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ABSTRACT

A study examined acquisition of new vocabulary through oral stories in first-, third-, and fifth-grade children. Each subject heard four stories, each including four nonsense words repeated three times. These novel words represented common nouns whose meanings could be derived from propositional information associated with their occurrence. The two factors of particular interest were the proximity of the novel word recurrences and the specificity of the propositional information surrounding them. The subjects' phonological production of the novel words, cued production with sentence context provided, and comprehension of word meaning by propositional recall, were analyzed. Producing the phonological word form and associating it with the correct proposition was difficult for all subjects, especially the younger ones. Comprehension and phonological production task results revealed that specificity and proximity had differential effects on novel word acquisition dependent on the type of information to be acquired and recalled; these results support the idea that the listener processes various aspects of the novel word and its meaning differently, depending on the propositional context available. This method of fast mapping of novel words in story context was found to be a flexible and useful paradigm for examining fast mapping skills across a wide developmental range. (MSE)

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Fast Mapping of Novel Words in Oral Story Context

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Children are thought to acquire most new vocabulary in naturalistic contexts. A child's first few encounters with a new word may dictate the amount and kind of learning that take place as a result of these early exposures and may have some impact on what ultimately is learned about the new word.

Fast mapping is the term coined by Carey and Bartlett (1978) to refer to children's initial rapid acquisition of information from limited exposures to a new word. The methodologies used to study these initial fast mappings have primarily focused on the acquisition of a single novel word with one or two encounters in a naturalistic conversational setting (Carey & Bartlett, 1978; Dickinson, 1984; Dollaghan, 1985) or the presentation of a number of new words in a training session paradigm (Holdgrafer & Sorenson, 1984; Nelson & Bonvillian, 1974; Schwartz & Leonard, 1984). The conclusions from these studies are: (a) even one encounter with a new word is sufficient for very young children (two years old) to map some information about the word in memory; (b) the more exposures to a word, generally the more complete is the map of that word; (c) comprehension and phonetic production of the word are achieved separately; (d) factors influencing this acquisition may be the number of novel words presented at any one time, and the number and type of referents available for each word; and (e) the type of presentation context, for example, definition, conversation or written story contexts, differentially affects the acquisition process across developmental ranges.

One naturalistic context that has generally been overlooked in the acquisition literature, however, is that of the presentation of novel words in an oral story context. Stories have traditionally been recognized as a means through which children learn new words and typically stories provide both a schematic framework for children and an intrinsic motivation to attend and comprehend. Dickinson (1984) used an oral story context as one of three presentation contexts in which to introduce new words, however, only one novel word was presented in each context and the novel words used were not counterbalanced across contexts.

Dickinson reported overall age differences between his first and sixth grade subjects in their metalinguistic abilities to make syntactic judgements, to recognize wordness, and to provide definitions about the novel words. Dickinson did not, however, test for exact propositional information related to the words nor for memory of the phonetic shape of the word itself, aspects likely to be established during the fast mapping phase. Thus, little information is currently available from oral story contexts on the

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way in which listeners acquire the phonological representation of a new word and derive its meaning.

Two factors that might influence the fast mapping of a word, particularly during the oral presentation of a story, can be inferred from the reading comprehension, memory, and word recognition literatures. These factors are, first, proximity, which is the closeness of the recurrences of a novel word and, second, specificity, the specificness of the propositional cues associated with the word. Proximity of recurrence, or how close the repetitions of a novel word and its accompanying propositions are to one another, may be critical to a subject when gathering together information about a new word. Even with fairly familiar words and contexts, children have repeatedly been shown to fail to integrate information across propositional contexts in both oral and written material, especially when intervening content is presented (Liben & Posnansky, 1977; Markman, 1979; Moeser, 1976; Werner & Kaplan, 1952).

The second factor, the specificity of the propositional cues, refers to the type of information provided about a new word and to how easily this information leads the reader to choose a specific referent for a particular word. The speedy choice of a referent can often aid a reader in comprehending the written message. Sanford and Garrod (1981) argue that decreased specificity serves to reduce the probability that an appropriate scenario, or referent, for a particular word or sentence will be activated. Thus, both the proximity of the novel word to its recurrences and the specificity of the propositional information may be expected to affect the processing of novel words in an oral story context where the listener cannot, as easily as the reader, return to prior propositions to derive a specific meaning.

This study examined the effects that proximity of the novel words and specificity of the propositional cues might have on the fast mapping skills of subjects in an oral story context. In order to control for any bias that might accompany real words, nonsense, and therefore novel, words were selected as the vocabulary to be introduced in the stories. The novel words referred to meanings already available to the child, but in some cases were specific references and in others implied a range of possibilities.

The subjects in this study were 20 first, third, and fifth grade children and adults living in a small metropolitan city. Each subject listened to four stories which each included four nonsense words. Each nonsense, or novel, word was repeated three times within a story. The 16 novel words represented common nouns and the meanings could be derived from the propositional information associated with each occurrence of the novel words. The novel words and their phonetic transcription can be seen in Appendix A.

