We Acquire Vocabulary and Spelling by Reading: Additional Evidence for the Input Hypothesis

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EXEMPLARY REASONS EXIST FOR DEVOTING attention to vocabulary and spelling. First, there are practical reasons. A large vocabulary is, of course, essential for mastery of a language. Second language acquirers know this; they carry dictionaries with them, not grammar books, and regularly report that lack of vocabulary is a major problem. Spelling, especially for treacherous languages such as English, is also a problem. Our standards in spelling are 100%; a single spelling error in public can mean humiliation.

On the theoretical level, the study of the acquisition of vocabulary and spelling ability can help us understand language acquisition in general. In my view, the most promising hypothesis is that vocabulary and spelling ability can help us understand language acquisition in general. This hypothesis suggests that, in the acquisition of a language, first, the learner needs to be exposed to the language input, and second, the learner needs to be able to interpret the input. The first hypothesis is that vocabulary and spelling ability can help us understand language acquisition in general. This hypothesis suggests that, in the acquisition of a language, first, the learner needs to be exposed to the language input, and second, the learner needs to be able to interpret the input.

I review some research in vocabulary and spelling and suggest that the results of this research are, so far, consistent with the hypothesis that has been proposed for language acquisition in general, the Input Hypothesis, and inconsistent with two alternative hypotheses.

The Input Hypothesis (IH) assumes that we acquire language by understanding messages from the world. More precisely, comprehensible input is the essential environmental ingredient—a richly specified internal language acquisition device (LID) also makes a significant contribution to language acquisition. I argue that the hypothesis is that competence in spelling and vocabulary is most efficiently attained by comprehensible input in the form of reading, a position argued by several others (e.g., 19, 122, 123, 124).

According to IH, when the Language Acquisition Device is involved, language is subconsciously acquired—while you are acquiring, you don't know you are acquiring; your conscious mind is on the material in the form. Thus, the acquisition process is identical to what has been termed "incremental learning." Also, acquired knowledge is represented subconsciously in the brain—it is what Chomsky has termed "tacit knowledge."

IH allows that the development of some linguistic knowledge may occur in other ways, outside the language acquisition device, using other mental faculties (16, 17, 42, 75, 120). This hypothesis is deliberately and consciously learned, and is represented consciously in the brain. Linguistic competence developed this way is highly limited, since it utilizes mental faculties that are not specialized for language. Severe limits exist on how much can be learned, as well as how this knowledge is used (the Monitor Hypothesis, 73, 75).

IH has several competitors. Two of the most popular are the Skill-Building Hypothesis (SBH) and the Output Hypothesis (OH).

The Skill-Building Hypothesis. According to SBH, we learn language by first consciously learning individual rules or items, and gradually, through drills and exercises, make these rules automatic. In terms of the theoretical framework developed in Krashen (72, 75), SBH is the hypothesis that "learning becomes acquisition," also known (121) as the "Interactive Hypothesis."

In vocabulary learning, the skill-building view involves learning words one at a time, by deliberate study, and may include analyzing their parts, their prefixes, suffixes, and roots, and exercises (e.g., draw a line from the word to the definition, fill in the blank). The skill-building approach to spelling is through word lists, spelling rules, and exercises.

To be precise, two versions of SBH or Interactive Hypothesis exist. The strong version insists that all of our competence in language comes from skill-building, that the only route to acquired competence is through conscious learning made automatic by some kind of "practice." A weaker version of SBH is that skill-building is a possible route. Other routes exist, such as comprehensible input.

The Output Hypothesis. According to OH, we learn language by producing it. I consider only one version of OH here, one I believe to be false: we learn rules and items by trying them out in production. If we experience communicative success, our (conscious) hypotheses about the rule or item is confirmed. If we experience communicative failure, or correction, our hypothesis is disconfirmed and we alter it. OH can exist in at least two forms (a strong version), or in combination with other hypotheses.

Skill-building and output with feedback, it is hypothesized, may produce some competence, but the competence is learned, not acquired, and thus is very limited. When skill-building or output-feedback based classes "work," when they produce language development, it can be due either to conscious learning or to the presence of conscious input (sometimes considered to be "practice"). When the latter is responsible for student improvement, skill-building is usually given the credit.

Both SBH and OH are, in this view, closely related. In skill-building, the student is given an explicit rule, then "practices" it. In output plus feedback, the student "disovers" the correct explicit rule. Skill-building is thus similar to what is known as "deductive learning," while output plus feedback is similar to "inductive learning." Despite this relationship, and despite the fact that many programs do both, in this paper I consider skill-building and output plus feedback to represent independent hypotheses. A substantial amount of first language research on vocabulary and spelling bears on these hypotheses, but only scraps of second language research address them. Both first and second language acquisition results, in my opinion, support the view that comprehensible input is the major source of vocabulary and spelling competence. This evidence is quite similar to that supporting IH for other aspects of language.

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EVIDENCE FOR THE INPUT HYPOTHESIS

If a hypothesis is correct, it will make only correct predictions. I attempt to show here that the Input Hypothesis makes correct predictions concerning vocabulary and spelling development. This step is necessary to demonstrate the correctness of a hypothesis, but it is not sufficient. It must also be shown that alternative explanations for the phenomena predicted by the hypothesis are not correct. I attempt to show here as well that strong versions of SBH and OH are not able to explain phenomena predicted by IH, or do so awkwardly. Skill-building and output plus feedback also have difficulty with phenomena that IH does not predict directly, but that it handles easily.

MORE COMPREHENSIBLE INPUT, MORE LANGUAGE ACQUISITION

If IH is correct, it predicts, first, that more comprehensible input, aural and written, results in more language acquisition. This prediction has been confirmed for other aspects of linguistic competence. Chomsky (13) reported that children who grow up in richer print environments displayed more grammatical competence. Several studies show that better writers read more outside of school (74). Better second language acquisition, as measured by a variety of tests, is associated with more comprehensible input in the second language of outside of school (studies reviewed in Krashen, 73, 75; see also Hafiz and Tudor).

Good evidence exists that this assertion is also true for vocabulary and spelling: more comprehensible input, in the form of reading, is associated with greater competence in vocabulary and spelling.

