Because most word meanings are learned from exposure in context, and because poor readers read less and less challenging materials than do better readers, there is a gap between the word meaning knowledge of good readers and poor readers. To overcome this gap, direct instruction can help. But for such instruction to be maximally useful, it should be productive. Productive approaches to teaching word meanings involve teaching a set of target words in a way that generates knowledge of a larger set of words. We discuss three approaches to productive instruction: teaching children to derive word meanings from context; teaching word parts such as prefixes, suffixes, and roots; and teaching words as part of semantic groups. We suggest a two-track approach to teaching word meanings, involving both teaching general strategies for learning words in a remedial setting and engaging poor readers in active vocabulary discussions in their regular classes.

Word recognition can be defined as the ability to recognize the written equivalents of words that are already in one's meaning vocabulary. Although the rest of the articles in this mini-theme are concerned with word recognition, this article concerns the development of that meaning vocabulary, or how people learn the meanings of words. This is not a wholly separate issue from the development of word recognition. Although one might be able to pronounce words solely on the basis of orthographical knowledge, such ability adds little to comprehension if the person has no idea of the meaning of the word. In addition, one's familiarity with the meaning of a word directly affects one's ability to recognize it. In an interactive model of the reading process, such as that proposed by Adams (1990), a person's word meaning store directly interacts with one's orthographical and phonological knowledge to facilitate word recognition. Therefore, to better teach children to recognize words, we also need to be concerned about the growth of the number of words that are known and can be recognized.
In normally achieving children, this growth is apparently prodigious. Children learn the meanings of about 3,000 new words per year (e.g., Nagy, 1988; White, Graves, & Slater, 1990). This figure is an average, with considerable variation. White et al. (1990) found that children learned from 1,000 to nearly 5,000 new word meanings a year, a fairly large spread. We assume that poor readers fall at the lower end of this spread.

Where does this growth in vocabulary come from? Because one can reasonably teach only about 300-400 word meanings per year through direct instruction (Nagy, Anderson, & Herman, 1987), the majority of words that a child learns must come from context. Nagy et al. (1987) have calculated that much of this annual growth in reading can come from incidental learning of word meanings from a reasonable amount of contextual reading.

**WHY A GAP BETWEEN GOOD AND POOR READERS?**

There are two possible explanations for the difference in the size of the meaning vocabularies of good and poor readers. One explanation has been that good readers are more able to derive word meanings from context than poorer readers (Stemberg, 1987). However, several studies of the amount of word meanings children actually do learn accidentally from context failed to find differences due to children's ability (Nagy et al., 1987; Schefelbine, 1990; Stahl, 1991), suggesting that able and less able readers can acquire word meanings from context at roughly the same rate. Ability differences do not seem to account for the differences in vocabulary growth noted by White et al. (1990).

The other explanation is that because poor readers tend to read less than better readers, the gap between good and poor readers, in absolute numbers of words, becomes progressively greater as the child progresses through school. This is part of the "Matthew effect" discussed by Stanovich (1986), who suggested that "the rich get richer and the poor get poorer" in vocabulary and other aspects of reading. That is, children who are good readers become better readers because they read more, but poor readers get relatively worse because they read less. Indeed, Anderson, Wilson, and Fielding (1988) have found large differences in the amount of free reading that good and poor readers do outside the school and Allington (1983) has found large differences in the amount of reading that good and poor readers do at school. For vocabulary, the differences in the amount of reading combined with the lack of differences in ability to learn words from context suggest that discrepancies between good and poor readers may lie in the amount of text to which they are exposed.

One way of providing that exposure to new vocabulary might be to read to children. Several studies have found that children can learn words as efficiently from having stories read to them as they can from reading stories themselves. Stahl, Richek, and Vandevier (1990) found that sixth graders learned about 7% of word meanings presumed unknown from a single listening. This effect was especially pronounced among children who were lower in initial word knowledge. Although word meanings can and should be learned through listening to stories, listening can only supplement and not supplant essential practice in reading.

