about the research, now or during the course of the project, and can be reached by telephone at: 706-542-4565. You may also contact the professor supervising the research, Dr. Marilyn Newhoff, Department of Communication Sciences and Disorders, at 542-4602.

- I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.

_____ _____

Signature of Researcher Date

_____ _____

Signature of Parent or Guardian Date

Questions or problems regarding your child's rights as a participant should be addressed to Chris Joseph, Ph.D., Institutional Review Board, Office of the Vice President for Research, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-6514; E-Mail Address IRB@uga.edu.

AGREEMENT TO PARTICIPATE

Department of Communication Sciences & Disorders
University of Georgia
Athens, GA 30602

Agreement to Participate
Main Experiment

This project is about how children read stories. It will take about 3 ½ hours to complete: 1 ½ hours the first day, then 1 hour several days later, then 1 hour a few days after that. I will be asked to do lots of different things.

On the first day, I will complete some tests and screenings. I will also have a conversation with the examiner. The conversation will be tape recorded. When the study is over, the examiner will keep the tape, unless my parent or I ask for it to be destroyed. I will also be asked about the meanings of some words. I will know some of the words, but many of them will be new to me. Some of them won't even be real words.

The second time, several days later, I will read two stories, and then write a little about each one.

In the last session, several days later, I will answer some questions about the stories.

My performance on any of these tasks won't have any affect on my grades in school. This experiment is completely separate from my school work.

I will let the examiner know if I want to stop at any time, but I will do my best to finish the project.

Signature of Participant _____

Date _____

PARENT QUESTIONNAIRE

Participant Number_____ Sibling's Date(s) of Birth:_____

Today's Date_____ _____

Your Child's Date of Birth_____ _____

Sex_____

Address and Phone Number _____

_____

Name and Relationship of Person Giving Information_____

Has your child ever been diagnosed with:

ADHD?	Y	N
a learning disability?	Y	N
a language or speech disorder?	Y	N
a reading disability?	Y	N

If yes, has your child ever received services, through a school, clinic, or hospital? When? By whom? For how long?

_____

_____

_____

Is your child *currently* receiving any of these services? By whom? _____

_____

Is there a family history of any speech/language disorder or a reading/learning disability? If so, please describe.

_____

_____

What (if any) medications is your child currently taking?_____

_____

Do you suspect that your child has a hearing loss?_____

Does your child have normal vision with / without (circle one) glasses?_____

Is your child progressing satisfactorily in school?_____

Are there subjects in school that are particularly difficult for your child? Which ones? _____

About how many books does your child read in the average month? _____

Has your child ever been hospitalized? If so, please describe. Was head injury a concern?_____

_____

What is the highest level of education achieved by the child's mother?_____

What is the highest level of education achieved by the child's father?_____

Does your child speak any other language besides English?_____

If so, which language?_____

Was English the first language learned?_____

APPENDIX G

LISTS OF MAIN IDEAS IN STORIES

Aunt Millicent

___class assignment / Jamie and Angelica challenged each other
___Jamie invented aunt / talked to family about inventing aunt
___Name: Aunt Millicent
___explorer
___Africa
___Anything about Grandma (interested in aunt / knitting socks for aunt)
___Jamie described aunt to class
___Anything about Angelica (her aunt was boring / she was jealous / she didn't believe Jamie)
___Word spread and got out of hand (can give examples of how or not)
___Decision made (family said tell the truth / teacher said make her uninteresting / Jamie made a decision)
___Response of class / community / family (disappointed / living on in imagination)

Lob's Girl

___How Sandy (and family) met Lob (Sandy lying on the beach / Lob surprised Sandy
___Sandy / the other children played with him / loved the dog
___Problem: owner lived far away
___Lob came to the family's house repeatedly
___(Lob's owner finally suggested) the dog remains with family
___Years passed / Lob got older / Sandy got older / Lob and Sandy still very close over the years
___Sandy got hit (by a truck)
___Doctor (and wife) found her / Sandy was taken to the hospital / reported in serious condition
___Lob came to the hospital
___Grandma brought Lob to Sandy's room / Sandy woke up / saw Lob / touched Lob
___Final realization of Lob's having died

