13

THE LEXICON

13.1 The significance of the lexicon

In SLA research to date, there has been much less attention paid to the lexicon than to other parts of language, although this picture is quickly changing (see Nation, 2001; Singleton, 1999; Bogaards and Laufer, 2004). However, there are numerous reasons for believing that lexis is important in second language acquisition. In fact, the lexicon may be the most important language component for learners.

Of all error types, learners consider vocabulary errors the most serious (Politzer, 1978, as cited in Levenston, 1979, p. 147). Additionally, large corpora of errors consistently indicate that lexical errors are the most common among second language learners. Meara (1984, p. 229) cited Blaas (1982) as indicating that lexical errors outnumbered grammatical errors by 3:1 in one corpus. Moreover, native speakers find lexical errors to be more disruptive than grammatical errors (Johansson, 1978, as cited in Meara, 1984, p. 229). Gass (1988b) seconded this argument, noting that grammatical errors generally result in structures that are understood, whereas lexical errors may interfere with communication. As an example, consider 13-1. The listener may notice an error in 13-1 and may infer that the speaker is nonnative, but still would probably understand what was intended.

(13-1) Can you tell me where is the train station?

On the other hand, consider an error cited by Gairns and Redman (1986, p. 3):

(13-2) I feel sorry for people who live in the suburbs.

Presumably, the typical native speaker of English who heard this would wonder what the speaker felt was wrong with suburbs; perhaps they are too stilted and boring. Gairns and Redman argued that this utterance,

made by a native speaker of Spanish, was presumably motivated by the Spanish "false friend" *suburbio* meaning "slum quarter, shantytown." The average English native speaker would misunderstand the sentence and never consider that the speaker had chosen the incorrect lexical item.

As pointed out in chapter 6, many linguistic theories place the lexicon in a central place, which also suggests its importance in language learning. Levelt (1989, p. 181) maintained that the lexicon is the driving force in sentence production (i.e., in encoding or sentence generation), which he described as a formulation process:

> . . . formulation processes are lexically driven. This means that grammatical and phonological encodings are mediated by lexical entries. The preverbal message triggers lexical items into activity. The syntactic, morphological, and phonological properties of an activated lexical item trigger, in turn, the grammatical, morpho-logical and phonological encoding procedures underlying the generation of an utterance. The assumption that the lexicon is an essential mediator between conceptualization and grammatical and phonological encoding will be called the *lexical hypothesis*. The lexical hypothesis entails, in particular, that nothing in the speaker's message will *by itself* trigger a syntactic form, such as a passive or a dative construction. There must be mediating lexical items, triggered by the message, which by their grammatical properties and their order of activation cause the Grammatical Encoder to generate a particular syntactic structure.

Levelt was referring to production by competent, adult native speakers. In general, there is good reason to believe that the lexicon is an important factor, if not the most important factor, in accounting for the bulk of second language data, in that the lexicon drives language production.

The lexicon is also important in comprehension, especially oral com-prehension, as Altmann (1990) showed in her overview of sentence com-prehension. Lexical information is clearly used in helping to determine syntactic relationships. Comprehension is undoubtedly of great impor-tance to second language acquisition. If words cannot be isolated from the speech stream and if lexical information cannot be used to interpret the utterances, the input will not be comprehended. Thus, comprehension of the input depends to a large extent on lexical skills (see section 13.5). The lexicon is also important in reading, but in the vast bulk of the world's orthographies the writing system itself, by virtue of having spaces between words, guides readers in the isolation of individual words.

In summary, there are various reasons for saying that the lexicon is important for second language learners. Both learners and native speakers recognize the importance of getting the words right and lexical errors are numerous and disruptive. In general, learners need good lexical skills to produce sentences and to understand them.

13.2 Categories of lexical knowledge: some dichotomies

The major task of second language lexical research is to discover what second language learners know about the lexicon of the second language, how they learn it, and why this particular path of development is followed.

13.2.1 *Production and reception*

An initial consideration is that learners appear to have differing degrees of knowledge of their second language lexicon. Nation (2001, p. 27) lists the following as word knowledge types necessary if one is to be con-sidered to have complete knowledge of a word:

Form
- Spoken (what does it sound like? *eight* sounds like [eit])
- Written (spelling)

Meaning
- Form and meaning (what is the meaning of a particular form?)
- Concept and referents (what concepts are included?)
- Associations (what words do we think of when we hear this form?)

Use
- Grammatical functions (the patterns the word occurs in)
- Collocations (what words can occur with the word—for example, with *vacation*, one says *take*)
- Constraints on use (e.g., registers—in what contexts do we expect to hear this word?)

