

Lexical Representation and Development in a Second Language

NAN JIANG

The Pennsylvania State University

A psycholinguistic model of vocabulary acquisition in a second language (L2) in instructional settings is outlined in this paper. Considered in light of how the lexical entries in the L2 lexicon evolve, L2 vocabulary acquisition is seen as consisting of three stages: the formal stage when a lexical entry with formal specifications is established, the first language (L1) lemma mediation stage when the lemma information of the L1 counterpart is copied into the L2 lexical entry and mediates L2 word use, and the L2 integration stage when semantic, syntactic, morphological specifications are integrated into the lexical entry. It is argued that due to the practical constraints imposed on L2 learning, a majority of L2 words fossilize at the second stage. Thus, lexical representation in L2 in general has three unique features: (a) a lexical entry consists of L2 lexeme and L1 lemma; (b) little morphological specifications are integrated within the entry; (c) the links between L2 words and concepts are weak. The processing consequences of these features, relevant research evidence in support of this model, and its implications for L2 vocabulary acquisition research are discussed.

INTRODUCTION

The psycholinguistic study of second language acquisition has three interrelated aspects: the study of representation, the study of acquisition, and the study of processing. Any theory of second language acquisition is incomplete without a representation component, because, as pointed out by Levelt (1989), representation and processes cannot be studied independently of each other. However, compared to acquisition and processing, representation has received little attention from second language researchers. This is also true in the study of vocabulary acquisition in a second language (L2). Much effort has been made to understand how L2 vocabulary can be acquired under different learning conditions and what factors influence the effectiveness and patterns of L2 vocabulary acquisition. However, the question of how L2 lexical information is represented in the mental lexicon has largely been ignored. This may partly explain why, more than one decade after L2 vocabulary acquisition became one of the hottest areas of applied linguistics and second language acquisition, we are still short of a conceptual framework within which we can discuss the findings of numerous L2 vocabulary studies. In this paper, I would like to suggest such a framework that is motivated by an understanding of the unique features associated with lexical development and representation in a second language.

This paper is organized into four sections. In the first section, a model of lexical development in L2 is outlined. It starts with a brief review of what is understood to be the internal structure of the lexical entries in the mental lexicon. It is followed by an analysis of how the conditions under which a second language is learned differ from those surrounding the first language acquisition and a summary of the consequences of such differences for L2 lexical development and representation. I suggest that the representation of lexical information in a second language is fundamentally different from that of the first language. I further suggest that vocabulary acquisition in a second language can be divided into three stages on the basis of what is represented in the lexical entry. The second section of the paper discusses research evidence from the study of the bilingual lexicon and productive use of L2 that is related to the model. In the third section, several issues this model raises are brought into focus, and in the last section the model is summarized and some limitations are discussed.

1. A PSYCHOLINGUISTIC MODEL OF VOCABULARY ACQUISITION IN L2

1.1 The internal structure of the lexical entries

Before I discuss lexical representation in a second language, it is necessary to see what lexical representation is like in the first language (L1). A lexical entry in L1 is generally considered to contain semantic, syntactic, morphological, and formal (phonological and orthographic) specifications about a lexical item.¹ These different types of information are believed to be represented in the two components that make up a lexical entry: the lemma and the lexeme. The lemma contains semantic and syntactic information about a word, for example, word meaning and part of speech, and the lexeme contains morphological and formal information, for example, different morphological variants of a word, spelling, and pronunciation (Garrett 1975; Levelt 1989). Figure 1 provides a graphic description of a lexical entry.

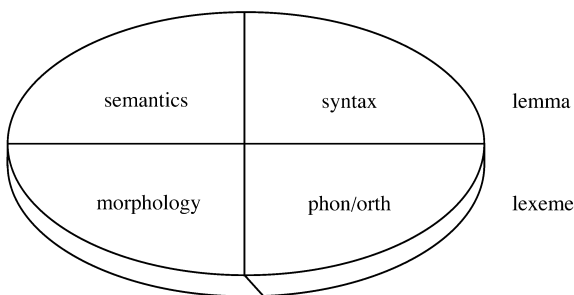


Figure 1: The internal structure of the lexical entry (adapted from Levelt 1989)

An important feature of the lexical representation in L1 is that these different types of information are highly integrated within each entry, such that once the entry is opened, all the information automatically becomes available. Several lines of evidence can be found in the study of word recognition that support the automatic simultaneous activation of different kinds of information in the lexical entries. It was found, for example, that phonological information is automatically activated in visual word recognition (for example, Van Orden 1987; Perfetti *et al.* 1988), even in languages such as Chinese where phonological information is unlikely to assist visual word recognition (Perfetti and Zhang 1995; Tan *et al.* 1995). Further evidence comes from the finding that both meanings of an ambiguous word are initially activated even when sentential context clearly favours one of the meanings (Swinney 1979; Tanenhaus *et al.* 1979).

It is conceivable that the integration of different kinds of information into lexical entries requires extensive, highly contextualized exposure to the language. With such highly contextualized input, a child is able to extract the semantic, syntactic, and morphological information while becoming acquainted with the form of the word. The information a child extracts may not be accurate or correct by an adult's standard, as can be seen in overextension (Clark 1973) and underextension errors (Griffiths 1986) found in children's speech, but what is learned becomes an integral part of the lexical entry. At the same time, the presence of these different kinds of information in the lexical entries and their automatic activation are critical for the appropriate and efficient use of these lexical entries in natural speech communication.

1.2 Two practical constraints on lexical development in L2 in instructional settings

During second language learning, particularly classroom second language learning, two practical constraints not present in L1 acquisition determine that L2 and L1 lexical development processes differ significantly. The first constraint is the poverty of input in terms of both quantity and quality. Classroom L2 learners often lack sufficient, highly contextualized input in the target language. This often makes it extremely difficult, if not impossible, for an L2 learner to extract and create semantic, syntactic, and morphological specifications about a word and integrate such information into the lexical entry of that word.

The second constraint in L2 learning is the presence of an established conceptual/semantic system with an L1 lexical system closely associated with it. The impact of these established systems on lexical development in L2 appear less straightforward, but may be actually more significant. Given the presence of the established L1 lexical system, L2 learners, in particular adult learners, may tend to rely on this system in learning new words in a second language, a tendency that has long been acknowledged (Lado 1957) and can be testified to by many L2 learners and teachers (for example, Jenkin *et al.*

1993: 119). Because the meanings of an L2 word can be understood through their L1 translation, the learner's language processor or language acquisition device may be less motivated to pay attention to the contextual cues for meaning extraction.

The established semantic system, at the same time, may discourage meaning extraction in a different way. When learning a word in L1, a child is learning a set of new semantic and formal specifications simultaneously because no semantic system exists. When one learns a word in a second language, however, it is very unlikely that a new concept, or a set of new semantic specifications, will be created in the process because corresponding, or at least similar, concepts or semantic specifications already exist in the learner's semantic system. Instead, it is more likely that the existing concepts or semantic specifications will be activated. In a sense, the established semantic system blocks, or stands in the way of, the creation of meanings similar to or intersecting with those in the existing semantic system.

Thus, both the lexical and semantic systems work together to discourage the extraction or creation of semantic specifications in the process of learning L2 words. Furthermore, the activation of L1 translation, or the tendency to use L1 translation on the learner's part, will be inevitable in learning L2 words, given that the existing semantic system is developed in the process of learning L1, and is thus closely connected to it.

1.3 Three stages of lexical development in L2

These unique conditions under which an L2 is learned, i.e. the limited contextualized exposure and the presence of the existing semantic and lexical systems, may contribute to a fundamental difference in lexical representation and development between L2 and L1. In first language development, the task of vocabulary acquisition is to understand and acquire the meaning as well as other properties of the word. In tutored L2 acquisition, the task of vocabulary acquisition is primarily to remember the word. L1 words are learned as both semantic and formal entities, but L2 words are learned mainly as formal entities because, here, the meaning is provided, either through association with L1 translation or by means of definition, rather than extracted or learned from the context by learners themselves. The learner's attention is focused on the formal features of the word, i.e. spelling and pronunciation. Little semantic, syntactic, and morphological information is created and established within the lexical entry in the process.²

A representational consequence of such a learning approach is that, in traditional instructional environments, a lexical entry in L2 initially only contains its formal specifications. Little content is established within the entry. It may also contain a pointer that directs attention to the L1 translation equivalent. This pointer serves as a link between L2 words and their counterparts in L1 (see Figure 2a). Following the distinction of lemma and lexeme as two components of an lexical entry, L2 lexical items at the initial

stage can be considered lexical items without lemmas, or the lemma structure is empty (De Bot *et al.* 1997). We may call this initial stage the formal stage of lexical development.

The suggestion that little semantic, syntactic, and morphological information is represented in the lexical entry does not mean that such information is not available to the learners. The meanings of L2 words and some grammatical information may become available through the activation of L2–L1 links; learners may also have learned other explicit grammatical rules about these words. Under both circumstances, however, such semantic and grammatical information is not an integrative part of the mental lexicon. Instead, it is stored outside the mental lexicon, for example, as part of one's general memory or episodic memory and it can't be retrieved automatically in natural communication. In this sense, it is part of one's lexical knowledge, not one's lexical competence. See Section 3 for more detailed discussion about the distinctions between the lexicon and episodic memory and between lexical knowledge and lexical competence.

At this initial stage, the use of L2 words involves the activation of the links between L2 words and their L1 translations mentioned above, or lexical association, as is postulated in the Lexical Association Hypothesis in the study of the bilingual lexicon (Potter *et al.* 1984). In receptive use of the language, the recognition of an L2 word activates its L1 translation equivalent, whose semantic, syntactic, and morphological information then becomes available and assists comprehension. In productive L2 use, the pre-verbal message first activates the L1 words whose semantic specifications match the message fragments. The L1 words then activate the corresponding L2 words through the lexical links between L2 and L1 words (Figure 2b).

