

LONGITUDINAL
DEVELOPMENTS
IN VOCABULARY
KNOWLEDGE
AND LEXICAL
ORGANIZATION

BRIGITTA DÓCZI

&

JUDIT KORMOS

Longitudinal Developments in Vocabulary Knowledge and Lexical Organization

Brigitta Dóczy

and Judit Kormos

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Introduction

VOCABULARY LEARNING, EVEN in one's first language, is a continuous and unending process. New words are invented and words gain new meanings to reflect changes in the world around us. We also learn new words as we acquire content knowledge in specific areas. It is no wonder that learning vocabulary in another language is a daunting and seemingly endless task that poses a great challenge to language learners.

Vocabulary is a widely researched area in the field of second language acquisition and much attention has focused on the subject of vocabulary learning, especially the size and development of lexicons (i.e., the breadth of word knowledge). However, in comparison with the abundance of research on how and how many lexical items are acquired, we still know very little about how well single words are known (i.e., about the depth of vocabulary knowledge), and even less about how particular words are learned over a longer period of time. While researching the breadth of vocabulary is very important, only by taking both the breadth and the depth of vocabulary knowledge into account can we gain deeper insights into the actual processes of vocabulary development.

Investigating vocabulary development involves addressing a number of highly complex issues, as individuals differ in their rate of acquisition of words, and the notion of knowing a word is also problematic. One of the underlying reasons for the complexities of vocabulary learning is that words are learned incrementally; thus there are different levels of knowing a word, and meaning is just one

element of this process. The complex and incremental nature of vocabulary development can only be observed over a longer period of time, which calls for longitudinal investigation. There is a scarcity of longitudinal studies in applied linguistics, although the field of second language acquisition would benefit greatly from "meaningful characterizations of the gradual process of attaining advanced second language and literacy competencies across various contexts" (Ortega and Iberri-Shea 2005, 28). This is all the more true for psycholinguistic research on second language vocabulary development and the mental lexicon.

This book aims to fill the research gap in longitudinal studies of vocabulary development, and it presents the results of a series of studies the two authors conducted in foreign and second language environments on the development of different aspects of word knowledge. The novelty of the book is that it includes both small-scale qualitative investigations and large-scale quantitative studies; thus it demonstrates the use of different research methodologies in the research of vocabulary development. A common feature of all the studies in the book is that they are characterized by a longitudinal design over a period of a minimum of one academic year. The studies also employ a wide variety of data collection methods, ranging from highly controlled tests of vocabulary knowledge to the use of word associations in the productive use of vocabulary in spoken texts. The research projects yield insights into how various aspects of vocabulary knowledge develop in instructed foreign language classroom contexts at the secondary level of education and in an English for Academic Purposes program in an English-language speaking context at the pre-university level.

This book not only presents the findings of a series of studies the authors conducted on longitudinal vocabulary learning but also places their research in the wider context of the fields of vocabulary studies, second language acquisition, and language teaching pedagogy. The book is the result of a particular degree of cooperation between two researchers who bring different perspectives to this book-writing project. Brigitta's Dóczi's expertise in the field of vocabulary research is complemented by her nearly two decades of experience as a teacher of English, a foreign language teacher, and a teacher trainer. This helped the authors when transferring the findings of their projects, as well as previous work in the field of vocabulary research, to the realm of the classroom and pedagogical practice. Judit Kormos's background in researching the processes of second language learning and individual learner differences helped the authors to build a bridge between vocabulary studies and the field of second language acquisition.

We hope that the reader will find this book useful and of help in understanding the long and laborious road that leads to the ability to use second language vocabulary successfully in a wide variety of contexts, and in finding ways to assist students in facing the challenges along the way.

1

Defining and Describing Key Constructs: Vocabulary and the Mental Lexicon

THIS CHAPTER LAYS the theoretical foundations of our book. In order to understand how vocabulary knowledge develops over time we need to clarify what we mean by vocabulary and vocabulary knowledge. Furthermore, it is important to elucidate what the components of vocabulary knowledge are, how this knowledge is represented and organized in the mental lexicon, and how we call on this knowledge when using language. We discuss each of these questions in the following sections of this chapter.