The above examples reflect receptive knowledge, but there is also pro-ductive knowledge to consider, which deals with aspects of pronunci-ation (knowing how to pronounce a word as opposed to recognizing it), spelling, nuances of meaning (as opposed to getting the general meaning), grammatical constraints (e.g., *impact* as a verb takes a direct object, but *impact* as a noun occurs in the phrase *has an impact on*).

If we take as an example the word *overextended*, there are many things we have to know, some of which are listed below.

Receptive knowledge includes:

- recognizing the word in writing or orally
- knowing the general meaning

- knowing the specific meaning in a specific context of use
- knowing that it is made up of the component parts—*over, extend, -ed*
- knowing that it has a possible negative connotation (as opposed to *overqualify*, which may or may not have a negative connotation)
- knowing that it generally occurs with *himself, herself, oneself, themselves, ourselves, yourself*
- knowing that the opposite is *underextended*.

On the other hand, productive knowledge involves greater specificity and includes, among others:

- knowing how to accurately pronounce a word or correctly spell it
- knowing the precise meaning in a variety of contexts
- knowing that *She overextended herself* is OK, but that *She overextended her chair* is probably not OK in the absence of a highly specific context
- knowing the precise context of use.

Learners generally have a wider range of receptive[1] vocabulary than productive vocabulary. However, as discussed in Teichroew (1982), the picture is really more complicated. Lexical knowledge cannot be captured by means of a simple dichotomy. Rather, Teichroew proposed that vocabulary knowledge can best be represented as a continuum with the initial stage being recognition and the final being production. In her view, production should not be viewed in a monolithic fashion, for productive knowledge includes producing both a range of meanings as well as appropriate collocations (i.e., what words go together), as has been described above. For example, in our discussion of the word *break* with regard to the work of Kellerman (chapter 5), we noted the many meanings of that word. Initially, learners may know the meaning of *break* as in *break a leg* or *break a pencil*, and only with time do they learn the full range of meanings and such collocations as *His voice broke at age 13*.

Another distinction to be made about the lexicon is one between *potential* and *real* vocabulary (Berman, Buchbinder, and Beznedeznych, 1968, as cited in Palmberg, 1987, p. 20). Potential vocabulary consists of words a learner will recognize even though she has not yet seen them in the second language. An example would be common scientific and technological terms. Much of this vocabulary spreads from language to language with little indication of whether the term was first coined by a Russian, English, German, or Danish speaker. Real vocabulary consists of words the learner is familiar with after (and because of) exposure.

Laufer and Paribakht (1998), based on research by Laufer (1998), investigated three types of vocabulary knowledge: passive, controlled

active, and free active. Passive knowledge involves understanding the most frequent meaning of a word, controlled-active knowledge involves cued recall (e.g., a test item might include *The railway con_____the city with its suburbs*, where the first few letters of a word are included to eliminate other possibilities), and free-active knowledge involves spontaneous use of the word. Laufer and Paribakht found that these three knowledge types developed at different rates. Passive vocabulary knowledge was the fastest, whereas active (particularly free active) was the slowest. Furthermore, passive vocabulary was always larger than active vocabulary, although there was a difference between learners in a foreign language setting and those in a second language setting. The gap between knowledge types was smaller in the foreign language setting, suggesting a strong role for the environment in learning.

13.2.2 Knowledge and control

A different distinction was drawn by Bialystok and Sharwood Smith (1985)—one between *knowledge* and *control*. Knowledge was defined as "the way in which the language system is represented in the mind of the learner (the categories and relationships in long-term memory)," whereas control was defined as "the processing system for controlling that system during actual performance" (p. 104) The authors made an analogy to a library. The knowledge is in the books and in the way they are organized, and control is in the way the books are accessed. With regard to the latter, the library user/language user needs to know how to determine which books are in the library and how to locate the books. The first time one uses a library, it is difficult to find one's way around, but with repeated use, access gets easier and more efficient.

The distinction made between knowledge and control is particularly useful with regard to vocabulary because it is not bound to just reception or production. Rather, both production and reception include information regarding knowledge and control.

However, the analogy has its drawbacks. In considering the library analogy as it is applied to the lexicon, there are a number of questions to be addressed, among them: What is a representation? How exhaustive are the representations? In other words, do the representations capture everything we know about words?

The library analogy, while useful, does not capture the dynamic changing nature of the second language lexicon. Books in a library are static and unchanging. A book purchased 10 years ago does not change in any significant way on the owner's shelf. Unchanging, static, formalized, symbolic descriptions cannot account for all of lexical learning.

