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Language and the lexicon in SLA

Marjolijn Verspoor and Norbert Schmitt
University of Groningen and University of Nottingham

When investigating language and the lexicon in second language acquisition (SLA), it is important to know how they are viewed from a theoretical perspective because it establishes what to look at, how to investigate phenomena, how to interpret the results, and what conclusions to draw. There is no single theory that deals with all aspects of what language is, how it is used, organized, processed, or acquired, how it changes, and how it is learned as a second language. However, recently a group of compatible theories has emerged that together

could fall under the umbrella of “usage-based” theories, which agree either implicitly or explicitly that language should be seen as a complex dynamic system and that language learning is a dynamic process, in that language emerges through use and changes continually because of interactions at all levels. What follows is a brief description of dynamic, usage-based theory and the implications of such an approach for SLA, with an emphasis on the lexicon.

Language and the lexicon as a complex, dynamic usage-based system

Robinson and Ellis (2008) give an excellent overview of the different approaches involved in usage-based theories. In this chapter, we will draw on Langacker’s work (2000), because it describes in detail how language may emerge through use. Langacker assumes that the process involved in language development at the group level is similar to language development at the individual level and we will focus on the latter.

Langacker argues that common cognitive abilities are involved in language learning: the ability to associate things with each other, to compare them, to categorize them, and to abstract away from them. *Association* is the well-known phenomenon in which one kind of experience is able to evoke another. In language use, the ability to associate enables symbolization: the ability to associate sounds, gestures or written marks with observable entities and later on the mental representations of these entities. A symbolic unit is thus a simple association a language user makes between a form (the sound, gesture or written mark) and a meaning (that which it is associated with). For example, the symbolic unit “dog” stands for an animal, first perhaps for only one very specific animal or picture, and there is a direct association between the symbol and the entity. Later, after many exposures to different instances of dog, the learner surmises that the word “dog” can stand for a group of rather similar-looking or -sounding animals. To be able to do so, the learner has shown that she is able to categorize and abstract away from individual instances.

Categorization and *abstraction* are involved at many different linguistic levels. For example, even though each language user may pronounce things somewhat differently, most users will recognize the string of sounds /d 0g/ as being similar enough to categorize it as a particular English word referring to an animal. Later, a string of letters such as [d-o-g-s] will be recognized as referring to more than one dog and after exposure to other words that have an -s ending, learners will recognize that an -s must refer to “more than one” in general. Such abstraction leads to schematization of a *construction*, which can be defined as a form-meaning pair (see **Construction learning**, and **Form-meaning connections**, this volume).

When humans abstract, attention is not on minute points of difference in multiple experiences, but on their general points of commonality. For example, structures like a plural -s may be pronounced numerous different ways when examined in fine-grained detail, but they may sound quite alike in a coarse-grained view in that they are all sibilants. A plural -s is thus a *schematization*, or “schema” for short, of a group of similar constructions. A schema is the perceived commonality that has emerged from exposure to distinct constructions.

Symbolic units can be combined into more complex ones by means of a process called *composition*. Composition involves the conceptual integration of two or more component units or constructions (e.g. *dog* and *house*) to produce novel constructions (e.g. *doghouse*). As this example clearly shows, a composition is not simply the sum of the two original units (*dog* + *house*) because both are modified somewhat in the process of combining them. The word *house* does not refer to a typical house and the word *dog* does not refer to an animal but to a possible inhabitant of the non-typical house. The process of composition can occur in various combinations and can be recursive in that one construction becomes integrated into another construction, yielding constituency hierarchies in indefinitely many levels of organization (see **Analogical mapping in construction learning**, this volume).

In this approach, the lexicon of a language is defined as the set of expressions with the status of conventional units (Langacker, 2000). A conven-

tional unit is one that is heard and used frequently and therefore entrenched, which is the result of habit formation, routinization, or automatization. Basically it means that each language event such as hearing or producing a word like *dog* leaves some kind of trace in memory that helps in reactivating it. Eventually it has been heard or used so often that it is not likely to change anymore. For example, for fluent language users, most words in a language have conventionalized forms (the way they are pronounced or written), have conventionalized meanings, and are used in conventionalized constructions. Moreover, this works not only with simple words and simple constructions; highly complex events can also become entrenched through enough repetition and practice. For example, long sequences (such as formulaic sequences, idiomatic expressions, or even whole poems) can become automated and become a “pre-packaged” groups of words that no longer require conscious attention to their parts or their order (see **Formulaic language**, and **Idiomaticity**, this volume).

