UNIVERSITY OF ALBERTA

Effects of Metalinguistic Cueing on Quick Incidental Vocabulary Learning (QUIL)

BY

©

Shari Shabits

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Master of Science.

DEPARTMENT OF SPEECH PATHOLOGY AND AUDIOLOGY

Edmonton, Alberta

Spring 1993

ISBN 0-315-82201-5

UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR: Shari Shabits

TITLE OF THESIS: Effects of Metalinguistic Cueing on Quick Incidental Vocabulary Learning (QUIL)

DEGREE: Master of Science

YEAR THIS DEGREE GRANTED: Spring 1993

Shari Shabits
Shari Shabits
#108, 1801 - 32 St.
Vernon, BC V1T 5K4

December 4, 1992

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Effects of Metalinguistic Cueing on Quick Incidental Vocabulary Learning (QUIL) submitted by Shari Shabits in partial fulfillment of the requirements for the degree of Master of Science.

Phyllis Scheider, Ph.D.

Paul Hagler, Ph.D.

Bruce Derwing, Ph.D.

December 3, 1992

ABSTRACT

Much of the research on quick incidental learning of vocabulary (QUIL) has focussed on the task variables that influence this skill, with little attention devoted to the abilities that allow children to achieve such rapid learning. The present study provides evidence that activation of metalinguistic strategies for detection and learning of novel vocabulary can aid the fast mapping process. Sixty-four normally developing children between the ages of 6 years, 5 months and 12 years, 5 months were read a brief story containing five nonsense words. Half the subjects were instructed specifically to find the nonsense words and the clues to their meaning as they listened to the story. The other half were instructed only to find "things you don't understand". The group who received the specific instruction detected more of the nonsense words than their peers in the control group. They also performed significantly better when asked to define the nonsense words. A main effect for age was also found on the definition task. These results indicated that awareness of the presence of novel words in a text, and the necessity to figure out what they meant, prompted the children in the specific instruction group to actively engage strategies for identifying and gathering information about those words. They were therefore more efficient at fast mapping than their peers who received the general instruction. Implications for vocabulary training with normally developing and language-disabled children are discussed.

Table of Contents

List of Tables

List of Figures

The Effects of Metalinguistic Cueing on Quick Incidental Vocabulary Learning (QUIL)

Much recent interest has focussed on children's acquisition of vocabulary. Researchers have estimated that children learn new words at the astounding rate of five to nine per day (Templin, 1957, cited in Carey, 1978; Crais, 1990; and Rice, 1990). Several theories have been posited in an attempt to explain the mechanisms allowing such rapid acquisition, but none adequately explain all the phenomena that researchers have encountered. Complicating the issue is the long-held assumption that children do not even begin to learn a new word until they have been exposed to it several times. Until recently vocabulary training studies have supported this view (see Rice, 1990, for a discussion of this literature). Yet if individual words are acquired so slowly, how do children learn so many, so quickly?

Recent research has provided the beginning of an answer to this question. In 1978 Carey and Bartlett published a seminal study demonstrating that children of preschool age acquired some information about a single new word from only one exposure in a discourse context. This information was by no means complete, but the subjects' performance was nonetheless a dramatic contrast to the results of previous studies. A rash of similar studies (see below) have since replicated and extended these results. We now know that, given a rich supporting context, even very young children usually learn something about a new word from minimal exposure to it. Adult intervention is not even necessary. This phenomenon has been termed "fast mapping" or "quick incidental learning", to contrast it with the slower process of refining and elaborating word meanings that occurs during continued experience with new terms.

Most recent studies have focussed on external variables influencing fast mapping. Fast mapping occurs in a variety of learning situations, across a wide array of materials, semantic categories and presentation methods. We have insight into what words are easiest to learn, how many can be mapped at once, and what information is most likely to be acquired. Our understanding of within-child variables affecting this capacity, however, is severely limited. All we really know is that the ability to fast map is robust from the start, and continues to grow stronger even into adulthood.

Preschool children have been the focus of nearly all the fast mapping research to date. Only two studies have examined this skill in school-aged children. These studies found significant improvements in fast mapping capability with increased age, but made no attempts to determine why. Of course, we know that memory capacity and processing skills improve as children mature, and this likely has a powerful effect on fast mapping capacity. However, we also know that the ability to monitor one's comprehension of a message and make deliberate attempts to resolve difficulties improves with the increase in conscious control of language and cognition that comes with maturity. It seems logical to reason that improved metalinguistic ability, particularly comprehension monitoring skills, would lead to an improvement in a child's ability recognize an unfamiliar word and activate strategies for learning. No one has yet examined the effects of metalinguistic sophistication on fast mapping ability, and it would seem to be a potentially powerful influence. It is this possible relationship that the present study investigated.

Background

Children's rapid acquisition of vocabulary during the preschool years has prompted much recent interest. Several researchers have cited Templin's (1957) data indicating that children acquire more than 14,000 new words by age 6, or nine new words daily (including inflected and derived words. This estimate falls to 8000 new words overall, or approximately five per day, when only root words are included. Carey, 1978; Crais, 1990; Rice, 1990). Some investigators have examined what kinds of words children learn (Gentner, 1982; Schwartz & Leonard, 1984) and found evidence suggesting a bias for object words. Others, such as Benedict (1979) and Nelson (1974), argue that action-related words are the real focus of early word learning. Comparisons of receptive and expressive lexicons in the same children have revealed gaps between the two, which seem to close around two years of age (Benedict, 1979). Leonard et al. (1982) found a preference for productive acquisition of words with initial consonants within the child's phonemic repertoire, although this bias was not evident in comprehension.

There have been relatively few studies investigating what and how children learn; most of the publications on vocabulary acquisition are theoretical in nature. Many of these posit various constraints on the kinds of hypotheses children make about the meanings of new words, with the reasoning that some constraints must be operating for children to acquire so many new words so rapidly. These hypotheses include, among others:

1. Clark's (1983) Lexical Contrast Theory, which argues that children are biased to learn words which contrast in meaning with those already acquired. Clark also believes that children add to their knowledge about the meanings of words gradually, with perceptual features the first features to be learned.

2. Nelson's (1974) Functional Core Hypothesis, which is similar to Clark's in its view of lexical acquisition as a gradual process of adding more features to a word's meaning, but holds that it is functional features that are first learned.

3. Markman's (1984) Mutual Exclusivity Bias, which predicts that children will learn and use basic category labels which are mutually exclusive, at least until they learn

that labels apply at different levels in a taxonomy (e.g., bird is a supernym of robin, thus both labels can be applied to the same creature).

4. The M-Constraint proposed by Keil (1983), which suggests that ontological categories are organized in rigid hierarchies, with predicates governing categories. The M-Constraint states that two predicates at the same level in the tree structure cannot govern the same category, unless the word or the predicate is ambiguous in meaning.

These theories are all based on empirical evidence, most often from studies of children's intensions, extensions, and overextensions of words. However, closer inspection has revealed methodological flaws in these studies, so that data used as supporting evidence for these constraints cannot be viewed as conclusive (Carey, 1978, 1982, 1983; Merriman, 1986). There has also been new evidence unexplainable by these constraints (Carey, 1982, 1983; Merriman, 1986). Indeed, as Carey (1982, 1983) points out, the failure of any current theory to explain all the phenomena encountered by researchers indicates that there may, in fact, be no conceptual constraints operating on the acquisition of word meaning. It is also possible that many constraints may be in effect at the same time.

Fast Mapping

Inherent in the above theories is the notion that children do not instantly acquire the full adult meaning of a word. As Rice (1990) points out,

> A fundamental axiom of the contemporary psycholinguistic literature is that word meanings are essentially categorical in nature. Words "stand for" sets of individual "things" that are regarded as equivalent for the purpose of the word meaning, although there are discernible differences among the "things". (p. 173)

Lexical acquisition, therefore, is a gradual process of refining and elaborating word "categories", of learning what is included in and excluded from each category. Multiple exposures to words thus have been traditionally considered necessary for a child to make the link between a word and its referents (Rice, 1990). This assumption has recently been contradicted by evidence that children can and do "form quick and rough hypotheses about the meanings of new words" (Heibeck & Markman, 1987) from as little as one exposure. This process has been termed "fast mapping", to differentiate it from the slower process of adding to and refining knowledge of word meanings. Rice (1990) has recently elaborated the fast mapping model and renamed it "quick incidental learning", or QUIL. These terms will be used interchangeably in this paper.

Studies of Single-Word Acquisition

The first experiment to demonstrate the presence of this quick, partial acquisition of word meaning was reported by Carey and Bartlett in 1978. They introduced three- and four-year old children to an unfamiliar colour word (chromium) which referred to an unfamiliar colour (olive green). The word was presented by the children's teacher in a naturalistic context during the course of the school day. Two trays, one red or blue and one olive green, were placed on a table. Each child was individually directed to "bring me the chromium tray, not the blue one, the chromium one" (Carey & Bartlett, 1978). The word was presented on one occasion only. A week to ten days after their exposure to "chromium", several tasks were presented to assess various aspects of the children's knowledge about the term. Maroon and its potentially confusable colours (red & purple) were included in these tasks to avoid the possibility that the children might select olive green simply because it was the only unusual colour. The children were first asked to put strips of coloured paper into boxes of the same colour. The colours presented were olive and its potentially confusable colours (focal green, brown, & gray) and the foils red and maroon. The subjects were then asked to name a few colours, including olive. Comprehension of the word "chromium" was then assessed by asking the children to select it from an array, along with two other colours (blue & yellow). Finally, the children's knowledge of "chromium" as a colour term was assessed.

The experimental procedures were carried out in two cycles, the second ten weeks from the first. The results indicated that the children had learned something about the new word. The experimental group improved from an error rate of 78% to 17% on the sorting task, although this included improvement in sorting other colours as well as olive. Forty-seven percent of the experimental group responded correctly on the comprehension task after cycle one, and 63% responded correctly after cycle 2. Thirty-five percent of the control group also responded correctly, however, suggesting that some of the experimental group's results could have resulted from lucky guessing. Significantly more of the children in the experimental group than in the control group changed their name for olive after cycle two. Of these, two used the label "chromium" or an approximation of the word, while others indicated that they knew olive had its own name but could not remember it. Such a response was never used by the control subjects. Many children could not perform the hyponym task; however, at cycle two, six subjects did identify "chromium" as a colour.

Carey and Bartlett did not draw general conclusions from their experiment, choosing instead to pose further questions regarding the effects of differences among subjects, introducing events, and lexical domains, as well as the acquisition of colour terms. They also questioned the idiosyncracy of children's initial mappings. Although Carey and Bartlett's experiment is flawed in its lack of careful experimental controls, and the methodological detail reported is limited (Rice, 1990), it provided the first evidence that children learn more from their first exposure to a word than was originally thought. This study presented a new direction for research and was followed by a number of similar studies.

Dockrell and Campbell (1986) attempted to address some of the questions raised by the Carey and Bartlett (1978) study, but "suspected that part of the reason that Carey found so few children reaching full mapping of the color term was because of the complex nature of the color vocabulary." (p. 136) Reasoning that animals, unlike colours, have clearly identifiable perceptual characteristics and represent a well-established class in children's existing lexicons, they introduced a novel animal to the children. Their task was very similar to that of Carey and Bartlett (1978). The children, ages 3 and 4, were exposed to the new word only once, in a naturalistic context (putting toy animals away). The novel animal was a tapir and was given the nonsense name "patas"; the foils were a cow, a sheep and a pig. No reason was given for the use of a nonsense name for the tapir instead of its real name, which the children did not know on a baseline measure. After the initial exposure, comprehension of the novel word was assessed in a game context with several foils including a meaningless control word. The researchers then allowed the children further exposure to the tapir, but not to its name, by providing a toy farm and animals for them to play with over a period of six weeks. Finally, a series of comprehension and production tasks were administered.