The library metaphor may work reasonably well for phonological knowledge of the lexicon. There is a need for some sort of phonological

idealizations, or what may be called *representations*, if only as targets for pronunciation (see Linell, 1982; Ard, 1989). However, representations do not capture everything important about lexical pronunciations. For example, they do not capture special effects (including unusual patterns of stress or emphasis) a speaker may choose to place on a word. In certain situations, a speaker may address an interlocutor as *darling*, while imitating the pronunciation of a Gabor sister to show affectation.

Tyler (1989, p. 444) noted that "the representation of a word cannot contain all the various and subtle interpretations that the word could have in different real-world contexts." She noted that pragmatic inferencing is required along with real-world knowledge. The point of this for SLA is that learners have to know more than just the representation to be able to use a word and understand it in a way approximating native speakers.

In sum, finding meaning is not simply a matter of finding stored, fixed information. Rather, constructive processes are involved in finding meanings for words. Because processes are involved, we cannot rule out the possibility that there can be varying degrees of control over these processes. Similarly, we demonstrate later that processes in using words, such as in production and in comprehension, have to be learned. Thus, we can talk of varying degrees of knowledge of the processes. Knowledge and control are both important, but their relationship is more intertwined than sequential. One does not just have knowledge and then try to control it.

13.2.3 Breadth and depth

The distinction between breadth and depth is tantamount to a distinction between quantity and quality. Breadth of knowledge refers to the number of words learners know (Nation, 2001; Nassaji, 2004). On the other hand, depth of vocabulary knowledge is a quality measure (Meara, 1996; Read, 1993, 2000; Nassaji, 2004). Earlier we discussed what knowing a word entails and it is this complexity that is referred to as vocabulary knowledge depth. As mentioned earlier, this might include not only the meaning of the word, but also semantic relationships with other words, syntactic patterning, collocations, pronunciation, and so forth.

Research has shown that both breadth and depth of knowledge play a role in comprehension, although most studies have investigated reading comprehension. For example, numerous studies (e.g., Koda, 1989; Coady, Magoto, Hubbard, Graney, and Mokhtari, 1993; Haynes and Baker, 1993; Laufer, 1997a, 1997b; Qian, 1999) have shown that there is relationship between breadth of knowledge and reading comprehension; depth of knowledge was a better predictor of L2 reading comprehension than just breadth of knowledge. Similarly, Nassaji (2004) found that depth of

knowledge could be tied to particular strategy use (e.g., identifying, evaluating, and monitoring), to more effective lexical inferencing strategies, and to the success of inferencing. The following excerpts illustrate the difference in lexically skilled and lexically less skilled participants in his study.

Lexically skilled	"Sewage in their nose . . ." "smell of their sewage in their nose . . ." "have dust between their toes and the smell of sewage in their nose . . ." I think, there a lot of dirty things around the city and that those things are making smells, and the smell goes to their noses, so sewage are things like dirty things, garbage, like, according to this . . . "and the smell of the sewage in their nose." Yes.
Lexically less skilled	". . . and the smell of sewage in their nose . . . in their nose . . . their toes . . ." "the toes and the smell of sewage in their nose," "their toes . . ." umm . . . because it is in their nose, I think . . . "between their toes . . ." I am not sure . . . because something in their nose their . . . mmm . . . is . . . mmm . . . maybe it's their . . . it's their . . . I'm not sure. "the smell of sewage . . ." it's the smell . . . the sewage it is something . . . there is some smell . . . may be sew . . . I'm not sure.

The differences between these two excerpts are striking. The first major difference is that the lexically less skilled participant is primarily repeating what is in the text peppered with *umms* and other hesitation phenomena. She or he never focuses on the actual meaning of the text. The first participant repeats a large chunk of relevant speech that includes *dust between their toes*. And, *dust* provides an important clue in unraveling the meaning of *sewage*.

Pulido (2003) looks at a range of issues (proficiency and topic familiarity) with regard to reading comprehension, but germane to this discussion is the finding that sight vocabulary knowledge (which measured breadth of knowledge of a limited set of vocabulary items; namely, the non-targeted words in the experimental reading passages) had an impact on incidental vocabulary gain. Laufer (1997a) goes a step further and claims that, at least for L2 readers, the "threshold for reading comprehension is, to a large extent, lexical" (p. 21).

Read (2004) discusses various ways of conceptualizing depth of knowledge, including precision of meaning, comprehensive word knowledge, and network knowledge. He notes that different researchers mean different things by depth of knowledge with some using meaning, others using comprehensiveness, and others using network associations. He further notes that any of these terms is problematic because the lexicon is "something that is inherently ill-defined, multidimensional, variable and thus resistant to neat classification" (p. 224).

As can be seen, knowing a second language word involves different ways of knowing, including receptive and productive knowledge. In the next section, we consider more specific details of what learners have to know about a word, including its meaning, subcategorization restrictions, associations, and collocations.

