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ABSTRACT

A study examined the acquisition of a reading vocabulary for abstract and concrete words in 62 second-grade children. Words had been learned as part of a basal reader program or as part of outside reading. Word recognition speed and reading accuracy were examined for abstract and concrete words using lexical decision and word naming tasks. Results indicated that the size of the concreteness effect was similar for both processing tasks. In neither task did concreteness influence reaction times, but abstract words were read with less accuracy than concrete words in both tasks. Further, these concreteness effects in reading accuracy were larger for words that were part of a basal reading program than for words acquired during free reading. Findings suggest that word meaning influences the entry of words at a time when children are developing a sizeable reading vocabulary. (Contains 32 references and two tables of data. An appendix of data is attached.) (Author/RS)

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Influence of Word Meaning on the Acquisition of a Reading Vocabulary in Second-Grade Children

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Abstract. The acquisition of a reading vocabulary for abstract and concrete words was examined in 62 second-grade children. Words had been learned as part of a basal reader program or as part of outside reading. Word recognition speed and reading accuracy were examined for abstract and concrete words using lexical decision and word naming tasks. The size of the concreteness effect was similar for both processing tasks. In neither task did concreteness influence reaction times, but abstract words were read with less accuracy than concrete words in both tasks. Further, these concreteness effects in reading accuracy were larger for words that were part of a basal reading program than for words acquired during free reading. We conclude that word meaning influences the entry of words at a time when children are developing a sizeable reading vocabulary.

Traditionally, reading researchers have looked separately at the acquisition of a sight vocabulary - a young reader's store of knowledge about written word forms - and the acquisition of a meaning vocabulary, or a lexicon. In interactive models of reading acquisition (e.g., Adams, 1990), written word forms and meanings are viewed as being represented in larger, interconnected networks. These models have provided a framework to examine the connections between written-word recognition and attributes of word meaning.

One semantic factor that may contribute to the acquisition of words is *concreteness*, a term used here to refer to the constellation of variables that distinguish abstract words with limited sensory referents from concrete words with more direct sensory referents. Numerous studies have suggested that concreteness represents a fundamental semantic distinction among words. In large factor analyses, concreteness has consistently emerged as a central semantic variable distinguishing among words (DiVesta & Walls, 1970; Paivio, 1968; Rubin, 1980).

Some general findings attest to the importance of concreteness in verbal processing in adults and children. Adults display better comprehension of concrete words than abstract words. For example, most studies of sentence comprehension reveal that sentences containing predominantly abstract words are harder to understand than sentences containing predominantly concrete words (Haberlandt & Grasser, 1985; Moeser, 1974; Schwanenflugel & Shoben, 1983). In lexical decision tasks, several researchers have found that adults display longer lexical decision times for abstract words than for concrete words (Bleasdale, 1987; DeGroot, 1989; Howell & Bryden, 1987; James, 1975; Kroll & Merves, 1986 [Experiment 2]; Rubin, 1980; Schwanenflugel, Harnishfeger, & Stowe, 1988; Schwanenflugel & Shoben, 1983; Whaley, 1978) but others have not (Gernsbacher, 1984; Kroll & Merves, 1986 [Experiment 1]; Richardson, 1976). Further, adults tend to display longer naming times for abstract words than concrete words, although the stability of this finding is not as clear (see Schwanenflugel, 1991).

Currently, there are at least two hypotheses about why adults take longer to process abstract words than concrete words. The first, called the Dual-Representation Hypothesis, states that concrete words are easier to process than abstract words because they have easier access to imagery. This theory proposes two distinct representational systems: a verbal system and an image system. Concrete words are said to have stronger access to the image system than do abstract words, whereas abstract and concrete words are said to have equal access to the verbal system (Paivio, 1986, p. 128). Thus, the processing superiority for concrete words over abstract words is attributed to the greater availability of the image system for concrete words (Paivio, 1986, p. 218).