The suggestion that learning the lexicon is all about frequency of input and automaticity is in line with *Activation Theory* (Rumelhart and McClelland, 1987). The more frequently one hears something, the more easily it is activated, the more frequently it is used and the faster it is learned (see **Automaticity**, and **Frequency effects**, this volume). Within activation theory, most work has been done at the lexical level, but MacWhinney also developed a computational model with self-organizing maps (SOMs) at different linguistic levels (morphology, syllable structure, lexicon, syntax and so on). In line with usage-based theories, MacWhinney’s unified model (UM) (2008) takes input as the source for learning. It learns by comparing the input, searching for similarities and differences. However, MacWhinney’s model emphasizes that in addition to pure frequency, the role of cue availability, validity and reliability play a role in pattern recognition (see **Competition Model**, this volume). Moreover, he argues that salience, which is the degree to which something is noticed, helps determine the course of acquisition.

Language can be regarded as a complex system (cf. de Bot *et al.* (2007), because it involves various components or subsystems that interact with each

other over time, and language is a dynamic system because the starting point of each new step is not the first step ever taken but the previous step (see **Complexity Theory/Dynamic Systems Theory**, this volume). This dynamicity can be illustrated as follows: the first step in language acquisition is to make a form-meaning link for a symbolic unit such as DOG as illustrated in Figure 5. Note that the circle is very light, as it represents the initial stage of development of the form-meaning link.

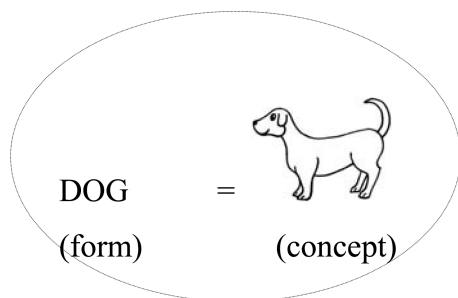


Figure 5 A symbolic unit: a form-meaning link

After multiple exposures of the unit, the form-meaning link will be strengthened, as illustrated in Figure 6. Note that the lines become thicker after each exposure, suggesting that each previous exposure contributes to strengthening the form-meaning link.



Figure 6 Strengthening of form-meaning link over time after multiple exposures

Even at the early stages of learning the word, the learner will probably be aware of some uses of the word, both linguistically and non-linguistically, but because uses of words vary, these connections are probably rather weak, as illustrated in Figure 7. However, just as the form-meaning link, these may strengthen over time. The different uses of the unit can apply to all kinds of interrelated areas such as the types of constructions it may occur in and the types of social situations in which it may be used;

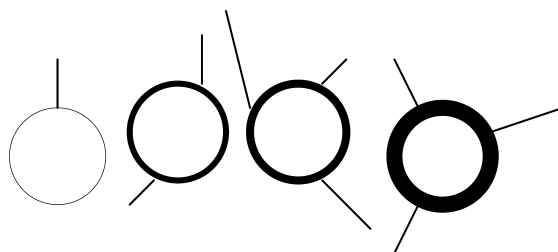


Figure 7 Strengthening of form-meaning link over time after multiple exposures, with weak associations concerning contextualized usage beginning to form

for example, the English unit DOG is a rather basic name (rather than CANINE) for a countable thing and in English such names have to be marked for one or more (*dog* versus *dogs*) and for being definite or non-definite (*the* versus *a dog*). There are certain words such as *barks* or *growls* it occurs with and certain conventionalized expressions such as *it is raining cats and dogs* it may occur in.

We may assume that the different uses of words, which may be called “contextualized aspects of word knowledge,” must take massive amounts of exposure to become fully established and are probably never completely mastered by most L2 learners (see **Word knowledge**, this volume). It is not surprising then that they decay more readily than the relatively simple form-meaning link.

We have talked about multiple exposures as if they are all the same, but with each exposure our knowledge of the unit has changed and therefore will affect the new knowledge we absorb at the next exposure. Moreover, as McWhinney (2008) points out, it is not just pure frequency of exposure but also reliability and salience that helps acquisition. Reliability has to do with the regularity of use and the ease with which the learner can discern a pattern. For example, a dog does not make that many sounds and it may not be difficult for an L2 learner to discover that the most common sound is *bark*. On the other hand, salience is related to how much something is noticed, which brings us to implicit and explicit learning (see **Explicit learning**, **Implicit learning**, and **Noticing Hypothesis**, this volume). It would make perfectly good sense that through skilful instruction, we can focus our

learners' attention on certain aspects of word knowledge, thereby strengthening the connections for the form-meaning link, for different meanings, or for different uses of the same word.