As one's experience in L2 increases, stronger associations are developed between L2 words and their L1 translations. What these strong associations mean, among other things, is the simultaneous activation of L2 word forms and the lemma information (semantic and syntactic specifications) of L1 counterparts in L2 word use. Such repeated simultaneous activation of L2

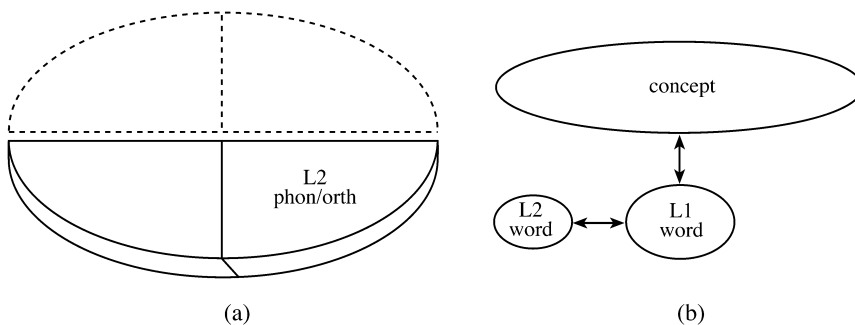


Figure 2: Lexical representation (a) and processing (b) at the initial stage of lexical development in L2

word form and L1 lemma information may result in a strong and direct bond between an L2 word and the lemma of its L1 translation. An alternative way to look at the ongoing change in the L2 lexicon at this stage is to suggest that information in L1 lemmas may be copied or attached to L2 lexical forms to form lexical entries that have L2 lexical forms but semantic and syntactic information of their L1 translation equivalents. This is made possible through repeated simultaneous activation of L2 lexical forms and L1 lemma information in L2 use. A word may be considered to have reached the second stage of development when L1 lemma information is copied into its entry. We may call this stage the L1 lemma mediation stage. The lemma space of an L2 word at this stage is occupied by the lemma information from its L1 translation and the L1 lemma information mediates L2 word processing.

Another important characteristic of the lexical representation at this stage as well as the first stage is that no morphological specifications are contained in the lexical entry. This is because, unlike the semantic and syntactic information which is often shared by L2 words and their translation equivalents, morphological information is usually language-specific, and thus less susceptible to transfer. To illustrate the point with an example, the English word *table* and its Chinese translation *zhuozi* may refer to essentially the same object, and both are nouns, but morphologically, *table* takes -s to become plural but *zhuozi* is still *zhuozi* even when plurality is intended. Thus, L1 morphological information is less likely to assist L2 use, except under very restricted conditions (Odlin 1989; see Hancin-Bhatt and Nagy 1994 for an example of morphological transfer). Figure 3a depicts a lexical entry at this stage.

A third characteristic of lexical representation at this stage is the weak connection between L2 lexical items and conceptual representations. A possible explanation of the weak connection is that the lemma information is copied from L1, rather than created in the process of learning the L2 words, thus not highly integrated into the entry. Alternatively, one may suggest that the representation of the information copied from the L1 lemma itself is weak because part of the information is lost in transition.

This stage is called the L1 lemma mediation stage because the use of L2 words is mediated by the lemmas of their L1 translations. A question in this context is whether, at this stage, L1 lexical forms are still involved or are bypassed in the use of L2 words. It may be possible that the L2 words are linked to the conceptual representation both directly through the L1 lemmas within their entries and through lexical association with their L1 translation (Figure 3b), as suggested by Kroll and Stewart's (1994) Revised Hierarchical Model of bilingual memory organization. As the former route is more direct, it becomes the default route. L1 lexical forms hence do not play a critical role in L2 word use. This is consistent with the intuition many second language users have that they seem to be able to use L2 directly at a certain stage, even though errors from L1 interference are still frequent, and also accords with findings from the bilingual lexicon studies to be discussed later.

The full development of lexical competence, conceivably, has a third and

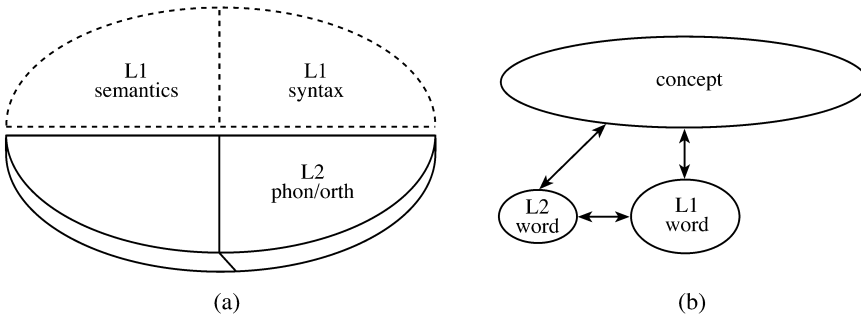


Figure 3: Lexical representation (a) and processing (b) in L2 at the second stage

final stage when the semantic, syntactic, and morphological specifications of an L2 word are extracted from exposure and use and integrated into the lexical entry. We may call this the L2 integration stage. At this stage, a lexical entry in L2 will be very similar to a lexical entry in L1 in terms of both representation and processing (Figure 4).

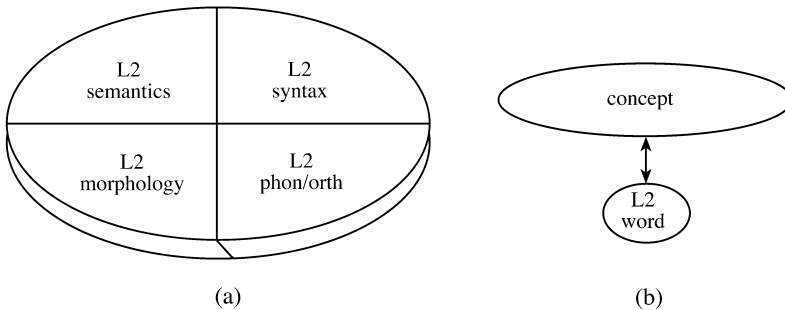


Figure 4: Lexical representation (a) and processing (b) in L2 at the third stage

Thus, lexical development in L2 can, now, be seen as comprising three stages, as shown in Figure 5. At the formal stage of lexical development, a lexical entry is established in the L2 lexicon, but it contains only formal specifications and a pointer. As one’s experience in the language increases, semantic and syntactic information of an L2 word’s L1 translation equivalent may be copied or attached to the entry of an L2 word to form lexical entries that consist of L2 forms and L1 lemmas. At the final stage, semantic, syntactic, morphological, as well as formal specifications about an L2 word are established within the lexical entry.

It should be pointed out that these stages are intended to describe how a specific word evolves in the learning process, rather than how the lexical competence of an individual learner develops as a whole, though these

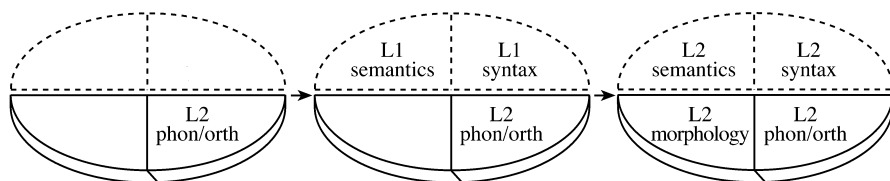


Figure 5: Lexical development in L2: from the formal stage to the integration stage

concepts are closely related. It is more likely that a learner's L2 lexicon contains words that are at various stages of development. An L2 learner hence can be seen as being at one of these stages only in the sense that a majority of the words in his or her L2 lexicon are at that stage.

It is also worth mentioning that these stages should not be seen as clear-cut. Grey areas may exist when words are in transition from one stage to another. For example, one may be able to use an L2 word without relying on its L1 translation in comprehension but not in production. Or the retrieval of some semantic information may become automatic but some other may not.

1.4 Lexical fossilization

In principle, any word or any learner may reach the third stage if sufficient, highly contextualized input in L2 is available and processed by the learner. In practice, the story is often quite different. As will be seen shortly, there is plenty of both anecdotal and research evidence to suggest that lexical competence in an L2 speaker may cease to develop even with plenty of contextualized input. That is, lexical development may fossilize. Viewed within the present framework, lexical fossilization refers to lexical development that stops at the second stage, even when extensive contextualized input is available.

Much work has been done to understand the cause of fossilization. Several causes have been suggested, such as the lack of desire to acculturate (Schumann 1978), lack of opportunity to learn (Bickerton 1975), and communicative pressure (Higgs and Clifford 1982) (see a summary in Ellis 1994). Given the findings that fossilization occurs in situations where plenty of motivation and opportunities are available (for example, Long 1997), I agree with Ellis (1994) that it has more to do with 'learners' general inability to utilize the information available to them in the input' (Ellis 1994: 604) than with the input itself. The question is what keeps the learners from utilizing the information in the input.

I suggest that L1 lemma mediation is a major cause of lexical fossilization. Potentially, increasing contextualized exposure may help learners to extract semantic and other information about a word. However, given the presence of the L1 lemma in the lexical entry, contextualized exposure may also

automatically reinforce L1 lemma mediation by strengthening the connection between the L1 lemma and the L2 lexeme. Now that meaning and other information can be accessed from L1 lemma with a certain degree of automaticity, the language processor will be less motivated to pay attention to the input for meaning extraction. Thus, we have a problem here in that the increasing exposure that is necessary for further lexical development also keeps lexical items from further development because of reinforced L1 lemma mediation. As a result, the transition from L1 lemma mediation to L2 integration may take much longer than might be expected. For most words, the transition may never be completed.

Alternatively, one may also argue that the presence of L1 lemma within the L2 lexical entry may block the integration of L2 lemma information into the entry. The concept of ‘blocking’ has been used to explain why overgeneralized forms in child L1 such as *goed* and *mans* are eventually abandoned in favour of adult forms such as *went* and *men* in first language development. It is well documented that the development of irregular past-tense forms in English involves three stages, a rote memory stage where *go* and *went* are treated as different, unrelated words, an overgeneralization stage where incorrect forms such as *goed* and *mans* are used, and an adult performance stage where overgeneralized forms are dropped. It is suggested that the use of overgeneralized forms is temporary because these forms are blocked from entering the lexicon by the lexical items like *went* and *men* that are already in the child’s lexicon (Bloom 1993). Similarly, the presence of L1 lemma information in the L2 lemma structure may act to prevent the establishment of L2 lemma information within the lexical entry. In other words, once the space is occupied by the L1 lemma information, it becomes very difficult for the L2 lemma information to get in.