Vocabulary. Children who perform better on vocabulary tests report more extensive reading. Anderson, Wilson, and Fielding asked fifth graders to record their activities outside of school, and reported that the ways children spend their time, reading books was the best predictor of several measures of reading achievement (C. p. 285), including vocabulary. Greeney (52) and Greeney and Hegarty (54) found modest but significant positive correlations between the amount of leisure reading reported by fifth graders and performance on tests that included a vocabulary measure. In addition, Rice (111) reported that adults who said they spent more time doing leisure reading scored higher on a vocabulary test.

The results of in-school free reading pro-
of students showing a relationship between vocabulary and spelling proficiency and re- ferred free voluntary reading. It is hard to see how it applies to Wells' (two findings: a relation- ship between vocabulary knowledge and pre- school listening to stories and preschool book- ownership; it is unlikely that preschool children engaged in much vocabulary study. One could hypothesize that these preschool experiences inspired more study in school or more self-study later on (far-fetched, but possible). To account for the effects of in-school free voluntary read- ing on vocabulary development, skill-building needs to hypothesize that these programs inspired more study, or contained extra skill- building. While these scenarios are possible, they seem to us to be extremely unlikely. They are, however, unexplored possibilities.

A strong version of OH can account for the spelling-reported free voluntary reading rela- tionship by postulating that those who read more outside of school also wrote more, and received appropriate feedback on their efforts. To account for the vocabulary data, OH can posit that those who read more outside of school, who grew up in print-rich environments, who par- ticipated in supplementary free reading pro- grams, and who heard more stories also wrote more, or used new words more in conversation and received appropriate feedback. These scenarios might be partly true; it would be no surprise to learn that reading and writing did take place in these cases. It is doubtful, however, that enough output occurred, or that feedback was frequent enough, to account for the tremendous amount of vocabu- lary and spelling development that takes place (see "Complexity/Size of Language below.")

**Acquisition without learning**

A second prediction that IH makes is that acquisition can occur without learning. Re- search strongly suggests that this is so. Two kinds of evidence for acquisition without learn- ing have been presented here: 1) studies that show that competence can develop without instruction (defined here as a program based on skill-build- ing); 2) "Hybrid and Text" studies that show that acquisition occurs after a small amount of com- prehensible input.

**Competence without instruction**

Competence without instruction exists in other areas of linguistic competence. It has been shown that first and second language acquirers acquire rules of grammar that have never been taught (22). Many documented cases exist of adult immigrants acquiring second languages without instruction, some attaining high levels of competence (e.g., 29, 75). The success of language teaching methods that rely nearly completely on comprehensible input, such as Total Physical Response (4) and The Natural Approach (59, 78) suggest that acquisition without learning exists.

Miller estimated, on the basis of a vocabulary test administered after the unit, that about a year's growth in vocabulary had taken place. There was, however, no pre-testing and no control group.

Many of those with large vocabularies do not claim to have developed them through vocabulary programs. Smith and Sapiaha (127) tested 456 company presidents who claimed that they had significantly larger vocabulary scores than a comparison group of white-collar workers. When asked if they had made an effort to in- crease their vocabulary since leaving school, only 54.5% of the sample said they had. Of those 54.5%, when asked what they did to in- crease their vocabulary, about half mentioned reading. About a third of this group mentioned the use of only a dictionary; fourteen (six percent of those who tried to increase their vocabulary and three percent of the entire sample) men- tioned vocabulary books.

It has also been shown that children know enormous numbers of words and acquire voca- bulary at an incredible rate, and that vocabu- lary teaching programs cannot be a source of this knowledge. Miller (91) has estimated that children between the age of six and eight pick up an average of fourteen basic words a day.

Nagy, Herman, and Anderson (57; see also 96) have estimated that school-age children acquire several thousand words per year. Nagy argues that direct teaching of vocabulary cannot be the source of these gains, since even the most am-

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In the contained Silent Reading (SSR), a certain amount of time, usually five to fifteen minutes, is set aside for free voluntary reading, with no book reports or tests on the reading. When SSR supplements regular language arts instruction, it typically results in superior voca- buulary development (Table 1).Eight

More comprehensible input in the form of listening to stories is also associated with better vocabulary development. Wells (143) reported that children who heard more stories during their preschool years were judged by their teachers to have better vocabularies at age ten.9

Children who grow up in print-rich environ- ments also have better vocabularies. Wells (142) found that children who owned more books at age five, before starting school, did significantly better on tests of vocabulary (as well as reading comprehension and math) two years later.4

Spelling. The relationship between reported leisure reading and spelling has not been investi- gated extensively. To my knowledge, only one study exists: Polak and Krashen found that col- lege ESL students who reported more leisure reading did better on a spelling test.

Supplementary free reading in school should also result in better spelling. In Pila's study, SSR was done in addition to the regular lan- guage arts program. Pila found, however, no difference between experimental and compar- ison subjects after two years of SSR. While the readers were no worse off, the hypothesis that more comprehensible input results in more ac- quisition was not supported. As we shall see, such apparent counter-evidence is rare.

**Alternative Hypothesis.** A strong version of SSR, one that claims that skill-building is the only route to competence, can account for these studies by hypothesizing that deliberate study of vocabulary and spelling (either in school or self-study) leads to better reading comprehension, which in turn leads to more free volun- 

<p>| TABLE I |
| Impact of Sustained Silent Reading on Vocabulary Acquisition (SSR as Supplement to Regular Program) |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Grades</th>
<th>Duration</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spent, 1948</td>
<td>5</td>
<td>6 weeks</td>
<td>Equivalent to comparisons</td>
</tr>
<tr>
<td>Pina, D., 1947</td>
<td>1-2</td>
<td>2 years</td>
<td>SSR superior</td>
</tr>
<tr>
<td>Minton, 1980</td>
<td>9</td>
<td>One semester</td>
<td>One semester</td>
</tr>
<tr>
<td>Shen et al., 1987</td>
<td>2</td>
<td>One year</td>
<td>SSR superior</td>
</tr>
<tr>
<td></td>
<td>3.6</td>
<td>One year</td>
<td>SSR superior</td>
</tr>
</tbody>
</table>

*SSR done in students' primary language.
specialized words frequently used in social studies after a fifteen-week unit on history and geography "involving wide reading and a great variety of learning activities" (140; p. 110). Typical pretest scores were around eighty out of 200; after the unit, average scores rose to above 107. Tyler interpreted his data as suggesting that "individual spelling vocabularies are acquired from pursuit of various activities relating to specialized fields" (p. 110).