1.1.1. DEFINING THE CONCEPT OF VOCABULARY

We often take for granted the constructs of *vocabulary*, *words*, *lexis*, and *vocabulary knowledge*, not only when teachers and learners discuss issues of vocabulary learning but also in second language acquisition and language testing research. Nevertheless, there is huge variation in what teachers, learners, and researchers mean by vocabulary learning, not only in terms of what it is that students learn but how they learn it and when we can say that they know a word. In what follows we briefly review definitions that foreground the formal, semantic, or psycholinguistic properties of words as units.

From the perspective of formal features, a word is defined as a string of letters separated by spaces. Although this definition might be useful in automated

lexical analysis for counting how many words there are in a text (see, e.g., Juilland and Roceric 1972), it does not take into account that words are semantic units and considers any string of letters to be a word without necessarily being meaningful. If words are seen as being the smallest meaningful units of language and the focus of the defining characteristics is on semantics rather than on the formal characteristics of words, one needs to face several issues. First of all, one word form can have several unrelated meanings, which raises the question of whether words such as *rear* should be regarded as two words, one being a noun and the other a verb. Furthermore in the case of *rear* as verb, should we further separate it into two words: *rear* meaning "to raise upright" and also "to cause to grow"? These questions are particularly relevant for language learning when we want to understand and estimate the size of students' vocabulary and to assess the learning burden associated with acquiring particular words with multiple meanings (for a discussion, see Bogaards 2001). One potential answer to this question was provided by Ruhl (1989), who showed that a large number of meaning senses of words are related and share historical roots, and therefore polysemous words (i.e., words with multiple meanings), if their meaning senses are related, can be regarded as one unit. Nevertheless, this results in a very vague bundle of semantically related meanings that not even first language speakers might be consciously aware of (Bogaards 2001).

With regard to semantic features, another question is whether we regard a group of words such as *build*, *builds*, *rebuild*, *building*, and *builder* as five different units or just one. This question is also crucial for measuring vocabulary size and for conceptualizing the storage of lexical knowledge. A possible solution to this question can be seen in the concept of word family as found in Laufer and Nation's (1995) Lexical Frequency Profile, where a word form and all its derived and inflected forms are counted as one measurement unit called a word family. We return to this issue in section 1.3 when we discuss estimations of vocabulary size.

Semantic definitions of words are riddled with two additional problems. The first is that some words such as *of* have limited semantic or pragmatic meaning, and the second is that a string of words can have a meaning that is different from the meaning of its constituent parts, such as *pull off*. To address these issues, lexico-semantic approaches de-emphasize the concept of words and operationalize the construct of vocabulary as consisting of lexical units. Cruse (1986) defines the construct of lexical unit as "the union of a lexical form and a single sense" (77). In this definition, lexical units need to satisfy two criteria: They must consist of at least one word and have at least one semantic constituent (Cruse 1986, 24). This allows researchers to regard formulaic phrases (Nattinger and DeCarrico 1992) as one lexical unit, but at the same time it also follows that words that have two

meaning senses such as *rear* can be considered two different lexical units. The issue of deciding when one can accept two meaning senses as being sufficiently similar to be regarded as one, as in the case of *rear* meaning to “construct” and “to breed and raise,” remains open. In this conceptualization, morphemes such as *dis-*, *un-*, and *ing* are not considered lexical units as they do not satisfy the criterion for words. In a more cognitively oriented approach, a lexical unit is considered to have a core meaning and semantic extensions of this meaning are also included within this unit (Langacker 2002).

The psycholinguistic approach to the construct of vocabulary considers how users of a language or multiple languages store and retrieve words from their mental lexicon. In this approach the entity of *lemma* is considered to be the basic unit of lexical storage and representation. In Levelt's (1989) model of speech production, lexical encoding is assumed to involve three steps: the activation of the relevant concept one wants to name, the search for and retrieval of the corresponding lemma, which contains information about the syntactic and morphological characteristics of the lexical unit in question, and subsequent activation of the *lexeme*, which is the phonological form of the lemma. Whether the lemma contains semantic as well as syntactic information is a question that is debated in psycholinguistic studies of lexical access and we discuss this in more detail in section 1.6.