Lexical fossilization in L2 thus can be depicted as in Figure 6.

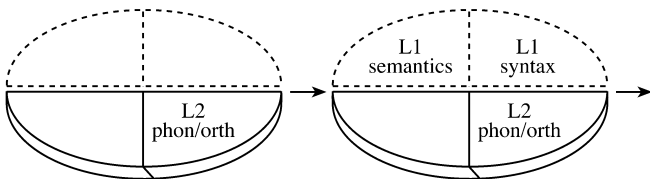


Figure 6: Lexical fossilization in L2

1.5 Processing consequences

The representational characteristics associated with L2 lexical development, as outlined above, have at least two consequences for the use of L2 words. While such consequences should apply to both productive and receptive uses of L2 words, their impact in productive use may be more pronounced than in reception. Thus, I will focus on L2 production in the following discussion.

According to Levelt's (1989) speech production model, speech production starts with a pre-verbal message. This activates lemmas whose semantic specifications match the message fragments. As syntactic information becomes available with the activation of the lemma, a syntactic building procedure is initiated which leads to the formation of a surface structure. With the insertion of lexical forms (lexemes) in the slots of the surface structure, a phonetic plan is available to be articulated. Several important features of speech production are highlighted in this model. Two of them are particularly relevant to the current discussion. The first is the central role the lemma plays in speech production. It is the bridge between the message to be communicated and the surface structure that is actually articulated to express the message. The second is automaticity. All the processes involved in speech production but one, the generation of message, are believed to be highly automatic, whether it is selection of lemma, grammatical encoding, phonological encoding, or articulation. Both lemma centrality and automaticity are present in speech production models other than Levelt's (Dell 1986; Bierwisch and Schreuder 1992) and in current second language production models (De Bot 1992; Poullisse and Bongaerts 1994).

What happens in productive use of L2 when, at the initial stage, an L2 lexical entry contains no semantic and syntactic information, but has a pointer in their place pointing to the word's L1 translation equivalent? It is not difficult to imagine that the choice of L2 words at this stage is dependent on the activation of the lexical links between L2 and L1. The pre-verbal message activates the L1 lexical entry whose lemma matches the message fragments. The L1 word then brings out the L2 word through the conscious recollection of L2-L1 connections established in learning the L2 word. We may call L2 use at this stage a process of lexical association. The productive use of L2 words at this stage, needless to say, will be laborious and effortful for two reasons: it depends on the conscious recollection of the connections made and the connection is being used in the opposite direction from the way it is established, i.e. from L1 to L2 rather than from L2 to L1.

The difference between the second stage when the lemma information has been copied into the L2 lexical entry and the first stage lies in automaticity and the involvement of lexical forms of L1 translations. The direct connection between the L1 lemma and the L2 lexical form, though not as strong as lemma-lexeme connections within L1, means a reduction in conscious recollection of the L2-L1 links in productive use of L2 words. This leads to a higher degree of automaticity in the productive use of L2 words.

The advantage of lexical association and L1 lemma mediation is obvious. They allow L2 words to almost immediately become part of one's receptive and productive vocabularies. At the L1 lemma mediation stage, a certain level of automaticity can be achieved. Such positive transfer is well documented in the literature (for example, Yu 1996; Parry 1993). Indeed, the immediate use of L2 words may be a major motivation for the use of L1 translation on the part of both the learner and teacher.

However, as has been pointed out by many researchers (for example, Sonaiya 1991), words in two different languages seldom share identical semantic specifications. Their syntactic properties may differ as well. Under both circumstances, lexical association and L1 lemma mediation will often lead to lexical errors.

In addition to L1 lemma mediation, another important characteristic of L2 lexical representation, the lack of morphological specifications within the lexical entry, also has its processing consequences, though the consequences may appear less straightforward than those of L1 lemma mediation. English inflections for past tense and plurality, for example, are realized by bound morphemes such as *-ed* and *-s*. How are these morphemes, or inflections, generated in L1 speech production? It is generally accepted that the selection of morphologically appropriate word forms is an automatic process. It is suggested that much of the information to be realized by inflections, such as number and tense, is coded in the pre-verbal message, and the selection of morphemes 'may be under direct control of message elements' (Bock and Levelt 1994: 975). In this sense, even though morphological information is generally not considered as part of the lemma (see Figure 1), what was said previously about lemma selection also applies to the generation of inflections. That is, it is an automatic process of mapping between the contents of message fragments and the morphological specifications associated with a lexical item.

It is further suggested in current models of speech production that the generation of bound morphemes may be part of grammatical encoding and that inflection is an intrinsic part of the syntactic frame (Garrett 1982; Lapointe and Dell 1989). That is, when a syntactic structure is built as a result of lemma activation, the morphological information, for example, that a certain element is plural or past time, is specified at the same time. Thus, when it comes to the generation of the actual lexical form in phonological encoding, the morphologically appropriate form of the word will be selected right away from the opened entry.

Also relevant to the current discussion is the view that different morphological variants of a word are represented in the same entry (Levelt 1989). For example, *go*, *goes*, *went*, *gone*, and *going* are represented in the GO entry. Once the lexical entry is opened, all these lexical forms automatically become available. This is just another, more concrete way of saying that morphological specifications are an integral part of the lexical entry.

From these proposals, one can envisage a one-step, automatic process of morphological production. To communicate the message 'They left' for example, two lexical entries are opened, one of them being the LEAVE entry, with all its variants such as *leave*, *leaves*, *left*, *leaving* automatically becoming available. Among these forms, *left* will receive the highest level of activation and be automatically selected because it matches best with what is coded in the pre-verbal message, i.e. the action of leaving that occurred in the past. It is a one-step process because the inflected form *left* is selected right

away without the mediation of the root form *leave* or any conscious application of morphological rules.

Such an automatic, one-step process, of course, requires strong integration of morphological information in the lexical entry. In the above example, different morphological variants of a word should be integrated in its entry and become automatically available when a pre-verbal message calls upon it. Such one-step automatic selection of morphologically appropriate words is an important part of one's lexical competence.

What happens when morphological information is not integrated into the lexical entries, but is learnt and remembered as explicit knowledge, as often is the case in instructed L2 learning? In other words, what processing consequences will it have, if one does not have the lexical competence described above, but only lexical knowledge? It is conceivable that the selection of morphologically appropriate words will become a conscious process involving two strictly serial steps: the selection of a root form such as *leave* and then the selection of the morphologically appropriate form on the basis of one's morphological knowledge.

To use the above example, if morphological variations such as *leave*, *leaves*, *left*, *leaving* are not integrated into the lexical entry for LEAVE in an L2 speaker, an alternative is that these morphological variations are represented individually in the L2 lexicon as separate entries. Conceivably, there will be links between these entries that are established in the process of learning these words. In producing 'They left', the entry for LEAVE will be opened, but this time, there is only the root form *leave* in it. A second step has to be involved in selecting a morphologically appropriate form *left*, through the application of morphological knowledge.

Such a two-step morphological process is not only less automatic. Morphological errors may occur as well. The application of morphological knowledge is most likely to be a conscious process requiring attentional resources. When one's attention is focused on the message to be communicated, morphological errors result. The application of morphological knowledge may also require an L2 user's *conscious* awareness of the 'past' or 'plural' fragment of the message. In natural communication, such fragments are not always the critical part of the message and often fail to enter one's consciousness. An incorrect word form can be used under such a circumstance as well.

2. RESEARCH EVIDENCE

In the first section, I have outlined a model of L2 lexical representation and development. A general claim this model makes is that lexical representation and development in tutored L2 is fundamentally different from that in L1 due to two practical constraints associated with L2 acquisition in instructional settings: lack of sufficient contextualized input and the presence of the established semantic and lexical systems. According to this model, lexical

development goes through an initial, formal stage, then a second, L1 lemma mediation stage. It is also argued that for most L2 words, the transition from the second stage to the final, L2 integration stage is not likely to occur. Lexical representation in L2 hence has three unique features. First, an L2 lexical entry contains its own formal specifications and the semantic and syntactic specifications of its counterpart in L1. Second, it does not have morphological specifications. Third, the connections between L2 words and higher level representations are relatively weak. These features, in turn, carry some important processing consequences, notably, L1 lemma mediation in L2 use and conscious application of morphological information.

In this section, I would like to review some evidence that is consistent with the model. The evidence comes from two areas: the study of the bilingual lexicon and the study of L2 production.

2.1 The transition from lexical association to conceptual mediation

Words in two languages may be connected in two different ways. English–Chinese translation pairs, such as *school* and *xuexiao*, may be connected directly when these two words form an association in the process of learning L2 (lexical association). They may also be connected through shared conceptual representations because of similar semantic content (conceptual mediation) (see Figure 3b). It was suggested earlier that the use of L2 words at the formal stage may rely on the mediation of L1 translation equivalents, but at the L1 lemma mediation stage, the connection between L2 words and higher level representations may be more direct in the sense that the L1 lexical form may be bypassed. In line with this view, several studies have showed that beginning L2 learners seem to rely more on lexical links, i.e. the direct connections, between L2 and L1, in L2 processing. But as their proficiency increases, conceptual mediation takes over. Earlier evidence is obtained in a study by Chen and Leung (1989)³ who tested beginning L2 learners and proficient L2 speakers in picture naming and translation tasks. Picture naming is generally believed to require conceptual activation and thus, follow the route of picture to concept to word. Translation from L1 to L2, on the other hand, may take two different routes, L1 to concept to L2, or L1 to L2 with the latter being more direct, and thus, faster. It was found that the proficient group were equally fast in picture naming and translation in L2, suggesting that they seemed to rely on conceptual mediation in both tasks. Adult beginners, however, performed the translation task faster than picture naming, suggesting that they relied on the faster lexical route. Similar findings were reported in a study by Kroll and Curley (1988). These findings provide strong evidence that L2 learners rely more on lexical association at the beginning stage, but as their proficiency increases, lexical association gives its way to conceptual mediation.