13.3 Lexical knowledge, development, and influences

Second language learners are known to have difficulty with vocabulary learning. This takes a number of forms which were mentioned earlier in this chapter; we turn to some of them now.

13.3.1 Subcategorization

As native speakers of our language, we know that some verbs require objects, some verbs require indirect and direct objects, some verbs require animate subjects, and so forth. Additionally, native speakers of English, for example, know how to interpret the role certain noun phrases play in the action described by the verb. For example, a native English speaker knows the relationships between 13-3 and 13-4:

(13-3) X rents Y to Z.
(13-4) Z rents Y from X.

or, a native speaker of Italian knows that

(13-5) mi   piacciono i   cani
        to me like (pl)   the dogs
        "I like dogs."

even though the subject is *the dogs*, the meaning is that I like dogs (the dogs are pleasing to me). This is an area of difficulty, as we saw in chapter 8 in the discussion of input processing. Thus, it is not enough to know the meanings of individual words. In 13-3 and 13-4, a speaker must know that when *rent* is accompanied by *to* the subject is the owner. On the other hand, when *rent* is accompanied by *from*, the subject is the person who takes possession of the property for a short time.

This type of information can differ from language to language. Adjemian (1983) found that second language learners tended to transfer lexical patterns from their L1 to their L2. The scope of his research was the lexical acquisition of French by native English speakers and of English by native French speakers. The following sentences were produced by the native French speakers learning English.

(13-6) At sixty-five years old they must *retire themselves* because
        this is a rule of society.
(13-7) They want to *fight themselves* against this (tuition increase).

Note that the reflexives in these sentences are not intended to indicate emphasis. In the translation equivalents of these sentences in French, the verbs require the reflexive morpheme *se* (*se retirer* and *se battre*).

English learners of French produced ungrammatical sentences such as 13-8.

(13-8) Elle marche les chats.
        She walks   the cats.

Sentence 13-8 is ungrammatical in French because the verb *marcher* "to walk" cannot take a direct object. Another verb (*se promener*) must be used. Learners in both cases assume that verbs in their second language take the same kinds of subjects and objects as they do in their native language.

13.3.2 Word associations and networks

As mentioned above, part of what is involved in knowing a word, and in particular in knowing a word in a manner similar to native speakers, is the association that is made to other words. Meara (1978) investigated the lexical associations made by learners of French. Modern theories of lexical semantics are concerned with the relationships between words. Word associations would appear to be a reasonable means of determining how individuals relate words. Meara found that learners tended to produce rather different associations from those made by native speakers of French. Native speakers primarily gave paradigmatic or syntagmatic associations, based on semantic factors:

Paradigmatic

Stimulus	Response
man	woman
	dog
	boy
	child

Syntagmatic	
Stimulus	*Response*
brush	teeth
hold	hands
black	mark
bank	robber

Learners tended to give responses based on phonological similarity, such as *plafond* "ceiling" or *professeur* "professor" to the stimulus *profond* "deep." A possible interpretation is that the learners had not constructed the network of relationships necessary for fluent word associations in their L2. A later study by Schmitt and Meara (1997) investigated word associations by Japanese learners of English, specifically word associations and their relationship with verbal suffixes. The authors found that the ability to produce native-like word associations, not surprisingly, is related to suffix knowledge as well as to vocabulary size and general proficiency.

In both our L1 and our L2, we establish networks which may be semantic networks, syntactic networks (words behave in similar/same ways syntactically), phonological networks, and so forth. Essentially, a lexical network involves the linking of words in some way. Henriksen (1999) uses exactly this approach in her discussion of depth of vocabulary knowledge. Various forms of word association measures have been used in second language research (e.g., Söderman, 1993; Schmitt, 1998a; Singleton, 1999; Meara and Fitzpatrick, 2000), with considerable discussion on development in terms of a movement from phonological to semantic associations.

13.3.3 Word formation

Knowledge of the lexicon also involves knowing how to combine elements to create novel lexical items. The importance of word formation varies from language to language. Word formation is much less important in English than in many other languages. Hankamer (1989) noted that Turkish contains much more productive derivational morphology than does English, allowing it to form more words through morphology. The situation is even more extreme in a language such as Eskimo or in a language with both verbal and nominal incorporation, such as Chukchee. For example, in Chukchee verbs meaning "to whale hunt," "to walrus hunt," and "to reindeer hunt" are formed from the words meaning "hunt," "whale," "walrus," and "reindeer."