Nickel a Pound

___Araceli (or little girl) heard about some airplane rides / really wanted to go / had always wanted to go
___Details (rides were a nickel a pound / to benefit a children's hospital)
___Araceli convinced her father to take her
___it began to rain
___long line / Araceli's father wanted to leave
___waiting in car / taking turns waiting in line
___Araceli saw a friend
___Araceli got on the plane / description of the experience during the ride (bumpy or some other description)
___Description of feelings while flying (afraid / didn't like it)

___Events immediately after ride (plane landed safely / glad when plane ride over / she told everyone she loved flying but she didn't)
___Her final thoughts while in bed (she understood her friend's expression now / started crying / didn't think flying was fun)

Rain, Rain, Go Away

___new family (Sakkaros) moved into the neighborhood / wife (Mrs. Wright) talked to husband about new family / she thought they were odd /wanted to get to know them / was curious about them
___new family was very concerned about the weather / looking at the sky all the time
___(Mrs. Wright invited) the family (went) to the park
___neighbors checked the weather / would only go if the weather was good / no rain
___Next day, despite good weather, the Sakkaros were nervous (can give examples instead of saying it)
___Sakkaros consumed lots of sugar / cotton candy while at park
___it looked like it may rain and the Sakkaros insisted on leaving immediately
___The ride home was tense / Sakkaros were anxious about the weather
___as they arrived home, it started raining
___neighbors ran for their house
___(Wrights watched as) neighbors dissolved in rain

APPENDIX H

INDIVIDUAL CHECKLIST DATA

Participant	Pre-Test Exper. Words Circled	Post-Test Exper. Words Circled	Pre-Test Exper. Nouns Circled	Post-Test Exper. Nouns Circled	Pre-Test Exper. Verbs Circled	Post-Test Exper. Verbs Circled
1	0	1	0	1	0	0
2	3	3	2	1	1	2
3	5	4	2	2	3	2
4	2	6	1	4	1	2
5	0	2	0	0	0	2
6	1	2	1	1	0	1
7	4	5	1	2	3	3
8	2	2	1	1	1	1
9	4	5	1	2	3	3
10	2	2	0	1	2	1
11	1	1	0	0	1	1
12	3	2	0	0	3	2
13	1	4	1	1	0	3
14	6	6	4	4	2	2
15	0	0	0	0	0	0
16	2	3	1	0	1	3
17	1	1	0	0	1	1
18	0	4	0	1	0	3
19	7	8	4	4	3	4
20	0	0	0	0	0	0
21	2	2	1	1	1	1
22	4	7	2	4	2	3
23	0	5	0	0	0	5
24	4	7	1	4	3	3
25	3	2	1	0	2	2
26	0	0	0	0	0	0
27	2	1	1	0	1	1
28	2	3	1	1	1	2
29	0	0	0	0	0	0
30	0	0	0	0	0	0
31	0	0	0	0	0	0
Total	**61**	**88**	**26**	**35**	**35**	**53**

Participant	Pre-Test Exper. Words Defined	Post-Test Exper. Words Defined	Pre-Test Exper. Nouns Defined	Post-Test Exper. Nouns Defined	Pre-Test Exper. Verbs Defined	Post-Test Exper. Verbs Defined
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	1	0	0	0	1
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	1	1	1	1	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	0	0	0	0	0	0
15	1	1	1	1	0	0
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	1	0	1	0	0
23	1	1	1	1	0	0
24	0	0	0	0	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	1	1	1	1	0	0
31	0	0	0	0	0	0
Total	**4**	**6**	**4**	**5**	**0**	**1**

Participant	Pre-Test Control Words Circled	Post-Test Control Words Circled	Pre-Test Control Nouns Circled	Post-Test Control Nouns Circled	Pre-Test Control Verbs Circled	Post-Test Control Verbs Circled
1	1	1	0	0	1	1
2	2	1	1	1	1	0
3	2	2	1	1	1	1
4	3	5	1	3	2	2
5	2	2	1	1	1	1
6	0	0	0	0	0	0
7	5	5	2	2	3	3
8	2	3	1	1	1	2
9	3	3	1	1	2	2
10	2	0	2	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	3	4	3	2	0	2
14	3	2	1	1	2	1
15	0	2	0	0	0	2
16	7	2	3	1	4	1
17	3	1	1	1	2	0
18	1	2	1	1	0	1
19	6	5	2	2	4	3
20	2	2	1	1	1	1
21	1	2	0	2	1	0
22	5	7	2	3	3	4
23	1	6	1	4	0	2
24	2	4	0	2	2	2
25	3	1	2	1	0	0
26	1	2	1	2	0	0
27	1	1	0	0	1	1
28	4	2	2	0	2	2
29	0	0	0	0	0	0
30	1	1	1	1	0	0
31	0	0	0	0	0	0
Total	**66**	**68**	**31**	**34**	**34**	**34**