The children acquired the new word almost immediately; thirteen of the sixteen subjects performed correctly on the first comprehension task, and all sixteen chose the tapir as the referent for "patas" on the second trial. The children were also able to retrieve the nonsense label for the tapir and did not extend it to other unknown animals. They also used the new term unambiguously in free play with the toy farm. The researchers concluded that the children had achieved a full mapping of the novel term. Dockrell and Campbell (1986) also reported an unexpected result from the control group. Although these children did not experience the introducing event, they performed similarly to the experimental group on the comprehension task. The authors attribute this to a ceiling effect: "The children were extremely efficient at figuring out that the unknown word referred to an unfamiliar object and therefore, to the tapir .... This is an extremely useful strategy for the early word learner." (Dockrell & Campbell, 1986, p. 139) Had the authors used unfamiliar as well as familiar objects as foils, this would not have occurred. Although this may be considered a flaw in the study's design, it is a fortunate one, for a valuable insight into preschool children's problem-solving strategies was gained.

Because the children in the animal study were presented with only one choice of a referent for the new word, they acquired the novel term so rapidly and completely that there was no opportunity to examine partial acquisitions or idiosyncratic responses at intermediate stages. This situation does not reflect the normal word-learning context. Dockrell and Campbell (1986) therefore designed another experiment, this time examining the acquisition of a single new word which could refer to the shape, colour, or pattern of an object. A red cube, a green sphere, and a striped hexagonal block were chosen as possible referents, with the nonsense word "gombe" as the new attribute term. The children were assigned to either the pattern group, who were asked to "Pass me the 'gombe' block, not the red one or the green one, but the 'gombe' one", or the shape group, who received the instruction to pass the "gombe" block in contrast to the round and square blocks. The procedure for this experiment was similar to that of the animal study, with the addition of an extra comprehension task. The two attributes present in the "gombe" block were separated in this task; the square and round blocks were given stripes, and the hexagonal block was plain. A hyponym task for colour and shape was also administered at this point.

The learned attribute category apparently had a significant influence on the children's acquisition of the new term. While all of the shape group subjects attributed "gombe" to hexagonally-shaped objects, only two of the pattern group attributed it to striped objects. All but one of the other children in the pattern group showed intermediate acquisition of the term, with two children attributing "gombe" to hexagonal shape. Only five of the children spontaneously used the term "gombe" in the production task, and even these results were not always consistent with performance on the comprehension task.

These results allowed Dockrell and Campbell to conclude that children can use contrastive information to assist them in identifying the specific attribute indicated when contextual cues are ambiguous. However, the researchers wished to further explore the idiosyncratic mappings of the pattern contrast group. Hypothesizing that the pattern task was too ambiguous because pattern was contrasted linguistically with colour, prompting "a search for a new color which could not be found" (Dockrell & Campbell, 1986, p. 143), they applied the same procedures to another group of preschool children, this time giving the "gombe" block a plain colour unlikely to be labelled with an established colour term by their subjects. The results were surprising; only one of the seven children attributed the new term to the new colour ("silver fern"), five decided it labelled the shape of the block (again, hexagonal), and one restricted mapping of "gombe" to denotation of only the original stimulus. Some of the children altered their responses across tasks; for example, one child originally mapped "gombe" onto "silver fern" but had switched to "hexagonal" by the last comprehension task. Another firmly attributed the new word to "hexagonal" on all comprehension tasks, but replied "gombe" when asked to label the colour "silver fern".

Dockrell and Campbell were unable to account for these phenomena, but suggested that mapping of the new term onto a new colour may have been preempted by the children's extension of an existing colour term to that colour. The authors suggested that this might be likely to happen because colours represent a continuum, while shapes are more discrete. The other possible referent attribute, hexagonal shape, was thus more likely not to have already had a shape term attached to it, allowing the children an alternate hypothesis rather than forcing them to attribute "gombe" to the new colour. Dockrell and Campbell point to the influence of preemption, the child's existing lexical database, and the type of input the child receives as factors influencing the mapping process. They also suggest that a significant portion of the process of lexical acquisition may be too cryptic to be explored, since the children's representations of the new terms in their studies changed over time (each study took place over a period of ten weeks) without any additional linguistic input.

QUIL of shape, colour, and texture terms was also examined by Heibeck and Markman (1987), using procedures similar to Carey and Bartlett's (1978). Heibeck and Markman attempted to avoid the problem of correct guessing by randomly selecting items from a pool of stimuli for each of the three lexical domains targeted, so that the subjects would not all hear the same word in the introducing event. However, it is unclear how this modification would accomplish this, since the children could presumably use the same strategy of "odd item - odd name" that Carey and Bartlett discovered. The real control for this strategy lies in the comprehension task itself, in which objects representing three familiar and three unfamiliar attribute terms were presented in addition to the target. However, since no control subjects were employed, there is no indication of the effectiveness of these measures.

There were two other differences between the Heibeck and Markman (1987) study and Carey and Bartlett's; the assessment tasks were presented in the same session as the introducing event, and the hyponym task was modified to make it easier for the children. Instead of asking the children "Is (attribute) a colour?", Heibeck and Markman required the child to produce a contrast term within the same lexical domain as an indication of hyponym comprehension. For example, a child in the "colour" group might be asked, "See this? It isn't chartreuse because it's _____." (Heibeck & Markman, 1987).

To be credited with knowled the lexical domain of the target word, the child would have to answer with a colour term, not necessarily the correct one.

The Heibeck and Markman (1987) study was much larger than those previously discussed, with 83 children ages 2 years, 2 months to 4 years, 8 months participating. The children were randomly divided into shape, colour, and texture groups. Each child was exposed to one word in an introducing event similar to that used by Carey and Bartlett (1978), and was assessed using the production, hyponym, and comprehension tasks, in that order. This order of presentation was used "to control how much exposure the children received to the new word and to other words in the domain before testing" (Heibeck & Markman, 1987, p. 1024). More of the children learned shape words than colour words, and colour terms were in turn easier to learn than texture terms, on all three tasks. In general, the children performed best on the hyponym task, followed by the comprehension task. In addition, there was a main effect of sex and an interaction between sex and domain on the comprehension task only: the girls performed better in general, and comprehended more shape and colour, but fewer texture, words than did the boys. The hyponym task showed a main effect for age; the older the children were, the better they performed. Age did not have a significant effect on performance of the comprehension and production tasks, however. Similar effects of age and domain were present on vocabulary assessments administered after the mapping assessment tasks.

Although their results supported their hypotheses, Heibeck and Markman raised several questions stemming from their procedures. First, because the children were given the choice of one familiar versus one unfamiliar attribute label, the researchers questioned whether it was necessary to provide an explicit lexical contrast in the form of the instruction, "not the (familiar term) one." They suggested that nonlinguistic cues could have been sufficient. Second, they were intrigued by the relative ease with which the children acquired a new shape term and proposed several possible reasons for this: (a) a predominance of shape terms in the existing lexicon (as was established on the vocabulary assessment), (b) shape having more perceptual salience to the children, or (c) the presentation of shape words as nouns rather than adjectives. Finally, Heibeck and Markman suggested that their hyponym task may have been too similar to the introductory event, in that the contrast item varied only on one dimension from the target, and that dimension remained the same (e.g., only a colour contrast was presented).

Heibeck and Markman (1987) revised their procedures to answer these questions, and presented the tasks to 64 children from 2 years, 8 months to 4 years, 5 months of age.

Procedures were generally similar to those of their initial study. However, half of the children received the original instructions in the introductory task, while the other half were given an implicit contrast, for example, "Bring me the chartreuse one, not the other one." (Heibeck & Markman, 1987). In addition, half of the children in the shape groups were taught the new shape terms as nouns, while the others heard them as adjectives. The production and comprehension tasks remained unchanged, but the objects used on the hyponym task differed on several dimensions from those presented in the introductory event. The results of the second study were very similar to those of the first. The procedural changes made had no significant effects on the children's performance on any of the tasks. Heibeck and Markman cited the children's attribution of the novel term to the unfamiliar referent as indirect evidence in support of the principles of contrast and mutual exclusivity. Such a conclusion seems rather hasty, given that all of the children in Study 1 and half the children in Study 2 were provided with explicit linguistic cues as to which object they were to choose. The fact that the children who received implicit cues responded similarly provides stronger support for this statement.

Dollaghan (1985) also followed a similar format in her fast mapping study. However, in order to "ensure that the children would not be able to assimilate the strange object into any of their already-existing lexical categories or to apply any of their existing labels to it" (Dollaghan, 1985, p. 450), Dollaghan used a nonsense object, an "oddly shaped" plastic ring. This was labelled a "koob", a nonsense word which was devised to contain only consonants normally acquired by the age of the children in the study. Thirty-five normal children, ages 2 to 6 years, participated in the study. The children were introduced to the "koob" during a hiding game, with two familiar objects (a pen & a fork) as foils. These objects and two oddly shaped objects were also used as foils on a comprehension task. The children were also asked to label the koob. Those who could not were presented with the label, a phonetically similar and a phonetically dissimilar foil ("soob" & "teed", respectively), and asked which was correct. Finally, to determine whether the subjects remembered some nonlinguistic contextual information associated with the koob, Dollaghan asked them to identify the koob's hiding place at the beginning of the study.

Results were consistent with the results of the other QUIL studies. Eighty-one percent of the subjects demonstrated comprehension of the novel term, and 45% could label it. Of the eight children who could not retrieve the label, five recognized the correct label. Sixty-two percent of the children remembered where they had hidden the koob in the introducing event. Although Dollaghan had not designed the study to examine age differences, it appeared that none were present. Correlation of QUIL task performances with MLU and age equivalent scores from the <u>Peabody Picture Vocabulary Test</u> revealed no significant relationships.

Dollaghan (1985) contrasted the results of this study, in which the children were able to acquire information about a nonsense word and referent from only one exposure, with other nonsense word-learning studies in which subjects required up to 40 presentations of the novel words before they could produce them. Dollaghan cited several aspects of the "koob" study which may have contributed to the children's skill:

> Specifically, the new word was presented in a context consisting of a familiar script (a hiding game); only one new word was presented; the child heard the word in a context requiring him/her to draw an inference and to act on it, thus ensuring at least some active processing; the word-referent pairing was unambiguous, since only one potential referent was present; and the child's fast mapping was probed very shortly after exposure to the new lexical item. (p. 454)

The other studies discussed above shared these methodological characteristics. Thus, several similar experiments have clearly demonstrated young children's ability to quickly match an unfamiliar word to an unfamiliar referent, store some information about both word and referent, and even retrieve the new label up to ten weeks after the introducing event. Despite the embedding of the new words in familiar scripts (hiding, requesting, putting away toys), many aspects of these experiments are highly structured and artificial. Children typically hear a new word many times, in a variety of contexts, often without a clear contrast with known words, and with many novel referents to choose from. New words usually must be detected from a stream of speech in conversation or story-telling, and several new words are often presented within a short period. In addition, children often encounter words referring to other than objects or attributes and attention to the targeted referent may or may not be manipulated by an adult (Rice, 1990). Finally, many of the new words children hear may refer to referents for which they already have a label. None of the above studies examined the effects of such an occurrence. Thus, while the existence of QUIL has clearly been established, many questions have been raised regarding the relative influence of many situational factors on this skill (Dollaghan, 1985).