Kyte studied students who were excellent spellers and who were excused from spelling instruction. He found that these excellent spellers, all of whom were good or excellent readers, continued to improve their spelling without instruction.

Cormann studied the effect of dropping all spelling instruction in two elementary schools for three years (spelling errors in compositions were still corrected by teachers, however). Cormann concluded that the effects of spelling instruction were "negligible," that unstructured students continued to improve in spelling and did as well as previous years' classes and just as well as students in other schools. Cormann's results were replicated by Richards, who studied seventy-eight children in grades six, seven, and eight who went without spelling instruction for one year. Richards reported that 67.3% of the children improved more than one year in spelling during this time, while 20.4% made no change, and only twelve percent got worse.

Alternative Hypothesis. To account for these results, a strong version of SBH might assume that self-study of vocabulary and spelling took place. As those who improved without instruction studied self-help vocabulary-building books, listened to vocabulary tapes, and diligently looked words up in the dictionary on their own. This is denied by most of the company presidents in Smith and Suppanich, is simply impossible for students in schools that developed spelling competence before starting school, and is unlikely in the other studies discussed here.

A strong version of OH must make the assumption that acquirers, in each case, had ample opportunity to try out new words in writing, and received feedback on their efforts, and/or tried out new vocabulary in conversation. Increased production opportunities may have occurred in cases of increased vocabulary and spelling competence accompanying subject matter instruction (91, 146) and with in-school free reading programs. Conceivably, company presidents write and engage in conversation more, and good readers excused from spelling instruction (79) wrote more, in all these re- mains to be demonstrated. Also, it is not likely that exact feedback was provided in any of these situations.

Skill-builders and output advocates could also dismiss Miller's junior high school results by pointing out that no scientifically valid testing took place, and that their observations could simply have been due to the students' greater use of words they already knew.

It could be argued that students consciously learn rules and generalizations in class, either deductively or inductively, and that they apply these rules to untaught words. This could account for some of the results presented here (e.g. 23, 24, 79). Rule-learning could account for some improvement, but not much, due to the complexity of the rules (see "Complexity/Size of Language").

Similarly, one could argue that students subconsciously acquire rules for word-formation and spelling from lists and exercises and apply these acquired rules to untaught words. While possible, it is doubtful that much acquisition occurs under these conditions due to the impoverished nature of the input.

**INCIDENTAL READ AND TEST STUDIES**

A number of studies using a similar paradigm confirm that both vocabulary and spelling can be acquired by reading for meaning. In each case, subjects are asked to read something, usually a short passage, but occasionally something longer (in one study, an entire novel was used). The text to be read contains words subjects are unfamiliar with or words they cannot spell. After reading the passage, subjects are tested on these words. In the studies I report here, subjects were not focused on vocabulary or spelling, that is, they were unaware that spelling or vocabulary would be tested. Rather, they were focused on the meaning of the passage.

**Incidental Read and Test. Vocabulary.** The most careful Read and Test studies probing vocabulary acquisition were done by Hermann, Heim, and Anderson (98), using elementary school students as subjects and passages from school textbooks as texts. Nagy's team concluded from its data that when an unfamiliar word was seen in print, "a small but statistically reliable increase in word knowledge" typically occurred
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(96: p. 26). They found that the chance of a subject's acquiring a word from one exposure was between five to twenty percent depending on the testing method used. This percentage may not seem high, but when we consider the amount of reading children do, even this small effect results in considerable vocabulary acquisition. Nagy (97) calculated that if children read about a million words per year, given only a five percent chance of acquiring a word from context with each exposure will result in vocabulary growth of about 1,000 words per year, "well enough to pass fairly discriminating multiple-choice tests" (97: p. 262).31

This research suggests that words are not learned all at once when they are seen in context; rather, word knowledge grows in "small increments." At any given time, there are words we know well, words we do not know, and words in-between. To increase our vocabulary we need to follow Tawdell's advice and tolerate some vagueness, vagueness that is reduced bit by bit as we read more and encoun-
ter unfamiliar words more. At any given mo-
tment, Tawdell notes, "we may 'know' a very large number of words with various degrees of vagueness—which words are in a twilight zone between the darkness of entire unfamiliarity and the brightness of complete familiarity" (119: p. 73).

The Clockwork Orange Study. Saragi, Nation, and Meister asked adults to read Bur-
kley's novel A Clockwork Orange. As adults who have read this novel, it contains a num-
ber of words from a Russian-based slang called cool. It can be assumed that few readers knew these words before reading the book. There are 281 sadat words in A Clockwork Orange, and they are repeated an average of fifteen times each. The version of A Clockwork Orange used in bookstores has a dictionary in the back, so readers can look up the meanings of the sadat words. In Saragi, Nation, and Meister's study, sub-
jects were simply asked to read the book, and were told to do so after they finished it they would be given a text of comprehension and literary criticism. They were not told to try to learn or remember the sadat words. What is crucial is that they were given the copies of the book with-
out the dictionary. The subjects read the book over a period of time, and reported finishing reading the book in three days or less. Within a few days of finishing the book, subjects were given a multiple-choice test covering ninety sadat words.

Results showed that considerable vocabulary acquisition had taken place. Scores ranged from fifty to sixty percent on the test, with an average of seventy-six percent. Subjects had picked up at least forty-five words simply by reading a novel! Saragi and observed that between frequency of occurrence and acquisi-
tion, noting that words that appeared less than ten times were typically not acquainted, but not acquired, a conclusion that matches Nagy, Her-
man, and Anderson's results closely.

Second Language Studies. A series of recently completed projects done at the University of Southern California has confirmed that second language acquirers can also increase their vocabulary by reading. In Dana Ferris' study, university level students of English as a second language (international students) read George Orwell's novel Animal Farm. They were given a multiple-choice test of seventy-five words, in-
cluding words used many times, usually on consecu-
tive days. After each reading, the pupils were asked to "read it in their own way" (35: p. 9). Analysis of the children's readings showed that with each reading, there was evidence of in-
creased and more accurate use of the target words, providing evidence of acquisition with-
out instruction. Elley has reported similar re-
sults for seventh and eighth graders using multiple-choice test.