There are two opposing views of how researchers conceptualize the inter-relationship of lexical and syntactic encoding. In models that view lexis and grammar as clearly separable components of language (see, e.g., Pinker 1991), only the basic form of a word (e.g., *dog*) and irregular inflected forms (e.g., *threw*) are considered to be lemmas, and regularly inflected forms (e.g., *dogs*) are processed by the speaker via a syntactic route each time they are perceived or produced. In contrast, other models assume a strong inter-relationship between syntax and the lexicon and argue that the inflected forms of high frequency verbs (e.g., *takes*) and nouns (e.g., *dogs*) are also stored as one unit (e.g., Stemberger and MacWhinney 1988).

In the psycholinguistic approach, derivative forms of words such as *dog-like* or *doggy* are considered to be separate lemmas from *dog*. Additionally, the mental representational approach allows for sequences of words often used together to be stored as one unit in the mental lexicon. Wray (2002) defines formulaic phrases based on the criterion of one unit of storage when she argues that the most important characteristic of prefabricated language is that it is “stored and retrieved whole from memory at the time of use rather than being subject to generation or analysis by the language grammar” (9). Although the definition of formulaicity (see Pawley and Syder 1983) is not straightforward (for a review, see

Schmitt 2010), it is important to note the significant role both the lexicosemantic and psycholinguistic approaches attribute to these types of lexical units.

1.2. CONCEPTUALIZING VOCABULARY KNOWLEDGE

In the previous section we discussed how words and lexical units can be identified, and now we focus on what we mean by vocabulary knowledge. From a cognitive perspective, knowledge is an underlying mental representation encoded in long-term memory (see, e.g., Bialystok 1994). This mental representation can be conceptualized as being person-internal and unrelated to the existing system of representations, which is embodied in the so-called trait definitions of the construct of vocabulary (Chapelle 1998). For example, tests of vocabulary size that assess the knowledge of words using discrete-point context-independent tasks, such as a multiple-choice test, view vocabulary knowledge as an abstract individual trait of learners. Knowledge can also be conceived of as learner-internal; but rather than being an isolated exemplar of a mental representation, it is a network of memory traces within which items have links of different strength with each other. Conceptualizations of vocabulary knowledge as an inter-related network of lexical items stored in the mental lexicon are an example of this view (see section 1.7).

The knowledge of words or lexical units as encoded in long-term memory is a multifaceted concept. As we will discuss in more detail in section 1.4, there are several interactive layers of word knowledge. Nevertheless, one of the most important aspects is the form-meaning association in the mental lexicon because words are "first and foremost, units of meaning" (Laufer et al. 2004, 205). Even if we restrict the discussion of word knowledge to the form-meaning relationship, the conceptualization of vocabulary knowledge is complicated by the fact that knowledge develops gradually and is not a state when we know every possible form-meaning relationship, have acquired full and accurate knowledge of the form of the word, and are familiar with various shades of meaning, or completely lack knowledge in these areas (Henriksen 1999; Read 2004). It is possible to have partial knowledge of the form of a word, to be familiar with one possible form and meaning link only, and to have partial knowledge of the meaning(s) of the word (Schmitt 2010).

Nevertheless, knowledge is not simply a matter of storing information but also involves access to and use of mental representations in order to perform a particular task. In this sense, learners' ability to access lexical units stored in memory in real time and to use them accurately and appropriately in a given context also needs to be seen as an integral part of knowledge (Daller, Milton, and Treffers-Daller

2007). This view is represented in the so-called interactionist definitions of the construct of vocabulary knowledge (Chapelle 1998). In these definitions vocabulary knowledge is seen "as an underlying trait, but one that needs to be specified relative to a particular context of use" (Read and Chapelle 2001, 8). In this view, vocabulary size is assessed with reference to a particular task, such as writing an academic essay, and is interdependent with the purpose of assessment. Schmitt (2010) makes a similar distinction when he separates word knowledge into two components: the knowledge of the form-meaning link and usage-based mastery. Another similar psycholinguistic distinction that is relevant in this regard is that of declarative and procedural knowledge (Anderson 1983). Declarative knowledge can be considered as being an underlying representation of factual information related to a particular lexical unit, whereas procedural knowledge involves the learner's ability to apply this knowledge to a given task (see, e.g., Read 2004).