QUIL of Multiple Words in Discourse Contexts

The discourse context used by Rice and Woodsmall (1988) was unusual in studies of language acquisition but true to real-world learning situations. Rice, in a series of previous studies, had discovered that preschool children's vocabulary is influenced by viewing educational television programs, such as "Sesame Street" and "Mr. Rogers's Neighborhood", geared towards this age group (Rice, 1984, cited in Rice & Woodsmall, 1988; Rice & Haight, 1986). Such programs use dialogue which

> has a simple grammar, refers to immediately present referents, explicitly focuses on key words, and involves frequent repetitions of form and content. Furthermore, the content expressed in key terms is often supported by close-ups and other salience-enhancing visual production techniques. (Rice & Woodsmall, 1988, p. 421)

These conditions are ideal for learning new words, a position supported by evidence from a two-year longitudinal study of 325 preschoolers in which viewing of educational programs, particularly "Sesame Street", was correlated with later scores on the Peabody Picture Vocabulary Test - Revised (Rice, Huston, Truglio, & Wright, 1990). Viewing was a significant predictor of PPVT-R scores for the younger age group (2-1/2 at the beginning of the study). Rice suspected that the children were mapping new words while viewing and decided to explore this possibility.

In the resulting experiment (Rice & Woodsmall, 1988), sixty-one normal children, ages 3 and 5 years, were shown two 6-minute animated programs featuring animal characters. Voice-over narration of stories corresponding to the action was added to the videotapes. Half of the children watched a version with 20 novel words used in the narratives, while the control group viewed a version using words which were similar in meaning but familiar. Thus, the experimental group were exposed to novel words with familiar referents; the study examined whether the children could map new words onto words already in their lexicons. Five each of the target words referred to objects, actions, attributes, and affective states, in order to determine whether word type affected mapping ability. The words were presented several times in each story.

The PPVT-R and a comprehension test for the experimental words, similar in format to the PPVT-R, were administered both pre- and posttreatment. The groups were similar in their pretest scores on both of these tasks. The experimental group had higher posttest scores than the control group, and the five-year-olds learned more than the three-year-olds. A word effect was also found; the subjects apparently found attribute terms easier to acquire than object words, objects easier than actions, and actions easier than affective state words. The only significant difference reported, however, was between attribute and affective terms. Word item analyses revealed that both age groups tended to learn the same individual words. The word type results were generally consistent with Rice and Woodsmall's predictions for ease of acquisition, based on results of other lexical acquisition studies, although they had predicted attribute terms would fall third in the hierarchy. The relative difficulty of affective state words was explained by the researchers as a factor of both their conceptual abstractness and grammatical variability. Not only do these words refer to internal states which cannot be directly observed, only inferred, they can function in a variety of grammatical roles. For example, one of the experimental words, dejection, was presented as a noun ("Suddenly the dejection goes away"), an attribute ("Matthew looks dejected"), and as an affective state ("Oh, he still feels dejected"). Rice and Woodsmall suggested that "the combination of grammatical variability and conceptual abstraction in the case of affective words may have been too challenging for a fast mapping in the viewing situation." (Rice & Woodsmall, 1988, p.426).

Most studies have investigated the fast mapping abilities of preschoolers; Dickinson (1984) examined these skills in school-aged children. That experiment also used a variety of discourse contexts to examine their differing influence on QUIL. First- and sixth-grade subjects were introduced to three experimental words in three ways. Each child was introduced to one of three new colour words in a manner similar to that used by the previous studies; this was labelled the conversational condition. In the storytelling condition, the subjects heard one of four stories introducing either an unfamiliar noun or an adjective. Finally, the children were told the definitions of four words, including an experimental word of the opposite form class from the word introduced in the story condition (e.g., if a subject heard a new noun in the story condition, an adjective would be defined). The children were then told a second story, containing no experimental words, as a filler between the exposure tasks and the testing session (the rationale for the use of a filler task was not given).

The testing session consisted of four tasks. First the children were read a list of twelve items consisting of three familiar words, the three test words the child had been exposed to, three of the other test words, and three nonsense words, and were asked to decide which were "words" or "things they had heard before" versus those which were "silly" or "not words". They were credited with recognition of experimental words as words if they identified the terms introduced in the exposure tasks as words, but identified the corresponding experimental words that they had not been exposed to as "not words". They were then asked to define those items which they considered words, or use them in a sentence. The third task required the children to identify correct syntactic usage of the test words in sentences. To receive credit for this task, the children had to accept both sentences that used the terms correctly and reject both of those with inappropriate usages. Finally, the subjects were shown an array of five pens and asked which one was the experimental colour each had heard.

Both groups of children (first & sixth grade) recognized test words as words, and the sixth grade subjects were also able to identify a significant number of the sentences with appropriate test word usage. The first graders could not. However, this may be due to the small number of first graders who were given all the test sentences; it was discovered after most of this group had been tested that many children could identify correct usages for words they had not identified as words. Thus it is likely that the first grade children would have performed better on this task than the results indicate, if they had all been given the word usage task.

Only 1% of the younger group could provide definitions for the test words or use them correctly in a sentence, while 31% of the sixth graders could do so. Interestingly, 64% of the sixth grade subjects who could not define the test words before being given the sentence usage test were able to provide a definition after the usage test. Presumably, sentences either provided extra information about the words (Dickinson, 1984) or aided these children's retrieval of previously acquired information. It is possible that the filler story task interfered with the children's recall of definitional information. Finally, an interesting effect was observed on the colour identification task. Of the three colour terms presented, only ochre (a bright yellow-orange) was identified correctly by a significant number of subjects. The words bice and beryl (both paired with a light yellow-green) were correctly identified by only three subjects. Dickinson postulated that either the word "ochre" or its corresponding colour was especially salient to the children; whether it was the colour or the word that stood out could not be determined, because the words and colours were not counterbalanced.

So far Dickinson (1984) had demonstrated that school-aged children can fast-map new words in a variety of discourse contexts and that age affects performance on these tasks. Age and presentation method were also found to interact. Story and definition presentations did not differ significantly in their effects on first graders' performance of any task, but the definitional task was found to be more facilitative of sixth graders' word learning than the other tasks. An unexpected result was the younger group's superiority in recognizing words heard in the story condition, which approached significance. Dickinson interpreted this as possibly indicating an unwillingness on the older children's part to indicate that something was a word without having explicit knowledge of its meaning. Their superior performance on the words that had been defined also was attributed to superior metalinguistic knowledge. Unfortunately, because Dickinson did not keep the target words constant across conditions, the relative effects of these presentation methods could not be compared. Dickinson also pointed out that the procedures gave only limited information about the effects of conversational presentation on QUIL. A second study was designed to examine this in more detail, as well as to examine the longevity of the initial word knowledge and the effect of the "availability of the concept on which the word is to be mapped" (Dickinson, 1984, p. 366).

The children in the second investigation ranged from 4 to 9 years of age. Colour was again targeted for study, along with a weight term, and the terms were introduced within the context of an extended interview with each child. Testing procedures were as per Experiment 1. Slightly more than half of the children were tested immediately following the interview, while the others were tested 3 to 7 days later. The older children (6 to 9) performed significantly better than chance on identifying test words as words. Results for the 4 to 5-year-old group were not stated for this task. All age groups were able to identify correct word usage sentences at better than chance levels, and again the older group performed significantly better than did the younger group.

Dickinson did not ask the children to define the words in this experiment and did not assess their mapping of the weight term onto a concept indicating weight. The colour identification task was again presented, however. Nine percent of the 4 to 5-year-olds and 21% of the 6 to 9-year-olds correctly identified "bice" in this experiment. Two different colours, dark green and light green, had been used as the referent for this term. Of the children in the older group, only those who were presented with the light green pen correctly identified it as "bice". Dickinson suggested that older children may recognize the lighter, more yellow shade of green as a fringe example of that colour and thus be more open to the possibility of its having a special name.

Crais (1987) also examined QUIL of novel words from storytelling, but with a different purpose. Crais suspected that the two tasks a learner faces in QUIL, inferring the meaning of the new word and encoding its phonological structure, might compete for the learner's processing resources. That experiment was designed to examine whether subjects would recall semantic and phonological information differently as a function of the specificity of the information given and proximity of successive exposures to a new word within the story.

First-, third-, and fifth-grade children and adults were read four stories containing four nonsense words each. The words were presented three times each, with the presentations either closely spaced (separated by one sentence) or distant (separated by several sentences & a topic change). The type of propositional information about each word was either specific, allowing subjects to quickly discern the referent, or nonspecific, so that the choice of referent was ambiguous. The subjects retold the stories, then answered questions about familiar and new words from the stories. Third- and fifth-grade children did not differ in their performance on these tasks, but significant differences were found among the other groups. Close repetition of the new words and specific information were associated with improved recall of information and poor production. The converse was also true; subjects were better able to remember the phonological form of the words, but recalled less propositional information, when the words were farther apart and the information provided was less specific. Crais suggested that, when subjects could not easily determine the meaning of a novel word, they relied more on recall of its phonological form. When the referent for the word was clear, its phonological form was not as important for recall.

These studies begin to answer many of the questions raised by the single-word QUIL studies. The number of exposures to a new word ranged from only one (Dickinson, 1984) to several (Rice & Woodsmall, 1988), and were presented in varying contexts. From three to twenty new words were encountered by the subjects, and in some cases referred to other than object and attribute concepts. Dickinson (1984) and Crais (1987) presented their subjects with novel referents for the novel words, while Rice and Woodsmall (1988) examined children's ability to map new words onto familiar content. In Crais's (1987) study, ambiguity of reference was also manipulated. Some general principles begin to emerge when all this information is combined.

Taken together, these results indicate that children and adults can fast map several new words at once, in a variety of discourse contexts, and for a variety of word types. Object and attribute terms appear to be easier to learn than action and affective state words. The type of information encoded varies as a function of the specificity of the information provided and the distance between presentations of a new word. Rice and Woodsmall's (1988) data contradict the Principles of Mutual Exclusivity and Contrast by demonstrating that young children readily learn new words for concepts for which lexical entries have already been made. Age is also a factor in QUIL ability; the older a child is, the more adept that child becomes at detecting unfamiliar words and attaching meaning to them.

How Does It Happen?

The QUIL studies, while providing new information about what children learn, the speed and completeness of their initial acquisitions, and some of the external conditions influencing the process, have yielded no information about how they do it. As these studies have so dramatically demonstrated, children are not passive absorbers of language input. They are actively involved in processing input and searching for what makes sense. Rice (1990) believes that QUIL is an internally driven process, and explicit assistance from an adult is not necessary for learning to occur. What does the child bring to the word learning task that enables such rapid acquisition?

Crais (1990) suggested that children's world knowledge is a direct and significant influence on their vocabulary acquisition. Script knowledge provides a stable, reliable framework for learning word meanings and gaining knowledge about language. Rice (1990) decribed several tasks inherent in the QUIL process: the child must be able to segment speech into individual words, detect words that are unfamiliar, match them to possible referents, compare the new word/referent mapping to the existing lexicon, store it, and retrieve it on a comprehension task. Part of the information encoded by the child must include the word's semantic class (Dickinson, 1984; Rice, 1990). Additional tasks, pointed out by Crais (1987, 1990) and Dollaghan (1985) are the encoding and retrieval of phonological information about the new word, a process apparently concurrent with, but independent of, the encoding of semantic information. The child's on-line processing abilities must be very robust to cope with such demands.

Metalinguistic skills are also clearly implicated here: abilities such as segmenting speech, recognizing an unfamiliar word, and classifying it are all metalinguistic skills. Much of the evidence for QUIL suggests that there is a developmental component to it; as we have seen several times, older children are more proficient mappers. Rice (1990) also stated that there is substantial individual variation in QUIL ability, and this claim is also borne out by the data. Only in Dockrell and Campbell's (1986) animal study did all the subjects acquire the new word rapidly and apparently completely. Many of the subjects in other studies either did not learn anything about the new word or made incomplete and even idiosyncratic maps of the new words and referents. This was in part due to external influences, such as referent ambiguity, conceptual difficulty, and the context of presentation, as several researchers (Crais, 1987; Dickinson, 1984; Rice & Woodsmall, 1988) have shown.