The Context Availability Hypothesis (Schwanenflugel, 1991) attributes the processing superiority for concrete words over abstract words to the relative ease with which people report being able to retrieve associated information from prior knowledge for such words. Ratings of context availability have been shown to be more closely correlated with adult lexical processing speed than ratings of imageability (Schwanenflugel, Harnishfeger, & Stowe, 1988; Schwanenflugel & Shoben, 1983). This view emphasizes the relative accessibility of prior knowledge for various words rather than the special status of sensory information. Thus, when supportive stimulus contexts are provided, adults no longer experience difficulty in processing abstract words (Schwanenflugel & Stowe, 1989).

Considerably less is known about the semantic factors influencing children's lexical processing. Research seems to suggest that children's lexical processing times are also influenced by concreteness. Schwanenflugel and Akin (1994) performed a developmental study on lexical decisions for abstract and concrete words and found that third- and fifth-grade children displayed large and significant concreteness effects. Thus, abstract words take much longer for children to process than concrete words, and this difficulty persists into adulthood.

Given the pervasiveness of concreteness effects in both adults' and children's lexical processing speed, it is important to examine the semantic factors engaged in the acquisition of a reading vocabulary. Because of methodological problems, word-instruction studies using early elementary and preschool children have not clearly demonstrated that abstract words are more difficult to acquire than concrete words. For example, Kiraly and Furlong (1974) investigated the effectiveness of commonly used stimulus cues (i.e., pictures, word configurations, and initial words sounds) in teaching abstract and concrete words. Kindergarten children were taught two abstract and two concrete words by using these stimulus cues. The findings revealed a direct concreteness benefit in learning to read concrete words over abstract words. However, the grammatical form class (i.e., noun, verb, adjective) of each word type reported in this study was confounded with word concreteness. The two concrete words (fire, boat) were nouns, while the form class of one abstract word (make) was a verb and the other (good) was an adjective. The abstract words might have been more difficult to learn than concrete words because of the grammatical category to which they belonged. Research on early language acquisition has consistently indicated that nouns predominate in children's early vocabulary, so there may be something conceptually easier about nouns (Gentner, 1982) than other grammatical categories. Further, only two abstract and two concrete words were used in this study. Thus, it is difficult to generalize these findings of concreteness effects to all concrete and abstract words.

In a similar study by Richmond and McNinch (1977), four abstract words and four concrete words were taught to first-grade children. Although the means suggested a concreteness effect, no significant difference was found between the two word types. Again, concreteness was confounded with form class in that the concrete words were mainly nouns and the abstract words came from four different form classes.

Finally, Yore and Olila (1985) asked classroom teachers to teach nine abstract and nine concrete words to their first-grade students. The results indicated that the children learned concrete words 6.4% better than abstract words, but again, concreteness was confounded with grammatical form class.

Other studies examining reading accuracy in older children have been mixed with regard to whether concrete words are acquired more easily than abstract words. Coltheart, Laxon, and Keating (1988) found a 6% difference in the reading accuracy in a naming task of high-frequency abstract and concrete words for 10-year-old children. On the other hand, Schwanenflugel and Akin (1994) reported similar reading accuracy levels (although not times) in lexical decisions for abstract and concrete words in both 8- and 10-year-old children in three studies.

Although these studies generally support the view that concreteness influences early reading vocabulary development, no study has examined the long-term acquisition of abstract and concrete words. In most of the studies reported earlier, the experimenter taught a small set of words, and only short-term acquisition was examined. In the present study, the abstract and concrete words examined were part of a normal basal reading program. Children were tested toward the end of the school year so that the teachers would have reviewed all the words as part of the program. The acquisition of these basal reader words was compared directly with similar abstract and concrete words not appearing in the basal reading program. Presumably, to the degree that children possessed knowledge of these nonbasal words, they would have had to acquire them through other kinds of reading. All of the words tested were nouns so that form class was not confounded with word concreteness.

