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INCIDENTAL VOCABULARY ACQUISITION IN A SECOND LANGUAGE

A Review

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It is widely agreed that much second language vocabulary learning occurs incidentally while the learner is engaged in extensive reading. After a decade of intensive research, however, the incidental learning of vocabulary is still not fully understood, and many questions remain unsettled. Key unresolved issues include the actual mechanism of incidental acquisition, the type and size of vocabulary needed for accurate guessing, the degree of exposure to a word needed for successful acquisition, the efficacy of different word-guessing strategies, the value of teaching explicit guessing strategies, the influence of different kinds of reading texts, the effects of input modification, and, more generally, the problems with incidental learning. This article briefly surveys the empirical research that has been done on these issues in recent years.

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After decades of neglect, L2 vocabulary learning has become, in the past dozen years or so, an object of considerable interest among researchers, teachers, and materials developers (see, for example, Carter & McCarthy, 1988; Coady & Huckin, 1997; Gairns & Redman, 1986; Huckin, Haynes, & Coady, 1993; Lewis, 1993; McCarthy, 1990; Nation, 1990; Nation & Carter, 1989; Schmitt & McCarthy, 1997). Most scholars seem to agree that, except for the first few thousand most common words, vocabulary learning predominantly occurs through extensive reading, with the learner guessing at the meaning of unknown words. This secondary type of learning is called "incidental" learning because it is a by-product, not the target, of the main cognitive activity, reading. Incidental learning of vocabulary has certain advantages over direct instruction, including the following: (a) It is contextualized, giving the learner a richer sense of a word's use and meaning than can be provided in traditional paired-associate exercises, (b) it is pedagogically efficient in that it enables two activities—vocabulary acquisition and reading—to occur at the same time, and (c) it is more individualized and learner-based because the vocabulary being acquired is dependent on the learner's own selection of reading materials.

However, incidental learning of vocabulary is still not fully understood, and many important questions remain unanswered. For example: How does incidental acquisition occur? How much and what kind of vocabulary knowledge does the learner need in order to guess effectively? How many and what kinds of exposures to a word does the learner need for successful acquisition? What word-guessing strategies are most effective? Do students need to be taught explicit strategies for guessing, or do they pick them up on their own? Do students benefit from explicit vocabulary instruction in the context of a reading program? Are some kinds of reading texts more conducive to incidental learning than others? How effective are input modifications such as glossing? What are the problems with incidental learning?

In this article we briefly overview the main lines of research done in recent years on these questions.

HOW DOES INCIDENTAL ACQUISITION OCCUR?

According to much psycholinguistic research, lexical acquisition appears to depend on the amount and kinds of cognitive processing that go into it. As noted by Schmitt and Schmitt (1995, p. 135), "The depth of processing hypothesis states that mental activities which require more elaborate thought, manipulation, or processing of a new word will help in the learning of that word" (Craik & Lockhart, 1972; Craik & Tulving, 1975). For long-term storage, such processing must have as its purpose the integration of the word into a broader lexical network: "For long-term recall, the successful learner not only can analyze and rehearse the new word and its meanings, but also can elaborate the word-meaning complex and establish it within a suitable network of meaning" (Lawson & Hogben, 1996, p. 104).

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Krashen (1989), in a review of 144 studies, argued that incidental acquisition of vocabulary occurs through the operation of his Input Hypothesis, with reading providing the comprehensible input that leads naturally to acquisition. Although only 3 of these studies deal with L2 acquisition, Krashen's claim that comprehension leads naturally to acquisition seems to have gone unquestioned by many L2 vocabulary researchers and theorists. As Lawson and Hogben (1996) noted, many such analysts "do not always clearly draw the distinction between comprehension of word meaning in context and the acquisition of word meaning from context" (p. 105).

There is reason to believe, however, that extensive reading for meaning does not lead automatically to the acquisition of vocabulary. Much depends on the context surrounding each word, the nature of the learner's attention, the task demands, and other factors. For example, as Nation and Coady (1988) point out:

> the very redundancy or richness of information in a given context which enables a reader to guess an unknown word successfully could also predict that that same reader is less likely to learn the word because he or she was able to comprehend the text without knowing the word. (p. 101)

In other words, if vocabulary learning requires a precise and effortful coordination of form and meaning, it may not optimally occur with an activity like extensive reading that allows the reader to bypass such precision and effort.