Incidental Read and Test. Spelling. Read and Test studies in spelling come to very similar conclusions. In a series of reports, Gilbert de-
monstrated that high school (45, 46) and univer-
sity students (47) can improve their spelling by reading. He presented his subjects with a spelling test, a reading passage containing some of the words on the test, and a posttest. Subjects did much better on the posttest than words that appeared in the reading passage.

In Gilbert's studies, the posttest was usually given immediately before the test. Never-
evertheless, Gilbert argued that his subjects were focused on the meaning of the passages and not spelling, since they were told they would be tested on the content of the passage. In two of Gilbert's studies, one experimental group took the pretest just before doing the reading—three weeks for one of three groups in Gilbert (47), four weeks in Gilbert (45). Gains were smaller, but still significant—about 14.5% in one (47) and four percent in the other (45).

In Niobet's study, children ages eleven to fourteen read passages containing words they could not spell correctly on a pretest. (The reading took place "a few days" after the pre-
test.) After reading the passage, they could spell an average of about one of the sixty-five words. Niobet found this figure impres-
sive and concluded that "intensive reading and study of a passage ... does lead to some learn-
ing of spelling, but his gain is not sufficient . . . to justify the neglect of specific spelling instruction" (99: p. 11). As we just saw, how-
ever, Nagy, Herman, and Anderson found that vocabulary acquisition from reading occurred with similar efficiency. Thus, one out of twenty-five may be enough, if readers do enough reading.

In Ormrod (101) college students who read for meaning learned to spell an average of 2.8 "pseudo-words" out of a possible eight (an ex-
ample of a pseudo-word is 140, used as a person's name in the passage; each pseudo-
word appeared six times). Lake Nisbet, Ormrod (141) concluded that "college students clearly have trouble learning to spell the words they see within the context of a reading passage..." (pp. 653-54). I think that her data show just the opposite: after a brief exposure, subjects made progress in learning to spell unfamiliar words, even when not asked to do so.

Neither SBIR nor OH in their strong forms, has any way to deal with incidental Read and Test studies. In these studies, there was no chance to do any deliberate study nor any kind of output. OH supporters could argue that the kindergarteners children in Etler (35) searched out meanings for the words used in the stories they heard between readings (e.g., with their parents), and tried out these words at home and got feedback. (The children apparently got no feedback on their use of the words in their re-
tellings.) One might also insist that Ferris' sub-
jects looked up unknown words in Animal Farm on their own, and that subjects in Saragi (119) somehow found copies of A Clockwork Orange with dictionaries of sadat words. These expla-
nations seem to me to be implausible, but are possible.

Intentional Read and Test Studies. In "inten-
tional" Read and Test studies, subjects are de-
liberately focused on new vocabulary and spelling words (5, 32, 67, 70, 101). In some cases do additional skill-based exercises using the target words (32, 70). Intentional Read and Test subjects do consistently better in vocabu-
lary and spelling than incidental subjects; this shows that focusing on form will result in addi-

TABLE III  Vocabulary Gains After Reading Animal Farm

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretend</th>
<th>Pretend</th>
<th>Score</th>
<th>Score</th>
<th>Gain</th>
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<tbody>
<tr>
<td></td>
<td>Read</td>
<td>Read</td>
<td>Animal Farm</td>
<td>Read</td>
<td>Animal Farm</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td>read</td>
<td>read</td>
<td>N = 30</td>
<td>16.13</td>
<td>27.23</td>
</tr>
<tr>
<td>Control (did not read</td>
<td>read</td>
<td>Animal Farm</td>
<td>N = 21</td>
<td>12.10</td>
<td>16.14</td>
</tr>
</tbody>
</table>

Ferris, Ferris.
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(96: p. 26). They found that the chance of a subject's acquiring a word from one exposure was five to twenty-five percent depending on the testing method used. This percentage may not seem high, but when we consider the amount of reading children do, even this small effect results in considerable vocabulary acquisition. Nagy (97) calculated that if children read about a million words per year, given only a five percent chance of acquiring a word from context with each exposure will result in vocabulary growth of about 1,000 words per year, "well enough to pass fairly discriminating multiple-choice tests" (97: p. 262).11

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Incidental Read and Test. Spelling. Read and Test studies in spelling come to very similar conclusions. In a series of reports, Gilbert demonstrated that high school (45, 46) and univer- sity students (47) can improve their spelling by reading. When he presented his subjects with a spelling test, a reading passage containing some of the words on the test, and a posttest. Subjects did much better on the posttest on those words that appeared in the reading passage.

In Gilbert's studies, the posttest was usually given immediately after the test. Nevertheless, Gilbert argued that his subjects were focused on the meaning of the passages and not spelling, since they were told they would be tested on the content of the passage. In two of Gilbert's studies, one experiment group took the posttest well before doing the reading—three weeks for one of three groups in Gilbert (47), four weeks in Gilbert (45). Gains were smaller, but still highly significant—about 14.5% in one (47) and four percent in the other (45).

In Niobe's study, children ages eleven to fourteen read passages containing words they could not spell correctly on a pretest. (The reading took place "a few days" after the pre- test.) After reading the passage, they could spell an average of about one of every twenty-five. Niobe found this figure unimpress- ive and concluded that "intensive reading and study of a passage ... does lead to some learn- ing of spelling, but this gain is not sufficient . . . to justify the neglect of specific spelling instruction" (99: p. 11). As we just saw, how- ever, Nagy, Herman, and Anderson found that vocabulary acquisition from reading occurred with similar efficiency. Thus, one out of twenty-five may be enough, if readers do enough reading.

In Ormrod (101) college students who read for meaning learned to spell an average of 2.8 "pseudo-words" out of a possible eight (an exam- ple of a pseudo-word is drenros, used as a person's name in the passage); each pseudo- word appeared six times). Lake Nisbet, Ormrod, and Charac (102) concluded that college students clearly have trouble learning to spell the words they see within the context of a reading passage ... (pp. 653-54). I think that her data show just the opposite: after a brief exposure, subjects made progress in learning to spell unfamiliar words, even when not asked to do so.