Not only do poorer readers read less than do good readers, but they face an additional handicap when they do read. Often content area texts add cues to a word's meaning, through a parenthetical definition. However, because of the large gaps in their vocabulary, some poorer readers are unable to take advantage of these aids. For example, Schefelbine (1990) gave high- and low-vocabulary students a passage containing the sentence "Gauchos, the cowhands of South America, learned to chase the birds on cow ponies." While the target word here was *gauche*, several of the low-vocabulary students had trouble with *cowhands* as well. Misinterpreting *cowhand* as the "front legs of a cow," as one of Schefelbine's subjects did, would suggest that *gauche* meant the same, disrupting comprehension.

Usually, the text is not as considerate and does not provide an explicit definition. In either case, the child with a low vocabulary faces an additional handicap. Each word that is not understood, or partially or inflexibly understood, adds to the child's misunderstandings, leading the child further and further from the author's intended meaning.

**PRODUCTIVE APPROACHES TO TEACHING WORD MEANINGS**

What does this all mean for instruction? First, it suggests that to get poor readers to become good readers, they must be encouraged, cajoled, or browbeaten to read more text, text that contains varied vocabulary. Further, texts designed for such readers should be considerate, that is, provide contexts that help children learn the word meanings (Konopak, 1988). Second, direct instruction may play a more important role for such children, and direct instruction of vocabulary should be directed toward the poorer reader, in the regular class as well as the clinic. The 300-400 new word meanings that can be taught through direct instruction is a larger percentage of the low end of the
PRODUCTIVE APPROACHES TO VOCABULARY

Teaching Children to Learn from Context

More promising approaches teach children general strategies that can be used when they encounter unknown words. One is the SCANR technique (Jenkins, Matlock, & Slocum, 1989). Children are taught to first Substitute a likely synonym or synonomic phrase for an unknown word, then Check the context for clues that support the choice, Ask if the substitution fits all context clues, determine if one Needs a new idea, and Revise the idea so it better fits the context. Kranzer and Pikulski (1988) revised this procedure, combining the last two steps into one. Their SCAR procedure taught the students to Substitute, Check, and then Accept or Revise. Both Jenkins et al. and Kranzer and Pikulski taught these procedures through direct instruction, involving a direct explanation of the procedure, modeling, and guided practice with feedback. The practice provided was extensive. Jenkins et al.'s medium practice group (the most efficient) practiced deriving the meanings of 135 words, compared with only 43 and 21 items in two basal reading series that they examined.

Jenkins et al. (1989) did find significant gains in the ability to derive word meanings on posttests on which students were directed explicitly to define words from context. Kranzer and Pikulski (1988), however, found smaller effects on measures of incidental learning, on which students were not given explicit instructions to derive word meanings. The latter measures are more realistic, because they measure what occurs in natural language learning.

Another approach to teaching children to develop a strategy for using context, "look inside-look out" (Herman & Weaver, 1988), gave students four specific aspects of context to examine while reading, two of them inside the word (word parts and prior knowledge) and two outside (general mood and specific context clues; see Figure 1). Students were first taught to "look inside" an unknown word to identify any parts of the word that might be known and at their existing familiarity with the word. They were then taught to "look out" at the flow of the events where the word occurred and at any specific context clues in the sentence. This was taught first by talking through the processes used to derive the word's meaning, explaining the teacher's thinking and weighing all options, until a "best guess" could be derived. Over several days, responsibility for this talking through was shifted to the students so that they had complete responsibility for figuring out the word meanings. In contrast to other approaches to teaching children to derive word meanings from context, the goal was not that students derive a full meaning for each unknown word. In reality, few contexts are elaborate enough for students to derive
II

look inside-look out

Look Inside - Look Out

Inside the Word

Outside of the Word

Word Parts

Context Clues

Prior Knowledge of the Word

General Mood


complete meaning. It was considered enough, for example, that a child know that delectable describes something in a positive way.