Learner attention is another crucial variable. In incidental vocabulary acquisition, the learner's attention is focused primarily on communicative meaning, not on form. Krashen's Input Hypothesis makes a stronger claim—namely, that acquisition occurs only when the learner's attention is focused on meaning. Yet many theorists today argue that vocabulary learning requires attention to both meaning and form (e.g., Ellis, 1995; Robinson, 1995). Schmidt (1993) pointed out that at least some degree of conscious attention is necessary for incidental learning, and Ellis (1994) suggested that the proper distinction is one between focal and peripheral attention.

Attention is clearly related to purpose, which in turn is governed in large part by task demands. A number of case studies in recent years have shown how incidental learning of vocabulary can be enhanced through text-based tasks. Parry (1993, 1997), for example, has done longitudinal studies in which students keep track of unknown words in their course readings. Her research reveals that the students' guesses from academic texts are enhanced by the context provided by the course. Joe (1995) investigated vocabulary knowledge gains by an adult learner who was required to perform a read and retell task. She found that the task demands (specifically, attention, retrieval, and generation) led to a significantly higher level of incidental vocabulary learning. Newton (1995) obtained similar results in a case study of task-based interaction. Research by Paribakht and Wesche (this volume; also Wesche & Paribakht, 1998) further underscores the relationship between task demands, learner at-

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tention, and learning outcome. In their think-aloud study of 10 intermediate-level university ESL students, they found that learners attend to those words that they perceive as relevant to performing a given task, and these differences lead to differential vocabulary learning outcomes. Thus, learner engagement in vocabulary processing when reading, as Paribakht and Wesche note, "is in some fundamental sense not 'incidental'" (p. 215).

Not surprisingly, this relationship between task demands, attention, and learning is not restricted to so-called incidental learning. In a study of direct vocabulary instruction, Lawson and Hogben (1996) took think-aloud protocols from 15 advanced learners using index cards, each of which had a target word, a definition, and a sample sentence that provided context. They found that their students relied far more on the target words and definitions than they did on the context clues. On the other hand, they also found that the highest-scoring learners used a broader range of learning strategies (rehearsal, writing, translation, use of context, paraphrase, etc.) than did lower-scoring learners, which conforms to the depth-of-processing hypothesis mentioned above.

HOW MUCH AND WHAT KIND OF VOCABULARY KNOWLEDGE DOES THE LEARNER NEED IN ORDER TO GUESS EFFECTIVELY?

It has long been recognized that, in order to guess the meanings of unknown words in context, the learner must be able to recognize on sight most of the surrounding words. (For a recent empirical study demonstrating this need, see Haynes & Baker, 1993.) A number of researchers have tried to gauge the character and size of this "sight vocabulary." Nation and Hwang (1995) claimed that a sight-recognition knowledge of the 2,000 most-frequent word families of English usually enables learners to recognize and use approximately 84% of the words in a wide range of written texts. (A *word family* consists of a base form and all of its derived and inflected forms that are semantically regular, that is, predictable.) Included among the 2,000 most-frequent word families are words like *sorry, jump, private, invite, melt,* and *threaten*. But 84% is not enough for general text comprehension, which, according to Nation (1990) and Laufer (1997), requires prior knowledge of at least 95% of the words in a text. To attain this threshold level of comprehension in a variety of texts, a sight vocabulary of the 3,000 or so most-frequent words in the language is needed, including, in English, words like *trumpet, fragrant, circus, paste, gloomy,* and *mortgage*. Of course, general comprehension is not the same as full comprehension, which may require accurate guessing of an occasional unknown word or phrase. For accurate contextual guessing, L2 researchers seem to agree that a reader must know at least 98% of the words in the text (Coady et al., 1993; Hirsh & Nation, 1992; Laufer, 1997), and for this the reader should have a sight-recognition vocabulary of about 5,000 word families, including words like *contaminate, dubious, candid, nurture, skid,* and *dabble*. Although 5,000 words is considerable, it is within reach of a system-

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atic vocabulary-learning program and suggests that teachers should indeed consider spending far more time than they currently do teaching vocabulary directly. Hazenberg and Hulstijn (1996) argue that the minimal vocabulary size needed for university studies is 10,000 word families. Thus the estimates of vocabulary knowledge needed for reading comprehension range from a minimal threshold of the 3,000 most-frequent word families (95% coverage of most ordinary texts) to a fuller level of comprehension supported by knowledge of about 5,000 word families (98% coverage) to 10,000 word families (99–100% coverage of university-level texts).

Jones (1995) gives an interesting account of learning Hungarian on his own. Because Hungarian has few borrowings from or cognates with its neighboring Indo-European languages, he found lexical acquisition to be his major task. Moreover, he found that he needed a large stock of "core lexemes" in order to read effectively and to learn the language through reading. It was only after he reached this threshold level that he was able to learn vocabulary through context.