Further evidence comes from a study conducted by Talamas *et al.* (1995,

discussed in Kroll and De Groot 1997). In a translation recognition task in which subjects had to judge whether two words are translations of each other, they included non-translation pairs that are related in form, related in meaning, or unrelated. They found less proficient bilingual speakers produced a large form interference effect, i.e. they took longer to reject them as translation pairs than they took to reject unrelated controls, but a small semantic interference effect. The more fluent subjects, however, showed the opposite pattern, producing a large meaning interference effect, but a small form interference effect. These results again suggest that as one's proficiency increases, reliance on L1 lexical forms decreases.

These findings are consistent with the understanding of the L2 lexical representation discussed above. At the first stage when the lexical entry contains mostly formal features, the activation of L1 lexical forms is obligatory in L2 use, but with increasing exposure and proficiency, the learner may reach the second stage where L1 lemma mediation allows L2 words to link to upper level representation more directly without relying as much on L1 lexical forms.

2.2 Weak connections between L2 words and conceptual representation

The semantic content in a lexical entry is the bridge between a lexical item and higher level conceptual representation. As I suggested earlier, if the semantic information of an L2 word is copied from the lemma of its L1 translation, we may expect relatively weak connections between these L2 words and their corresponding conceptual representations.

The evidence for such weak connections comes from some recent masked cross-language priming studies. In a cross-language priming study, a target word is preceded by its translation equivalent to determine if these targets are responded to faster than when preceded by an unrelated prime word. The prime word may be a translation or an unrelated word to the target. The participant's task is to decide whether the target is a word or not (lexical decision task) or to determine the semantic category of the target (semantic categorization task). In a masked priming experiment, the prime is usually presented for a very brief duration (for example, 50 msec) and is masked by a forward mask, for example, a string of hash marks (#####) presented immediately before the prime words. Subjects are usually not consciously aware of the presence of these prime words and the bilingual nature of the task. All they see consciously is the mask followed immediately by the target words. This procedure is adopted to minimize the involvement of strategic effects or attentional processes. Each test item may consist of a mask for 500 msec, a prime word for 50 msec, and a target for 500 msec, with each member of the triad immediately following the preceding one.

In the four masked cross-language priming studies published, one can find a clear and consistent pattern: the priming from L1 to L2 (L1-L2) is strong and

consistent and priming from L2 to L1 (L2–L1) is weak and inconsistent. One of these studies is by De Groot and Nas (1991). Dutch–English bilingual speakers were tested on Dutch–English prime–target translation pairs and strong translation priming was found from L1 to L2. In the second study (Sanchez-Casas *et al.* 1992), Spanish–English bilingual subjects were tested on L2–L1 translation pairs with a semantic categorization task. No cross-language priming was found. In a recent study by Gollan *et al.* (1997), Hebrew–English and English–Hebrew bilingual speakers were tested. Unlike the first two studies, both priming directions, L1–L2 and L2–L1, were tested in this study. Again, translation priming was found only in L1–L2 direction, but not the reverse. The asymmetry was replicated in a study by Jiang (1999) where the same group of Chinese–English bilingual speakers were tested in both directions. Given the assumption that cross-language priming comes from the conceptual level (De Groot 1992), the failure to obtain a priming effect from L2 to L1 indicates weak connections between L2 words and concepts.

2.3 Word choice and usage errors in L2 production

Further evidence for the model comes from lexical errors made in L2 production. As pointed out earlier, lexical association and L1 lemma mediation would lead to lexical errors when an L2 word and its L1 translation do not have a complete overlap in semantic or grammatical specifications. These errors are often categorized as interference errors in the L2 literature. Indeed, L1 interference has been found to be a major cause of lexical errors in L2 production. In a study by Zughoul (1991), for example, more than 73 per cent of the 691 English lexical errors found in the written texts of 128 university ESL students can be traced to the interference from L1.

Lexical errors due to L1 interference often appear in the form of incorrect word choice, as can be seen in the following examples:

- 1 * I go to the oven (bakery) in the morning to buy bread.
- 2 * My father is a long (tall) thin man.
- 3 * There are many works (jobs) in the city. (Zughoul 1991)
- 4 * . . . they thought it's a good possibility (chance) to catch him . . .
(Lennon 1991)
- 5 * to count (take) someone's pulse (Biskup 1992)

In addition to such word choice errors, L2 words may be often used incorrectly syntactically by L2 learners. Hakuta (1987), for instance, reported a case where a Japanese learner of English regularly used the English word *mistake* as a verb in contexts where such usage is not allowed in English, but allowed in Japanese. Similarly, Chinese learners of English often make errors such as

- 6 * He put a book.

or consider them acceptable because the Chinese counterpart for *put*, *fang*, may be used with a single NP without a PP. More examples of such syntactic errors can be found in Dalgish (1991) and Yu and Atkinson (1988).

These interference errors in word choice and usage suggest that L2 words are selected or used on the basis of the semantic and syntactic information of their L1 translations.

2.4 Morphological errors in L2 production

As pointed out earlier, due to the lack of morphological specifications within the lexical entry, the generation of morphologically appropriate forms becomes a conscious process, and when fewer attentional resources are available, morphological errors occur. Consistent with this view, morphological errors such as the following are abundant in the speech and written texts of ESL users, even very advanced users:

- 7 * we become (became) close friend (friends)
- 8 * he see (saw) one car from back of his bike (Long 1997)
- 9 * TV is one of the form (forms) of media (Aaronson and Ferres 1987)

An analysis of the error pattern provides further support for a two-step process of morphological production in instructed L2. I suggested earlier that when morphological specifications are not an integral part of the lexical entry, morphologically related words may be represented individually with connections built among them. As the root form is often the focus of instruction when a word is first introduced, what is represented in lexical entry is often the root form such as *leave*, which is linked to its morphologically related words *leaves*, *left*, *leaving*. These links are likely to be directional, i.e. from a root form such as *leave* to inflected forms such as *leaves* and *left*, rather than the reverse. The selection of a morphologically appropriate word form may start from the root form and a second step is then involved to select the right inflected form by applying one's morphological knowledge. This means that morphological errors are more likely to occur when an inflected form is required. Under such circumstances, a root form may be used because of limited attentional resources available for applying morphological knowledge. This is exactly the pattern one can find in L2 production. More morphological errors take the form of using an incorrect root form when an inflected form is required, rather than the reverse.⁴

More convincing support for this argument would come from a situation in which an inflected form is introduced as a basic form in language teaching. Under such a circumstance, an opposite pattern would occur, i.e. more errors would occur in which inflected forms were incorrectly adopted in situations where an uninflected form was required. A study by Mukkatesh (1986) reveals such a situation where, according to Mukkatesh, 'the root form of Arabic verbs is generally translated by Arab teachers into the English simple past (for example, *katab* = *wrote*)' (Mukkatesh 1986: 191). Consistent with what I have suggested, the most frequent verb tense error in his Arabic students of English involved the incorrect use of the simple past when the simple present tense should be used.

Note that the rules regarding these inflections in English are usually very simple. An L2 learner of English may get to know such a rule by the end of the first month of learning English, or by the end of the first day if the teacher prefers. Indeed, L2 learners are often aware of the fact they have made an error and are able to state the rule regarding the inflection if they are asked to. The subject in Krashen and Pon's (1975) study, for instance, 'was able to self-correct nearly every error she made in casual speech when the errors were pointed out to her after their commission. Furthermore, in nearly every case she was able to describe the grammatical principle involved.'

The occurrence of such morphological errors while relevant rules are known to the speaker provides a strong argument for the distinction between lexical information represented within the lexical entry and that outside the lexical entry. Instead of assuming that what an L2 learner knows about a word is always represented in the lexical entry, as is often the case in L2 vocabulary acquisition research, I suggest that much of the lexical information obtained by means of other than contextualized extraction is represented outside the lexical entry and thus is part of the attentional rather than automatic process. This includes semantic and syntactic information as well. Hence, when an L2 learner is able to use the word *table* to refer to an object 'table', it does not necessarily mean the semantic specification has been integrated into the lexical entry. Instead, lexical association may be at work.

2.5 Lexical fossilization

Lexical fossilization can be best supported through findings from longitudinal studies. Unfortunately, such studies are hard to find in the second language literature. The one that we can find suggests, that, in some cases, lexical development ceases before it reaches a native-like state. Long (1997) reported a ten-year longitudinal study of a Japanese woman who lived in the United States for more than 40 years. Many of the lexical errors found initially reappeared ten years later. A similar case has been reported by Lardiere (Lardiere 1998). Plenty of motivation and learning opportunities did not seem to help defossilize these adult L2 speakers' lexical development.

Evidence for lexical fossilization can also be found in morpheme acquisition studies carried out in the 1970s and early 1980s (for example, Dulay and Burt 1974; Larsen-Freeman 1976; Krashen *et al.* 1978; Pica 1983). It is repeatedly found that past tense is a problem even for advanced learners. It was also categorized as one of the morphemes to be acquired latest in Krashen's natural order of morpheme acquisition (Krashen 1977).

Further indication of lexical fossilization comes from the masked cross-language priming studies mentioned above. The bilingual subjects in both Gollan *et al.* (1997) and Jiang (1999) were very proficient in L2. Many of these subjects had lived in the L2 environment for many years and L2 had become a daily working language. The failure of these subjects to produce L2-L1

priming suggests that the representational status of the L2 lexical system did not seem to change even within a quite extended period of time.

3. SOME RESEARCH AND PEDAGOGICAL ISSUES RELATED TO THE MODEL

The model I outlined above raises some important issues to be further investigated in the study of second language acquisition. I will discuss four of them below.