In sum, then, the focus of the current study is on the impact of semantic variables related to concreteness on the acquisition of a reading vocabulary during a time in which children are acquiring a sizeable reading vocabulary. To date, research studies examining these semantic factors have been flawed, and their findings conflict. Because semantic effects are often larger for lexical decisions than word naming in adults (Balota, Ferraro, & Conner, 1991), children participating in this study performed both a naming and a lexical decision task.

Thus, we were able to learn more than we currently know about the factors engaged in the development of a reading vocabulary and about the cognitive processes engaged in early reading.

METHOD

Design

A 2 (Words) X 2 (Concreteness) design was used with reading skill as a continuous variable. Words were either basal or nonbasal.

Subjects

Sixty-two students from four second-grade classes in an elementary school in a rural county in central Georgia participated in the study. The majority of the students were African American and from low socioeconomic status (SES) backgrounds. According to their Iowa Tests of Basic Skills (ITBS) scores (i.e., the Normal Curve Equivalent reading score received on the ITBS), the mean percentile rank was 47.38 with a standard deviation of 23.38. The scores ranged from 4 to 92.

Instructional Methods Reported by Teachers

All four teachers reported using the guidelines presented in the basal reader, *Windmills* (Orlando-Harcourt, Brace & Jovanovich, 1989). However, each teacher supplemented it with activities around the reading. All teachers indicated that one story was covered per week. The students worked on the skills presented by the basal reader and on work sheets constructed by the teachers. After the vocabulary was presented, the children read the story silently to themselves. Each student read a section of the story aloud, or the teacher read the story to the students. Students listened to taped readings. Some teachers reported placing students into groups to construct basic story webs on the characters, plots, and setting.

Stimuli for Lexical Processing Tasks

The stimulus words to be examined were selected from a set of unpublished imageability and context availability norms for third- and fifth-grade children that was devised by Schwanenflugel and her colleagues. Items were selected for this study based on the third-grade ratings for imageability; 44 abstract and 44 concrete items were selected. (See the Appendix for the words used and their ratings on these variables). The 46 basal words were located in the cumulative vocabulary list of the basal reader for second-graders (Harcourt, Brace, & Jovanovich, 1989); the 42 nonbasal words were not. For basal words, abstract words were similar in word frequency to concrete words (abstract: $M = 89$, $SD = 78$; concrete: $M = 108$, $SD = 101$; $t(44) = .67$, $p > .10$). For nonbasal words, abstract words were similar in word frequency to concrete words (abstract: $M = 31$, $SD = 32$; concrete: $M = 31$, $SD = 20$; $t(42) = 03$, $p > .10$). Word length (number of letters) was similar for abstract basal words to concrete words (abstract: $M = 6.0$, $SD = 1.8$; concrete: $M = 5.2$, $SD = 1.6$; $t(44) = 1.59$, $p > .10$). For nonbasal words, abstract words were similar to concrete words in word length (abstract: $M = 6.4$, $SD = 1.4$; concrete: $M = 6.7$, $SD = 1.6$; $t(42) = .67$, $p > .10$).

Next, the total list of words was divided into two lists. One list contained 11 abstract and 11 concrete words appearing in the basal reader, and 11 abstract and 11 concrete words that did not. The other list contained 12 abstract and 12 concrete basal words, and 10 abstract and 10 concrete, nonbasal words. Each subject received each word list, one for the naming task and the other for the lexical decision task. The lists were counterbalanced across tasks. In addition to the words used, 14 pronounceable nonwords for the lexical decision task were constructed from other abstract and concrete words in the Schwanenflugel norms by changing one letter. These pronounceable nonwords were used in the lexical decision task only.

Procedure for Lexical Processing Task

The procedure for the lexical decision task was as follows: First, students were shown examples of possible words and nonwords on index cards and were instructed to make a "yes" decision to words and a "no" decision to nonwords. Next, the index cards were placed in front of the computer screen, and children were instructed to press the "yes" button for words and the "no" button for nonwords in a separate response box with large, clearly labeled keys.