HOW MANY AND WHAT KINDS OF EXPOSURES TO A WORD DOES THE LEARNER NEED FOR SUCCESSFUL ACQUISITION?

Incidental vocabulary acquisition depends on multiple exposures to a word in different contexts. There is no agreement, however, as to how many and what kinds of exposures are needed. Saragi, Nation, and Meister's 1978 study with L1 learners learning periodic pseudo-words inserted in a text suggested that at least 10 exposures were needed for full acquisition. Nagy, Herman, and Anderson (1985) estimated the probability of learning a word from context after just one exposure to be between .10 and .15; a follow-up study (Herman et al., 1987), however, found the probability to be even lower, .05. Nation's (1990) survey of these and other studies concluded that from 5 to 16 exposures were needed for full acquisition. In any case, there are so many variables involved in learning a word that it is impossible to determine any one threshold for number of exposures. Much depends on such factors as the word's salience in a given text (Brown, 1993), its recognizability as a cognate (Holmes & Ramos, 1993), its morphology, the learner's interest, and the availability and richness of context clues.

Another variable, of course, is the concept of successful acquisition. As Henriksen (this volume) points out, word-learning outcomes can range over continua of lexical knowledge and use competencies from partial recognition knowledge to precise knowledge and productive use capability. The required number of exposures to a word for "successful acquisition" depends in part, therefore, on how that concept is defined.

WHAT WORD-GUESSING STRATEGIES AND KNOWLEDGE SOURCES ARE MOST EFFECTIVE?

Numerous studies have found that effective word guessing requires the flexible application of a variety of processing strategies, ranging from local ones

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such as graphemic identification to global ones such as the use of broader contextual meanings.

For example, in a cloze study of 41 adult native speakers, Dubin and Olshtain (1993) found that, when guesswork had to be done without access to word-form clues, the following kinds of knowledge were required: structural information within the sentence or paragraph, semantic information at the sentence level, semantic information beyond the sentence and paragraph level, thematic content knowledge, and general extratextual knowledge.

In her longitudinal case studies, Parry (1993, 1997) found that her advanced ESL students used quite different strategies for incidental vocabulary learning, some adopting a holistic approach and others an analytic one. Because neither approach was fully satisfactory, she concluded that ESL teachers should spend more class time on metacognition, discussing the pros and cons of different vocabulary-learning strategies according to particular circumstances and purposes.

In a study of 850 sophomore non-English majors at a Chinese university, Gu and Johnson (1996) found that two metacognitive strategies—self-initiation and selective attention—emerged as the best predictors of vocabulary learning. Their study was based on the results of a questionnaire compared with scores on a standardized vocabulary test. Other factors positively correlating with vocabulary acquisition included contextual guessing, contextual encoding, oral representation, skillful dictionary use, note taking, activation strategies, and paying attention to word formation. Those students that used the wider context in their contextual guessing were more successful in building rich vocabularies than those that only used the immediate context. In general, the most successful learners were the relatively small number of "Readers," those students who believed that vocabulary should be picked up through natural exposure complemented by some careful study (but not memorization). Close behind were the "Active Strategy Users," highly motivated and hardworking students who consciously used a variety of learning strategies.

Ahmed (1989), in a study of 300 Sudanese learners, found that good learners used a more diverse set of vocabulary-learning strategies than did poor learners. He also found that learners tended to improve their use of strategies as they became more experienced. Lawson and Hogben (1996) obtained similar results in their case studies of 15 advanced Australian learners of Italian.

Fraser's study (this volume) shows that consulting a dictionary to confirm inferences is a valuable metacognitive strategy for lexical acquisition. The combination of inferring and consulting produced a 50% rate of recall, compared to only 31% and 30%, respectively, for either of these activities alone.

DO STUDENTS NEED TO BE TAUGHT EXPLICIT STRATEGIES FOR GUESSING, OR DO THEY PICK THEM UP ON THEIR OWN?

Some strategies seem to arise naturally, whereas others need to be taught. Holmes and Ramos (1993), in a series of observational studies involving Brazil-

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ian low-intermediate students of English, found that these students relied heavily on a natural strategy of cognate recognition, so much so that they failed to check for false cognates. Thus, cognate monitoring is a strategy that needs to be taught explicitly. Moss (1992), in a similar study of 400 first-semester Spanish-speaking university students, found that their ability to recognize Spanish–English cognates was lower than expected. These students recognized only 67% of the cognates in context and 45% in isolation, which suggests that cognate recognition, although perhaps a natural strategy, is not as fully developed as it should be. On the other hand, Duquette and Painchaud (1996) found that vocabulary growth by English-speaking university students learning French in Canada was greatly aided by the rather significant cognate relationships between English and French. Thus it would seem that cognate recognition can vary greatly.