Another factor that should be pointed out for English word formation is that many of the complicated words in English are taken from Latin and Greek. The average English speaker is not aware of how these words are formed. The situation is different in German. The German word *Wasserstoff* means "hydrogen" and is a part-by-part translation (*hydro*

means "water," which is *Wasser* in German, and *gen* means "substance," or *Stoff* in German). A German speaker is thus more likely to recognize the word-formation process in *Wasserstoff* than is an English speaker in *hydrogen*. We might expect German speakers to be more sensitive to word-formation processes in general in learning a second language as well.

Olshtain (1987) investigated the development of word-formation processes by learners of Hebrew. She considered the use of new words from the perspective of production and interpretation. In the case of production tasks, learners showed a progression toward target language patterns. For example, native speakers tended to provide innovative words to tasks 74% of the time, advanced learners 67%, and intermediate learners only 19%. Additionally, when intermediate learners did innovate, the mechanisms they used differed from those of both advanced learners and native speakers. Only the intermediate students relied predominantly on suffixes, emphasized in their language classes as the major means of forming new words. Both the advanced learners and native speakers used a greater variety of means of forming new words. They were much more likely to use compounding, blending, and root changing than were the intermediate learners. However, on an interpretation task, a task that required learners to assign meaning to new words, neither group of learners performed like native speakers. On this task, learners were asked to interpret words out of context. The inability to interpret words in a native-like fashion, even by those who *produced* words like native speakers, suggests that even advanced speakers are highly context-bound in their use of the L2.

13.3.4 Word combinations, collocations, and phraseology

Individual words often appear together on a regular basis. For example, native speakers of English when confronted with an economics article and see the word *underdeveloped* might predict that the next word will be *nation* or *country*. In other words, the choice of the next word is quite narrow. Other collocations, such as *broad daylight*, *green with envy*, and *deep sigh* are common in language and are often processed as single units. These are different from idioms such as *kick the bucket* and multiword structures that signify a particular meaning and are represented by single words in many languages, such as *yellow jacket*. Unfortunately, in English, orthography is not always a good indicator of the status of words. *Matchbox*, *match-box*, and *match box* are all attested spellings. Learners have to learn these multiword units as wholes. Of course, in a perceptual situation a learner may err and interpret bound phrases like these word by word. The interpretation gained in this manner will generally not make any sense in its context.

An important factor about these combinations is that they are not totally free. In fact, there are strong statistical constraints on possible co-occurrences, as is shown in gap-filling tests. Consider what words could be chosen in the following frames:

I'm afraid I have some _____ news.
She looked out the window and breathed a _____ sigh.
I wonder what's wrong. She's been in there a _____ time.
He's very stubborn. He's had a _____ will ever since he was a baby.
I know that's true as a _____ rule, but this may be an exception.

Akhmatova (1974, p. 24) suggested that:

It follows that word-combination becomes "free" in the sense of not having any constraints imposed upon it only when words are combined by *creative* or "imaginative" speakers who are not content with merely reproducing the already existing complexes. Words are combined "freely" only by people who strive for novelty and originality. It is mainly in fiction or other types of imaginative speaking and writing that we find word-combinations that are really "free."

Until recently, relatively little attention had been paid to these problems in second language learning. Meara (1983, 1987) gave only four sources for collocations in his bibliographies for vocabulary in a second language: Alexander (1982), Binon and Cornu (1985), Brown (1974), and Cowie (1978). All of these studies dealt only with the pedagogical problem. None discussed how learners acquire competence in word combinations and collocations.

In recent years, research has looked at collocations as one form of language chunk. Nation (2001) characterizes the position of N. Ellis (2001) as follows:

language knowledge and language use can be accounted for by the storage of chunks of language in long-term memory and by experience of how likely particular chunks are to occur with other particular chunks, without the need to refer to underlying rules. Language knowledge and use is based on associations between sequentially observed language items. This viewpoint sees collocational knowledge as the essence of language knowledge.

(p. 318)

An interesting experiment regarding idiom learning was conducted by Bogaards (2001), in which Dutch learners of French were presented with

French idioms. He presented new words and idioms with similar meanings to the learners and found that multiword expressions that contained known words (e.g., *homme à femmes* versus *dragueur*—both meaning "womanizer") were easier to learn than words that are completely new. He suggests that initial knowledge of form helps learners as they learn new meanings attached to those forms.

We discussed chunking[2] and prefabricated patterns in chapter 8. Essentially, we can think of chunks as prefabricated patterns where the learner may not know how to "unpackage" the component parts, as was seen with the Japanese child Uguisu's use of *doyou* as a single unanalysed unit. Or, one can think of chunks as a form of collocation where with repeated exposure we learn that *take a bath* or *take a shower* go together as opposed to *do a bath* or *do a shower*. One can further see that this reduces the learning burden, in that storage (see chapter 8) is often limited to a limited number of items and, if some of them are multiword, less processing time may be involved.