Herman and Weaver (1988) found that this approach, taught over the course of a school year to remedial seventh graders, appeared to be effective in sensitizing children to the importance of new vocabulary in context and appeared to help them to derive information about them.

A third promising technique is teaching children the concept of "definition" (Schwartz & Raphael, 1985). Children are taught that a word's definition contains the category to which it belongs, examples, and descriptions. One can also add nonexamples to the training. Schwartz and Raphael began with a familiar concept, such as computer, and showed how its definitional components could be integrated into a word map, such as that shown in Figure 2. This is extended to less familiar concepts and eventually to teaching students to

pick out characteristics, examples, and categories from information provided in texts.

General Principles in Teaching Children to Learn from Context

The preceding four techniques have a number of things in common. First, they view the process of learning words from context as a strategy, rather than a mechanical application of rules about context clues. Because, as noted, explicit clues are relatively rare and context is often a misleading source of information about a word's meaning, a flexible, strategic approach is necessary.

A more general way of teaching children to be strategic in deriving of meanings from context is to use a talk-through technique. In such a technique, the teacher would first talk through the processes he or she is using to figure out a word's meaning from context. Next, the teacher can lead students, individually or in a group, though deriving a word from context, using directed question prompts such as "What part of

Figure 2 Concept of definition diagram
needs to be aware about what one knows and does not know before help with the larger context.

and may not use what they know about partially unknown words to appear unaware that they have any partial knowledge about words ping words that are not immediately accessible, poor readers often they may not realize which words they do not know (Erickson, Stahl, Not only do poor readers not know many of the words they encounter, they seem to be more aware of new words and more interested in acquiring them. This "word awareness" seems to be the key to explaining not only why these programs are effective, but also why some programs that teach specific word meanings also improve students' understanding of words not taught as part of the program (e.g., Beck, McKeown, & Perfetti, 1982). A good vocabulary teaching program makes students excited about words, leading students to attend more closely to them.

This can be accomplished in a number of different ways, including providing incentives for children to find new word meanings from context or find examples in context of words taught through direct instruction. For example, Beck et al. (1982) used as part of their successful vocabulary training program an activity in which children brought in examples of words that were taught in class, with the student who brought in the most examples in a week becoming "Word Wizard." This activity can be also done directly through a knowledge rating checklist. Blachowicz (1986; see also Dale & O'Rourke, 1986) suggested one such checklist (see Figure 3). Such checklists can be used in whole-class settings.

Another approach to sensitizing students to difficult words in the text might be having groups of students preview a text and choose the words for instruction, instead of having the teacher select the words (Haggard, 1986). Such an approach appears to be successful with poor readers, as well as better readers.

Word Part Instruction

A second type of productive vocabulary instruction involves the teaching of within-word parts: prefixes, suffixes, and roots. Although words like geologist, interdependent, and substandard are often figured out from context, decomposing such words into known parts like ge-, logist, inter-, depend, etc. not only makes the words themselves more memorable, but, in combination with sentence context, may be a useful strategy in determining the meaning of unknown words (Dale & O'Rourke, 1986). Such an "inside-outside" approach to word meanings has already been discussed. This strategy may be especially important for content area reading, where many of the words contain identifiable word parts which have the same meaning in many different words.

How do children acquire the meanings of word parts that might aid in determining the meanings of unknown words? One possibility is that they infer them during reading. However, a number of studies (e.g., Nagy, 1991; O'Rourke, 1979; Sternberg, 1987) provide evidence that even many high school students are unaware that decomposing words in their parts can help with their meaning, and often do not know the meanings of common word parts. Thus, less able readers might benefit from instruction in this area.

One must first decide which parts are worth teaching. There are lists containing hundreds of prefixes, suffixes, and Greek and Latin roots (e.g., Dale & O'Rourke, 1986). Although such lists may be useful, it hardly seems possible or even fruitful to teach each element on each
Most useful would seem a two-pronged approach that directly teaches the most commonly used or important elements combined with a general strategy for decomposing words and combining word part information with information from the sentence context.