A final construct to be discussed in relation to the concept of vocabulary knowledge is that of control. Bialystok (1994) argues that in understanding how language is used, it is important to consider not only how knowledge is stored, organized, and analyzed but also how it is applied efficiently and with appropriate speed. This latter aspect of language use, which is identified as control in her model of second language (L2) acquisition, is called vocabulary accessibility (Laufer and Nation 2001; Meara 1996). Segalowitz, Segalowitz, and Wood (1998) highlight the importance of automatic word recognition for fluent reading performance (see also Grabe 2009; Koda 2005). They explain that for L2 learners to be able to recognize words quickly and efficiently, the processes of word recognition need to be highly automatized. If lexical access is not fully automatic, L2 users will need to rely on conscious and controlled processing, which requires attention. This might result in decreased reading and listening speed as well as inaccurate comprehension. Furthermore, the automaticity of lexical processing is not only relevant in comprehension, but also highly important for L2 production. Therefore, vocabulary knowledge also needs to include aspects of speed and efficiency of access, both from meaning to form as required for production and from form to meaning in comprehension (Daller et al. 2007).

If vocabulary knowledge is not only seen as a storage system of mental representations but also includes the ability to use words, it is important to consider what "ability to use" can mean. This question has traditionally been discussed with reference to the dichotomy of passive and active vocabulary knowledge. Passive vocabulary knowledge is usually defined as consisting of lexical units that learners are able to recognize and understand, whereas active vocabulary comprises the repertoire of lexis they can use in speech or writing. Although this distinction is useful from a pedagogical perspective, this dichotomy might not be psycholinguistically

plausible. As suggested by Read (2004) and also advocated by Laufer and Goldstein (2004) and Schmitt (2010), it might be more viable to consider the two most important ways in which vocabulary constitutes part of communication: comprehension and recognition on the one hand and recall and use on the other.

1.3. DEFINING BREADTH OF VOCABULARY KNOWLEDGE AND VOCABULARY SIZE

The depth and the breadth of vocabulary knowledge were first proposed as two distinct types of vocabulary knowledge by Anderson and Freebody (1981). In this original conceptualization, the size of one's vocabulary is separated from how well one knows the words. Although this distinction between the size and quality of knowledge is a useful one for research and pedagogical purposes, it is important to recognize that these two aspects of vocabulary are inter-related. As Schmitt (2010) points out, it is almost impossible to assess one's vocabulary size without assuming some depth of knowledge of the words tested, and in this respect each test or measure of vocabulary size is at the same time a measure of vocabulary depth.

In order to assess the breadth of vocabulary, one needs to provide an estimation of the number of words or lexical units known by the given speaker of a language. Estimations of vocabulary size are relevant not only for understanding how the knowledge of L2 vocabulary develops but also for gaining insight into how many words one needs to be familiar with in order to use and comprehend language in specific tasks and contexts. Although the issue of what counts as one unit of measurement for the foregoing purposes is certainly related to how we define words and how words and lexical units are stored in the mental lexicon, it is further complicated by the question of what we consider to be a unit from the point of view of acquisition.

As pointed out earlier, one possibility for counting words is to take the base form of the word as one unit. This would, however, mean that the different commonly inflected forms of words, such as *listen*, *listens*, *listening*, and *listened*, are counted as separate units. This is psycholinguistically not viable, as these words might not be stored as separate units in the mental lexicon, and the learning burden associated with acquiring these four words is not the same as committing four words that are unrelated in meaning and form to long-term memory. This way of counting was applied in early automated corpus-based analyses.