As an example, one might think of learning a language with a different script. At first we have difficulty in determining the different parts of letters. Let us consider the following examples from Hebrew, Arabic, and Korean.

Hebrew:	ו	ל	ז
Arabic:	ك	ش	ق
Korean:	언	어	

When learning a language with a different script, it is often difficult to recognize individual letters (and even more difficult to produce the letter) or to determine one letter from another. With repeated exposure, learners can see each letter as a unified whole much as those familiar with a Latin script can see the letters *a*, *b*, c, etc. as unified wholes without seeing the individual strokes and can identify the letter quickly and effortlessly. At a later stage, we chunk larger items together, such as individual words, and can understand them without "seeing" the component parts. For example, very frequent words, such as *the* or *and*, are recognized without decomposing them into each letter.

Learners are often forced to be innovative in their word combinations. The result is that misunderstandings abound. Consider the following example. Normal synonyms for *local* include *parochial* and *provincial*. Consider the differences among the following statements:

(13-9) The *Detroit Free Press* is a local paper.
(13-10) The *Detroit Free Press* is a parochial paper.
(13-11) The *Detroit Free Press* is a provincial paper.

The first of these descriptions is just a matter-of-fact account. The second two ascribe pejorative evaluations about the quality of the newspaper. A learner who said one of the latter two might be surprised to hear an interlocutor object that she thinks the paper is pretty good. When we hear something unusual, we assume that the speaker had a good reason to say things in this unusual manner. The problem for the learner is to learn how not to be innovative and stick to the standard combinations.

13.4 L1 influence

In all aspects of language learning, the L1 (or other languages known; see chapters 2 and 5) undoubtedly play an important role. The lexicon is no exception. Singleton (1999) reviews a number of studies and comes to the conclusion that there is connectivity between the L1 and the L2 lexicon. Note that he uses the term *connectivity* to rule out a disconnect between the two lexica as well as to rule out total integration. ". . . L1 and L2 lexis are separately stored, but that the two systems are in communication with each other—whether via direct connections between individual L1 and L2 lexical nodes, or via a common conceptual store (or both)" (pp. 189–190). He also raises the question of individual differences and notes "that the relationship between a given L2 word and a given L1 word in the mental lexicon will vary from individual to individual" (p. 190). What is particularly interesting is that he attributes this to factors of acquisition and on the extent to which formal and/or semantic connections are made by the learner of the L1 and L2 word.

There is evidence to suggest that both languages remain activated even with advanced proficiency in a second language (Jared and Kroll, 2001; Marian and Spivey, 2003). This, it is claimed, is the case even though automaticity increases with proficiency (see Segalowitz and Hulstijn, 2005). Sunderman and Kroll (2006) report that in words that have close forms (neighbors) in the L1 and L2, there is influence from both languages even when performing a task in only one of the languages. They cite the example in English of the word *gate*, which has neighbors in English (*game*) and in Spanish (*gato*, "cat"). Regardless of what language a task is being conducted in, both languages show influence of neighbors in both languages. Sunderman and Kroll (2006) investigated English-speaking learners of Spanish at two levels of proficiency and found that there was L1 activation for both groups, but that the sensitivity to the L1 translation decreased with increasing proficiency.

Jiang (2000, 2002, 2004) proposes and presents evidence to support a three-stage model of adult second language vocabulary learning. The first stage is a lexical association stage in which learners recognize some form as a word. They understand the meaning of the word because they associate it with their L1—hence the association phase of learning. This phase of lexical representation only contains the form of the word (phonology, orthography) and something that points it to a comparable word in the L1. All processing is done through the L1 translations. With continued exposure and use, the semantic/syntactic information from the L1 is transferred to the L2 word. At this point the lexical representation contains L2 form information and the transferred syntactic and semantic information that has been transferred from the L1, and there is a direct link between the L2 word (weak or strong) and the conceptual representation. He calls this the L1 lemma mediation stage since processing still involves L1 information. The third stage is one in which L1 information is discarded, but Jiang (2000) suggests that, for many words, the second stage remains the steady-state stage. His various empirical studies verify these claims with Korean learners of English (Jiang, 2004) and Chinese learners of English (Jiang, 2002).

Lee (2007) argues against Jiang's semantic transfer hypothesis, pointing out that L2 proficiency, but not L1 influence, is a key factor in explaining semantic overgeneralization, at least within the conceptual domains that Jiang explored. Specifically, Lee added a NNS comparison group, pointing out that in any L1 transfer research, there have to be two groups of NNSs. Otherwise, one is left not knowing whether transfer or developmental factors are involved. In Lee's study, high-advanced Korean ESL learners were compared with advanced Korean ESL learners, high-advanced Chinese ESL learners, and NSs of English, with respect to semantic overgeneralization in contextualized environments. The findings revealed the comparable overgeneralization behaviors of high-advanced Korean ESL and high-advanced Chinese ESL groups, indicating that the semantic overgeneralization may be an indicator of L2 development but not that of crosslinguistic influence.