After preparing the students for using the computer, the experimenter pressed the space bar on the keyboard to begin the practice session and the experiment. The sentence, "Get Ready!" appeared on the screen, which signaled the experimenter to press the space bar again. After the space bar was pressed, the ready signal disappeared and the lexical decision item was displayed in upper-case letters in the middle of the screen. The subjects were instructed to decide as quickly and accurately as possible whether or not the item presented was a word and to press either the "yes" or "no" buttons on the response box. After the subject's response, the stimulus item disappeared. When a correct response was made, the subject's reaction time appeared in the left-hand corner of the screen. If an incorrect response was made, a blank screen appeared and served as feedback that the wrong button had been pressed. Finally, the "Get Ready!" signal reappeared on the screen, and the experimenter pressed the space bar to present the next stimulus item. Subjects completed 20 practice trials and 58 experimental trials. All practice and experimental trials were presented in random order.

The procedure for the naming task was somewhat different from the lexical decision task. First, subjects were shown examples of stimulus words on index cards and asked to pronounce these words into the microphone. After several trials, the experimenter pressed the space bar to begin and the "Get Ready!" signal appeared on the screen. The space bar was pressed a second time and the stimulus word appeared on the screen. The subjects were instructed to say the stimulus word into the microphone as fast and as accurately as possible without stuttering. If stuttering occurred, the response was recorded as incorrect. If the subjects could not identify the word, they were told to say, "I don't know" into the microphone. Once the subject spoke into the microphone, the word disappeared from the screen and the subject's reaction time appeared in the upper left-hand corner of the screen. However, the subject was told the correct word if he or she named the word incorrectly. The experimenter recorded errors by entering a "W" from the keyboard. Otherwise, the next trial began when the space bar was pressed. Subjects completed 15 practice trials and 44 experimental trials. All practice trials and experimental trials were presented in random order.

All subjects received a naming task and a decision task that were composed of different lists. The ordering of tasks and lists was counterbalanced across subjects. Subjects were run individually, and the experimental session lasted approximately 25 minutes.

RESULTS

For all analyses, reaction times greater than two standard deviations above the mean for each subject were considered errors. Only correct responses were used for the reaction times analyses. Subjects' mean reaction times and error rates were examined separately.

Because a number of subjects had 100% error rates in some conditions (usually in the abstract word conditions) causing a missing cell in reaction time analyses, accuracy was considered the primary dependent measure. As a result, subjects with missing cells in their reaction times were excluded from reaction time analyses. The majority of the subjects removed from these analyses were low-skilled readers. However, all subjects were included in the analyses of accuracy. Because of that, the analyses regarding reaction times were weighted less than analyses of accuracy in our conclusions. All analyses were considered significant at $p > .05$ level unless otherwise indicated. Naming tasks and lexical decision tasks were analyzed separately. For both lexical decision and naming tasks, a 2 (Concreteness) X 2 (Basal) ANCOVA was performed with Reading Skill as the covariate. Reading skill was determined by the normal curve equivalent score on the ITBS in reading.

Naming Task

When analyzing reaction times for the naming task, data from 22% of the subjects had missing cells and these subjects' data were removed from the analysis of reaction times. Mean reaction times for the remaining subjects were 1326 and 1737 milliseconds (ms.) from the basal and nonbasal concrete words, respectively, and 1369 and 1611 ms. for the abstract basal and nonbasal words. The expected two main effects of Reading Skill, $F(1,53) = 30.07$, and Basal, $F(1,53) = 8.53$, emerged. However, there was no main effect in reaction times for Concreteness or any significant interactions between Concreteness and any other variable (all $ps > .05$). Thus, if concreteness was an influence on early word reading, it did not yet influence the relative speed with which children named the words. However, since the lowest-performing children were not included in this analysis, it could also be that the effects of concreteness on reaction times were underestimated.