3.1 Lexical knowledge, lexical competence, and lexical transfer

In the study of L2 vocabulary acquisition, the question of what is meant by learning a word has not received as much attention as it should, at least from a representational point of view. This neglect is reflected in the lack of a proper definition of lexical competence that is widely accepted by researchers in this area. Currently, three versions of such a definition can be found in the literature. The simplest or most narrow definition one can find is to define the acquisition of a word as being able to recognize or recall a word or its meaning. Though such a definition is seldom explicitly adopted, it is often implicitly employed as a working definition in many experimental studies of L2 vocabulary acquisition (for example, Markham 1989; Brown and Perry 1991; Hulstijn 1992; Moore and Surber 1992; Hogben and Lawson 1992, 1994; Wang *et al.* 1992; Ellis and Beaton 1993a, 1993b; Fischer 1994; Griffin and Harley 1996). In these studies, L2 vocabulary acquisition is often evaluated by measuring the percentage of new words the subjects were able to recognize, recall, or provide definition, synonym, or translation for.

For practical reasons, a working definition like this may be something to begin with. However, one has to realize, while interpreting the results of such studies, that what these studies measured was whether a word is remembered, rather than acquired. Knowing that a letter string forms a word, or even knowing its meaning, does not tell us much about whether one is able to actually use the word appropriately and efficiently in communication (Ellis and Beaton 1993b), let alone the psycholinguistic status of the word.

A broader definition of lexical competence comprises various kinds of knowledge one has to possess in order to use a word appropriately. One such definition can be found in Richards (1976), who suggests eight 'assumptions concerning the nature of lexical competence'. Lexical competence is seen as much more than knowing the form and meaning of a word. It also means to know, for example, the association between a word and other words, the likelihood a word may occur in a linguistic context, and the limitations imposed on the use of a word according to variations of function and situation. Similarly, Nation (Nation 1990) considers lexical competence as consisting of four dimensions of knowledge form, position, function, and meaning.

By looking into a broader spectrum of knowledge one has to have, these definitions acknowledge the depth of knowledge involved in vocabulary acquisition and use. This approach to lexical competence also leads to a much richer repertoire of tasks to be used in measuring lexical competence (for example, Schmitt and Meara 1997; Wesche and Paribakht 1996). However, as Manguerra (1993) pointed out, a list such as the one suggested by Richards is not the best way to describe a system. Furthermore, lexical competence is still defined as knowledge. Little is being said about the representational nature of the knowledge.

A third way to define lexical competence is to look at it as skills rather than knowledge, with an emphasis on automaticity in lexical processing. In this view, vocabulary acquisition is a process of increasing automaticity in lexical recognition and production. Thus, Coady *et al.* (1985) divided L2 words into three categories: words whose meaning is not known to a learner, words whose form and meaning are familiar to the learner but only recognizable in context, and words whose form and meaning can be automatically recognized even without context. Such a view of lexical competence is also implicit in the research that emphasizes automaticity (for example, Segalowitz 1995) or measures one's lexical competence by means of reaction time (for example, Kempe and MacWhinney 1996). However, as can be seen in both studies, the automaticity-oriented definition is closely associated with L2 word recognition which covers only a small fraction of lexical competence and performance. We may apply such a definition to other aspects of lexical competence, for example, lexical production. However, as pointed out earlier, a certain level of automaticity can be achieved through L1 lemma mediation, which does not constitute lexical competence in the framework proposed in the paper. The coexistence of high levels of automaticity and inflection or interference errors in very advanced learners suggests that lexical development in L2 is more than a matter of automaticity.

In this context, I would like to make a distinction between lexical knowledge, lexical competence, and lexical transfer, with an emphasis on the first two. The terms 'lexical knowledge' and 'lexical competence' can both be found in the L2 vocabulary acquisition literature and are used largely interchangeably. We are making a distinction between these two on the basis of whether or not information is integrated into the lexical entry. By lexical knowledge I mean the knowledge or information an L2 learner remembers about the form, meaning, grammatical usage, and sociolinguistic use of a word that is stored in a general memory system, rather than integrated into the lexical entry of a word. This covers the first and second definitions mentioned above. These different kinds of information are explicitly taught to and remembered by the learners in the process of learning a word and are typically available for conscious recollection.

I save the term 'lexical competence' to refer to the semantic, syntactic, morphological, and formal knowledge about a word that has become an integral part of an lexical entry in the mental lexicon and can be retrieved

automatically in natural communication. Such a definition is based on my view of lexical development as a process of integrating information into lexical entries, which has also been suggested by De Bot *et al.* (1997). Defined this way, lexical knowledge and lexical competence differ in two ways. Lexical knowledge is represented outside the lexical entry but lexical competence is within the lexical entry. A certain level of conscious awareness is required in the application of lexical knowledge, but the execution of lexical competence is an automatic process. In this sense, lexical competence is procedural knowledge, and lexical knowledge is propositional knowledge.

Thus, an L2 learner's lexical performance is driven by three forces: the lexical knowledge he or she has about a word, the lexical competence he or she has developed, and lexical transfer, which is the use of L2 words on the basis of their L1 translations. In the latter case, lexical performance is based only on the knowledge that a certain L2 word is the translation of a certain L1 word. It is not always possible to tell which plays a more important role in a specific situation. For instance, when there is a positive transfer from L1, an L2 word may be used correctly and with a certain level of automaticity, as if driven by lexical competence. In addition, much of the lexical knowledge may have to do with L1 transfer and thus, they may be hard to distinguish in practice. However, generally speaking, a lack of fluency and accuracy, accompanied by frequent self-correction characterize the performance of lexical knowledge, rather than the performance of lexical competence. Lexical performance driven by L1 transfer may reach a certain level of automaticity, but because of its 'pseudo-acquisition nature' (Krashen 1983: 142), it is prone to interference errors. Competence-driven performance is characterized by a high degree of fluency and idiomaticity. Errors may still occur. But these errors reflect the inaccuracy of the information represented in the lexical entry, just like the ones made by children in first language development. Unlike errors associated with L1 transfer or conscious application of lexical knowledge, they are more consistent and usually not accompanied by self-correction. No clear source of L1 interference can be identified either.

Thus, we may refer to an L2 learner as having lexical knowledge about a word but not lexical competence when he or she can state the rule regarding plurality but uses a singular form when a plural form is required. We may refer to the lexical performance as being driven by lexical transfer, not lexical competence, when an L2 learner can provide the form and meaning of a word when requested, but uses the word in the way its L1 translation would be used in L1. In short, lexical competence is not defined in terms of how much knowledge one knows about a word, or just in terms of the level of automaticity, but in terms of whether the knowledge is integrated into the lexical entry.

While such a distinction has important implications for the teaching and testing of L2 vocabulary and for L2 vocabulary acquisition research, it also raises the question of how one can empirically distinguish lexical knowledge from lexical competence, a question yet to be explored. Different paradigms

may be needed for dealing with different aspects of lexical competence. One place to look for such paradigms is in the field of psycholinguistics, in particular the areas of word recognition and bilingual language processing. In word recognition studies, for example, it has been found that different inflectional variants of the same word prime each other. If this is an indication of these variants being represented in the same entry, it would be interesting to see if L2 words produce similar priming effects. The presence or absence of such an effect might provide an indication of whether the morphological specifications have been integrated into the lexical entry.

3.2 The role of semantic overlap in L2 lexical development

The existence of a previously established semantic system has been considered, in the present model, as a major cause for the difference in lexical development between L2 versus L1 and for lexical fossilization in L2. It is suggested that when a meaning corresponding to, or at least similar to, the meaning of an L2 word has already been learned in the process of first language acquisition, this meaning will be activated in learning the L2 word, thus making meaning creation an unnecessary and often impossible part of L2 vocabulary acquisition.

However, not all L2 words have corresponding L1 translations and not all L1 translations have the same degree of semantic overlap with L2 words. L2 words hence can be divided into three categories in terms of whether they have L1 translations and to what extent their L1 translations match their semantic specifications. We may call those L2 words without L1 translations *strangers*. Their meanings are not coded lexically in L1, or such a concept does not exist. The words *privacy* and *community* are two such words for Chinese learners. Another category of words are *real friends*. They not only have L1 translations but also have a high degree of semantic overlap with their translations. Or to put it another way, they can find ready semantic specifications in the existing semantic system. Finally, there are *false friends*, words that have L1 translations which nevertheless do not share a high degree of semantic overlap.

Based on the role this model designates for the established semantic system and on the above distinction, different patterns of lexical development can be predicted for these types of words. First, a contrast can be made between strangers and friends. The friends may be relatively easy to learn initially in that they may become part of the productive vocabulary early and they may be used with some fluency early. This is so because they have L1 translations to serve as a walking stick and there is also ready-made semantic content to be copied to their lexical entries. However, for the same reason, they may remain at the second stage for an extended period of time, if not forever. Their fluency and accuracy may be capped at a certain level, or fossilized.

The strangers, on the other hand, may take quite a while even to be understood, let alone used, by the learner. During this time, a motivated

learner will search for each stranger's meaning and other lexical information by looking into all the contextual information available. This is a process of meaning creation. Once this process is completed, strangers will reach the third stage at which they will be used with a much greater degree of automaticity and accuracy than friends.

A further contrast can be made between real friends and false friends. As their degree of semantic overlap differs, it is more likely for a learner to catch a semantic mismatch between a false friend and its translation than a real friend. Take the English word *support* for example. It is often translated into *zhichi*, a high-frequency Chinese word that is only used in the abstract sense such as '*wo zhichi ni dangxuan*' ('I support your being elected'). When encountering a sentence like '*we need something to support the wall*', a Chinese learner may notice that the word *support* can also be used in a concrete or physical sense. This noticing or awareness is very important because it is the first step toward the creation of a new semantic content that is specific to this L2 word. It provides a motivation for the learner to pay attention to the context for further indications or confirmation of what he or she has discovered. The result will be a new combination of semantic features to be integrated into the lexical entry of this word. Conceivably, such a process will be less likely to occur for L2 words that match to a high degree their translations in meaning.