The child factors discussed above must also play a role, though. Our knowledge of these processing and metalinguistic skills, and their relative influence on QUIL ability, is limited (Rice, 1990). Dickinson (1984) and Crais (1987) providee some preliminary information regarding the influence of metalinguistic sophistication. Dickinson's (1984) studies used metalinguistic exposure and assessment tasks, thus revealing some metalinguistic knowledge. Children could recognize a new word as a word after only one exposure to it and could recognize appropriate syntactic uses of it. Older children, with more sophisticated metalinguistic skills and more practice in using them, performed better when the introductory task was metalinguistic (a definition). These results suggest that increasing linguistic and metalinguistic knowledge may influence children's ability to gain knowledge about words presented incidentally.

Unfortunately, both of Dickinson's experiments have serious design flaws which limit their reliability. Use of different words for different discourse contexts prevented direct comparison of the influence of presentation method in the first study; in the second, only one presentation method was used. Only one word from each category was presented to each child, and the children were not all exposed to the same words. This limits the extent of the knowledge gained from this experiment. Further, Dickinson did not explore the relationship between one of the test words in the second experiment and the concept to which it referred. Finally, Dickinson relied on multiple one- and two-sample tests of significance, thus increasing the risk of experiment-wise error. The utility of Dickinson's results is therefore seriously compromised, a frustrating circumstance because of the insight they could have given into the influence of metalinguistic abilities on quick word learning.

The role of metalinguistic knowledge is detectable in Crais' (1987) research as well. One wonders if Crais would have obtained similar results had the subjects not been required to retell the stories. Knowing that they must do so may have triggered an active, if unconscious, search for the most effective strategy for acquiring the new word, based on the information given. It would be interesting to compare these results with those of a group who did not expect to be required to recall the story, and thus would not be alerted to the necessity of learning and remembering unfamiliar lexical items.

A Closer Look at Metalinguistics

Limited and indirect as these results are, they are tantalizing in their suggestiveness. A closer look at the potential influence of metalinguistic knowledge on QUIL is certainly warranted. One such strategy is used here. Specifically, this study explored the effect of a metalinguistic cue on elementary school children's QUIL of several novel words presented in an oral story context. Examination of the comprehension monitoring literature reveals that metalinguistic control of comprehension continues to grow throughout the school years. Several studies (Baker, 1984a; Miller & Isakson, 1978; Paris & Myers, 1981) have shown increased ability to detect unfamiliar words in written and orally presented text with increasing age. Surprisingly, even the older subjects in the latter two studies (grades 3 & 4, respectively) failed to identify all the unfamiliar words.

In contrast, Baker's (1984a) 9- and 11-year-old subjects detected all the nonsense words embedded in the text. There was one difference between these studies that Baker (1984b, 1985) believed was responsible for the contradictory results; Baker's (1984a) subjects were given specific instructions as to the types of textual problems they should look for (they were required to identify internal & external inconsistencies as well as lexical problems). They were also given practice in performing the task. Miller and Isakson's (1978) and Paris and Myers' (1981) subjects were not even warned that there would be problems with the text. Thus, Baker suggested, the children in these studies may have failed to perform the task adequately simply because they were unaware of the expectations. All three studies embedded nonsense words in the text; Baker (1984b, 1985) suggested that the children simply accepted these as unfamiliar and continued with the text.

Baker thus conducted a second study (1984b), in which half the subjects (9- & 11-year-olds, including both good & poor readers) were given specific instructions for detecting textual problems, while the others received only general instructions. Detection of textual difficulties was indicated by underlining the unfamiliar word or inconsistency. As predicted, the group who had received explicit comprehension monitoring instructions performed significantly better than their counterparts. The specific instructions were also of more benefit to the older and better readers. Thus, Baker (1984b, 1985) concluded that because children are not taught how to monitor their comprehension and repair breakdowns, even older and more skilled children do not always use the strategies they have when reading or listening to text. This conclusion is consistent with results from a wide variety of metalinguistic and metacognitive studies showing that children often fail to use the learning strategies at their disposal (Paris, Wasik, & Turner, 1991). Much of the literature, like Baker's (1984b) experiment, suggests that use of comprehension monitoring and learning strategies can be activated simply by alerting children to the need for them.

Presumably, increased attention to novel words will prompt not only recognition of their unfamiliarity but also deliberate and strategic attempts to determine their meaning based on previous knowledge and story context. Thus, if a specific instruction to consciously monitor vocabulary in a story yields improved detection of novel words, the children will be in a better position to attempt to resolve the breakdowns. Quick incidental learning of vocabulary may be facilitated simply by bringing an unconscious monitoring process into deliberate use.

Baker (1984b), however, did not examine potential improvement in word learning as a result of more explicit cueing; only detection of novel vocabulary was examined. The study here proposed is therefore intended to replicate and extend Baker's results. The results will have implications for vocabulary training procedures, both in the clinic and in the classroom. Recent research has focussed on the strategic use of narratives as a method of facilitating speech and language acquisition (Pemberton & Watkins, 1987; Hoffman, Norris, & Monjure, 1990). However, the use of narratives for facilitating vocabulary acquisition has not been examined.

Children learn an overwhelming number of words during their school careers; direct teaching of vocabulary can only touch the tip of the iceberg (Beck & McKeown, 1991; Jenkins, Stein, & Wysocki, 1984; Nagy, Herman, & Anderson, 1985). As well, the specific vocabulary acquired varies widely among individuals; thus, the teacher or clinician attempting to teach vocabulary can only guess at what any child already knows, has partially acquired, and has yet to learn. Direct teaching of vocabulary is thus at best a hit-and-miss approach. Finally, direct teaching does not give children skills for learning new words on their own. This is not meant to imply that direct teaching has no value; as Beck and McKeown (1991) assert, direct training may have benefits in certain situations and for certain types of words:

> Words that are the most appropriate targets of instruction for general vocabulary development are those of high frequency in a mature vocabulary and of broad utility across domains of language. Because of the role such words play in a language user's verbal repertoire, direct instruction of these words might have significant impact on verbal functioning (Beck & McKeown, 1991, p. 810).

Improvement of children's incidental word-learning skills, in contrast, would ideally lead to greater ability to learn independently, a richer lexicon of words more specific in their scope and utility, and greater skill at learning what they need to know, when they need to know it. This has obvious implications both for improving general teaching practices and for improving interventions with language-impaired students.

Developmental differences in the impact of a cue on incidental vocabulary learning may also be postulated. Improvements in comprehension monitoring have been found with increased age (e.g., Baker, 1984a, 1984b, 1985; DiVesta, Hayward, & Orlando, 1979; Flavell, Speer, Green, & August, 1981; Harris, Kruithof, Terwogt, & Visser, 1981; Markman, 1979, 1981; Miller & Isakson, 1978; Paris, Wasik, & Turner, 1991). These studies examined differences among a wide range of ages, from kindergarten (Flavell et al., 1981) to eighth grade (DiVesta et al., 1979). Markman and Gorin (1981) examined differences in 8- and 10-year-olds' detection of inconsistencies and false statements within a text when given explicit versus general instructions about the kind of problems they would encounter. While both groups' performance improved with use of the explicit cue, the 10-year-olds benefited more than did the 8-year-olds.

The procedural similarity between the Markman and Gorin (1981) study and the present one lent extra support to the hypothesis that the explicit cue would benefit older subjects more than younger ones. These age differences may be attributed to general differences in metalinguistic awareness and control (as well as age-related increases in processing & memory capacities & semantic organization). As children mature, they not only learn more strategies for acquiring knowledge, they also learn more about the value of applying those strategies to various learning situations. The more value they attach to strategy use, the more frequently and efficiently they will use them, eventually automatizing them (Paris, Wasik, & Turner, 1991). Thus, not only should the efficacy of explicit cueing improve with age, it is possible that a ceiling effect may be achieved past a certain age. That is, children of that age and older may not improve their QUIL of new words as a result of metalinguistic cueing simply because they are already spontaneously activating strategies for deriving word meanings. They may already be performing to their full potential.

The present study examined all these assumptions. Specifically, the study addressed these questions:

1. What is the effect of an explicit instruction to find and guess the meaning of novel words in an oral story on the number of novel words detected and learned?

2. What is the effect of age on the number of novel words detected in and learned from the story?

3. What is the effect of the interaction of age and type of instruction on detection and learning of novel words from the story?

Thus, this study examined both the quantity and the quality of the information the subjects acquire about new words.

Method

Subjects

Sixty-four normally developing children from the Edmonton area participated in the study. They were divided into a "younger" group (6 years, 5 months to 9 years, 5 months) and an "older" group (9 years, 8 months to 12 years, 4 months) with 32 children in each age group. These age groups were chosen to represent two potentially different levels of metalinguistic ability. Age is not always an accurate predictor of a child's development in a given skill area. Thus it was felt that a cross-section of older and younger children within the age groups sampled would be more likely to yield a true difference in metalinguistic skill. Data from a pilot study indicated different performance on the experimental tasks between these two age groups.

All subjects were in good health, with English as their first language and no history of linguistic or hearing impairment, as indicated by parental report on a questionnaire provided with the consent form. A pure-tone threshold screen was administered to ensure hearing was within normal limits at the time of the experiment.

The subjects were further divided into two conditions: those receiving specific instructions (SI) and those given general instructions (GI). Subjects in the two conditions were matched on the basis of age. An attempt was made to match for sex, but time constraints did not allow enough

Table 1

Gender and age data for experimental groups

Group	# Boys	# Girls	Mean Age	Age Range
YGI	10	6	7;8	6;6 - 9;3
YSI	6	10	7;8	6;5 - 9;5
OGI	7	9	10;11	9;8 - 12;2
OSI	6	10	10;11	9;8 - 12;4

Note. Y = younger O = older

GI = general instruction SI = specific instruction

Ages are given as years;months.

subjects to be gathered for all subjects to be matched for both age and gender. Priority was given to age matching, to help control for differences in processing skill and memory capacity. Gender matching was not of great concern as no consistent sex differences in QUIL ability have been found in other studies. Age and gender information for each group are given in Table 1.

Materials

Five nonsense words were presented in the context of an oral story. A modified version of Rice and Woodsmall's (1988) "Billy the Bug" story was used (Appendix A). Since the original story was a narrative accompaniment to an animated cartoon, the modifications were intended to fill in the gaps where information was visually presented. The language was also modified to make it more acceptable to school-age children, because Rice and Woodsmall's subjects were 3- and 5-year-olds. The nonsense words included three nouns and two verbs. Two word classes were used due to contextual constraints imposed by the short story; this also avoided limiting the generalizability of the results to only one word class. The target words were also derived from those used by Rice and Woodsmall (1988), with the exception of one noun ("nif", from "coniferous"), which was added because Rice and Woodsmall's wordlist did not include three object words appropriate to the "Billy the Bug" story. The nonsense words were derived by selecting one or two syllables from the original Rice and Woodsmall (1988) vocabulary, so that a realistic-sounding word was obtained. Because the nonsense words were potentially recognizable as derivatives of their real synonyms, they were rotated within the story so that each referred to a word other than that from which it was derived.

Each target word appeared between three and seven times in the story. The number of occurrences of each word could not be controlled to remain equal without severely straining the naturalness and flow of the story. Three of the pilot study's subjects in the SI condition (one 8 years of age, one 10, & one 11) were able to detect and provide accurate definitions for all the target words; thus it was felt that differences in frequency of occurrence among targets would not significantly affect the subjects' performance. Although the amount and specificity of information about the referents varied from presentation to presentation of the words, enough information was provided to ensure that the children had the opportunity to gain enough specific knowledge of the referent to obtain the maximum score for their definitions. Indeed, of the four children participating in the pilot study, three provided definitions that met the criteria to receive the maximum score. The target vocabulary and informative sentences are listed in Appendix B, to highlight the information provided by each sentence which provides clues to a word's meaning. The supporting context for some presentations of some words is relatively neutral, but care was taken to ensure that none of the information given or implied would be misleading.