To summarize, a dynamic, usage-based view of language defines language as an assembly of meaningful, symbolic units, which can be words, formulaic sequences, idioms, or longer syntactic constructions. They are learned through exposure in a bottom-up process – with the help of some basic cognitive abilities such as association, categorization, and schematization. The more frequently a unit is heard or used and the more meaningful clues the learner has, the more chance initial form-meaning links are made and the more chance the form will be used in conventionalized contexts.

In the next section we show how the dynamic, usage-based view presented above relates to what we know about L2 vocabulary acquisition.

The lexicon and second language acquisition

A usage-based view of language acquisition can pertain to both a first and second language, but it does not tell us how the L1 and the L2 are related. Are they two completely separate systems where words and constructions in the L1 have only associative links with each other, or is it one big system in which all symbolic units in both the L1 and L2 interact and are associated with each other? The best evidence for a single, interconnected network with L1 influence on L2 and vice versa comes from psycholinguistic studies, which demonstrate that the L1 is active during L2 lexical processing in both beginning and more-advanced learners (e.g. Sunderman and Kroll, 2006) (see **Lexical access and selection in bilingual production**, and **Revised Hierarchical Model (RHM)**, this volume). Seeing the L1 and L2 as one overall interconnected conceptual system has implications for L2 acquisition at all levels: associations of different strength can be at the level of form, meaning, and use.

At the form level, there is clearly an L1 influence on the L2. For example, it is difficult to learn L2 sounds that are different from the L1 because the L1 processing of sounds may be entrenched.

Through infancy and childhood, the mind becomes attuned to the features and regularities in the L1 input (Ellis, 2006). This *developmental sharpening* applies not only to individual sounds but also their possible combinations (composite structures) such as words, spoken or written, and longer utterances such as phrases or sentences. This L1 specialization makes L1 processing efficient, but can cause problems when there is an attempt to process an L2 in the same way. For example, English speakers use mainly stress to parse words in the speech stream, while French speakers rely more on syllable cues. Cutler and her colleagues have found that both French and English speakers used their L1 cue processing strategies when learning the other language as an L2, causing problems for both groups (e.g. Cutler and Norris, 1988). The same type of mismatch has been found in the processing of written language, for example, between Chinese and English (e.g. Koda, 1997). What this means is that learners not only have to learn new oral and written forms in the L2, but they may also have to develop a completely new way of processing those forms, one which is different from the automatic, entrenched processes in their L1 (see **Entrenchment**, and **Writing**, this volume). The reverse is also true. For example, de Groot (2006) found that L2 words that match L1 orthographical and phonological patterns are easier to learn and are less susceptible to forgetting than L2 words that are atypical.

In addition, because they may be difficult to distinguish, lexical items with similar forms may be difficult to acquire in the L2. For example, Laufer (1988) studied words with similar forms and found that some similarities were particularly confusing for students, especially words that were similar except for suffixes (*comprehensive/comprehensible*) and for vowels (*adopt/adapt*). Another source of difficulty lies in words that have a similar form to a number of others in the L2 (i.e. large *orthographic neighborhoods* (Grainger and Dijkstra, 1992)). For example, the word *poll* may not be difficult in itself, but the fact that there are many other similar forms in English can lead to confusion (*pool, polo, pollen, pole, pall, pill*). Similarly, Bensoussan and Laufer (1984) found that a misanalysis of word forms, which looked transparent

but were not, sometimes led to misinterpretation. Their learners interpreted *outline* (which looks like a transparent compound) as “out of line,” and *discourse* (which looks as if it has a prefix) as “without direction.”

Obviously, depending on different factors such as the learner’s L1, age of acquisition and proficiency level, some L2 forms may be difficult to learn and the question is whether only frequent exposure to them is enough to acquire them correctly, as Ellis (1997) argues. There is evidence that attention to form is useful, especially because it can help other aspects of vocabulary learning. For example, Bogaards (2001) found that knowing the form of lexical items aided subsequent vocabulary learning for those items, such as learning additional polysemous meaning senses. So it may well be useful to address form in vocabulary exercises, but if we do, we need to remember that the mind has a finite processing capacity, and any attention given to form will diminish the resources available for attention to meaning, and vice-versa (Barcroft, 2002) (see **Vocabulary learning and teaching**, this volume). Therefore it seems reasonable to focus attention on one or the other of these aspects at any one time.