Chern (1993), using a think-aloud methodology with 20 Chinese advanced learners of English, found that these students naturally used global context clues, in particular "backward clues" (i.e., those preceding the word to be guessed), even though their cultural tradition encouraged word-by-word translation. They also naturally used topic knowledge. In contrast, only the more proficient of these learners naturally used "forward clues," suggesting that this particular strategy is one that needs to be taught to less proficient learners. In a similar but smaller study, Huckin and Bloch (1993) also found that their subjects naturally used context clues but with a very strong preference for local clues (i.e., those found in the same sentence) rather than global ones. Another natural strategy was quick word identification, which resulted in a number of false-positive cases ("mistaken identity") as well as some negative cases ("potholing") in which the subject detoured around an unknown word.

Some weaker students do not automatically use guessing strategies but tend to rely on translation as their primary strategy, which suggests that metacognition training is crucial if they are to improve. For example, Prince (1996) found that French university students weak in English proficiency preferred to learn words by translation rather than from context when given a choice.

Wode (this volume) compared students in an immersion program with a control group and found that the immersion students developed their L2 vocabulary at a faster rate than the controls. He attributes this result mainly to incidental learning, including the application of strategies for guessing that were presumably picked up naturally.

DO STUDENTS BENEFIT FROM EXPLICIT VOCABULARY INSTRUCTION IN THE CONTEXT OF A READING PROGRAM?

Several recent studies have found positive evidence supporting the use of explicit vocabulary instruction in conjunction with extensive reading. Paribakht and Wesche (1997) conducted an empirical study comparing incidental vocabulary learning through reading with incidental vocabulary learning through

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reading coupled with vocabulary instruction. Learners showed significant gains in both approaches over a period of three months, but the reading plus vocabulary instruction treatment led to quantitatively and qualitatively superior gains. In a similar study, Zimmerman (1994) found that 3 hours a week of interactive vocabulary instruction accompanied by a moderate amount of self-selected reading was more effective for learning subtechnical vocabulary than just the reading alone.

The study by Fraser (this volume) showed positive results for instruction in lexical processing strategies (LPSs). Although LPS instruction did not produce directly measurable gains in vocabulary knowledge, it did help learners develop strategies for learning new words. Qian (1996) found that decontextualized L2 vocabulary learning with feedback was more effective for 63 Chinese university students than contextualized learning without feedback.

ARE SOME KINDS OF READING TEXTS MORE CONDUCIVE TO INCIDENTAL LEARNING THAN OTHERS?

Some kinds of texts do appear to facilitate incidental vocabulary acquisition. Several studies indicate that texts that are personally interesting to learners stimulate incidental vocabulary acquisition. For example, Parry's case-study research found that EAP students received motivational benefits from using their course readings (Parry, 1993, 1997). Grabe and Stoller (1997) found similar affective value in their case study of an American speaker who taught himself to read Portuguese mainly through daily reading of a Brazilian newspaper.

Textual elaboration, by contrast, appears to have little effect on incidental vocabulary learning. Chung (1995) randomly assigned 507 Korean EFL students to six condition groups: Control, Unmodified, Simplified, Lexically Elaborated, Structurally Elaborated, or Lexically and Structurally Elaborated. Three vocabulary tests were applied involving form, meaning, and delayed meaning recognition. The results showed no significant effects of textual elaboration on reading comprehension or incidental vocabulary learning.

HOW EFFECTIVE ARE INPUT MODIFICATIONS SUCH AS GLOSSING?

One possible way of dealing with some of the problems associated with incidental learning is to modify the textual input. For example, several studies have explored the effects of providing glosses of unusual words. In a study of 116 English speakers studying Spanish at the university level, Jacobs (1994) found that vocabulary glosses in reading passages were somewhat effective in promoting reading comprehension. Ko (1995) studied EFL students and found that glosses helped them learn new vocabulary, especially when the learning was intentional rather than incidental. Hulstijn, Hollander, and Greidanus (1996) studied incidental acquisition in a group of Dutch university students with advanced proficiency in French. These students benefited significantly

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from marginal glosses, especially for words that appeared frequently in the text. On the other hand, in a study of 101 English speakers studying fourth-semester university-level Spanish, Jacobs, Dufon, and Hong (1994) found no significant differences in recall resulting from vocabulary glosses in reading passages, although there was a trend favoring students who had glosses, particularly with those students who had above-average proficiency.