Prefixes
White, Sowell, and Yanagihara (1989) found that only 20 prefixes (see Table 1) accounted for 97% of prefixed words that appear in printed school English, excluding those that were followed by non-English roots (such as the ad in adjacent). They concluded that teaching at least the top 9, if not all 20, to middle-school students would markedly increase vocabulary learning. They found that third graders given training on these 9 prefixes and a strategy for decomposing words into roots and suffixes outperformed a control group on several measures of word meaning.

Suffixes
White et al. (1989) also estimated the frequency of suffixes in printed school English (also shown in Table 1). Inflectional endings such as noun endings (-s, -es), verb endings (-ed, -ing, -en), and adjective endings (-er, -est) were the most common. In general, these are used in even young children's oral language and probably do not need direct instruction, because they can be understood as they are encountered during reading.

Derivational suffixes appear in fewer than a quarter of all the words that contain suffixes, but they might be useful to teach. Comprehension of relatively infrequent words such as glacial and monarchy can be aided by knowledge of the -ial and -y suffixes. Many children, especially poorer readers, have difficulty isolating the root word. Knowledge of which letter patterns are suffixes may also serve to help poor readers identify the root. Often such children are overwhelmed by the length of words. Giving them a word part reduces the size of the word.

WEATHER

How much do I know about these words?

<table>
<thead>
<tr>
<th>Can Define</th>
<th>Have Seen/Heard</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Mass</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Air Pressure</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Meteorology</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Barometer</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

and allows them to focus on relevant information within the word (Adams, 1990). Suffixes such as -tion or -ly, might also help identify words, if only to cue the reader in on the grammatical function of words in sentences.

Other suffixes, such as -ful and -less, are meaningful components of words, contributing to words' meanings much the same way that prefixes do. In fact, words containing these suffixes behave more like compound words than like words with other types of suffixes. We feel that -ful and -less and other similar, meaningful suffixes should be taught separately, as if they were variations in spelling for word compounds, rather than grouped with other suffixes.

Roots

Words like interdependent, readable, and substandard, which contain regular English words as roots, can be also be treated as compound words. Poor readers can be taught to analyze the words for structural elements, including prefixes, suffixes, and familiar English roots, and to combine these within-word cues with information in the context. But content words like biology, extraterrestrial, geologist, and projectile, which contain Greek or Latin roots, present a different problem, because the root per se may not be part of a child's vocabulary.

Reading educators are divided as to whether to teach these roots or not. Nagy and Anderson (1984) argued that the modern meanings of words (especially the most common derived words) often do not reflect the meanings of their historical roots, and that readers might be mislead by a literal translation of root to meaning. For example, knowing that, -mort refers to death may help with mortal or immortal, but probably does not with morbid or mortify or mortgage. Likewise, knowing saline may not help with salary, even though they are both derived from the same root.

On the other hand, teaching roots may make the words more memorable, by adding a story to the word's definition. Research has found that having children elaborate basic information makes it more memorable (Pressley, 1988). For example, sanguinary and sanguine both derive from the Latin word meaning blood, but sanguinary means blood-thirsty and sanguine (through the Middle Ages belief that body fluids affected one's disposition) means cheerful. One of us heard this example in high school and has since remembered both the meanings and the example.

We have compiled a list of commonly occurring Greek and Latin roots in Table 2. For individual content areas, it might be worthwhile to make up lists specific to each area. Thus, for biology, such a list might include bio-, chromo-, eco-, soma-, etc. These can be integrated into classroom procedures to provide background for children's lessons.