Neither SBIR nor OH, in their strong forms, has any way to deal with incidental Read and Test studies. In these studies, there was no chance to do any deliberate study nor any kind of output. OH supporters could argue that the kindergarteners in Elley (35) searched out meanings for the words used in the stories they heard between readings (e.g., their parents), and tried out these words at home and got feedback. (The children apparently got no feedback on their uses of the words in their re- tellings.) One might also insist that Ferris's sub- jects looked up unknown words in Animal Farm on their own, and that subjects in Saragi (141) somehow found copies of a A Clockwork Orange with dictionaries of nadot words. These expla- nations seem to me to be implausible, but are possible.

Intentional Read and Test Studies. In "intention- al" Read and Test studies, subjects are de- liberately focused on new vocabulary and spelling words (5, 32, 67, 70, 101) and in some cases do additional skill-building exercises using the target words (32, 70). Intentional Read and Test studies do consistently better in vocabu- lary and spelling than incidental subjects; this shows that focusing on form will result in addit-
The effects of instruction

It insists that the only way of stimulating the operation of the language acquisition device is comprehensible input. Other means of attempting to internalize language, such as skill-building, rely on other mental faculties outside the language acquisition device. These attempts may result in language-like behavior, but not real language. If this is so, we would expect that competence produced outside the LAD makes little contribution to language performance.

This view leads to the prediction that the effect of traditional, conscious, learning-based instruction will be small, compared to the effect of comprehensible input (reading).

Comprehensible input has done very well in method comparisons in the past: beginning second language students in comprehensible input-based methods consistently outperform students in "traditional," usually skill-building-based methods (studies reviewed in Krahen, 73; see also 37 and 59). At the intermediate level, "sheltered" subject matter teaching has been shown to be very effective (31, 60, 80).

Previously published research allows several ways of evaluating the effect of instruction, vocabulary and spelling development: 1) comparing the progress of students in in-school free reading programs with the progress of comparison groups participating in traditional programs; 2) comparing the time efficiency of free reading and formal instruction (possible only for vocabulary); 3) comparing the effects of formal instruction to normal growth without instruction (spelling only); 4) determining whether more formal instruction results in more acquisition (spelling only).

Vocabulary

In-school free reading compared to traditional instruction. Previously, I discussed in-school free reading programs that supplement regular language arts programs. Some in-school free reading programs replace some or all of regular language arts instruction, and can thus be considered competing methods.

Table IV covers sustained silent reading programs that replace part of regular language arts instruction. Table V covers self-selected reading. As in sustained silent reading, children in self-selected reading choose their own reading material. They also have regular, brief conferences with teachers to discuss their reading and deal with problems.

In Table Va, self-selected readers are compared to students who follow the regular program. The design in Table Vb is weaker because no control group is used; instead, students' progress is compared with expected growth.

Tables IV and V show that when free voluntary reading, in the form of either sustained silent reading or self-selected reading, substitutes for all or part of the regular language arts program, free readers do at least as well, and often better, than students in the regular program on vocabulary tests, suggesting that free reading is at least as effective as traditional instruction. As noted earlier, free reading programs look even better when they are allowed to run for seven months or longer (see Table VI), the difference between long- and short-term programs is not, however, statistically significant.

The results of two studies suggest that vocabulary development is better served when at least some language arts time is devoted to reading aloud. Cohen (19) reported that second graders who were read to every day in school made better gains in vocabulary than second graders who were not read to. Cohen, Kita, and Goldstein found that first graders who were read to daily outperformed comparison students on every language test given to them, including vocabulary diversity on a story-telling task. 13

Time efficiency. Nagy's calculations (97) allow us to compare the effect of free voluntary reading and vocabulary instructional programs in another way. Nagy estimated that in their Read and Test study, children gained about 25 words per minute. In Appendix II below, I present estimates of efficiency for a number of vocabulary instruction methods. Most of the methods included utilized some form of skill-building. Inspection of this data reveals that some methods, including several using children as subjects, appear to be more efficient than Nagy's 25 words per minute for reading, While others appear to be less efficient.

These methods that are more efficient are not, in my view, preferable to reading. First, they do not provide a "deep" knowledge of words, with their full semantic and syntactic properties (see discussion of vocabulary complexity in the next section). Typically, they only ask students to learn synonyms or short definitions. In contrast, methods that take more time aim to give students a more thorough knowledge of words. Beck (7) presented evidence showing that for vocabulary knowledge to have an impact on reading comprehension, such deeper knowledge is necessary. Nagy (97,
Acquiring Vocabulary & Spelling

the most widely used series in grades three and four. Table VII shows only small differences among the three series (the first three rows); others (commercial series row four) produced similar results.

Of more interest to us, Hammill (58) also treated the spelling of a group of children who had no spelling instruction at all. These un instructed children were behind at grades three and four, which seems to indicate that spelling instruction in the other groups was effective. By grade five, however, there was no difference among the groups; the un instructed children had caught up.

What has happened here, I suggest, is that the spelling test used covered many words that children eventually learn to spell from reading. Spelling instruction, for these words, was a wasted effort; it only succeeded in helping chil dren learn to spell words that they would have learned to spell anyway on their own. The entire first half of the test could have been used for activities we know are good for language development, activities that are more pleasant for both children and teachers.

Thompson studied the effect of spelling instruction on 1,528 students in grades two through eight, and concluded that formal in struction resulted in a "permanent improve ment equivalent to one-half year's gain in excess of that to be expected as a function of general maturity and incidental learning" (115: p. 71). This effect is large. The reason may be the fact of commercial spelling programs. As indicated in Table VII, the goal of the study was to see which of three commercial reading programs was best. Word Book, Basic Goals, or Spell Correctly.

Children were tested at grades three, four, five and six, and seven and eight on a spelling test that included words appearing in

<table>
<thead>
<tr>
<th>TABLE VII</th>
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<tr>
<td>Mean Scores on the &quot;Test of Written Spelling&quot; at Different Grade Levels</td>
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<td>Grades</td>
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n = number of children tested.

From Hammill, Larsen, and McNutt. Perfect score = 60.
Clarke compared first grade children who were allowed to use invented spelling with children whose teachers emphasized correct spelling in their writing. Both groups had traditional (basal) reading instruction, including phonics. The invented spellers scored significantly higher on two out of three spelling tests at the end of the school year (they also did better on the third test, but the difference was not significant). Traditional spellers spelled more words correctly in their writing, but had access to dictionaries and word lists, and were encouraged to consult the teacher for help. The invented spelling group, as expected, wrote much more (on the final writing assignment it averaged 40.9 words, compared to 13.2 for the traditional group), which means that these results, like those of Hillierich, are consistent with both OH and HH does.