In the next sections, we focus on learning, both incidental and incremental learning.

13.4.1 Incidental vocabulary learning

A great deal of attention has been paid to what is known as *incidental vocabulary learning* (see Gass, 1999, for a discussion of the controversial nature of this term). Wesche and Paribakht (1999b, p. 176) defined incidental learning as what takes place when "learners are focused on comprehending meaning rather than on the explicit goal of learning new words." In other words, learning is a by-product of something else (e.g., reading a passage).

A number of studies have shown that incidental learning is indeed possible. Rott (1999) examined exposure through reading and its effect on acquisition and retention of vocabulary. Her study of the acquisition of

German by NSs of English investigated the effects of differential exposure to lexical items: exposure two, four, or six times. The results showed that only two exposures were sufficient to affect vocabulary growth and that six exposures resulted in the greatest amount of knowledge growth. Retention, following exposure, was greater for receptive knowledge than for productive knowledge.

Paribakht and Wesche (1997) divided learners of English into two instructional conditions. In one group, learners read passages and answered comprehension questions. In the other group, learners read passages and then did vocabulary activities. The same words were targeted for both groups. Although both groups made gains on vocabulary knowledge, the first group's knowledge was limited to recognition, whereas the second group acquired productive knowledge as well.

In a follow-up study, Paribakht and Wesche (1999), using think-aloud and retrospective methodology, focused on the strategies that learners used in the process of learning a new word. Inferencing was one of the most common strategies that learners appealed to. Surprisingly, dictionary use did not predominate (see also Fraser, 1999). Learners used morphological and grammatical information as aids in the inferencing process.

Gu and Johnson (1996) investigated the lexical strategy use by Chinese university students learning English. Strategies such as guessing from context, dictionary use (for learning purposes as opposed to comprehension only), and relying on word formation were noted. Oral repetition correlated with general proficiency, but visual repetition (writing words over and over, memorizing the spelling letter by letter, writing new words and translation equivalents repeatedly) negatively predicted vocabulary size and general proficiency. The least successful group of students used memorization and visual repetition of word lists. There was more than one way to achieve vocabulary growth: through extensive reading as well as by employing a wide range of strategies.

Hulstijn, Hollander, and Greidanus (1996), in their study of advanced learners of French (Dutch NSs), found that for this group the availability of a bilingual dictionary or marginal glosses fostered acquisition of word meanings. They claimed that when there is access to external information (e.g., dictionaries or glosses), the formation of a form–meaning relationship is fostered upon repeated exposure. In other words, if a learner looks up the meaning of an unknown word the first time that word is encountered, each subsequent encounter reinforces the meaning of the word. On the other hand, when no such external information is available, learners often ignore an unknown word (see also Paribakht and Wesche, 1999), or infer incorrect meanings. Thus, repeated exposure has little effect.

R. Ellis and He (1999), in an investigation of the role of negotiation in incidental vocabulary learning, found that when learners have the opportunity to use new lexical items in a communicative context (including negotiation), those words are retained (in the short and long term) to a greater extent than when they are only exposed to input. However, Newton (1995) found that negotiation was not always a precursor to learning a new vocabulary word. Other factors such as task type played a role in whether or not a word was learned. Gass (1999) proposed that incidental learning is most likely to occur when the words in the two languages are cognates, when there is significant exposure, and when related L2 words are known. In other cases, greater intentionality (e.g., through attention) is required.

Hulstijn and Laufer (2001) and Laufer and Hulstijn (2001) relate retention of vocabulary learning to the concept of *depth of processing* (Craik and Lockhart, 1972), which in its simple form predicts that memory retention is due to whether something is shallowly or deeply processed. We have discussed earlier that knowing a word involves many possibilities, including understanding the phonological form, the meaning, collocations, etc. It is predicted that processing a vocabulary word at the level of meaning is more deeply processed than processing at the level of phonological form and, presumably, knowing meaning and collocations suggests even deeper processing. A related concept is Craik and Tulving's (1975) richness of encoding. Hulstijn and Laufer and Laufer and Hulstijn take these concepts a step further by introducing the concept of *involvement*. Involvement in their model consists of need, search, and evaluation. Need refers to motivation and the need can be either moderate or strong. Need is strong when it is motivated by the internal needs of the learner and it is moderate when it is motivated by an external source (e.g., a teacher). Search and evaluation are both cognitive constructs. The former refers to the attempt to determine the meaning of a word (e.g., looking it up in a dictionary). Evaluation represents an attempt to determine whether the word is the correct one given the context. Evaluation involves a decision, for example, following a comparison of one meaning of a word with other meanings. This would be moderate involvement, but if a decision involves combination of the new word with other words, this is strong involvement.