A Program for Teaching Word Parts

Introductory lessons in word part lessons should stress the idea that words can be composed of elements, such as prefixes, suffixes, and roots. These should be defined for the students, but the emphasis should not be on learning the specific terms as much as on learning about how parts function together to affect word meaning. For example, a lesson on un- might not only provide examples of words beginning with un- but also ask students to generate un- words of their own, including silly words. The use of imaginative extensions may solidify the meaning of un- as well as the concept of prefix in general. Nonexamples, such as under and uncle, also help reinforce the basic concept of prefixing. For roots, similar teaching procedures could be used. It also might be useful to use a web such as that in Figure 4. Such webs would introduce children to many new words while teaching a few target words, thus serving a productive function. Nagy and Anderson (1984) suggested that such a strategy of discussing derivatives when introducing a new word, with or without a web, is useful and motivational. Including words that are relatively infrequent (such as geocentric or geode) may reinforce target words (such as geology) by providing more elaborate information about the target word.

As noted English roots such as depend in interdependent should be

<table>
<thead>
<tr>
<th>Root</th>
<th>Meaning</th>
<th>Origin</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>aed</td>
<td>hear</td>
<td>Latin</td>
<td>audiphile, auditorium, audition</td>
</tr>
<tr>
<td>astro</td>
<td>star</td>
<td>Greek</td>
<td>astrology, astronaut, asteroid</td>
</tr>
<tr>
<td>bio</td>
<td>life</td>
<td>Greek</td>
<td>biography, biology</td>
</tr>
<tr>
<td>dict</td>
<td>speak, tell</td>
<td>Latin</td>
<td>dictate, predict, dictator</td>
</tr>
<tr>
<td>geo</td>
<td>earth</td>
<td>Greek</td>
<td>geology, geography</td>
</tr>
<tr>
<td>meter</td>
<td>measure</td>
<td>Greek</td>
<td>thermometer, barometer</td>
</tr>
<tr>
<td>min</td>
<td>little, small</td>
<td>Latin</td>
<td>minimum, minimal</td>
</tr>
<tr>
<td>mit, mis</td>
<td>send</td>
<td>Latin</td>
<td>mission, transmit, remit, missile</td>
</tr>
<tr>
<td>ped</td>
<td>foot</td>
<td>Latin</td>
<td>pedestrian, pedal, Pedestal</td>
</tr>
<tr>
<td>phon</td>
<td>sound</td>
<td>Greek</td>
<td>phonograph, microphone, phoneme</td>
</tr>
<tr>
<td>port</td>
<td>carry</td>
<td>Latin</td>
<td>transport, portable, import</td>
</tr>
<tr>
<td>scrib, script</td>
<td>write</td>
<td>Latin</td>
<td>scribble, manuscript, inscription</td>
</tr>
<tr>
<td>spect</td>
<td>see</td>
<td>Latin</td>
<td>inspect, spectator, respect</td>
</tr>
<tr>
<td>struct</td>
<td>build, form</td>
<td>Latin</td>
<td>construction, destruct, instruct</td>
</tr>
</tbody>
</table>
distinguished from Greek or Latin roots such as cred in incredible. A strategy of looking for common English words within longer words, and parsing out prefixes and suffixes, might be a useful one for many words. Again, because poor readers tend to be overwhelmed by long words, they may not do this.

Teaching children to decompose words into their parts as a way to determine the meanings of unknown words is a productive strategy. Such a strategy would not only be helpful for words with obvious derivatives, but also may be useful for getting poor readers to be sensitive to orthographical similarities among words. Combining decomposition with the use of context clues, as in the "look inside-look out" procedure (Herman & Weaver, 1988; see also Dale & O'Rourke, 1986), may be especially fruitful, particularly in the content areas, because so many of the words encountered in content area texts contain recognizable parts.

After students are familiar with the basic concepts of prefix, suffix, and roots, teaching specific word parts should be easier. This can be done within the context of other vocabulary instruction, as part of the discussion of particular word meanings, or using direct instruction. Such instruction would include defining the target word part, modeling words using that word part, and reading sentences containing the target parts. For prefixes, one should attempt to extend the instruction to as many words as possible, both real words and silly words.