Conclusions and Alternatives Hypothesis. HH handles the results of the studies reviewed in this section quite well.

- In-school free reading programs typically result in equivalent, and often better vocabulary development, when compared to traditional programs (Tables IV, V, VI), and in the only study comparing free reading and traditional instruction in spelling (51, 53), no difference was found. Reading alone is thus at least as effective as formal instruction for spelling and vocabulary development.

- Picking up vocabulary from reading is more time-efficient than methods that aim to give students a stock of knowledge of words. Methods that are more time-efficient than reading do not appear to provide as deep a knowledge of words as reading does.

- Some studies show spelling instruction to be no more effective than incidental acquisition alone (21, 112), while others show that instruction produces measurable gains (24, 55, 58, 135). In one (55), gains were modest; in another (135), they required extraordinary effort. In Hammill (58), children without instruction caught up with instructed children by grade five.

- The results of several studies suggest that more instruction in spelling does not result in more correct spelling. In some cases, in fact, more instruction appears to result in less spelling proficiency (18, 65).

SRH must work very hard to explain these results. In the case of in-school free reading, it could be hypothesized that free reading stimulated more word study. It could also be argued that reading aloud had a similar effect. Skill-building could also argue that the instructional programs utilized were incorrectly planned or executed, or that the children didn't apply themselves. A few more repetitions, a little more drill, might have made the difference.

OH does better. It needs only to hypothesize that in-school free reading and reading aloud were accompanied by more writing and/or oral language use, which certainly happens in "whole language" programs, or that children in these programs were stimulated to do more writing and speaking, and that they received accurate feedback on their attempts to use new words.

To account for the finding that traditional programs have little or no effect, OH needs only point that these programs included little opportunity for language production and feedback. OH even finds it hard to come up with a precise definition of a second program found to be better for developing spelling ability provided more writing (18, 65).

COMPILATIVITY SIZE OF LANGUAGE

Native speakers and advanced second-language performers of a language have mastered large and complex systems of vocabulary and spelling. This fact alone makes it clear that the instructional fact, that professional linguists have not yet succeeded in describing them. This fact is not predicted by HH, but HH has little to deal with it. The complexity argument has also been used for grammar (75), for phonics (123), and for the acquisition of "planned discourse," or expository prose style (76).

Word Size. Using the technique of testing subjects on samples of words, Commoner estimated that the average college graduate knows about 15,600 words (58,000 "basic" words, 96,000 "derived" words, and 2,000 "rare" words; an example of a basic word is "legal"; "legally" is a derived word). Smith (123) noted, this knowledge could not have come from 156,000 trips to the dictionary, 156,000 flash cards, or 156,000 fill-in-the-blank exercises.

Not everyone has agreed with this estimate. Both Chatterji and Chait criticized Seashore and Eckers-
OH has similar difficulties. For the strong version of OH to be correct for vocabulary, each new word, or at least each basic word (but see note 15), must be used in speech or writing, with each shade of meaning, exhibiting each of its grammatical properties. In addition, the language user must receive feedback on his or her use of the word, must notice the feedback, and must be able to use the feedback to arrive at a correct meaning of the word, or a meaning closer to the correct meaning. For spelling, OH must assume that each spelling rule is tested out in writing, that writers receive feedback on each rule, that they notice the feedback, and make a correct analysis of the spelling rule from this feedback, or at least an analysis leading to a better version of the rule. If we must learn to spell each individual word this way, the burden, of course, is greater. Given the complexity and size of the tasks, and the infrequency with which children write, these scenarios are highly unlikely.

SUMMARY AND CONCLUSIONS

In some cases, the strong versions of SBH and OH struggle to account for the results that IH handles with ease. In other cases, they fail completely.4 According to accepted scientific method, just one failure would be enough to eliminate a competing hypothesis. Here, the competing hypotheses fail short and again and again.

Nevertheless, the data do not support a pure IH. Despite the presence of a few studies that suggest that learning has no effect (23, 110) or a negative one (18, 65), learning appears to have some impact, as evidenced by the finding that students in traditional methods do make some gains. While a substantial part of these gains is probably due to incidental comprehensible input, there are gains over and above what one would expect from comprehensible input alone (24, 135). Also, subjects who participate in intentional Read and Test studies make gains superior to incidental readers, showing that focusing on form has some effect. A combined position does fit the data: CI results in improved comprehension, while SBH results in incidental building and output plus feedback can lead to consciously learned competence. But conscious language learning does not appear to be as efficient as acquisition from input.

Thus, while both acquisition and learning exist, they are not equal partners. This conclusion is consistent with the hypothesis that the acquisition of vocabulary and spelling involves the language faculty, the mental organ specialized for language. When vocabulary and spelling are consciously learned, mental faculties outside the language faculty are used, and only a limited amount of "language-like" competence can be developed (16, 17, 77, 120).

Nearly all of the research I have reviewed here is from first language acquisition—again the small amount of second language research we have, however, points in the same direction. A hypothesis that spelling and vocabulary are developed in second languages as they are in the first language, by reading, is at least thus reasonable.

If these conclusions are correct, the pedagogical implications are obvious: we are teaching vocabulary and spelling, not the structure of language, the hard way. (Even if it were shown that conscious learning was as good as acquisition, or even twice as efficient, I would still prefer comprehensible input: an hour of pleasure reading is far preferable to thirty minutes of drill.) The easy way is to encourage a lot of reading, especially for extensive reading. Nearly everyone in the language teaching profession agrees that reading is extremely beneficial. Yet, few first language and nearly no second or foreign language teaching programs do anything to encourage it.

We have, of course, tried nearly every other teaching device but the interesting book of magazine. If reading is so effective, we need much better libraries, filled with books in first and second languages that our students will read, and we need to provide students help in finding books—courses in popular literature, newspapers, magazines, etc.

Problems. Whenever I suggest a comprehensible input-based approach, certain problems are pointed out: 1) we lack books and money for them; 2) our students need to pass discrete-point, form-based tests; 3) next year's teacher will expect them to know certain words, certain rules; 4) reading in school should focus on works of proven worth; 5) parents, school boards, and administrators expect to see vocabulary lists and spelling drills.