Participant	Pre-Test Control Words Defined	Post-Test Control Words Defined	Pre-Test Control Nouns Defined	Post-Test Control Nouns Defined	Pre-Test Control Verbs Defined	Post-Test Control Verbs Defined
1	1	1	1	1	0	0
2	0	1	0	0	0	1
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0	0	0	0	0
14	1	1	1	1	0	0
15	0	0	0	0	0	0
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	1	0	1	0	0
23	0	0	0	0	0	0
24	1	1	1	1	0	0
25	0	0	0	0	0	0
26	0	0	0	0	0	0
27	0	0	0	0	0	0
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	0	0	0	0	0	0
31	0	0	0	0	0	0
Total	**3**	**5**	**3**	**4**	**0**	**1**

APPENDIX I

INDIVIDUAL MULTIPLE CHOICE DATA

* Data are ratios of the number of items correct divided by the total number of items.

Participant	Control Nouns - Syntactic	Control Verbs - Syntactic	Exper. Nouns - Syntactic	Exper. Verbs - Syntactic	Known Nouns - Syntactic	Known Verbs - Syntactic
1	.63	1.00	.25	.75	1.00	1.00
2	.50	.75	.63	.50	1.00	1.00
3	.63	.75	.50	.75	1.00	1.00
4	.38	.75	.50	.50	1.00	1.00
5	.75	.63	.38	.88	1.00	1.00
6	.50	.63	.50	.50	1.00	1.00
7	.50	.63	.63	.50	.83	1.00
8	.63	.88	.63	.88	1.00	1.00
9	.50	.63	.38	1.00	1.00	1.00
10	.50	.75	.25	.63	1.00	1.00
11	.13	.25	.13	.25	.67	.83
12	.25	.63	.25	.88	1.00	1.00
13	.25	.75	.38	.75	1.00	1.00
14	.75	.88	.75	.75	1.00	1.00
15	.38	.88	.25	.75	1.00	1.00
16	.50	.63	.50	.38	1.00	1.00
17	.50	1.00	.25	1.00	1.00	1.00
18	.63	.75	.38	.88	1.00	1.00
19	.25	.88	.63	.75	1.00	1.00
20	.88	.50	.63	.63	1.00	1.00
21	.38	.88	.25	.75	1.00	1.00
22	.38	1.00	.75	.88	1.00	1.00
23	.25	.75	.63	.88	1.00	1.00
24	.63	.88	.50	.63	1.00	1.00
25	.50	.25	.50	.25	1.00	1.00
26	.63	.88	.63	1.00	1.00	1.00
27	.50	.63	.38	.63	1.00	1.00
28	.38	.75	.75	.75	1.00	1.00
29	.75	.75	.50	.75	1.00	1.00
30	.50	.00	.50	.50	1.00	.83
31	.38	.75	.50	1.00	1.00	1.00