A separate analysis of reading accuracy was conducted using data from all subjects participating in the study. A significant main effect for Reading Skill, $F(1,61) = 157.64$ and Basal $F(1,61) = 37.61$ was found. However, there was a marginally significant main effect for Concreteness, $F(1,61) = 2.82$, $p < .10$. The most important finding was a significant interaction between Concreteness and Basal $F(1,61) = 9.02$. As seen in Table 1, both abstract and concrete words were named more accurately when they were part of the basal reading program than when they were not. However, the effect of basal instruction was greater for concrete than abstract words. Basal concrete words were named 15% more accurately than basal abstract words. There was only a 1.1% difference observed between nonbasal abstract and concrete words. Thus, young readers seemed able to learn concrete words more effectively than abstract words that were part of the basal reading program. No other interactions with Concreteness approached significance ($p > .20$).

Table 1. Accuracy Rates and Standard Deviations for Basal and Nonbasal Words

Word Type	Naming Task Basal	Naming Task Nonbasal
Concrete	65.9%	34.2%
(SD)	(29.4)	(30.1)
Abstract	51.1%	35.3%
(SD)	(29.0)	(27.3)

	Lexical Decision Basal	Lexical Decision Nonbasal
Concrete	75.0%	44.0%
(SD)	(22.0)	(28.3)
Abstract	59.3%	40.9%
(SD)	(28.0)	(28.0)

Lexical Decision Task

Prior to examining the influence of concreteness on lexical decisions, we performed a t-test to ascertain, in a general way, the relative performance of subjects with words as opposed to nonwords. Words were not read significantly faster than nonwords (words: $M = 1994$; nonwords: $M = 2077$, $t(62) = .85$, $p > .10$). However, nonwords were read more accurately than words (words: 57%; nonwords: 75%, $t(62) = 3.9$, $p < .05$). Thus, children seemed to be following instructions to press the "no" button if they did not know that the item was a word. Thirteen percent of the subjects' data contained missing cells and were eliminated from the reaction times analyses. Mean reaction times for the remaining subjects were 1685 and 2115 ms. for the concrete basal and nonbasal words, respectively, and 1767 and 1948 ms. for the abstract basal and nonbasal words. A main effect for Reading Skill, $F(1,42) = 9.57$, and Basal, $F(1,42) = 12.05$ was shown. Yet, neither a main effect for Concreteness nor an interaction with any of the other variables was significant (all p's $> .20$). Thus, as in the naming task, concreteness did not have a discernable influence on lexical processing speed in these young readers. Again, because the less skilled performers were eliminated from the analysis, this may underestimate concreteness effects. High-skill readers performed better on the lexical decision and naming tasks than low-skilled readers. All subjects tended to respond faster and more accurately to basal words than nonbasal words.

Like the naming task, the analysis of accuracy indicated concreteness effects in the lexical decision task. In addition to the anticipated main effects for Reading Skill, $F(1,61) = 89.11$ and Basal, $F(1,61) = 32.27$, a main effect for Concreteness emerged, $F(1,61) = 17.42$. The most important finding was that a statistically significant interaction emerged between Concreteness and Basal, $F(1,61) = 10.80$. Again, the concreteness benefit was observed for basal abstract and concrete words but not for nonbasal words. There was only a 3.1% difference in accuracy for abstract and concrete words not appearing in the basal reading program but a 15.7% difference for words taught in the basal reading program. Thus, the influence of the basal reader program was larger for concrete words than abstract words. No other interactions between concreteness and any other factors were significant.

In sum, concreteness effects did not emerge for reaction times in these young readers. However, the analyses of errors did indicate concreteness effects in the accuracy with which abstract and concrete words were read. For both tasks, a concreteness advantage of concrete words over abstract words was more prevalent among basal abstract and concrete words than nonbasal abstract and concrete words. Thus, subjects were more accurate with basal concrete words than abstract words across lexical decision and naming tasks. In short, concreteness affected learning. Children learned concrete words more easily than abstract words.