3.3 Episodic nature of L2 lexical representation?

What has been discussed so far constitutes a microview of L2 lexical representation, because it deals with how individual lexical entries evolve. One may also look at L2 lexical representation from a more global perspective, i.e. how the L2 lexical system is represented as a whole.

A distinction has been made in memory studies between episodic and semantic memory (Tulving 1972; 1983). Episodic memory is a system that receives and stores information about episodes or events. Semantic memory 'is a mental thesaurus, organized knowledge a person possesses about words and other verbal symbols, their meaning and referents, about relations among them' (Tulving 1972: 386). In word recognition studies, a similar distinction has been made between the lexical system, i.e. the lexicon, and the non-lexical, episodic system (Forster 1985). Thus, lexical information can be represented in both the episodic system and the lexicon. When one learns a word, the word is stored in the lexicon and it leaves a trace in the episodic system as well. In an experimental setting, if a participant is asked to remember an unrelated word pair such as *city-grass*, such information is believed to be stored in one's episodic memory. However, the knowledge one has about the relatedness of word pairs such as *green-grass* or *doctor-nurse* is believed to be stored in semantic or lexical memory.

Evidence for the distinction of these two systems first comes from the dissociation of priming effect in tasks that tap different systems. It has been

found in several studies (for example, Carroll and Kirsner 1982; Neely and Durgunoglu 1985; Dagenbach *et al.* 1990a) that semantically related word pairs (*doctor, nurse*) produced priming only in a lexical decision task (LDT) in which the participant was asked to decide if a letter string was a word or not. LDT is believed to tap the lexical system. No such priming effect was found in an episodic recognition task (ERT) in which the participant was asked to decide if a word presented to them was one of the words they saw previously. ERT is believed to tap the episodic system. In contrast, when semantically unrelated word pairs (*city, grass*) were studied together to form an association, such word pairs produced priming only in ERT, not in LDT. Further dissociation between the two systems can be found in the presence of a frequency effect in LDT, but not in ERT, and a repetition effect for non-words in ERT, but not in LDT (Forster 1985). Further evidence in support of the distinction comes from the finding that contextual variation affected subjects' performance only in ERT, not when the lexical system was involved (Stumpfel 1986).

We may assume that semantic specifications are required for a word to be represented in the lexicon because they are necessary for words to relate to each other and to relate to the conceptual representation. It is consistent with Tulving's idea that the semantic system as a mental thesaurus contains both forms and meanings of words. Besides, a word whose meanings are unknown to a person is equivalent to a non-word to this person. If he or she is told it is a word but not told its meaning, it may become a word in the episodic system in the sense that he or she 'knows' it is a word by remembering being told so.

The findings from two studies are consistent with this meaning requirement assumption. In a study by Forster (1985), the recognition of obsolete words unknown to the subjects was not facilitated when these words were primed by themselves. That is, no repetition effects were found when these obsolete words were treated as non-words. However, when their meanings were explained to the subjects, the same set of words produced repetition effects. In another study by Dagenbach *et al.* (1990b), it was found that only new words whose meaning could be recalled produced a semantic priming effect. New words whose meaning could not be recalled produced either no effect or an inhibitory effect. Both studies show the central role meanings play in the integration of new words into the lexicon.

An interesting issue to explore, then, is whether L2 words are represented in the episodic system or in the lexicon. Given the meaning requirement assumption mentioned above, and if it is true that L2 lexical entries contain only formal specifications at the first stage of vocabulary acquisition, it is highly likely that they are part of the episodic system. A more subtle situation is when, at the second stage, the lexical entry contains the semantic information of the L1 lemma. Do these semantic specifications satisfy the semantic requirement?

Not much can be found in the literature that may be brought to bear on this issue. However, two things are clear and may be potentially relevant. First,

according to Tulving (1983), 'access to, or actualization of, information in the episodic system tends to be deliberate and usually requires conscious effort whereas in the semantic system it tends to be automatic' (Tulving 1983: 46). Morphological errors discussed earlier clearly suggest that the application of morphological information is a conscious and effortful process. Thus, it is very likely that morphological information is represented in the episodic system. Second, according to a series of experiments carried out in our lab (Jiang 1997; Jiang and Forster 1997, Forster and Jiang, in press), L2 words that failed to produce cross-language priming in LDT were able to produce priming when the task was switched from LDT to ERT. This finding strongly suggests that lexical links between L2 and L1 are episodic in nature and are part of the episodic system.

I consider the episodic nature of L2 representation an important issue to pursue. It may help us understand what non-nativeness means from a psycholinguistic point of view. The answer to this question, however, will ultimately depend on the finding of a research paradigm that can empirically distinguish lexical information represented in two different systems, and such a paradigm has yet to be found.

3.4 Lexical development and vocabulary teaching

In addition to semantic overlap, teaching is another factor that may affect the pattern of lexical development in L2. Two general vocabulary teaching approaches may be distinguished for the present purpose. One is the word association approach. An example of such an approach is the key word method (for example, Wang *et al.* 1992; Hogben and Lawson 1994). Here, the meaning of an L2 word is 'told' to the learner by means of providing its L1 translation. The meaning is not 'discovered', so to speak, by the learners themselves. Another approach, the contextualized approach, emphasizes the learning of L2 words in context (for example, Cho and Krashen 1994; Day *et al.* 1991; Watanabe 1997). It emphasizes providing contextualized exposure to new words, mostly through reading, and encourages the inference of meaning from context.

These two approaches are different in terms of the two constraints discussed earlier, contextualized input and reliance on L1. The first approach does not emphasize the provision of contextualized input, at least initially, and is more likely to encourage the learner's tendency to rely on L1. The second approach encourages meaning inference and attempts to minimize the reliance on L1. Given the relation I discussed between input and reliance on L1 on one side and lexical representation and development on the other, the second approach seems to provide better conditions for the development of lexical competence.

However, many questions remain to be answered before any conclusion can be reached. It is not clear, for example, to what extent L1 intervention can be avoided or at least reduced when the contextualized approach is adopted. If

the activation of and reliance on L1 translations are inevitable or beneficial (for example, Kern 1994), should teachers still try to avoid using L1 translations? Another potential problem with relying only on context is that L2 learners may not always be able to guess the meaning of a word from context (for example, Bensoussan and Laufer 1984). On the other hand, while teaching vocabulary through translation pairs is believed to be more effective in terms of word retention, is it also more effective in the long run? How much lexical information can be learned this way? What about L1 interference? It seems that each side of the debate over the effectiveness of incidental vs. decontextualized vocabulary learning (for example, Krashen 1989; Oxford and Crookall 1990; Clipperton 1994; Raptis 1997) has their own problems to solve. The debate is not likely to be settled before we know more about the psycholinguistic processes and their representational consequences involved in vocabulary acquisition under different conditions.

4. CONCLUSION

I have attempted to outline a model of tutored L2 vocabulary acquisition that is based on an understanding of the representational characteristics of the L2 lexicon. The model can be summarized as below.

- 1 There is a fundamental difference between L1 and tutored L2 in lexical development. The integration of semantic, syntactic, morphological, and formal specifications may occur for most, if not all, L1 words, but only for a small proportion of L2 words.
- 2 The major causes of the difference are (a) limited contextualized input and (b) the intervention of the existing semantic and lexical systems.
- 3 Lexical development in tutored L2 can be divided into three stages on the basis of what information is represented in the lexical entry. At the first stage, a lexical entry is established for an L2 word, but it only contains formal specifications and a pointer. At the second stage, an L2 entry is a combination of L2 formal information (in the lexeme) and the semantic and syntactic information of its L1 translation (in the lemma). The integration of L2 information other than formal specifications is realized at the third stage.
- 4 A majority of L2 words fossilize at the second stage. Fossilized lexical representation in L2 has three unique features: (a) lexical entries consist of L2 formal specifications and the semantic and syntactic information of their L1 translations; (b) no morphological specifications are represented in L2 lexical entries, which means different morphological variants of the same word are represented individually as separate entries; (c) the connections between L2 words and concepts are weak.
- 5 These representational features carry two significant processing consequences: (a) the use of L2 words is based on the lemma information of

their translations; (b) the selection of morphologically appropriate lexical forms becomes a conscious process.

I also discussed some issues this model raises. They include the formulation of a representationally adequate definition of lexical competence and the development of empirical paradigms for the testing of such competence, the role of semantic overlap between L2 and L1 words in L2 lexical development, the episodic nature of L2 lexical representation and its processing consequences, and finally, the role of teaching in lexical development.

Before I finish, I would like to emphasize the limitations of this model. First, the immediate purpose of this study is to provide an account of the psycholinguistic processes involved in lexical representation and development in L2. In this sense, this model represents a micro view of vocabulary acquisition in L2. Many broader issues, such as how social contexts may affect the process of lexical development in L2, are not dealt with in this model.

Second, this model deals with second language learning with insufficient natural exposure and/or with established L1 linguistic and semantic systems, as in, for example, adult second language acquisition in formal settings, or tutored second language learning. It is not intended to account for L2 vocabulary acquisition under naturalistic settings, though some findings from naturalistic L2 acquisition are not inconsistent with the model (Long 1997; Lardiere 1998; Aaronson and Ferres 1987). Significant modifications may be required of this model if it is to explain a wider range of data from naturalistic L2 vocabulary acquisition. Furthermore, lexical development in simultaneous acquisition of two languages, or L2 acquisition at young ages, may be very different from what is described in this model.

Finally, it should be noted that this is a very preliminary model. In addition to the issues I discussed in Section 3, many questions may be asked that have no easy answer in this model. One such question is lexical fossilization. While the findings from studies such as Long (1997), Lardiere (1998), and Aaronson and Ferres (1987) suggest lexical fossilization occurs even in adult L2 lexical development in naturalistic settings, there are also L2 learners who do seem to achieve a lexical proficiency level that is comparable to that of native speakers. This suggests that there are factors other than input and established semantic and lexical system that may be involved in lexical fossilization. It is by no means clear what these factors are and how they affect lexical development and representation. More case studies such as Long (1997) should be carried out to document fossilized and non-fossilized lexical development and uncover the factors involved in the process.