Procedure

All subjects were tested individually, in a quiet room in their schools. Hearing was first screened with a portable audiometer at 25 dB at octave intervals from 500 to 4000 Hz, according to ASHA guidelines (25 dB was used as appropriate for the ambient noise levels in the test rooms). Only one subject failed the hearing screen. Her parents were notified and the subject was excused from the study.

The experimental procedures were then initiated. All subjects received the same story with the target vocabulary. The general format of the instructions was the same for each group and is presented below. However, the GI group was told to listen for "things you don't understand" in the text, while the SI group was told to listen specifically for unfamiliar vocabulary ("new words").

Presentation of Story and Target Words

The subjects were introduced to the experiment as follows: "I am going to read you a short story. There are some things that will be hard to understand/new words into it. I want to see if you can find them. I will read the story once all the way through. This time, all you have to do is listen and see if you can find the things you don't understand/new words. When I am finished I will tell you what to do next." The story was then read once. This procedure was intended to familiarize the children with the story content, so that they could focus their attention on listening for difficulties or new words during the second reading.

Detection Task

After the story was presented once, the investigator said, "Now I am going to read the story again. This time I want you to listen very carefully to find the things that are hard to understand/new words. Every time you hear something/a word you don't understand, raise your hand and tell me what it is. Then I will write down what you said. Ready?" The investigator then proceeded with the second reading. When the subject indicated detection of a difficulty or new word, the investigator asked what it was. In the pilot study, the investigator repeated the sentence or sentence fragment just read, to ensure the subjects could target a specific word. However, the subjects in the pilot study did not need such a review; in fact, many simply blurted out the nonsense word when the examiner stopped reading. Hence, in the present experiment the examiner repeated the sentence or sentence fragment only when a subject indicated uncertainty (verbally or nonverbally) about the specific difficult item or novel word.

A checklist of the target words was used to tally the children's detection of the novel vocabulary. If a subject identified an untargeted word or another textual problem, the response was transcribed but was not counted for scoring. Once the difficult item or novel word was identified, the subjects were instructed to listen for clues in the story that would help them figure out the difficult item or the meaning of the new word. Finally, the children were reminded to continue listening for further difficulties or new words, and to raise their hands when they detected one.

The reminders to attend to and guess at the meaning of all new vocabulary (or, for the GI group, "things you don't understand") were included due to a suggestion by Baker (1985) that individuals may choose to infer the meaning of some unfamiliar words while deciding to ignore others, based on their judgment of a word's importance to their comprehension of the text as a whole. Repetition of the instruction to listen for all new words and clues to their meaning was intended to prevent such selection, as it was the purpose of this study to encourage subjects to learn as many new words as they could.

Definition Task

Following reading of the story, the GI subjects were told that they would be asked about "some of the words in the story"; SI subjects were told they would be asked about the "new words". They were instructed to think about what they heard in the story and give their best guess about what each word meant. The examiner then read each target word, followed by a neutral sentence containing the word, as a memory prompt. The neutral sentences were not taken from the story and provided minimal contextual support for the words (e.g. "Wait by the sev at the bottom of the hill") to avoid giving extra clues about the referents. This step was included as a result of the pilot study, in which it was observed that some subjects had trouble remembering what they had learned about the target words, particularly the two verbs. This was patently due to difficulty in accessing the new information and not to limitations in the information itself; when a neutral sentence from the story was read as a prompt, the subjects were able to provide accurate definitions. Because the memory prompt was neutral, it apparently helped the subjects retrieve the information they had gleaned from the story, rather than providing them with further information.

The story was also restructured after the pilot to make the verbs more perceptually salient. It was hoped that these two measures would prevent interference from memory constraints.

The subjects were then asked to define each of the target words. It was considered likely, given Baker's (1984b) results, that the children in the GI group would detect fewer novel words than those in the SI group. This possibility raised the question of whether these subjects would be unfairly penalized in a statistical analysis of the definition task scores. Their definitions might be of equivalent quality to the SI group's, but they might achieve statistically lower scores simply because they were able to define fewer of the target words. However, given Rice's (1990) argument that QUIL is an automatic, unconscious process, it was also possible that the children might QUIL some words they did not consciously detect. In this situation, obtaining and scoring definitions only for words reported by the subjects would also give an inaccurate view of their capabilities. For this reason, it was considered most prudent to request and score definitions for all words, regardless of whether the subjects reported detection of them.

Responses were tape recorded for later transcription and scoring. Each definition was assigned a score from a 6-point scale, based on its accuracy and completeness. Scoring criteria were as follows:

5 points: a) all key features were cited (e.g., "A "fab" is an instrument made of wood, with strings and a bow"); or

b) the actual referent, or one fitting the presented contextual information equally well, was named (e.g., "It's like a violin"; another bowed instrument (e.g., a cello) would also receive full points since there was no clue in the story pointing specifically to a violin).

4 points: a) accurate but missing at least one key feature (e.g., "It's an instrument with strings"); or

b) a closely related referent was named ("It's a guitar").

3 points: definition was vague, with no key features named, but correct semantic category was maintained (e.g., "A 'fab' is an instrument").

2 points: a) an incorrect, unrelated referent was named, but correct part of speech was maintained (e.g., "It's a baseball bat."); or

b) semantic category was accurate but incorrect part of speech was used (e.g., "'Fab' means playing music'")

1 point: cited referent was semantically and grammatically inaccurate (e.g., "'Fab' means playing ball.') One point was awarded for

this type of response because it was felt that such a definition indicated that the child learned something about the new word, even if that "something" bore no similarity to the true referent.

0 points: No attempt to define the word ("I don't know" or no response).

Occasionally a subject attributed the right definition to the wrong word. The two verbs were particularly likely to be confused. When it was apparent that such confusion had occurred, the definitions of concern were given the score they would normally have received, minus one point. This gave the children credit for their achievement in learning the nonsense word(s), while accounting for incomplete matching of the new word and its referent.

Use of a verbal definition task is admittedly problematic, since it is influenced by differences in expressive language ability and overlooks many aspects of what the child knows about the word. However, the definitions were scored on the basis of whether the child got the gist of the word's meaning, rather than on the quality of its verbalization. The investigator decided to tolerate these possible effects since the child's responses could occur in an open set; a recognition task would have limited the choices, and the child might have been scored inaccurately due to the fact that that particular response was not included in the set. In addition, research has shown that even children in the lower elementary grades are capable of giving acceptable definitions not much different from those of older children and adults (Al-Issa, 1969; Storck & Looft, 1973; Swartz & Hall, 1972). Indeed, the children in the pilot study had no difficulty providing appropriate definitions which could easily be scored using these criteria. In fact, pilot results prompted the experimenter to expand the scoring criteria to make finer discriminations among responses.

It was possible, however, that some subjects might provide definitions which under-represented their true knowledge of the word and thus receive a lower score than they deserved. To prevent such an occurrence, the children were prompted for more information (e.g., "Tell me more" or "Anything else?") if they gave an incomplete definition. If the information elicited was still inadequate for a full score, but the child indicated the correct semantic category (eg., "fab" is an instrument; "arsan" is something you do), the subject was presented with an array of three pictures representing various items from that category. The item selected by the child was recorded, and the definition was awarded an extra point if the correct item was selected.

Reliability

To assess intrajudge reliability, twenty-five percent of the definitions were rescored one month after the original scoring. A Pearson product-moment correlation was computed for the two sets of scores and yielded a correlation coefficient of .99. Twenty-five percent of the children's definitions were also scored by an independent rater, and reliability calculated in the same fashion. The correlation coefficient for interrater reliability was calculated at .97. Both comparisons were of point-to-point agreement. The definition scoring system was therefore considered adequately reliable both within and across judges.

Results

Data collected in this manner resulted in the following dependent variables: number of words detected and total definition score. This resulted in a two-factor, between-groups experimental design with age and instruction type as the independent variables. Separate ANOVAs were run for the detection and definition tasks. F-max tests performed at the beginning of each analysis determined that variances for each group were homogeneous enough for the ANOVAs to be performed. Critical alpha levels were not adjusted to compensate for the increased experimentwise error resulting from multiple analyses of the same data set, because only two comparisons were planned and the increase in risk of error was considered negligible. As shown below, the effects were either highly significant or not significant at all, so adjusting the alpha would not have affected the outcome of the study.

Detection Task

Table 2 shows the results of the two-factor analysis of variance. The analysis revealed a significant main effect for instruction type [$F(1, 60) = 16.928$, $p=.0001$] but not for age [$F(1, 60) = 3.188$, $p=.079$]. The SI group detected more words ($M = 4.13$) than the GI group ($M = 2.47$), as was predicted.

Table 2

Results of detection score comparisons

Source	ss	df	ms	F	p
Instruction	43.891	1	43.891	16.928	.0001
Age	8.266	1	8.266	3.188	.079
Instr. x Age	5.641	1	5.641	2.176	.145
Error	155.563	60	2.593		

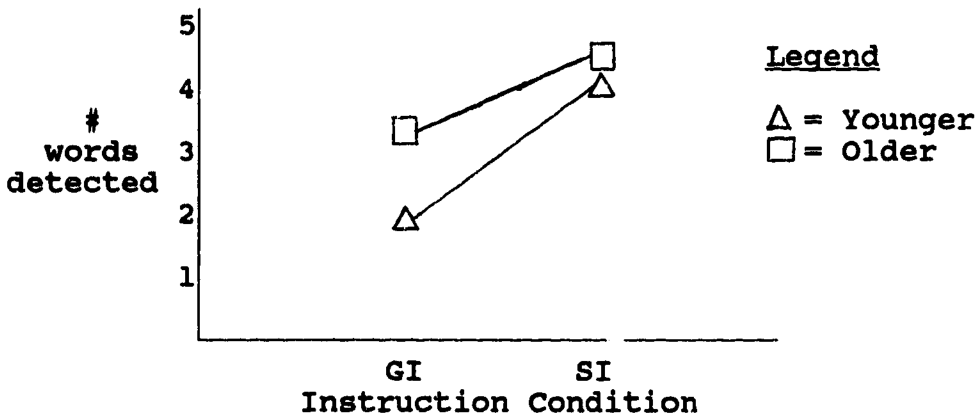
The interaction effect for the two independent variables was also nonsignificant [$F(1, 60) = 2.176$, $p = .145$], however, the age and interaction effects did approach significance (see Figure 1 for a graph of the interaction).

Definition Task

Simply detecting more words does not necessarily mean that more words were learned, or learned more completely. However, it was hypothesized that this would in fact be the case; if the children detected and were thus consciously aware of more of the novel words, they would be more likely to

Figure 1

Interaction of age with instruction condition on detection task.



attend to clues about the words' meanings. The investigator also instructed the children to "listen for clues that will tell you what that means". The reader will recall that this was done in the hope of activating word-learning strategies which might otherwise lie dormant. However, all the children received that instruction regardless of the group to which they belonged. That is, the children in the GI group were given specific instructions designed to facilitate learning of a target word once they indicated detection of it, as were the SI children. If a child from the GI group indicated detection of "fab", for example, the subject was then instructed to find the clues to its meaning just as that child's age-mate in the SI group was. Hence there was no longer any difference between the two instruction conditions for the words the children detected. This would not have created a problem if the GI subjects had all detected a minimal number of target words. However, several of the children in the GI group detected most or all of them, so any comparison based on the original grouping would be invalid.