The next option for counting words is to consider the lemma as one unit, with the lemma being the base form of the word and its inflected forms in the same part of speech (Kučera 1982). Thus the aforementioned examples of *listen*, *listens*, *listening*,

and *listened* would be considered one lemma. Bauer and Nation (1993), however, argue that certain word forms with frequent and regular affixes, such as *-able*, *-er*, *-ish*, *-less*, *-ly*, *-ness*, *-th*, *-y*, *non-*, and *un-*, could also be included in the construct of word family. They point out that above a certain level of proficiency, L2 learners use these affixes productively and these word forms “can be understood by a learner without having to learn each form separately” (253). Although it seems to be important to consider the possibility of the productive use of certain highly regular derivative affixes in estimating vocabulary size, there are number of problems if we consider word forms such as *listener* and *listenable* as a single unit for counting. First of all, these words have different meanings and thus will need to be considered different lexical units. Furthermore, as they correspond to different conceptual representations they are also likely to be stored as separate units in the mental lexicon (Gardner 2007). In addition, Schmitt and Zimmerman’s (2002) research indicates that even learners with a relatively high level of proficiency did not know all the word forms within a word family productively. While word families might be useful units for estimating the number of words L2 learners can recognize, they might not be viable means for assessing the size of productive vocabulary. Nonetheless, for the assessment of the recognition knowledge of vocabulary, counts based on word families might be useful in the case of highly proficient learners who have advanced skills in word formation and a wide repertoire of derivative morphology.

1.4. DEFINITIONS OF DEPTH OF WORD KNOWLEDGE

Depth of word knowledge can be defined from two different perspectives: On the one hand, one can consider how well students know a particular word, which is a “word-centered” conceptualization; on the other, we can perceive depth of word knowledge as knowledge about how words relate to each other in the lexical system, which is a “lexicon-based” view (Schmitt 2010). Anderson and Freebody (1981) provided one of the first word-based definitions of depth of word knowledge. They saw depth of word knowledge as being inherently related to the “the quality of understanding of a word”. This means that a word can be considered to be known by a learner if “it conveys to him or her all of the distinctions that would be understood by an ordinary adult under normal circumstances” (93). Henriksen (1999), who conceptualizes depth of word knowledge as *network knowledge*, offered the first lexicon-based definition of depth of word knowledge. In her view, the construct of vocabulary depth expresses the strength and number of links a word has with other semantically related words in the learner’s lexicon. Henriksen argues that the larger a learner’s vocabulary size, the more strongly

new words are embedded into an already existing network of words. She further points out that the development of vocabulary depth involves restructuring the network of words (see also Meara 1996, for a similar argument).

Word-centered conceptualizations of depth of word knowledge can be further subdivided into two approaches: the *dimensions or components approach* and the *developmental approach* (Read 2000). The dimensions approach considers the types of information students need to acquire about a particular word, whereas developmental approaches make an attempt to describe word knowledge on a scale ranging from complete lack of knowledge to full mastery (for more detail on developmental approaches, see Chapter 3, section 3.1).

Within the dimensions approach, Nation (2001) provides the most comprehensive definition of depth of word knowledge. His framework clearly separates the dimensions of receptive and productive knowledge and delineates three aspects of word knowledge for each: (1) word form (containing the spoken form, orthography, and parts of the word (affixes)); (2) word meaning (the connection between form, meaning, concepts, and associations); and (3) word use (including grammatical function, collocational behavior, and constraints on use, such as the frequency or stylistic register of the given word). This approach provides insights into learners' receptive and productive knowledge in different areas of lexical competence (see figure 1.1).