Participant	Control Nouns - Gen. Sem.	Control Verbs - Gen. Sem.	Exper. Nouns - Gen. Sem.	Exper. Verbs - Gen. Sem.	Known Nouns - Gen. Sem.	Known Verbs - Gen. Sem.
1	.25	.50	.25	.50	1.00	1.00
2	.25	.25	.25	.13	1.00	1.00
3	.38	.38	.38	.75	1.00	1.00
4	.13	.38	.38	.38	1.00	.83
5	.38	.50	.25	.38	1.00	1.00
6	.25	.38	.25	.50	1.00	1.00
7	.25	.50	.38	.13	.83	1.00
8	.38	.63	.13	.75	1.00	1.00
9	.25	.63	.13	.75	1.00	1.00
10	.38	.63	.13	.38	1.00	1.00
11	.13	.25	.00	.25	.67	.83
12	.25	.63	.13	.75	1.00	1.00
13	.13	.25	.38	.25	1.00	1.00
14	.38	.50	.38	.38	1.00	1.00
15	.13	.63	.25	.63	1.00	1.00
16	.13	.25	.25	.00	1.00	.83
17	.38	.88	.25	.50	1.00	1.00
18	.25	.25	.38	.63	1.00	.83
19	.13	.63	.38	.38	1.00	1.00
20	.38	.13	.25	.50	1.00	1.00
21	.25	.50	.13	.75	1.00	1.00
22	.38	.75	.75	.63	1.00	1.00
23	.13	.63	.38	.50	1.00	1.00
24	.63	.50	.50	.63	1.00	1.00
25	.25	.13	.50	.13	1.00	1.00
26	.63	.50	.38	.75	1.00	1.00
27	.25	.25	.25	.50	1.00	1.00
28	.38	.63	.75	.50	1.00	1.00
29	.25	.63	.38	.63	1.00	1.00
30	.13	.00	.25	.25	1.00	.83
31	.13	.50	.13	.75	1.00	1.00

Participant	Control Nouns - Det. Sem.	Control Verbs - Det. Sem.	Exper. Nouns - Det. Sem.	Exper. Verbs - Det. Sem.	Known Nouns - Det. Sem.	Known Verbs - Det. Sem.
1	.63	.13	.13	.38	1.00	1.00
2	.13	.38	.13	.13	.83	1.00
3	.38	.13	.50	.00	1.00	1.00
4	.00	.25	.25	.50	1.00	1.00
5	.00	.13	.13	.13	1.00	1.00
6	.63	.25	.50	.13	1.00	1.00
7	.13	.38	.38	.38	1.00	.83
8	.38	.25	.13	.25	1.00	.83
9	.25	.00	.25	.38	1.00	.83
10	.00	.50	.13	.38	.83	1.00
11	.00	.00	.00	.38	1.00	1.00
12	.13	.50	.13	.38	1.00	1.00
13	.25	.13	.25	.63	.33	.83
14	.38	.25	.25	.00	1.00	1.00
15	.13	.13	.38	.25	1.00	1.00
16	.25	.38	.25	.25	1.00	1.00
17	.13	.25	.50	.38	.83	1.00
18	.88	.25	.38	.25	.83	1.00
19	.25	.25	.13	.50	1.00	1.00
20	.38	.13	.38	.13	1.00	.83
21	.50	.25	.25	.00	.83	.50
22	.38	.75	.38	.50	1.00	1.00
23	.25	.38	.50	.13	1.00	1.00
24	.75	.63	.13	.38	1.00	1.00
25	.38	.50	.50	.38	1.00	1.00
26	.75	.00	.25	.63	1.00	1.00
27	.25	.63	.63	.50	1.00	1.00
28	.25	.13	.75	.63	1.00	.83
29	.38	.00	.50	.38	1.00	1.00
30	.38	.25	.50	.63	.83	1.00
31	.25	.25	.25	.25	1.00	1.00

APPENDIX J

INDIVIDUAL STORY SUMMARY DATA

* Data are the number of main events, out of 11, provided in the story summaries of each participant.

Participant	Story 1	Story 2	Story Set 1	Story 3	Story 4	Story Set 2
1	7	10	17			
2	8	10	18			
3	9	10	19			
4	3	4	7			
5				8	6	14
6	7	10	17			
7				10	4	14
8	6	9	15			
9				9	7	16
10				5	6	11
11				5	7	12
12				4	7	11
13				8	4	12
14	9	8	17			
15				8	10	18
16	8	9	17			
17				4	7	11
18	6	10	16			
19	7	8	15			
20	2	0	2			
21	6	7	13			
22	7	10	17			
23				9	6	15
24	8	8	16			
25				5	8	13
26	8	9	17			
27				8	8	16
28				7	5	12
29				5	6	11
30				7	9	16
31	8	9	17			
Mean	**6.8**	**8.2**	**15**	**6.8**	**6.7**	**13.5**
SD	**1.9**	**2.7**	**4.4**	**2.0**	**1.7**	**2.3**