One interesting but unexpected finding was that words not appearing in the basal readers did not display reliable concreteness effects. Thus, for words children must have acquired from their ordinary background reading, abstract words were learned as readily as concrete words. However, as we will show in the correlational analyses below, this could have been attributable to the way concreteness was defined in the study. That is, in this study (as in most studies on concreteness effects), concreteness was defined as imageability, but other factors related to concreteness such as context availability may be more important to word reading.

Correlational Analyses

Correlational analyses were performed to ascertain the degree to which different semantic variables related to concreteness may have influenced the entry of words into children's reading vocabularies. Previous research examining concreteness effects in adults suggested that rated context availability is a better correlate of speed of lexical processing than rated imageability (see Schwanenflugel, 1991, for a review). However, recent research has suggested that imageability is somewhat more important to children than adults in determining lexical processing speed (Schwanenflugel & Akin, 1994). Other research has suggested that context availability may also be important in children's lexical processing (Noyes & Schwanenflugel, 1994). As of yet, we do not know which factors related to concreteness influence the entry of words into children's reading vocabularies.

Ratings for context availability were taken from the Schwanenflugel norms in which words were rated by 12 third-graders on a 1 to 7 scale according to how easy it was for them to *think of a sentence* for the word. Presumably, if words are hard to place into sentences, it is difficult to retrieve relevant information from prior knowledge about them as well. Ratings for imageability were taken from these same word norms in which 15 third-graders had rated words on a 1 to 7 scale interms of how easy it was for them to *think of a picture* for the word. These context availability and imageability ratings were used as predictors of percent accuracy calculated across subjects for the individual words used in the study.

To examine the degree to which semantic factors related to concreteness could account for reading accuracy, we first controlled for two nonsemantic factors associated with lexical processing: word length (in letters) and word frequency. Word frequencies were taken from the third-grade corpus of the Carroll, Davies, and Richmond (1971) *Word Frequency Book*, and were assumed to be reasonable estimates of the frequen

Table 2. Correlations of Semantic Variables Associated with Concreteness and Reading Accuracy

	Basal Words		Nonbasal Words	
Semantic variable	Lexical decision	Naming task	Lexical decision	Naming task
Context availability (r)	.51*	.30*	.40*	.47*
Imageability (r)	.37*	.28**	.04	.02

Note. $^{*}p < .05$, $^{**}p < .10$

cy with which children were exposed to the words in their free reading. As can be seen in Table 2, word reading accuracies correlated significantly with ratings of context availability for nonbasal words, but not imageability. This was true for both naming and lexical decision tasks. Thus, nonbasal words rated as being relatively easy to place in a sentence were read more accurately by these readers. Therefore, context availability appears to be related to the relative ease with which children learn words from their free reading.

Imageability seems to be more important for basal reader words than nonbasal reader words. That is, both ratings of context availability and imageability correlated with lexical processing accuracy in these two tasks (although imageability correlated only marginally with naming, $p = .06$). However, when the influence of context availability was partialed, the correlation between imageability and naming accuracy ($r = .22, p > .10$) and imageability and lexical decision accuracy ($r = .28$, $p = .07$) was no longer significant. However, when imageability was partialed instead of context availability, only the correlation between context availability and lexical decision accuracy remained significant ($r = .46$). The correlation between context availability and naming accuracy dropped to a nonsignificant .24 ($p > .10$). Thus, both imageability and context availability seem to be related to lexical processing accuracy for words that were part of the basal reader program.

DISCUSSION

The purpose of this study was to examine the influence of word meaning on the development of a reading vocabulary during a period in which children are developing a sizeable reading vocabulary. During this early stage of reading development, concreteness appears to influence the accuracy with which various words are recognized but does not yet influence lexical processing speed for words that have already been acquired. The influence of concreteness was particularly noticeable for words taught as part of the basal reading program. For both naming and lexical decision tasks, abstract basal reader words were read with less accuracy than concrete words. The effect of the basal reader program was larger for concrete words than abstract words. Interestingly, for nonbasal words, low-imageable abstract words were not read with less accuracy than concrete words. On the other hand, concreteness effects for nonbasal words emerged in the form of context availability effects. For both basal and nonbasal reader words, words for which the retrieval of relevant contextual information from prior knowledge is difficult were read less accurately than words rated high in context availability. Thus, semantically difficult words were less likely to be acquired by these second-grade children.