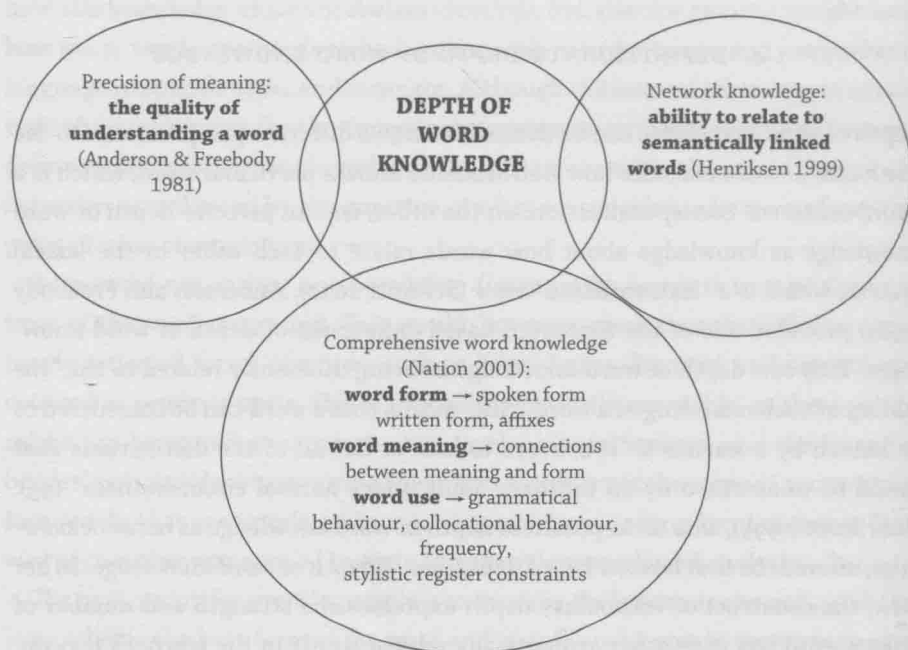


FIGURE 1.1 Conceptualizations of depth of word knowledge

1.5. STORING VOCABULARY KNOWLEDGE: THE CONCEPT OF THE MENTAL LEXICON

In previous sections of this chapter we discussed the concept of word and lexical unit and conceptualizations of vocabulary knowledge. In this section we turn our attention to the storage and organization of words in the mental lexicon. In order to understand the construct of mental lexicon, it is necessary to go back to the origins of this concept. In early theories, language was seen as consisting of words and rules. It was argued that sentences were constructed with the help of grammatical rules and words were simply used to fill the relevant slots in a sentence created by various syntactic transformations (e.g., Chomsky 1965). In this view, the mental lexicon is simply a store of lexical, phonological, and morphological information relating to words. However, more recently, interest has shifted from grammar to vocabulary and, as Elman (2009) explains, “many linguists have come to see words not simply as flesh that gives life to grammatical structures, but as bones that are themselves grammatical rich entities” (548). Contrary to views like those of Chomsky (1965), usage-based theories of language claim that words drive syntactic encoding in sentence production and comprehension, as well as syntactic development in child language acquisition (e.g., Tomasello 2003). For example, in Bresnan’s (1982) lexical theory of syntax, the syntactic features of words determine the syntactic structure and trigger syntactic encoding in sentence production. As the boundaries between lexis and grammar are becoming increasingly blurred, the information the mental lexicon needs to hold has also been extended; for example, in Levelt’s (1989) model of speech production, an essential component of the lexicon is syntactic information related to a particular lexical entry.

These developments have important consequences for the conceptualization of the mental lexicon, as it has become difficult to separate syntactic regularities of language, traditionally seen as “rules,” from linguistic construction units (e.g., words, phrases, formulaic expressions, and chunks). This has resulted in the expansion of the different types of knowledge the mental lexicon needs to store, which we discuss in more detail later. Another development in recent years, which has great relevance for theories of the mental lexicon, is the application of Dynamic Systems Theory (Van Geert 1994) to the study of language, and advances in cognitive science which point to the nonmodular nature of language (e.g., Thomas and Karmiloff-Smith 2002). In simple terms, Dynamic Systems Theory views language as consisting of inter-related subsystems, such as a lexical system, a phonological system, and a syntactic system, that dynamically interact with and mutually influence each other (for a discussion, see Larsen-Freeman