Teaching suffixes presents special problems. Prefixes and roots should be defined, because their definition tends to be consistent over a variety of words. However, definitions of suffixes may confuse children. Some sources define -ance/-ence and -ment as "condition of, quality of, or state of." Adding this to the definition of a root might make understanding amendment or precedence a complicated task. Instead of defining suffixes, we suggest proving many examples of words containing suffixes, along with the words they were derived from. Ample experience with both the suffixed words and the original words would probably be more useful than memorizing an abstract definition.

**Teaching Words as Part of a Semantic Field**

In his meta-analytic review of approaches for teaching word meanings to poor readers, Marmolejo (1991) found that approaches that teach word meanings as part of a semantic field were especially for children with low initial vocabularies. Such students may need help tying new word meanings to their existing word knowledge. These approaches are productive because the teaching of a few target words serves as a springboard for teaching sets of related words. An example of a semantic field approach is semantic mapping (Heimlich & Pittelman, 1986). In semantic mapping, one targeted word is tied through the discussion and the mapping to other, related words. For the high-vocabulary children, most of these related words are known, and thus reinforce the target words. For the low-vocabulary children, some of these may be unknown and thus may be learned as well.

Teaching strategic use of context and word parts seems especially appropriate for small-group work in a remedial setting. For semantic mapping, and these other techniques, it is important that whole-class discussion is used. Such discussion seems to be an especially effective medium for vocabulary learning, because, in the classroom interaction, preconceptions and misconceptions can be discussed openly and clarified (Stahl & Clark, 1987). This is especially important for students with low vocabularies, who are likely to have partial knowledge of more words, and thus more preconceptions. Open classroom discussion affords the poorer students the opportunity to learn from the better students in a nonthreatening manner. In our studies (e.g., Stahl & Clark, 1987), we have found that children with low initial word knowledge benefit from discussion as much as high-vocabulary children do, if not more so.

Techniques for teaching words as part of a semantic field are described elsewhere in this issue. Our point is that they seem especially useful for children with a low vocabulary because these children get a bonus. They learn not only the target words, but also many related words from the same semantic field. By using whole-class discussion, the teacher can take advantage of the knowledge possessed by the high-vocabulary students in a natural, nonthreatening manner. As we have found, children with low initial vocabulary knowledge benefit as much as those with higher levels.
This is not to say that one should never teach a single word in isolation to poor readers. There are times that doing so is appropriate and desirable. It is just that, given the limited amount of time available, teaching groups of words is more efficient.

PUTTING IT TOGETHER

What we are suggesting is a two-track approach to vocabulary instruction for poor readers. The first track—teaching of general skills needed to unlock the meanings of unknown words—could take place in the remedial reading setting. Here one might begin teaching a generic approach to using context, such as SCAR or “look inside-look out.” A chart can be kept in the remedial reading room. This chart can be referred to throughout the year as unknown words are encountered during reading. Also, one might teach directly a few prefixes, suffixes, and roots, as recommended earlier, adding others that are useful in the content area subject. For example, if the science teacher teaches geography, the remedial teacher might expand that to geography, geometry, etc.

The other track is active involvement of poor reaching students in vocabulary discussions in the regular class. Active teaching of words as part of larger semantic fields appears to improve the vocabulary knowledge and comprehension of students of all abilities. This would also involve an active program of story reading to children, at all elementary grade levels. We have found that even fifth and sixth graders enjoy and benefit from being read from books of literary merit and interest.

Vocabulary instruction for poor readers should not be all that different from that given to better readers. The suggestions made here are initially applicable to average and above-average children and are no more than quality instruction. But good readers thrive on quality instruction, and poor readers require it. Without instruction that accelerates their learning, poor readers will fall further and further behind (Stanovich, 1986).

Poor readers need productive vocabulary instruction, in which reaching a few target words leads to learning a larger amount of words. Productive instruction can involve sensitizing children to deriving word meanings from context or word parts or teaching targeted words within a field of related words, some of which might not be known to students. Such learning is accelerated learning, because it gives children the tools to grow faster than they would otherwise.