Computer-aided instruction has provided an alternative to marginal text glossing. Chun and Plass (1996) studied 103 students in their second year of German at an American university who were asked to read a 762-word text on the computer with 82 words annotated and retrievable by clicking on the word. All the glosses had a short definition in English and a sentence containing the word, some also had a still picture, and others had a supplementary video. There were 36 words targeted, 12 in each condition (text, text plus picture, text plus video). As might be expected, approximately a quarter of the new words were learned by the subjects. However, the text-plus-picture scores were significantly better than the other two conditions, which suggests a need for further research into the effect of the specific mode of annotation. Kang (1995) obtained similar results with 103 fifth-grade Korean students.

Learner involvement seems to enhance the effectiveness of input. Ellis, Tanaka, and Yamazaki (1994) did two classroom studies of the effects of modified interaction on vocabulary acquisition among 79 and 127 high school EFL students in Japan and found that interactionally modified input resulted in better acquisition than did premodified input. They suggest that "interaction helps learners work toward comprehension because it gives them control over the input they receive and enables them to systematically identify and solve comprehension problems" (p. 481). In Ellis and He (this volume), the study of learner involvement is extended to include learner-modified output, which is shown to have even greater pedagogical efficacy than interactively modified input.

WHAT ARE THE LIMITATIONS OF INCIDENTAL LEARNING?

The main problems are these: First, guessing is imprecise because many reading tasks call for precise interpretation (see Grabe & Stoller, 1997; Parry, 1993, 1997); second, accurate guessing requires accurate word recognition and careful monitoring because there are many deceptive lexical items that can easily mislead the learner; third, guessing takes time and thus slows down the reading process; fourth, guessing is effective only when the context is well understood and almost all of the surrounding words in the text are known, which requires good textual clues and substantial prior vocabulary knowledge on the part of the learner; fifth, guessing requires good reading strategies, which many students lack; sixth, guessing often does not translate into acquisition; and, seventh, guessing is not very effective in the acquisition of multiword lexical items. In short, guessing from context has serious limitations. It is still seen as an important part of vocabulary building, especially among advanced

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learners, but it requires a great deal of prior training in basic vocabulary, word recognition, metacognition, and subject matter (see Haynes, 1993; Kelly, 1992; Laufer, 1997; Stein, 1993).

It is becoming increasingly recognized that multiword phrases and collocations like *make a proposal* and *a call for action* constitute a large part of ordinary language use. Yet research suggests that such phrases are not learned well through incidental exposure, especially in foreign language settings. For example, Bahns and Eldaw (1993) found that, for advanced EFL students, collocations present a major learning problem. More recently, Arnaud and Savignon (1997) did a study comparing the knowledge of idiomatic collocations and low-frequency words by 34 experienced nonnative English teachers in France. They found that these teachers could match university-level native speakers in their knowledge of low-frequency words but not in their knowledge of idiomatic expressions. They concluded that, in a foreign-language setting, incidental exposure to multiword phrases is inadequate for acquisition and that such phrases should be taught directly.

CONCLUSION

Incidental acquisition is the primary means by which second language learners develop their vocabulary beyond the first few thousand most-common words. Given its importance, it is not surprising to find it the object of considerable attention from researchers. This review of literature has sketched out the main lines of investigation, which underscore the following points:

1. Incidental learning is not entirely "incidental," as the learner must pay at least some attention to individual words. However, the amount of attention and the amount of learning varies according to a number of factors, including context, type of attention, and task demands.
2. Incidental learning requires a basic sight-recognition vocabulary of at least 3,000 word families. For university-level texts, a knowledge of 5,000–10,000 word families may be needed.
3. Although incidental acquisition takes place incrementally over a period of time, there is no agreement as to how many and what kinds of exposures are needed for successful acquisition.
4. Effective word guessing requires the flexible application of a variety of processing strategies, ranging from local ones such as graphemic identification to global ones such as the use of broader contextual meanings.
5. Some strategies seem to arise naturally but others need to be taught.
6. Students generally benefit from explicit vocabulary instruction in conjunction with extensive reading.
7. Some kinds of reading texts are more conducive to incidental learning than others—in particular, texts that are personally interesting to learners.
8. Input modification, including glossing of specific words, is generally effective, especially if it involves the learner interactively.
9. Incidental learning depends on educated guesswork and thus can lead to imprecision, misrecognition, and interference with the reading process. To overcome

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these problems, learners need to have a well-developed core vocabulary, a stock of good reading strategies, and some prior familiarity with the subject matter. This is where research passes the baton to pedagogy.

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