The subjects were regrouped to circumvent this problem. The investigator reasoned that, since the basic hypothesis was that detection of more unfamiliar words would lead to learning of more words, and more complete learning, the groups could be collapsed and redivided based on the number of words detected. The original age grouping was maintained, but the children were sorted into two different condition groups: those who detected two or fewer of the nonsense words, and those who detected three or more. That is, the condition variable was changed from type of instruction to detection score. This division was somewhat arbitrary, but was considered reasonable because it classified the children according to whether they detected the majority of the nonsense words. Thus, this grouping was considered to be the "cleanest" for separating the children hypothesized to have the best chance of obtaining high definition scores from those who had the worst chance.

Reorganizing the groups resulted in uneven numbers of subjects in each group, and the subjects could no longer be matched for age. However, a 2-factor analysis of variance, with detection group and age group as independent variables, could still be performed. The results of the analysis are presented in Table 3. Both the main effect for detection score [$\underline{F}(1,60) = 7.307$, $\underline{p} = .009$] and the main effect for age

Table 3

Results of definition score comparisons

Source	SS	df	ms	F	p
Det. score	151.587	1	151.587	7.307	.009
Age	749.418	1	749.418	36.125	.0001
Det. x Age	.155	1	.155	.007	.931
Error	1244.696	60	20.745		

[$F(1, 60) = 36.125$, $p = .0001$] were significant. Subjects who detected three or more words were more likely to achieve a high definition score ($M = 15.95$) than those who detected fewer than three ($M = 11.73$). On this task, older subjects outperformed younger ones, achieving a mean definition score of 18.16 while the younger group's average score was 10.84.

As in the detection task, the interaction of the two independent variables did not produce a significant effect on definition scores. In this case, however, there is no question of confounding variables interfering with the effect; it is so small as to be nonexistent. Obviously, both age groups benefitted equally from having detected more nonsense words.

The definition task was intended to assess both quantity (number of words defined) and quality (points awarded per definition) of the children's responses. However, because the sums of the children's definition scores were entered, the analysis of variance did not reveal whether the high-detection group achieved higher scores because they defined more words, gave better definitions, or both. To illustrate, a child could achieve a total score of 10 by defining all five words, but giving definitions meriting only 2 points each; by defining only two words, but giving definitions worth 5 points each; by giving a 4-point definition and a 3-point definition with three 1-point definitions, and so on.

Only differences between detection groups were of interest, so the age groups were collapsed and two separate _t_-tests performed. One-tailed _t_-tests were performed because the high-detection group was known to have achieved higher overall scores than the low-detection group. It was therefore reasonable to expect that the high-detection group would perform better on both quantity and quality analyses. Performance of multiple analyses on the same set of data is acknowledged to result in increased risk of Type I error (obtaining a significant difference by chance alone). To prevent this, the experimenter considered following the common practice of dividing the overall alpha level by three to yield a per-analysis alpha of .017. However, this approach was rejected due to the increased risk of Type II error (failing to find a significant difference when one does exist) it would bring. Thus, the experimenter decided to allow a per-analysis alpha of .05 in order to balance the possibilities of both errors, as Huberty (1987) has recently advised.

The first *t*-test examined quantitative differences between the two detection groups by comparing the number of words each group defined. As expected, the high-detection group defined significantly more words (M = 4.4) than did their counterparts (M = 3.7; t = 2.16, p = .036). Differences in quality of definitions were also statistically significant (t = 2.12, p = .02). Qualitative differences were analyzed by comparing the number of definitions achieving a score of 3 or more points. The high-detection group obtained high scores on an average of 3.1 of their definitions, versus the low-detection group's average of 2.3 high-scoring definitions. Thus, the children who reported detection of at least three of the target words were then able both to define more words and to give better definitions for them.

Discussion

This study examined the effects of a specific instruction to find and learn the meaning of new words in an orally presented story on children's ability to QUIL those words. The effects of age on this ability were also investigated, as was the interaction of instruction type with age.

Task Variables

Instruction Effects

The group of subjects who were specifically instructed be alert for "new words" identified significantly more of the nonsense words as unfamiliar. The children in the SI group overtly identified an average of 4 nonsense words as unfamiliar, versus an average of 2.5 words for the GI group. The children in the SI condition, particularly the younger subjects, also reported more of the real words in the story as being unfamiliar. One of the main purposes of the study, to replicate the results of Baker's (1984b) comprehension monitoring study, was accomplished.

There is no doubt that the specific instruction was effective in improving the children's detection of novel vocabulary. Were the children in the GI group unaware of the words they did not report? They were instructed to "find the things they didn't understand". Comments from some of the subjects suggested that, at least in some cases, the GI group "filled in" the meanings of the unfamiliar vocabulary as the story was read the first time. Thus, by the second reading, they had already guessed what those words meant. They did not raise their hands for the target words because they were no longer "things they didn't understand". This possibility is particularly likely for the older children, who were more sophisticated both linguistically and metalinguistically. Although both younger and older children in the GI condition detected fewer of the nonsense words than their SI peers, the older children may have failed to identify unfamiliar words for a different reason than the younger ones. The younger children may simply have not been conscious of the new words, while the older children were aware of them but could understand them.

Effect of Detection on Definitions

One would expect, then, that because those subjects had already mapped the nonsense words onto likely referents based on story clues, they would be able to define them about as easily as the SI group. This, however, was not the case. The children who reported detection of more words were more likely to achieve a high definition score; this was true for both the older and the younger children. Thus, the research hypothesis that explicit instructions to look for novel words would lead to better QUIL of these words was also supported. It may be true that at least some GI subjects reported only the nonsense words they could not make sense of, if any. However, these subjects were less effective in their QUIL of the words they did not report than were those who did report them, and were then instructed to "find the clues in the story that will tell you what that word means". Conscious use of strategies for word learning is apparently more effective than is unconscious mapping, as this study predicted.

This is particularly interesting in light of Rice's (1990) conjecture that QUIL is an automatic, unconscious activity that needs no external assistance from an adult. There is no quibble with that argument here. Even the children who detected none of the nonsense words in the story could define at least one of them, however poorly; obviously some QUIL was taking place at an automatic level. Also, Rice (1990) did not suggest that adult intervention could not be of assistance, simply that it is unnecessary. However, the present experiment provides the first evidence that school-aged children, at least, can improve their use of QUIL strategies when prompted by an adult.

How did these subjects achieve their higher definition scores? Comparison of the quality versus the quantity of the subjects' definitions revealed that heightened attention to the nonsense words in the story provided an advantage to these subjects in the number of words they could learn. They were able to at least attempt definition of more words than they might otherwise have been equipped to do. Their learning was also more thorough; they gave more definitions worth 3 or more points than did their peers who had detected fewer words. The results of this comparison suggest that increased alertness to novel words and the necessity to figure out what they meant placed the subjects in a better position to learn more of the words. These subjects were also able to acquire more accurate and complete representations of the novel words' meanings.

Word Effects

Statistical comparisons were not considered appropriate for analysis of word effects because of the small number of target words used. Items representing two different parts of speech (nouns and verbs) were used, however, and the data were visually inspected for evidence that some words may have been easier to detect and/or learn than others. No clear pattern emerged for most of the data. The younger/general instruction

(YGI) group, in contrast, consistently identified "fab" (the violin) and "nif" (the carpenter) as unfamiliar while largely overlooking the other three words. As one would expect, they also found those two words the easiest to learn. Two-thirds of the definitions from this group which scored 3 or more points were definitions of those two words.

Why might this be so? Both words were nouns, and nouns seemed to be a little easier to learn than verbs. "Fab" was likely the most salient of the words and the most clearly defined. It was the first nonsense word presented in the story; it was introduced early in the story and was repeated seven times throughout. The reference clues were also among the least ambiguous and most often presented. "Nif" was introduced in the middle of the story but was repeated five times. The story also explicitly states what a "nif" does ("Making and fixing wooden things is my job"), and the nif's actions in making a new handle for the "fab" are described. These factors likely account for the relative ease with which the YGI children detected and defined these words.

Subject Variables

Age Effects

Detection task. The hypothesis that the older children would outperform their younger peers on the detection task was not supported. The older children detected an average of 3.6 words, versus the younger group's average of 2.9, a nonsignificant difference. This is inconsistent with the results of previous studies (discussed above; e.g., Baker, 1984a, 1984b, 1985; Markman, 1979, 1981; Markman & Gorin, 1981; Pa[illegible], Wasik, & Turner, 1991) that found consistent improv[illegible] in comprehension monitoring with increased age. However, it should be noted that the age effect closely approached significance (p = .0665). Similarly, the predicted interaction between age and instruction condition was not statistically significant, but, as Figure 1 illustrates, approached significance. Similar factors may have limited the effects of age and the age/instruction interaction, so they will be discussed together.

One of the most interesting observations was of the great variability in performance from children of approximately the same age. More than one child in each age group failed to overtly detect any of the nonsense words, yet several achieved the maximum detection score of 5 words. Nearly half (6/16) of the younger/specific instruction (YSI) group detected all five nonsense words; fully 75% of this group achieved scores of 4 or 5. The superior performance of this group alone could have caused just enough overlap with the older group to limit the age effect.

These results also suggest the influence of a ceiling effect. There were only five target words in the story, and even the younger children were obviously quite capable of detecting all five. This nevertheless seems likely to have been close to the limits of their ability. Slightly more than half of the YSI group did not achieve the maximum score. It seems safe to assume this was the best each child could do, given that they were assigned to the specific condition, which was intended to optimize their performance. The older subjects, particularly the specific instruction (OSI) group, were also much more homogeneous in their performance than were the younger children. Seventy-five percent of the OSI group reported detection of all five nonsense words; this suggests that, as a group, this was a fairly easy task for them and they may well have been capable of more. It is possible that a significant age difference would have been found if there had been more "new words" to find. The younger children may have stopped at five, while the older children may have been able to overtly detect more words. Such an effect would certainly constrain the influence of age and an age/instruction interaction.

Two other limitations may have affected the results. One is the age division itself. As noted in the Method section above, the boundary between age categories was quite artificial: the oldest subjects in the younger group were 9 years, 0 months to 9 years, 5 months of age, while the youngest subjects in the older group were 9 years, 6 months to 10 years, 0 months. Had the age categories been more distinct, a significant age difference may have resulted. Finally, the size of the study itself may have restricted the magnitude of the differences. Inclusion of more subjects may have resulted in achievement of a significant main effect for age and a significant interaction effect.

Definition task. The main effect for age on the definition task, on the other hand, was significant. In fact, age appears to be a considerably more powerful predictor of definition score than performance on the detection task. The older children were more sophisticated linguistically and metalinguistically. They also had the advantage of superior processing skills and short-term memory capacity. Perusal of the data shows that they were much more likely to recall some story information about most of the nonsense words. The younger children, in contrast, exhibited greater difficulty retrieving such information, even when they had detected most of the nonsense words. They were more likely to guess at definitions, use the neutral prompt sentences as contextual cues (eg., for "nif" (carpenter), the prompt sentence was "My brother is a nif." Several children defined "nif" as "a jerk" or "a pain"), or not attempt a definition at all. These children's nonverbal behaviours indicated that they simply could not cope with the task's demands on their capacities for extracting, storing, and integrating information from the story. The older children were therefore better equipped at the outset to learn the novel vocabulary.

Interaction effects. Surprisingly, the experimental hypothesis that the older children would derive more benefit from overt awareness of more words was not supported. The two groups made similar gains in definition scores as a result of this awareness. It was reasoned that the older children would already have acquired an array of learning strategies, but would not yet be using them spontaneously. In contrast, the younger children were presumed to be at the stage of acquiring such strategies, so would have fewer skills to employ in detecting and learning the nonsense words. However, the data do not support these assumptions. It appears that age and detection score affect the ability to QUIL new words independently, but detection score does not affect different age groups differently.