The two factors of particular interest in this study were the proximity of the novel word recurrences and the specificity of the propositional information surrounding the novel words. The recurrences of the novel word and its associated propositional cues

were either close in proximity, separated by only one sentence, or were more distant in the story, separated by at least three sentences and a topic change. The propositional cues which accompanied the novel words also varied in their degree of specificness. For eight of the words, the cues were very specific and therefore narrowly restricted the choice of a common referent to one or two probable choices. For the other eight words, the propositional cues were nonspecific and much broader and therefore allowed several (or more) referent choices. The two factors and their two levels can be seen in a sample story in Appendix B. The sixteen novel words were counterbalanced across the stories and across the four experimental conditions.

The four stories were presented from audiotapes recorded by a female radio announcer skilled in reading children's stories. Following story presentation, the subjects were required to retell the stories, to listen to sentences from the stories and to fill-in-the-blanks when story-related novel and familiar words were left out, and to tell what they could remember about the novel words and selected familiar words from the stories.

Analyses of variance with group, specificity, and proximity as factors were performed on three dependent measures (phonological production of the novel words during story retelling, cued production of the words with sentence context provided, and comprehension of word meaning by propositional recall). Means and standard deviations for each dependent measure can be seen in Tables 1-5. Overall group differences ($p<.05$) were seen, except between the third and fifth grade groups, on all three dependent measures. With increasing age, the groups were more likely to produce correctly the phonological form of the novel words in both the story retells and on the cued production task, and were better able to recall propositions associated with the novel words.

Producing the phonological form of the novel words and associating those forms with the correct propositions proved to be difficult tasks for all the children, particularly the first graders. It was apparent from the errors in phonological production made during the story retells, that the children could often represent the content of the novel words in the retells, but had much more difficulty than the adults in either producing or attempting to produce the phonological form of the words. Additionally, from the comprehension of word meaning task, it was clear that all the children could report more propositions than they were able to associate correctly with the novel words. Thus, both the correct storage of the phonological form of the novel words and the linking of that form with the correct propositions were crucial elements for all the subjects, but were especially fragile in the children's processing of the words.

In addition, the results of the comprehension of word meaning task and the phonological production task revealed that specificity and proximity had differential effects on novel word acquisition dependent on the type of information to be acquired and recalled. On the comprehension of word meaning task all the subjects recalled

more propositional information when the novel word reoccurrences were close together. This effect was only evident, however, on the nonspecific items. The novel words which had more specific propositional information showed very little difference in the number of propositions recalled for the close versus distant conditions. All the subjects had more difficulty recalling propositions which were nonspecific and distant.

The phonological production results, in contrast, were opposite to the comprehension results. It was the novel words with less specific propositional cues and the ones whose repetitions were further apart which were the best recalled by all the subjects. Although the effects were small (only one half word recalled better in the nonspecific condition), the difference between the distant and close items was a large one (almost two words better recalled in the distant condition). When the novel word reoccurrences were close to one another and had specific propositional information surrounding them, it was more difficult for the subjects to acquire the phonological forms of the words and therefore recall them.

An explanation for these findings, particularly for their opposing effects, may be found by considering what the listener is doing when hearing and attempting to understand a story with novel words. It could be hypothesized that, when receiving very specific and very close information about a novel word, the listener is better able to use that information to choose a real world referent for the novel word, and is therefore less dependent on the phonological form of the word. In this case, although the phonological form of the word itself may not be retained, the listener is readily able to use the chosen referent for attaching and integrating the associated propositions, thus facilitating the later recall of those propositions. And the reverse occurs when the listener is given less specific or more distant information. In this case, it is not as easy for the listener to integrate the propositions and choose a referent, and therefore, the phonological form of the word becomes more important in the attempt to connect the later propositions. And conversely, the associated story propositions are less well recalled because a ready referent is not available to which to attach the propositions.

The results indicated that when the listener was provided with nonspecific propositional information, the close proximity of the reoccurrences of the novel word facilitated recall of that information. The specific items did not display this same trend and therefore it may be that when specific propositional information is provided, a referent is more easily chosen (and the associated propositions more quickly attached), and therefore the distance between the reoccurrences becomes less important.

The results from both the phonological production and comprehension of word meaning tasks support the idea that the listener processes various aspects of the novel word and its meaning differently dependent on the propositional context available. The phonological form of the words was better recalled

when the propositional information associated with the words was less specific and more distant. The propositional information, on the other hand, was better retained when the information was close together and the referent was very specific.