Here are my answers:

- If you lack books, get them. My suspicion is that reading is not simply a way to develop vocabulary and spelling, and other important aspects of competence, it is the only way. We have no choice. The problem is not always money; often it is a matter of priorities. Just think how many books can be bought for the price of one computer.
- Students who read more will do well on discrete-point exams of spelling and vocabulary. Nevertheless, we do need to get rid of the exams. The problem has nothing to do with the validity of discrete-point exams; some of them are valid, that is, they test what they are supposed to test. Students who know more vocabulary, for example, will do better on a valid discrete-point vocabulary test than those who know less.
- There are exceptions: when vocabulary tests are based on particular texts. Kingsley (see Table 1V) noted that her self-selected readers who did not excel on vocabulary for this reason—the test was based on words from a basal series. Her readers did exceed expected growth in reading comprehension, but not in vocabulary. Also, students in comprehensible input-based classes who have not "learned" will be at a disadvantage when tests focus on late-acquired rules.
- Ironically, discrete-point language arts tests cause problems, however, because of their impact on teachers and students. Teachers will teach to the exam, and students will study for the exam, and no force is likely to change this. Even if free reading is the best way to build vocabulary, it is hard to convince teachers and students to throw away the vocabulary lists and read.
- Ironically, dumping vocabulary and spelling tests can result in better vocabulary and spelling development. No testing means no time devoted to vocabulary lists, time that can be devoted to reading, and better vocabulary and spelling development.

NOTES

1This paper is an expanded version of a presentation made at the IM/PO/OU Symposium on Research Perspectives in Adult Language Learning and Acquisition, Ohio State University, 21 October 1988.
2The general hypothesis is that vocabulary is acquired from comprehensible input. Reading, however, appears to be the best kind of comprehensible input for vocabulary development. Nagy and Anderson suggest that while oral language experience is important, written reading typically contains a lower proportion of difficult or low-frequency words than written language (50, p. 321). Written language, they hypothesize, is the primary source of vocabulary beginning at about the third grade.
The contribution of oral input remains an empirical issue. There is excellent evidence, as we shall see in the next section, that oral input in the form of stories and in the form of written stories read aloud has a positive effect on vocabulary acquisition. For evidence that oral input in the form of conversation can increase vocabulary, see Drum and Madison.

In theory, argues that the explicit rule may be forgotten by the learner (the 'discarded crutch hypothesis'), while others assume it is remembered. This issue is not relevant to the discussion in this paper. Also not dealt with here is a form of skill-building in which the learner is neither given an explicit oral rule nor expected to discover one (see so-called 'mechanical drill').

As noted in Kralove (17), and contrary to Ellis' characterization of my position, there is a version of OH that I think is correct, that is fully consistent with IH, output with language acquisition indirectly by encouraging CI, via conversation. When you speak, it invites others to talk to you. Moreover, as you speak, your output provides your conversational partner with information about your competence and whether or how he is communicating successfully. In this way, he provides you conversational feedback which helps you to adjust the input to make it more comprehensible (38: p. 96-98). Conversation is an excellent way of obtaining CI, but strictly speaking it is not necessary. Off can be divided into two subcategories. In output plus correction, the learner's output is comprehensible, but not grammatical. In the 'comprehensible output hypothesis', output is not comprehensible (104). For additional discussion of comprehensible output, see Swain (133), Nieveen (118), and Kralove (17). One could also argue that SHH is an output hypothesis, because 'practise' entails language production.

Output can have positive affective effects as well. As Smith (131) has noted, production in the foreign language can make the writer feel more like a member of the 'literary club,' like someone who reads and writes. In terms of the theoretical framework assumed here, this means a greater openness to input, a lower 'affective filter,' and more rapid language learning. The writer will 'feel like a writer' (131). The same may be true of oral language production; second and foreign language students who actually speak the language may feel more like members of the group that knows the language, resulting in a desire for more interaction and a greater receptivity to CI.

A growing amount of research shows that output, especially writing, can have very positive cognitive consequences. Writing helps clarify thinking, and helps problem-solving (33, 81).

In this sense, one restricts the evidence to CI outside of school, in the 'informal' environment, and to its school programs where extra CI is provided as a supplement to regular instruction. Pre-school programs in which total 2-language input is compared with regular instruction are considered to be 'CI' (130).

Note that the relationship between CI and language development need not be strictly linear, since factors other than the amount of input may influence language development (e.g., the Learning Filter, the type of input).

The only exception to Table 1, Sperber's study, was a study by a young girl. I have argued (79) that short-term free recall of material taught in CI is not evidence for children's ability to use that material. On the other hand, the positive evidence of recall is a more recent picture of Sperber's study. Sperber (slightly) 'topped' the school. While SSR students did gain more during the SSR period than the students in the control condition, the gains were small (three months in vocabulary compared to no gain at all during the previous semester), and the program was very unpopular. Motion outcomes for the reasons:

The program was implemented with very little staff consultation, involvement was inadequate (the staff received only a memo describing SSR, and were invited to a few voluntary meetings), and the entire school did SSR at exactly the same time, which made it very inconsistent for students in industrial arts and physical education classes.

Wason presents evidence suggesting that stories may be an excellent vehicle for vocabulary acquisition. In her study, one group of nine kindergarten pupils heard a new word (Pommerau) in a straightforward lesson. Here is an excerpt:

'[a] procession is an animal you can't see. It's one self that moves all the moving places such as your mouth and nose and eyes. It lives in water, it can live in the ocean, it can be food for animals, some of them are good and some of them maybe aren't so good, and they can make us ill..' The animal heard the words as part of a story. 'I asked the children what does a little fish eat?' and he said, "He, there's a fish that's sort of animal-like, plant-like stuff, the smallest animal that we know, it's called a Proserna.'

When asked afterwards what 'proserna' meant, one child in the experimental group correctly guessed the word in the story, while seven out of the nine who heard the story remembered the word. Of the three students who heard it and story could be a factor: it could have been a bad lesson and a wonderful story. But, the results are suggestive and consistent with the research on oral reading and vocabulary development.

Gutek provides apparent counter-evidence to the claim that oral reading is a better method and free reading. Gutek reported that reading achievement in three countries (New Zealand, the United States, and Iran) was 'highly associated' with the volume of reading that took place in these countries; students from countries in which more reading took place were better readers. Verbal knowledge, however, was not clearly associated with reading volume; in fact, for the fourteen-year-olds, the country with the least reading volume (Iran) had the highest vocabulary scores.