Individual differences. More interesting than simple age differences is the great individual variability among subjects of similar age. This variety occurred on both tasks but was most noticeable on the definition task, in which a greater range of scores was possible. The younger subjects' composite definition scores ranged from 1 to 24 points, while the older subjects achieved scores ranging from 12 to 25, the maximum possible. Most of the older subjects (approximately 80%) achieved definition scores between 14 and 22 with no obvious outliers. The younger group was considerably less consistent, with the majority of scores falling between 4 and 16; the four children who achieved scores higher than 16 were obvious outliers. The range of scores is not attributable solely to condition group differences; the children in the YSI group achieved scores as low as 2 and 6, and one of the younger/general instruction (YGI) subjects scored 22. Similar overlap occurred in the older groups.

Age differences may have accounted for the wide range of scores on this task. Each age group comprised a three-year range. Perhaps the youngest children achieved the lowest scores, and so on. Definition scores were correlated with chronological age, using Pearson's _r_, to test this assumption. Although the correlation was significant, it was only moderately strong ($r = .5480$, $p < .001$). This indicates that chronological age alone cannot account for any other than the grossest differences in performance.

Rice (1990) predicted that "significant individual differences in the ability to QUIL new words" would be found, and indeed, previous studies of fast mapping have discovered them. This is hardly surprising, given that children are known to develop different skills at widely differing rates. Nonetheless, the scope of the differences in performance found in this study, particularly in the younger subjects, was not expected. Certainly normal variation in processing skills and semantic memory, prerequisite for fast mapping, could account for a great deal of the variability. Learning styles could also influence performance on this task. The story was presented orally, with no supporting illustrations; assuming that some of the children were better visual learners than auditory, they would have been placed at a disadvantage. The study also made no attempt to control for aptitude. It is possible that the SI and/or high-detection groups contained a disproportionate number of "word buffs", children who have a natural affinity for learning new words. If this were the case the main effects for condition may not have resulted from the task conditions at all. This experiment would have been susceptible to the confounding influence of such a variable due to the small sample of subjects (16 per cell). However, because subjects were randomly assigned to conditions, there is no reason to suspect that this was the case.

As the reader will recall, one of the main premises of this study was that improvements of QUIL ability with increasing age could be linked to corresponding improvements in comprehension monitoring and other metalinguistic skills. Could individual differences in metalinguistic ability have contributed to the wide dispersion of scores? This study has demonstrated that such strategies can be recruited to improve both detection and QUIL of unfamiliar vocabulary, at least when supported by a context rich in referential information. It is reasonable to suggest that the children who were more sophisticated metalinguistically would do better than their less sophisticated peers. Unfortunately, this study was not designed to uncover such differences. Perhaps an experiment which compares QUIL in children of varying metalinguistic skill would provide more conclusive information regarding such a relationship.

Implications for Education and Remediation

Normal Children

Educators have recently turned their attention to ways of helping children become more active in the learning process. Much of the research has focussed on training metacognitive and metalinguistic strategies (Baker, 1984a, 1984b, 1985; Cosgrove & Patterson, 1977; Flavell et al., 1981; Myers & Paris, 1978; Paris, Wasik, & Turner, 1991; Raphael & Pearson, 1985). The present study has provided further evidence that active engagement in a task can improve what children learn from it. The results are only preliminary, but they provide evidence that elementary-age children's ability to fast map new vocabulary can be improved simply by prompting them to pay attention to new words.

Can strategies for better QUIL be taught? This question will remain unanswerable until we have gained a much better understanding of the processes and strategies that contribute to this skill. The extent to which the results of this study can be applied to real-world learning situations is also limited. A familiar task (story comprehension) was used, and the children were given no guidance beyond the prompt to aid them in mapping the new vocabulary. However, the subjects did have some advantages that they would not have in real life:

the story was brief and simple, with no textual difficulties beyond the unfamiliar vocabulary to distract them. The subjects listened the story individually, in a quiet room, and their attention was high. Finally, the clues to the target words' referents were clear and specific. Students must often read or listen to boring and/or difficult material, often in noisy or otherwise distracting conditions. In addition, new vocabulary is often introduced in contexts that may be ambiguous or even misleading. Still, if further research demonstrates that the results of this study are reliable, educators may find this information useful. Of the myriad new words that children encounter every day, only a handful can be taught directly. Teachers may be able to boost their students' unguided learning by prompting them to use the learning strategies they have already acquired.

Language/Learning Disability

What about children who are not learning language normally? Rice (1990) predicted that specifically language-impaired (SLI) children would prove to have inferior QUIL abilities. Evidence from some studies of SLI indicates that these children have limited vocabularies and experience difficulty in acquiring new words (eg., Leonard, 1988; Leonard et al., 1982). Thus, it is reasonable to question SLI children's fast mapping ability.

Three recent investigations have indeed found differences in the SLI children's QUIL. Dollaghan (1987a) found that language-impaired children had trouble remembering the phonological form of the new word. They showed normal abilities in detecting the new word, associating it with its referent, locating the correct referent from an array when given its name, and recalling the location of the object upon their first encounter with the word. However, in this study as in Dollaghan's 1985 experiment, only one new word was introduced, in a game designed to highlight it. It may be that the SLI children performed as well as they did only because they were given so much support. Rice, Buhr and Nemeth (1990) and Rice, Buhr and Oetting (1991) repeated Rice and Woodsmall's (1988) study with language-impaired children. Both investigations found that the SLI children learned fewer of the novel words than their age-mates.

Rice et al. (1990) suggested that language-impaired children's poor semantic skills may be due to poor fast mapping ability, or vice versa. Their limited grammatical knowledge may also influence fast mapping, since this skill relies to some extent on understanding of the linguistic context in which new words are encountered. Evidence of processing difficulties in this population (eg., Kamhi, Lee, & Nelson, 1985; Leonard, 1988) lends support to this hypothesis. Furthermore, this population has been found to suffer impairments in the use of comprehension monitoring and other metalinguistic strategies (Kamhi, 1987; Kamhi & Koenig, 1985; van Kleeck, 1984).

Based on research demonstrating improvements in learning-disabled students' performance on tasks tapping cognitive skills such as selective attention and memory after receiving prompts or strategy training, Torgesen (1977) proposed that many of the difficulties faced by learning disabled students may result from a passive approach to such tasks. That is, these children may perform below their capacity because they do not know or apply effective strategies to the tasks. This model is applicable to language-impaired students as well. Several studies have shown that these children tend to be passive communicators (Brinton & Fujiki, 1982; Dollaghan, 1987b; Meline & Meline, 1983). Studies of comprehension monitoring in this population have provided evidence that language and learning-disabled children often detect inadequate messages, but make no attempt to resolve the problems. This is the case even when they are aware that they may attempt a repair, and possess the linguistic skills to do so (Donahue, Pearl, & Bryan, 1980; Meline & Brackin, 1987; Skarakis-Doyle, MacLellan, & Mullin, 1990; Skarakis-Doyle & Mullin, 1990).

Some studies have shown that language/learning disabled children's comprehension monitoring and other metalinguistic skills improve with training (Dollaghan & Kaston, 1986; Olsen, Wong, & Marx, 1983). The evidence to date supports a view of LLD children as passive communicators and learners, poorly sensitive to their own and others' communicative needs. Their linguistic difficulties appear to be compounded by inefficient (or nonexistent) use of strategies for detecting and repairing communication breakdowns, and taking an active role in their own learning. It is not unlikely that they may be going about detection and acquisition of unfamiliar vocabulary in an inefficient manner.

Provision of a simple instruction to "find the new words and the clues that tell you what they mean" may not be sufficient for these children, though. Klein-Konigsberg (1984) has argued that language/learning disabled children have difficulty organizing and integrating semantic information. This would certainly interfere with the QUIL process. The source of these problems is unknown. These children may have access to strategies for vocabulary acquisition but simply do not activate them, or they may need formal training in such strategies. Also, there is no evidence that such training would remove the need for direct vocabulary training. Training such skills may be useful as a way to help these children help themselves, but may only narrow the gap between them and their nondisabled peers, not bridge it. Finally, we do not know if training such strategies would improve LLD children's ability to QUIL new words. Nonetheless, these skills may help them compensate for inefficient processing skills.

References

Al-Issa, I. (1969). The development of word definition in children. Journal of Genetic Psychology, 114, 25-29.

Baker, L. (1984a). Children's effective use of multiple standards for evaluating their comprehension. Journal of Educational Psychology, 76, 588-597.

Baker, L. (1984b). Spontaneous versus instructed use of multiple standards for evaluating comprehension: Effects of age, reading proficiency, and type of standard. Journal of Experimental Child Psychology, 38, 289-311.

Baker, L. (1985). How do we know when we don't understand? Standards for evaluating text comprehension. In D.L. Forrest-Pressley, G.E. MacKinnon, &. T.G. Waller (Eds.), Metacognition, cognition, and human performance, Vol. I: Theoretical perspectives (pp.155-205). Orlando, FL: Academic Press.

Beck, I., & McKeown, M. (1991). Conditions of vocabulary acquisition. In R. Barr, M.L. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), Handbook of reading research: Vol II (pp. 789-814). White Plains, NY: Longman.

Benedict, H. (1979). Early lexical development: Comprehension and production. Journal of Child Language, 6, 183-200.

Brinton, B., & Fujiki, M. (1982). A comparison of request-response sequences in the discourse of normal and language-disordered children. Journal of Speech and Hearing Disorders, 47, 57-62.

Carey, S. (1978). The child as word learner. In M. Halle, G. Miller, & J. Bresnan (Eds.), Linguistic theory and psychological reality (pp. 264-293). Cambridge, MA: MIT Press.

Carey, S. (1982). Semantic development: The state of the art. In E. Wanner & L.R. Gleitman (Eds.), Language acquisition: The state of the art (pp. 347-389). Cambridge, NY: Cambridge University Press.

Carey, S. (1983). Constraints on word meaning - natural kinds. In T.B. Seiler & W. Wannenmacher (Eds.), Concept development and the development of word meaning (pp. 126-146). Berlin: Springer-Verlag.

Carey, S., & Bartlett, E. (1978). Acquiring a single new word. Papers and Reports in Child Language Development, 15, 17-29.

Clark, E.V. (1983). Convention and contrast in acquiring the lexicon. In T.B. Seiler & W. Wannenmacher (Eds.), Concept development and the development of word meaning (pp. 67-89). Berlin: Springer-Verlag.

Cosgrove, J.M., & Patterson, C.J. (1977). Plans and the development of listener skills. Developmental Psychology, 13, 557-64.

Crais, E.R. (1987). Fast mapping of novel words in oral story context. Papers and Reports in Child Language Development, 26, 40-47.

Crais, E.R. (1990). World knowledge to word knowledge. Topics in Language Disorders, 10(3), 45-62.

Dickinson, D.K. (1984). First impressions: Children's knowledge of words gained from a single exposure. Applied Psycholinguistics, 5, 359-373.

DiVesta, F.J., Hayward, K.G., & Orlando, V.P. (1979). Developmental trends in monitoring text for comprehension. Child Development, 50, 97-105.

Dockrell, J., & Campbell, R. (1986). Lexical acquisition strategies in the preschool child. In S.A. Kuczaj & M.D. Barrett (Eds.), The development of word meaning: Progress in cognitive development research (pp. 121-154). New York, NY: Springer-Verlag.

Dollaghan, C. (1985). Child meets word: "Fast mapping" in preschool children. Journal of Speech and Hearing Research, 28, 449-454.

Dollaghan, C. (1987a). Fast mapping in normal and language-impaired children. Journal of Speech and Hearing Disorders, 52, 218-222.

Dollaghan, C.A. (1987b). Comprehension monitoring in normal and language-impaired children. Topics in Language Disorders, 7(2), 45-60.

Dollaghan, C., & Kaston, N. (1986). A comprehension monitoring program for language-impaired children. Journal of Speech and Hearing Disorders, 51, 264-71.