Laufer and Hulstijn (2001) analyzed a number of studies and their effect on vocabulary retention, showing that in general the tasks that were effective were those that had high involvement. Hulstijn and Laufer (2001) conducted an experiment to determine if greater involvement would lead to greater retention of receptive knowledge. They constructed three tasks with different levels of involvement (reading comprehension with glosses in the margins, reading comprehension plus fill in the blank, and writing a composition using the target words). It was predicted that writing the composition entailed the greatest involvement, and reading with glosses involved the least. Their participants were learners of

English from the Netherlands and Israel. The Israeli participants fully supported the order, but the Dutch students performed better on the reading with glosses in the margins than on the reading with the fill in the blank. In general, the greater use that learners make of vocabulary items, the greater the likelihood that they will retain these items both in form and in meaning. This is not unlike what we saw in the discussion of the Output Hypothesis in chapter 10. Using language promotes acquisition. It also suggests that breadth of vocabulary knowledge is only relevant when accompanied by depth of knowledge.

13.4.2 Incremental vocabulary learning

Learning vocabulary is not a one-time affair. In other words, it is unrealistic to believe that a learner hears a word or, in the case of some pedagogical methods, memorizes a word with the consequence being full knowledge of the word. It is perhaps sufficient to think about what happens when we encounter words in our native language that we don't know. One interesting fact is that, once that happens, we seem to encounter that word quite frequently, making us wonder how we could have missed it for so long. Learning the meaning and use of the word requires us to listen to how it is used in different contexts and perhaps even to consult a dictionary before being brave enough to attempt to use it ourselves. Thus, a first encounter with a word may draw a learner's attention to that item. Subsequent encounters provide learners with opportunities to determine relevant semantic and syntactic information. The important point is that learning words is a recursive process and does not occur instantaneously (see also Schmitt, 1998b). In fact, Paribakht and Wesche (1993) developed a Vocabulary Knowledge Scale with five stages: (a) the word is unfamiliar, (b) the word is familiar but the meaning is not known, (c) a translation into the NL can be given, (d) the word can be used appropriately in a sentence, and (e) the word is used accurately both semantically and grammatically.

Schmitt (1998b) conducted a longitudinal study investigating the acquisition of 11 words by three adult learners during a one-year period of time. His focus was on four kinds of knowledge: spelling, associations, grammatical information, and meaning. All were advanced learners of English. The results were not conclusive. Spelling was not a problem for any of the learners. For association knowledge, two of the learners developed, but one did not. With regard to meaning knowledge, none of the learners had anything more than partial mastery of all the meaning senses. Two of the learners made progress in meaning knowledge; one did not. The one that did not was not the same as the one who did not make progress in association knowledge. For grammatical knowledge, only one student made steady progress; the other two were somewhat

erratic across the time period. What was not found, however, was any sort of developmental hierarchy of knowledge types.

13.5 Using lexical skills

Thus far in this chapter we have primarily dealt with lexical knowledge. We now turn our attention more toward things learners do or try to do with words. We look at lexical skills involved in using language. A particular goal of this discussion is to relate second language research findings to psycholinguistic research. We compare certain findings about how learners use words with descriptions of psycholinguistic processes to determine what relationships, if any, exist.

13.5.1 Production

The primary evidence about second language lexical use comes from production. Production processes and strategies may have a strong effect on what learners produce. In ordinary conversation, learners generally rely on sentence production processes, except in unusual situations where they repeat something that has been memorized as a whole. Even many experimental and/or standardized tests, such as gap-filling exercises or tests in which learners select from a list of words to fit in a context, may encourage learners to run through an analogue of sentence production to complete the task. For example, if asked to fill in the blank in:

Credit card payment is _____ to lock-in any instant purchase fares.

either a learner or a native speaker may use skills normally used in sentence production to fulfill the task by generating a word that would be meaningful and would make sense in the syntactic environment.

As mentioned earlier, there is good reason to believe that lexical information is crucial in the sentence production strategies of competent native speakers. Hence, it at first seems paradoxical that little evidence of this is found in the early stages of second language acquisition. Klein and Perdue (1989) provided a thorough discussion of principles that might determine word order arrangements by second language learners in naturalistic (untutored) settings. In their conclusion they wrote:

The objective . . . was to analyze whether there are any principles according to which learners with a limited repertoire put their words together. It was shown—with some exceptions and some degree of uncertainty—that there are basically three rules which determine the arrangement of words in early learner varieties