Much detail waits to be worked out too. For instance, how does such a three-stage model accommodate the possibility that different types of words may follow different patterns of development? I mentioned the possible difference among strangers, real friends and false friends. Cognates and non-cognates may follow different patterns too. Such detail will to a large extent depend on further empirical evidence. My purpose in proposing such a

preliminary model is to provide a framework that may serve to stimulate further research in this area and lead to the development of models with greater empirical support. It is also my hope to illustrate in this paper that an understanding of representational characteristics of L2 may serve as an adequate starting point and is at the same time critical for the development of theories of second language acquisition.

(Revised version received May 1999)

ACKNOWLEDGEMENT

The author is most grateful to Kenneth Forster, Judith Kroll, Claire Kramsch, Martin Bygate, and three anonymous reviewers for their comments on earlier versions of this paper. The writing of the paper is supported in part by a Baker Summer Research Fellowship from the Language Schools at Middlebury College.

NOTES

- 1 In this paper as well as in the field of psycholinguistics, word level grammatical knowledge, such as morphology, subcategorical information, but not word order or other sentence level grammatical knowledge, is considered to be represented in lexical entries as part of one's lexical knowledge. Much of the discussion on lexical representation and development that follows will include what is usually considered grammatical knowledge in the second language literature.
- 2 It should be noted that more 'communicative' or 'incidental' vocabulary teaching methods are available. See Section 3.4 for examples.
- 3 In this and the other psycholinguistic stud-

ies discussed in this section, bilingual participants had diverse L2 learning backgrounds. Most of them started learning L2 in a formal setting and then lived in an L2 environment. Their L2 proficiency was usually determined by the number of years they spent learning L2 or living in the L2 environment. The diverse L2 learning backgrounds and the definition of L2 proficiency may create a difficulty in interpreting the findings. See Grosjean 1998 for discussion of this issue.

- 4 However, it is possible that at a certain stage of L2 development, L2 learners are particularly conscious of such morphological errors in their speech and become overusers of inflected forms.

REFERENCES

- Aaronson, D. and S. Ferres. 1987. 'The impact of language differences on language processing: An example from Chinese-English bilingualism' in P. Homet, M. Palij, and D. Aaronson (eds.): *Childhood Bilingualism: Aspects of Linguistic, Cognitive, and Social Development*. Hillsdale, NJ: Lawrence Erlbaum.
- Bensoussan, M. and B. Laufer. 1984. 'Lexical guessing in context in EFL reading comprehension.' *Journal of Research in Reading* 7: 15-32.
- Bickerton, D. 1975. *Dynamics of a creole system*. Cambridge: Cambridge University Press.
- Bierwisch, M. and R. Schreuder. 1992. 'From concepts to lexical items.' *Cognition* 42: 23-60.
- Biskup, D. 1992. 'L1 influence on learners' renderings of English collocations: A Polish/German empirical study' in J. L. Arnaud and H. Bejoint (eds.): *Vocabulary and Applied Linguistics*. London: Macmillan Academic and Professional.
- Bloom, P. 1993. 'Overview: Controversies in language acquisition' in P. Bloom (ed.): *Language Acquisition: Core Readings*. Cambridge, MA: MIT Press.

- Bock, K. and W. Levelt. 1994. 'Language production: Grammatical encoding' in M. A. Gernsbacher (ed.): *Handbook of Psycholinguistics*. San Diego: Academic Press.
- Brown, T. S. and F. L. Perry. 1991. 'A comparison of three learning strategies for ESL vocabulary acquisition.' *TESOL Quarterly* 25: 655-70.
- Carroll, M. and K. Kirsner. 1982. 'Context and repetition effects in lexical decision and recognition memory.' *Journal of Verbal Learning and Verbal Memory* 21: 55-69.
- Chen, H.-C. and Y.-S. Leung. 1989. 'Patterns of lexical processing in a non-native language.' *Journal of Experimental Psychology: Learning, Memory, and Cognition* 15: 316-25.
- Cho, K.-S. and S. D. Krashen. 1994. 'Acquisition of vocabulary from the Sweet Valley Kids series: Adult ESL acquisition.' *Journal of Reading* 37: 662-7.
- Clark, E. 1973. 'What is in a word: On the child's acquisition of semantics in his first language' in T. Moore (ed.): *Cognitive Development and Acquisition of Language*. New York: Academic Press.
- Clipperton, R. 1994. 'Explicit vocabulary instruction in French immersion.' *The Canadian Modern Language Review* 50: 736-49.
- Coady, J. M., P. Carrell, and P. Nation. 1985. *The Teaching of Vocabulary in ESL from the Perspective of Schema Theory*. Milwaukee: Midwest TESOL.
- Dagenbach, D., S. Horst, and T. H. Carr. 1990a. 'Adding new information to semantic memory: How much learning is enough to produce automatic priming?' *Journal of Experimental Psychology: Learning, Memory, and Cognition* 16: 581-91.
- Dagenbach, D., T. H. Carr, and T. M. Barnhardt. 1990b. 'Inhibitory semantic priming of lexical decisions due to failure to retrieve weakly activated codes.' *Journal of Experimental Psychology: Learning, Memory, and Cognition* 16: 328-40.
- Dalgish, G. M. 1991. 'Computer-assisted error analysis and courseware design: applications for ESL in the Swedish context.' *CALICO Journal* 9(2): 39-56.
- Day, R. R., C. Omura, and M. Hiramatsu. 1991. 'Incidental EFL vocabulary learning and reading.' *Reading in a Foreign Language* 7: 541-9.
- De Bot, K. 1992. 'A bilingual production model: Levelt's speaking model adapted.' *Applied Linguistics* 13: 1-24.
- De Bot, K., T. S. Paribakht, and M. B. Wesche. 1997. 'Toward a lexical processing model for the study of second language vocabulary acquisition: Evidence from ESL reading.' *Studies in Second Language Acquisition* 19: 309-29.
- De Groot, A. M. B. 1992. 'Bilingual lexical representation: A closer look at conceptual representations' in R. Frost and L. Katz (eds.): *Orthography, Phonology, Morphology, and Meaning*. Amsterdam: Elsevier.
- De Groot, A. M. B. and G. L. J. Nas. 1991. 'Lexical representation of cognates and non-cognates in compound bilinguals.' *Journal of Memory and Language* 30: 90-123.
- Dell, G. S. 1986. 'A spreading activation theory of retrieval in sentence production.' *Psychological Review* 93: 283-321.
- Dulay, H. and M. Burt. 1974. 'Errors and strategies in child second language acquisition.' *TESOL Quarterly* 8: 129-36.
- Ellis, N. and A. Beaton. 1993a. 'Factors affecting the learning of foreign language vocabulary.' *The Quarterly Journal of Experimental Psychology* 46A: 533-58.
- Ellis, N. and A. Beaton. 1993b. 'Psycholinguistic determinants of foreign language vocabulary learning.' *Language Learning* 43: 559-617.
- Ellis, R. 1994. *The Study of Second Language Acquisition*. Oxford: Oxford University Press.
- Fischer, U. 1994. 'Learning words from context and dictionaries: An experimental comparison.' *Applied Psycholinguistics* 15: 551-74.
- Forster, K. I. 1985. 'Lexical acquisition and the modular lexicon.' *Language and Cognitive Processes* 1: 87-108.
- Forster, K. I. and N. Jiang. 1999. 'The nature of the bilingual lexicon: Experiments with the masked priming paradigm.' In J. L. Nicol and T. D. Langendoen (eds.). *One Mind, Two Languages*. Oxford: Blackwell.
- Garrett, M. F. 1975. 'The analysis of sentence production' in G. Bower (ed.): *Psychology of Learning and Motivation*. New York: Academic Press.
- Garrett, M. F. 1982. 'Production of speech: Observations from normal and pathological language use' in A. Ellis (ed.): *Normality and Pathology in Cognitive Functions*. London: Academic Press.
- Gollan, T. H., K. I. Forster, and R. Frost. 1997.