From the reading comprehension literature come two opposing points of view of what happens when an unfamiliar word is encountered in reading. One model, based on Rumelhart (1977), would argue that on encountering a new word, the reader begins to develop hypotheses about the novel input string. The hypotheses are sent to a message center and confirmed, disconfirmed, or replaced by new hypotheses. The reader is said to be spending cognitive effort to derive the meanings of unfamiliar words. A second possibility, the minimum effort principle, has been suggested by Freebody and Anderson (1983). Freebody and Anderson contend that rather than spend immediate effort on the word, the reader often skips over the unfamiliar word and continues reading. Then, at the point of later testing, the reader either reconstructs information from partial memory of the passage combined with world knowledge, or tests probabalistic assertions to come up with an answer. Thus, as Freebody and Anderson suggest, the reader commits as little effort as possible during proposition by proposition encoding of the text.

Although the novel words in this study were presented in an oral context, the results nonetheless support the cognitive effort view of processing. The effects that specificity and proximity had on both the phonological production and the comprehension of word meaning would appear to support the idea that the listener is actively attempting to integrate information about the novel words while listening to the propositions. The disruption in integration that occurred when listening to nonspecific and/or distant propositions was represented across all subjects.

In conclusion, the fast mapping of novel words in story context has proven to be a flexible and useful paradigm for looking at fast mapping skills across a wide developmental range. The use of stories provided a natural context for word acquisition, motivated the subjects to attend to the task, and permitted the systematic manipulation of variables affecting the fast mapping process. This paradigm has excellent potential for future study with both children and adults and could be manipulated to include variation of story type and length, mode of presentation, or story structure.

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TABLES

Table 1. Phonological Production: Mean number (and standard deviations) of correct phonological productions (maximum possible = 16).

Group	First	Third	Fifth	Adult
X =	1.45	3.36	4.15	10.35
SD =	(0.94)	(2.18)	(2.48)	(3.15)

Table 2. Phonological Production: Mean correct for specific, nonspecific, distant, and close conditions (maximum possible = 8).

Nonspecific = 2.59	Specific = 2.24
Distant = 2.84	Close = 1.99

Table 3. Cued Production: Means (and standard deviations) of the number correct novel words (maximum possible = 16).

Group	First	Third	Fifth	Adult
X =	1.35	4.55	4.55	10.95
SD =	(1.14)	(3.14)	(2.89)	(2.82)

Table 4. Comprehension of Word Meaning: Mean number (and standard deviations) of correct propositions (maximum possible = 24).

Group	First	Third	Fifth	Adult
X =	2.88	7.01	7.20	13.40
SD =	(2.68)	(3.30)	(3.22)	(2.13)

Table 5. Comprehension of Word Meaning; Mean number (and standard deviations) of correct propositions by story context condition (maximum possible = 24).

	Specific Distant	Specific Close	Nonspecific Distant	Nonspecific Close
X =	8.15	7.80	5.89	8.65
SD =	(5.36)	(4.57)	(3.92)	(5.13)

APPENDIX A

Novel Words with their IPA transcription

Poom	/pum/	Tash	/tæʃ/	Nen	/nɛn/	Nif	/nɪf/
Sais	/ses/	Doyd	/dɔɪd/	Wup	/wʌp/	Gug	/gʌg/
Keke	/kiki/	Momo	/momo/	Soosoo	/susu/	Wayway	/wewe/
Hobuh	/hobə/	Gobi	/gabi/	Yeduh	/jidə/	Fepo	/fipo/

APPENDIX B

Sample story containing four novel words (capitalized) in each combination of experimental conditions: specific-distant (SD), specific-close (SC), nonspecific-distant (NSD), nonspecific-close (NSC).

Once there was a MOMO (SC) who lived in a castle. The castle was by a beautiful lake. The MOMO (SC) had a son, named John, and two ducks. One duck was a girl and one was a boy duck, but no one knew which was which. The MOMO (SC) was sitting on the throne and he told John to find out which duck was the girl duck. John was excited and was ready to start. He knew if he could find out which one was the girl duck, he would get the TASH (NSD) he'd always wanted. John ran around the castle and asked everyone about the ducks. But no one seemed to be able to help him. John decided this was kind of like a DOYD (SD) and he'd always liked playing with them. He was sure he'd find out about the ducks if he just asked the right person.

John then left the castle and went to see a GOBI (NSC) at his house. He said "Please help me find out which is the girl duck". The GOBI (NSC) had animals and knew all about animals. When John saw all the animals, he was sure he'd come to the right place. The wise GOBI (NSC) said "Take the ducks to some water and see which one gets in first. The one who gets in first is always the girl duck". John was very pleased and all he could think about was playing with his TASH (NSD) when he got home. But first he had to get the ducks and take them to some water. Only then would this funny DOYD (SD) have all its parts.

John took the ducks to the lake by the castle. He put a red string around the neck of the duck who got in the water first. He ran back inside the castle and showed everyone the duck with the string. He said "Look everyone this is the girl duck. I have finally put the last piece in the DOYD (SD) and it is finished". All the people clapped and cheered and were very proud of John. And just as John thought, there was a beautiful TASH (NSD) waiting for him. John was happy and told everyone how he'd found out about the ducks.