We have learned that word meaning influences the learning of words during a period when children are establishing basic vocabulary and word reading skills. A number of features of this experiment enable us to draw this conclusion with greater confidence than we could in previous research examining the impact of instruction on abstract and concrete words. First, the initial presentation of abstract and concrete words was not provided by the experimenter. The words used to test the students were taken directly from their basal reader and compared with a set of control, nonbasal words. The teachers were informed near the end of the year that the students would be tested on basal words, disallowing any unusual form of bias that may have been presented by the teacher or experimenter. Thus, concreteness effects observed in this study can be assumed to be of the form and size that would have occurred in normal classroom and nonclassroom settings. Further, by examining second-grade reading rather than the reading of younger children, we were able to determine the influence of concreteness at a time when children are rapidly expanding their reading vocabulary and starting to develop skills needed to become automatic word readers. Finally, by examining the results of basal reader instruction toward the end of the school year, we were able to examine the *long-term* impact of concreteness effects as a function of instruction over a large group of words.

Interestingly, the findings of the present study suggest that the acquisition of a reading vocabulary mirrors that noted for a productive (spoken) vocabulary. Studies examining productive vocabulary (Brown, 1957; Schwanenflugel, 1991) have noted that the acquisition of a concrete vocabulary exceeds the acquisition of an abstract vocabulary during the elementary school years. Presumably, in these naturalistic vocabulary studies, children are exposed to abstract and concrete words through a number of spoken and written sources. Young elementary school children have been shown to prefer naming concrete actions and objects. Through comparisons of most frequently used words by adults and first-graders, Brown (1957) found that 75% of the nouns and 67% of the verbs used by children were concrete. An analysis by Schwanenflugel (1991) revealed that 80% of high-frequency, adult, concrete words were acquired by first grade, yet the same percentage of abstract word acquisition did not occur until grade seven. Further, her analyses suggest that ratings of imageability and context availability are equally predictive of entry into children's productive vocabularies.

Another interesting but unexpected finding was that concreteness was found to impact only reading accuracy, not speed. Balota and his colleagues (1991, Balota, Boland, & Shields, 1989) as well as

Adams (1990) have constructed interactive models of word identification that suggest that some level of meaning representation influences word recognition speed. Thus, as the orthophonological characteristics of the written word are connected to its meaning, the word's meaning can serve to assist in the recognition of the word. However, in the present study, meaning served only to assist in reading accuracy. The findings of the present study suggest that a certain degree of connection between the orthographic, phonological, and meaning connections within a mental representation of the written word must occur before meaning affects reaction times in word recognition. Still, our data suggest that word meaning is involved from the earliest stages of word recognition as the written word is entered into the reading vocabulary.

In sum, the results of this study suggest that concreteness effects will determine which words children will be able to remember and which words they find easy to learn in reading. Although children were taught both abstract and concrete words as part of the basal reader program, concrete words benefited from this instruction more than abstract words did. Interestingly, imageability seemed to be somewhat more important for the learning of basal words than nonbasal words. Perhaps teachers were spending more time or using pictorial methods to teach concrete words compared to abstract words because they found these words both easier to teach and easier to find materials for. Further, it could be that typical teaching procedures for words in basal reading programs are biased toward the acquisition of concrete words. The procedures used in the basal reading program in the participating school system are typical of the older style basal reading programs (see Hoffman, McCarthy, et al., 1993). These include having the teacher first show the word in an example sentence. This example sentence usually represents a defining context for the word. The presentation of the words in sentences may bias instruction toward words that having high imageability as well as high context availability.