Donahue, M., Pearl, R., & Bryan, T. (1980). Learning disabled children's conversational competence: R ponses to inadequate messages. Applied Psycholinguistics, 1, 387-403.

Flavell, J.H., Speer, J.R., Green, F.L., & August, D.L. (1981). The development of comprehension monitoring and knowledge about communication. Monographs of the Society for Research in Child Development, 46(Serial No. 192).

Gentner, D. (1982). Why nouns are learned before verbs: Linguistic relativity versus natural partitioning. In S. Kuczaj (Ed.), Language development, Vol. II: Language, thought, and culture. Hillsdale, NJ: Erlbaum.

Harris, P.L., Kruithof, A., Terwogt, M.M., & Visser, T. (1981). Children's detection and awareness of textual anomaly. Journal of Experimental Child Psychology, 31, 212-230.

Heibeck, T.H., & Markman, E.M. (1987). Word learning in children: An examination of fast mapping. Child Development, 58, 1021-1034.

Hoffman, P., Norris, J., & Monjure, J. (1990). Comparison of process targeting and whole language treatments for phonologically delayed preschoolers. Language, Speech, and Hearing Services in Schools, 21, 102-109.

Huberty, C. J. (1987). On statistical testing. Educational Researcher, 16, 4-9.

Jenkins, J. R., Stein, M., & Wysocki, K. (1984). Learning vocabulary through reading. American Educational Research Journal, 21, 767-787.

Kamhi, A.G. (1987). Metalinguistic abilities in language-impaired children. Topics in Language Disorders, 7(2), 1-12.

Kamhi, A.G., & Koenig, L.A. (1985). Metalinguistic awareness in normal and language-disordered children. Language, Speech and Hearing Services in Schools, 16, 199-210.

Kamhi, A.G., Lee, R.F., & Nelson, L.K. (1985). Word, syllable, and sound awareness in language-disordered children. Journal of Speech and Hearing Disorders, 50, 207-212.

Keil, F.C. (1983). Semantic inferences and the acquisition of word meaning. In T.B. Seiler & W. Wannenmacher (Eds.), Concept development and the development of word meaning (pp. 103-124). Berlin: Springer-Verlag.

Klein-Konigsberg, E. (1984). Semantic integration and language learning disabilities: From research to assessment and intervention. In G.P. Wallach & K.G. Butler (Eds.), Language learning disabilities in school-age children, pp. 179-98. Baltimore, MD: Williams & Wilkins.

Leonard, L.B. (1988). Lexical development and processing in specific language impairment. In R.L. Schiefelbusch & L.L. Lloyd (Eds.), Language perspectives: Acquisition, retardation, and intervention (2nd ed., pp. 69-87). Austin, TX: Pro-Ed.

Leonard, L.B., Schwartz, R.G., Chapman, K., Rowan, L.E., Prelock, P.A., Terrell, B., Weiss, A.L., & Messick, C. (1982). Early lexical acquisition in children with specific language impairment. Journal of Speech and Hearing Research, 25, 554-564.

Markman, E.M. (1979). Realizing that you don't understand: Elementary school children's awareness of inconsistencies. Child Development, 50, 643-655.

Markman, E.M. (1981). Comprehension monitoring. In W.P. Dickson (Ed.), Children's oral communication skills (pp. 61-84). New York: Academic Press.

Markman, E.M. (1984). The acquisition and hierarchical organization of categories by children. In C. Sophian (Ed.), Origins of cognitive skills: The 18th annual Carnegie symposium on cognition (pp. 376-406). Hillsdale, NJ: Erlbaum.

Markman, E.M., & Gorin, L. (1981). Children's ability to adjust their standards for evaluating comprehension. Journal of Educational Psychology, 73, 320-325.

Meline, T.J., & Brackin, S.R. (1987). Language-impaired children's awareness of inadequate messages. Journal of Speech and Hearing Research, 52, 263-70.

Meline, T., & Meline, N. (1983). Facing a communicative obstacle: Pragmatics of language-impaired children. Perceptual and Motor Skills, 56, 469-70.

Merriman, W.E. (1986). How children learn the reference of concrete nouns: A critique of current hypotheses. In S.A. Kuczaj and M.D. Barrett, The development of word meaning: Progress in cognitive development research (pp. 1-38). New York, NY: Springer-Verlag.

Miller, J.W., & Isakson, R.L. (1978). Contextual sensitivity in beginning readers. The Elementary School Journal, 78, 325-331.

Myers, M., & Paris, S.G. (1978). Children's metacognitive knowledge about reading. Journal of Educational Psychology, 70, 680-90.

Nagy, W., Herman, P., & Anderson, R. (1985). Learning words from context. Reading Research Quarterly, 20, 233-253.

Nelson, K. (1974). Concept, word, and sentence: Interrelations in acquisition and development. Psychological Review, 81, 267-285.

Olsen, J.L., Wong, B.Y.L., & Marx, R.W. (1983). Linguistic and metacognitive aspects of normally achieving and learning disabled children's communication process. Learning Disability Quarterly, 6, 289-304.

Paris, S.G., & Myers, M. (1981). Comprehension monitoring, memory, and study strategies of good and poor readers. Journal of Reading Behavior, 13, 5-22

Paris, S.G., Wasik, B.A., & Turner, J.C. (1991). The development of strategic readers. In R. Barr, M.L. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), Handbook of reading research: Volume II (pp.609-640). White Plains, NY: Longman.

Pemberton, E.F., & Watkins, R.V. (1987). Language facilitation through stories: Recasting and modelling. First Language, 7, 79-89.

Raphael, T.E., & Pearson, P.D. (1985). Increasing students' awareness of sources of information for answering questions. American Educational Research Journal, 22, -35.

Rice, M.L. (1990). Preschoolers' QUIL: Quick incidental learning of words. In G. Conti-Ramsden & C.E. Shaw (Eds.), Children's language (Vol. 7, pp. 171-195). Hillsdale, NJ: Erlbaum.

Rice, M.L., Buhr, J.C., & Nemeth, M. (1990). Fast mapping word-learning abilities of language-delayed preschoolers. Journal of Speech and Hearing Disorders, 55(1), 33-42.

Rice, M.L., Buhr, J., & Oetting, J.B. (1990). Specific-language-impaired children's quick incidental learning of words: The effect of a ... pause. Paper presented at the Annual Convention of the American Speech-Language-Hearing Association, Seattle, Washington.

Rice, M.L., & Haight, P.L. (1986). The "motherese" of "Mr. Rogers": The dialog of educational television programs. Journal of Speech and Hearing Disorders, 51, 282-287.

Rice, M.L., Huston, A.C., Truglio, R., & Wright, J. (1990). Words from "Sesame Street": Learning vocabulary while viewing. Developmental Psychology, 26(3), 421-428.

Rice, M.L., & Woodsmall, L. (1988). Lessons from television: Children's word learning when viewing. Child Development, 59, 420-429.

Schwartz, R., & Leonard, L. (1984). Words, objects, and actions in early lexical acquisition. Journal of Speech and Hearing Research, 27, 119-127.

Skarakis-Doyle, E., MacLellan, N., & Mullin, K. (1990). Nonverbal indicants of comprehension monitoring in language-disordered children. Journal of Speech and Hearing Disorders, 55, 461-7.

Skarakis-Doyle, E., & Mullin, K. (1990). Comprehension monitoring in language-disordered children: A preliminary investigation of cognitive and linguistic factors. Journal of Speech and Hearing Disorders, 55, 500-7.

Storck, P.A., & Looft, W.R. (1973). Qualitative analysis of vocabulary responses from persons aged six to sixty-six plus. Journal of Educational Psychology, 65, 192-197.

Swartz, K., & Hall, A.E. (1972). Development of relational concepts and word definition in children five through eleven. Child Development, 43, 239-244.

Torgesen, J.K. (1977). The role of nonspecific factors in the task performance of learning disabled children: A theoretical assessment. Journal of Learning Disabilities, 10, 27-34.

van Kleeck, A. (1984). Assessment and intervention: Does "meta" matter? In G.P. Wallach and K.G. Butler (Eds.), Language learning disabilities in school-age children, pp. 179-98. Baltimore, MD: Williams & Wilkins.

Appendix A

Story

It was a beautiful day in the spring, near the end of school. The sun was shining and the air was warm. Billy wanted to play ball with his friends after school, but today was the day he had his music lesson. He went home just long enough to have a snack and pick up his fab, and then had to leave again. Tucking the fab and its bow under his arm, Billy trudged down the street to his lesson. He had to walk past the ballpark on the way, and stopped to watch his friends playing.

He couldn't watch too long, though, or he would be late for his lesson. Sighing sadly, Billy began to turn away. Suddenly, the ball flew over the fence. Billy watched in horror as it headed straight for his fab! It was going to ola the handle! Billy tried to get out of the way, but it was too late. The ball hit the fab's handle and olaed it from the instrument. The broken handle dangled by the instrument's strings. "Oh, no!" cried Billy. "Now what am I going to do?" He sat down under a tall sev and started to cry.

Just then a kind nif came along. "What's wrong?" he asked. "Oh," Billy said, "I was watching the ballgame, and the ball hit my fab. It olaed the handle! See, it came right off!" The nif looked at the broken instrument. "I think I can fix this," he said. "Making and fixing wooden things is my job.

Just wait here while I get my tools." Soon he came back with his tools. He found a thick branch on the sev Billy was sitting under and began to saw it off. He had to be careful not to let the sev's needles poke and scratch him. While he worked, Billy asked what he was going to do. "I will arsan a new handle from this piece of wood," the man explained. Finally the branch came down with a crash! Billy jumped out of the way just in time. "Careful!" said the nif. "I can fix your fab, but I can't fix you!" The nif began to arsan a new handle from the branch, peeling off the bark and carving the wood. Billy was afraid the nif couldn't arsan a new handle, but he didn't say anything; he just sat and watched. He grew more and more e[illegible]d as the plain piece of sev wood turned into a new handle for his instrument. Finally it was finished, and the nif glued the new handle to the fab. "Now, be careful with this one," he said. "This new handle is just glued on, so it will ola very easily, right at the point where the old handle came off." Billy nodded, then eagerly tested the strings with his bow. It sounded as good as new. "Oh, thank you!" he said. "It sounds wonderful!" Then he looked at his watch. "All right! It's too late, I don't have to go to my lesson after all!"

Appendi. B

Nonsense Words and Contextual Clues

Following are the nonsense words embedded in the story, their definitions, and the contextual clues surrounding them which provide specific information about the referents.

"fab": A stringed wooden instrument, played with a bow; a violin or viola.

1) ...today was the day he had his music lesson. He went home just long enough to have a snack and pick up his fab, and then had to leave again. Tucking the fab and its bow under his arm....
2) The ball hit the fab's handle .... The broken handle dangled by the instrument's strings.
3) "I will arsan a new handle from this piece of wood," said the nif.
4) Billy ... tested the strings with his bow.

"ola": To sever or break off.

1) The ball hit the fab's handle and olaed it from the instrument. The broken handle dangled by the instrument's strings.
2) "the ball ... olaed the handle! See, it came right off!"

3) "This new handle is just glued on, so it will ola very easily, right at the point where the old handle came off."

"sev": A coniferous tree, such as a spruce or pine.

1) He sat down under a tall sev ....

2) He found a thick branch on the sev ....

3) He had to be careful not to let the sev's needles poke and scratch him.

4) The plain piece of sev wood ....

"nif": A carpenter; a person who makes and/or repairs wooden objects.

1) "Making and fixing wooden things is my job."

2) The nif began to arsan a new handle from the branch ... carving the wood.

"arsan": To carve.

1) "I will arsan a new handle from this piece of wood"

2) The nif began to arsan a new handle from the branch ... carving the wood.

3) The plain piece of sev wood turned into a new handle