- 'Translation priming with different scripts: Masked priming with cognates and noncognates in Hebrew-English bilinguals.' *Journal of Experimental Psychology: Learning, Memory, and Cognition* 23: 1122-39.
- Griffin, G. and T. A. Harley. 1996. 'List learning of second language vocabulary.' *Applied Psycholinguistics* 17: 443-60.
- Griffiths, P. 1986. 'Early vocabulary' in P. Fletcher and M. German (eds.): *Language Acquisition*. Cambridge: Cambridge University Press.
- Grosjean, F. 1998. 'Studying bilinguals: Methodological and conceptual issues.' *Bilingualism: Language and Cognition* 1: 131-49.
- Hakuta, K. 1987. 'The second-language learner in the context of the study of language acquisition' in P. Homet, M. Palij, and D. Aaronson (eds.): *Childhood Bilingualism: Aspects of Linguistic, Cognitive, and Social Development*. Hillsdale, NJ: Lawrence Erlbaum.
- Hancin-Bhatt, B. and W. Nagy. 1994. 'Lexical transfer and second language morphological development.' *Applied Psycholinguistics* 15: 289-310.
- Higgs, T. and R. Clifford. 1982. 'The push towards communication' in T. Higgs (ed.): *Curriculum, Competence and the Foreign Language Teacher*. Skokie, IL: National Textbook Company.
- Hogben, D. and M. J. Lawson. 1992. 'Superiority of the keyword method for backward recall in vocabulary acquisition.' *Psychological Reports* 71: 880-2.
- Hogben, D. and M. J. Lawson. 1994. 'Keyword and multiple elaboration strategies for vocabulary acquisition in foreign language learning.' *Contemporary Educational Psychology* 19: 367-76.
- Hulstijn, J. H. 1992. 'Retention of inferred and given word meanings: experiments in incidental vocabulary learning' in Pierre J. L. Arnaud and Henri Bejoint (eds.): *Vocabulary and Applied Linguistics*. London: Macmillan Academic and Professional.
- Jenkin, H., S. Prior, R. Rinaldo, A. Wainwright-Sharp, and E. Bialystok. 1993. 'Understanding text in a second language: A psychological approach to an SLA problem.' *Second Language Research* 9: 118-39.
- Jiang, N. 1997. 'Cross-language priming from L2 to L1 in episodic recognition' in M. G. Shafto and P. Langley (eds.): *Proceedings of the Nineteenth Annual Conference of the Cognitive Science Society*. Mahwah, NJ: Lawrence Erlbaum.
- Jiang, N. 1999. 'Testing processing explanations for the asymmetry in masked cross-language priming.' *Bilingualism: Language and Cognition* 2: 59-75.
- Jiang, N. and K. I. Forster. 1997. Masked translation priming in Chinese-English bilinguals with L2 primes. Paper presented at the Lexical Processing Workshop, Tucson, Arizona, September.
- Kempe, V. and B. MacWhinney. 1996. 'The crosslinguistic assessment of foreign language vocabulary learning.' *Applied Psycholinguistics* 17: 149-83.
- Kern, R. G. 1994. 'The role of mental translation in second language reading.' *Studies in Second Language Acquisition* 16: 441-61.
- Krashen, S. D. 1977. 'Some issues relating to the Monitor Model' in H. Brown et al. (eds.): *On TESOL '77*. Washington DC: TESOL.
- Krashen, S. D. 1983. 'Newmark's "ignorance hypothesis" and current second language acquisition theory' in S. M. Gass and L. Selinker (eds): *Language Transfer in Language Learning*. Rowley, MA: Newbury House Publishers.
- Krashen, S. D. 1989. 'We acquire vocabulary and spelling by reading: Additional evidence for the input hypothesis.' *Modern Language Journal* 73: 440-64.
- Krashen, S. D. and P. Pon. 1975 'An error analysis of an advanced learner of ESL: the importance of the monitor.' *Working Papers on Bilingualism* No. 7.
- Krashen, S. D., J. Butler, R. Birnbaum, and J. Robertson. 1978. 'Two studies in language acquisition and language learning.' *ITL: Review of Applied Linguistics* 39/40: 73-92.
- Kroll, J. F. and J. Curley. 1988. 'Lexical memory in novice bilinguals: The role of concepts in retrieving second language words' in M. Gruneberg, P. Morris, and R. Sykes (eds.): *Practical Aspects of Memory, Vol. 2*. London: John Wiley and Sons.
- Kroll, J. F. and A. M. B. de Groot. 1997. 'Lexical and conceptual memory in the bilingual: mapping form to meaning in two languages' in A. M. B. de Groot and J. F. Kroll (eds.): *Tutorials in Bilingualism: Psycholinguistic Perspectives*. Mahwah, NJ: Lawrence Erlbaum.
- Kroll, J. F. and E. Stewart. 1994. 'Category

- interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations.' *Journal of Memory and Language* 33: 149-74.
- Lado, R. 1957. *Linguistics across Cultures*. Ann Arbor: University of Michigan Press.
- Lapointe, S. G. and G. S. Dell. 1989. 'A synthesis of some recent work in sentence production' in G. N. Carlson and M. K. Tanenhaus (eds.): *Linguistic Structure in Language Processing* Dordrecht: Kluwer.
- Lardiere, D. 1998. 'Case and tense in the "fossilized" steady state.' *Second Language Research* 14: 1-26.
- Larsen-Freeman, D. 1976. 'An explanation for the morpheme acquisition order of second language learners.' *Language Learning* 26: 125-34.
- Lennon, P. 1991. 'Error and the very advanced learner.' *IRAL* 29: 31-44.
- Levelt, W. J. M. 1989. *Speaking: From Intention to Articulation*. Cambridge, MA: Bradford.
- Long, M. 1997. Fossilization: Rigor Mortis in Living Linguistic Systems? Paper presented at SLRF '97, East Lansing, MI, October.
- Maiguashca, R. U. 1993. 'Teaching and learning vocabulary in a second language: past, present, and future directions.' *The Canadian Modern Language Review* 50: 83-100.
- Markham, P. 1989. 'Effects of contextual versus definitional computer-assisted vocabulary instruction on immediate and long-term vocabulary retention of advanced ESL students.' *Educational Psychology* 9: 121-6.
- Moore, J. C. and J. R. Surber. 1992. 'Effects of context and keyword methods on second language vocabulary acquisition.' *Contemporary Educational Psychology* 17: 286-92.
- Mukhtesh, L. 1986. 'Persistence in fossilization.' *IRAL* 24: 187-203.
- Nation, I. S. P. 1990. *Teaching and Learning Vocabulary*. New York: Newbury House.
- Neely, J. H. and A. Y. Durgunoglu. 1985. 'Dissociative episodic and semantic priming effects in episodic recognition and lexical decision tasks.' *Journal of Memory and Language* 24: 466-89.
- Odlin, T. 1989. *Language Transfer: Cross-Linguistic Influence in Language Learning*. Cambridge: Cambridge University Press.
- Oxford, R. and D. Crookall. 1990. 'Vocabulary learning: A critical analysis of techniques.' *TESL Canada Journal* 7/2: 9-30.
- Parry, K. 1993. 'Too many words: learning the vocabulary of an academic subject' in T. Huckin, M. Haynes, and J. Coady (eds.): *Second Language Reading and Vocabulary Learning*. Norwood, NJ: Ablex.
- Perfetti, C. A., L. C. Bell, and S. M. Delaney. 1988. 'Automatic (prelexical) phonetic activation in silent word reading: Evidence from backward masking.' *Journal of Memory and Language* 27: 59-70.
- Perfetti, C. A. and S. Zhang. 1995. 'Very early phonological activation in Chinese reading.' *Journal of Experimental Psychology: Learning, Memory, and Cognition* 21: 24-33.
- Pica, T. 1983. 'Adult acquisition of English as a second language under different conditions of exposure.' *Language Learning* 33: 465-97.
- Potter, M. C., K.-F. So, B. V. Eckardt, and L. B. Feldman. 1984. 'Lexical and conceptual representation in beginning and proficient bilinguals.' *Journal of Verbal Learning and Verbal Behavior* 23: 23-38.
- Poullisse, N. and T. Bongaerts. 1994. 'First language use in second language production.' *Applied Linguistics* 15: 36-57.
- Raptis, H. 1997. 'Is second language reading vocabulary best learned by reading?' *The Canadian Modern Language Review* 53: 567-80.
- Richards, J. 1976. 'The role of vocabulary teaching.' *TESOL Quarterly* 10: 77-89.
- Sanchez-Casas, R. M., C. W. Davis, and J. E. Garcia-Albea. 1992. 'Bilingual lexical processing: Exploring the cognate/noncognate distinction.' *European Journal of Cognitive Psychology* 4: 293-310.
- Schmitt, N. and P. Meara. 1997. 'Researching vocabulary through a word knowledge framework: Word associations and verbal suffixes.' *Studies in Second Language Acquisition* 19: 17-36.
- Schumann, J. 1978. 'The acculturation model of second language acquisition' in R. C. Gingras (ed.): *Second Language Acquisition and Foreign Language Teaching*. Washington, DC: Center for Applied Linguistics.
- Segalowitz, N. 1995. 'Automaticity and lexical skills in second language fluency: Implications for computer assisted language learning.' *Computer Assisted Language Learning* 8: 129-49.
- Sonaiya, R. 1991. 'Vocabulary acquisition as a process of continuous lexical disambiguation.' *IRAL* 29: 273-84.

- Stumpfel, V. 1986. 'Context effects in word recognition and episodic recognition: A single dissociation.' *Bulletin of Psychonomic Society* 24: 175-8.
- Swinney, D. A. 1979. 'Lexical access during sentence comprehension: (Re)consideration of context effects.' *Journal of Verbal Learning and Verbal Behavior* 18: 645-59.
- Talamas, A., J. F. Kroll, and R. Dufour. 1995. *Form-Related Errors in Second Language Learning: A Preliminary Stage in the Acquisition of L2 Vocabulary*. Unpublished manuscript, Pennsylvania State University, University Park.
- Tan, L. H., R. Hoosain, and D. Peng. 1995. 'Role of early presemantic phonological code in Chinese character identification.' *Journal of Experimental Psychology: Learning, Memory, and Cognition* 21: 43-54.
- Tanenhaus, M. K., J. M. Leiman, and M. S. Seidenberg. 1979. 'Evidence for multiple stages in the processing of ambiguous words in syntactic contexts.' *Journal of Verbal Learning and Verbal Behavior* 18: 427-40.
- Tulving, E. 1972. 'Episodic and semantic memory' in E. Tulving and W. Donaldson (eds.): *Organization and Memory*. New York: Academic Press.
- Tulving, E. 1983. *Elements of Episodic Memory*. Oxford: Clarendon Press.
- Van Orden, G. C. 1987. 'A ROWS is a ROSE: Spelling, sound, and reading.' *Memory and Cognition* 15: 181-98.
- Wang, A.-Y., M. H. Thomas, and J. A. Quellette. 1992. 'Keyword mnemonic and retention of second language vocabulary words.' *Journal of Educational Psychology* 84: 520-8.
- Watanabe, Y. 1997. 'Input, intake, and retention: Effects of increased processing on incidental learning of foreign language vocabulary.' *Studies in Second Language Acquisition* 19: 287-307.
- Wesche, M. and T. S. Paribakht. 1996. 'Assessing second language vocabulary knowledge: Depth versus breadth.' *The Canadian Modern Language Review* 53: 13-40.
- Yu, L. 1996. 'The role of L1 in the acquisition of motion verbs in English by Chinese and Japanese learners.' *The Canadian Modern Language Review* 53: 191-218.
- Yu, V. W. S. and P. A. Atkinson. 1988. 'An investigation of the language difficulties experienced by Hong Kong secondary school students in English-medium schools: I. The problem.' *Journal of Multilingual and Multicultural Development* 9: 267-84.
- Zughoul, M. R. 1991. 'Lexical choice: towards writing problematic word lists.' *IRAL* 29: 45-59.