On the other hand, children in this study displayed equivalent and reasonably high knowledge of nonbasal abstract and concrete words despite the absence of direct instruction by their teacher. This suggests that highly imageable words might not have such an advantage in more comprehension-oriented approaches, such as whole language, since individual words are not stressed in such instruction. Instead, the emphasis is on reading whole texts and in learning words from the context of such reading. From the point of view of the Context Availability Hypothesis (Schwanenflugel, 1991), presentation of abstract words in a supportive context should override any comprehension difficulty readers might face for such words. Thus, it may be that more comprehension-oriented approaches may serve to eliminate comprehension differences typically noted between abstract and concrete words, thus facilitating the acquisition of abstract words. Clearly, further studies examining the methods that teachers use to introduce various word types are needed in order to understand both why concreteness effects actually *increased* with basal reader instruction in this study and why the form of those concreteness effects toward one predicted by imageability (to some degree) took place. However, our present research is clear in showing that children have special difficulty with abstract words as they are building a reading vocabulary. Thus, further research is needed if we are to understand how best to present abstract words so they are easiest for second-grade children to learn. Such research is especially important in light of the fact that children's reading materials become increasingly more abstract as they progress through the elementary school years (see Schwanenflugel, 1991).

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APPENDIX

Words Used and Third-Grade Ratings of
Context Availability and Imageability

Basal	Context Availability	Imageability	Basal	Context Availability	Imageability
answer	6.5	2.7	motion	4.1	3.6
arrow	5.7	5.9	opposite	5.0	2.8
attention	5.0	3.0	pail	6.3	5.8
basket	6.3	6.2	pair	6.0	4.8
child	6.5	6.6	penny	6.1	6.3
corn	6.5	6.8	piece	6.1	4.9
danger	6.3	2.8	planes	5.7	6.2
direction	6.3	3.3	plate	6.0	6.6
dish	6.5	6.0	problem	5.0	1.4
excuse	4.4	3.2	purpose	5.0	2.2
eye	6.6	5.6	rest	6.0	2.9
fact	5.5	2.2	secret	5.6	3.0
fingers	6.0	6.9	size	6.0	3.4
joke	6.5	3.2	spacecraft	4.3	5.2
head	6.5	6.3	sheep	6.0	6.3
hill	6.6	6.5	shoulder	5.2	5.2
honor	5.4	2.4	string	5.6	6.2
information	4.3	3.3	tea	6.0	6.2
machine	5.2	6.4	teeth	6.3	5.7
mind	6.5	3.8	trouble	6.0	3.1
minute	6.2	2.6	visit	5.6	2.6
mistake	5.8	3.2	wagons	5.6	6.2
mood	5.3	3.3	wish	6.0	2.7

Words Used and Third-Grade Ratings of
Context Availability and Imageability

Nonbasal	Context Availability	Imageability	Nonbasal	Context Availability	Imageability
action	5.9	3.4	gasoline	5.5	5.0
amount	5.2	3.2	general	4.7	5.4
beast	4.5	6.6	habit	5.0	4.0
beginning	5.4	2.4	income	4.5	2.8
board	5.7	6.0	invention	4.9	4.8
bucket	6.0	5.8	lily	5.3	5.4
buffalo	5.2	6.8	moment	5.7	2.6
century	4.8	2.0	package	5.4	6.5
choice	6.5	2.0	ponies	5.6	6.8
creatures	5.3	6.3	promise	6.0	3.0
customs	5.5	2.8	protection	5.4	3.6
discovery	5.4	3.9	quality	5.1	2.0
distance	4.9	3.5	rage	4.1	3.7
ending	6.2	2.4	reason	5.2	2.9
events	6.3	2.9	relief	6.3	2.2
evil	5.0	3.4	result	4.9	3.2
excuse	4.4	3.0	speed	6.2	3.9
factory	5.5	4.9	stranger	6.1	6.2
fear	5.6	2.6	strength	5.7	3.6
features	5.7	3.7	success	3.3	2.6
fright	6.0	2.9	symbol	4.7	5.6

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