There was some doubt, however, as to the contribution ability to derive words from context, in turn improving vocabulary. In the recent study, the English version may have been harder than the other two. The main source of comprehension, the English language, is not inconsistent with the hypothesis that vocabulary that comes from reading; New Zealand is reported to have more reading volume than the United States, and vocabulary scores in New Zealand are either equal to (fourth-year-olds) or higher than (eighth-year-olds) scores from the United States. Scores on Word Knowledge Test 1; (40-year-olds, 14, New Zealand, 8, 8, 18, 18-year-olds; New Zealand, 28, 7, Iran, 25, 4, U.S.A., 37. Reading volume — 1, New Zealand, 2, U.S.A., 1, Iran. (Word knowledge scores from Thorndike (137); reading volume calculated by Gutke.)

It is possible that the children in Winds (148) gained vocabulary from their parents' speech; families owning more books might also use a wider vocabulary. If true, this will support IH (Note 7 above).

Vocabulary research also shows that children of the same age differ substantially in vocabulary size. Smith (128) found that second graders had larger vocabularies than some high school students. According to Smith, the range of basic words known by first graders was from 1,500 to 32,000, and for seventh graders from 28,000 to 75,000. Other researchers have come up with more conservative data. Graves, Brunett, and Slater, limiting their analyses to the 5,452 most frequent words in school printed English, found a gap of 1,200 words between middle and lower class second and third grade students. What is clear is that some children enter school with much more vocabulary than others. Nagy and Herman argue that...

...children who acquire a larger than average vocabulary—could simply be learning 1,500 words per year and above those learned by the average student— are not doing so simply with average vocabulary learned' (96: p. 23).

Nagy (91, 98) cites research showing that the average fifth grader reads about 450,000 words per year outside of school — or reading an average of about 60 minutes of in-school reading per day at 200 words per minute.

In several head and first studies, less able readers were less successful at deriving the meanings of words from texts, leading to the hypothesis that there is significant individual vari...

urational variance in the ability to acquire words from context. This result has been found both in individual (5, 11, 36, 88, 109) and incidental studies (5, 82, but see 98). It has been suggested, on the basis of these studies, that reading may provide an important and effective means for improving vocabulary for everyone.

However, other interpretations exist. First, even if there is a correlation of acquisition words from reading, this does not mean that these less able to do may be still better off reading than those who do not at all. While less proficient readers may not do as well as more proficient readers, they are still able to acquire words from context (see 62).

Second, good readers do not typically develop the ability to derive words from context, since such information is not regularly provided. They quickly derive the facility the same way they became good readers—by reading (48, 77, 125). Less able readers will likely have a harder time developing this ability, because the difference between the two groups is not very large...
building, with little or no comprehensible input (reading for meaning).

"Do we need to acquire derived words? It could be argued that once basic words are acquired, all we need to do is learn or acquire rules of derivation. Even if this is true, the task of vocabulary acquisition is still gigantic. If 25,000 basic words are to be acquired—less if large and clausal are correct, but an impressive number nevertheless.

Also, rules of affixation are themselves complex. Teaching the students meanings of roots and affixes are not of much help when word meanings are not directly derived from component parts. Levin, Carney, and Princepa report that direct instruction on roots and affixes helped to clear what was known by 64% (in "to cut", "in front of", "to cut", "at"), but not in less clear cases, such as "permit" (to introduce, from "per" [before] and "mit" [give]).

Note that a competing hypothesis need not fail completely. As Cressy (14) points out, the fact that the hypotheses can operate only awkwardly is reason enough to doubt it.

Finally, skipping words is an excellent way of building vocabulary. When we skip unessential words, we read more, and acquire the meanings (or parts of the meanings) of other words. If we stop to look up every strange word, we read less and acquire less vocabulary. I personally know people who refuse to read in other languages, because they have the mistaken notion that they should never skip words they do not know, and they dread the work that looking up every word entails.

Here is a three-step plan for dealing with new words (inspired by Smith and Goodman's criteria). If you can, skip the word, for reasons just given. 2) If you can't skip the word, and it appears to be essential to the meaning of the text, guess the meaning. 3) If you cannot, the text itself will tell you what was meant. A dictionary is essential (told-off, from "to", and "out"), but not in less clear cases, such as "permit" (to introduce, from "per" [before] and "mit" [give]).

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28. Frelow, E. 
If spelling errors from reading, why do so many people consider themselves to be good readers but poor spellers? Here is a possible explanation:

First, we need to distinguish good spelling from poor spelling. Most good readers are good spellers, not poor spellers. There is a huge difference between good spellers and poor spellers. Good spellers misspelled only a small percentage of the 39,000-156,000 words they know, the "uncommon" that plague many of us (i.e., words ending in "ed", "ed", "ed", "ed", "ed", "ed", "ed", "ed", "ed", "ed"). Poor spellers misspell thousands of words. (I also suspect that when good spellers are about to make a spelling error, they are aware of it. Poor spellers are not.)

In more cases, reading will develop good spellers, but it may not develop good (nearly perfect) spellers. The reason extensive reading may not result in perfect spelling is that fluent readers do not need to pay attention to every item of visual information, but only need enough information to confirm their predictions (48, 123). Thus, fluent readers need not process everything.

Since our standards in spelling are 100%, we need to develop good spellers, not just good spellers. (As noted in the introduction, a single spelling error in public means humiliation—I suspect this is one reason why presidential debates are oral and not written.) The way to develop great spellers, I suspect, is first to help students become good spellers, through large amounts of free voluntary reading. We can then teach them techniques for bridging the gap from good spelling to great spelling, e.g., using a spelling dictionary, using a spelling checker program.

This hypothesis is intended to explain the difference between good readers-great spellers and good readers-good spellers. It does not explain the difference between these groups and good readers-ucally poor spellers, a well-re

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Corrected for guessing efficiency in adults is significantly greater than efficiency in studies using children as subjects (adult mean = 2.876, S = 2.055; child mean = .179, S = 1.330. p < .01)

Vocabulary Teaching Methods

Classifiers: subject given short phrases describing objects or events, asked to classify them with one of four target words. Subjects allowed to check answers.