A form needs to be linked to meaning, which is a very complex, dynamic entity in itself. As early as 1979, Rumelhart suggested that words have no meaning of their own but provide cues to meaning. In line with this view, Langacker states that symbolic units are labels for concepts, which in turn is nothing but a network of associations, which may be activated depending on context. The associations Langacker refers to can be perceptual, personal, pragmatic, cultural, or linguistic. For example, the word *dog* may be associated with how it looks, smells, and behaves; whether it is appropriate to call a person “a dog” or not, whether a dog is seen as a house pet or a wild animal, and which words usually precede or follow the word *dog*. In other words, all knowledge—experiential and linguistic—is part of the network and may change over time.

When a learner tries to establish a new form-meaning link in the L2, it is likely that initially—just as with sounds—entrenched L1 associations of all kinds are mapped straight onto the L2 words. However, even though there may be a great deal of

overlap between L1 and L2 concepts, there may also be differences. For example, a “dog” in one culture may be associated with friendship and loyalty, in another culture with aggression and fiendishness, and yet another culture with work and usefulness (see **Lexical concepts**, this volume). Therefore, in learning the meaning of an L2 word, the learner needs to discover what the similarities and differences are between the L1 and L2.

The question is what the most effective way is to discover the meaning of L2 words. Many experts fear that using the L1 to explain L2 words will cause unnecessary L1 interference and suggest that the L1 should be avoided as much as possible. However, there are also some good arguments to use the L1 at the earliest stages to establish an initial form-meaning link. Because the L1 concept is already established and provides a natural, efficient vehicle to make the form-meaning link, it will allow more cognitive resources to be focused on the form (Barcroft, 2002). Cognitive resources are limited; therefore, it is unlikely that learners will absorb much of the contextualized knowledge at the beginning stages anyway. Once the initial form-meaning link is established, resources can be allotted to discovering the similarities and differences between the L1 and L2 meanings.

Evidence for the benefits of initially establishing form-meaning through the L1 was found in several studies. Prince (1996) found that more newly learned words could be recalled using L1 translations than L2 context, particularly for less-proficient learners. With secondary school Malaysian learners, using L1 translations was much more effective than providing L2-based meanings (Ramachandran and Rahim, 2004). Laufer and Shmueli (1997) found the same trend with Hebrew students. Lotto and de Groot (1998) found that L2–L1 word pairs lead to better learning than L2-picture pairs, at least for relatively experienced foreign language learners. Also learners themselves like to use their L1 in learning an L2, most noticeably in the consistently high usage of bilingual dictionaries (Schmitt, 1997). They also strongly believe that translating helps them to acquire English language skills, such as reading, writing, and particularly vocabulary words, idioms, and phrases (Liao, 2006).

However, after initial form-meaning links have been made, words need to be met many times in order to be learned (Nation, 2001), not just to consolidate the original form-meaning link, but also to developing the other types of word knowledge. Words will have to be met in many different contexts in order to discover their meanings and uses, and this entails a long-term recursive approach to vocabulary learning. Indeed, some research suggests that single episodes of instruction may not only be ineffective, but may actually be counter-productive under certain circumstances. Chang and Read (2006) found that vocabulary instruction before a listening comprehension task helped less than hearing the input twice or reading and discussing the topic beforehand. Crucially, the students reported that they did not learn the target vocabulary well enough to utilize it in the on-line listening task, and for higher proficiency students, a focus on this inadequately learned vocabulary seemed to distract their attention away from a more general understanding of the listening passages.

The discussion so far has implicitly focused on the form-meaning links of single words, but words do not occur in isolation: words are known by the company they keep (Mackin, 1978). If we take a usage-based approach seriously then symbolic units also consist of conventionalized constructions at all kinds of levels, that is, *formulaic language*. Learners need to know various categories of formulaic language to be proficient in the L2, such as collocations, idioms, and lexical bundles. Such combinations are very widespread in language (Wray, 2002) and used for a number of purposes, such as expressing a message or idea (*The early bird gets the worm* = do not procrastinate), realizing functions (*[I'm] just looking [thanks]* = declining an offer of assistance from a shopkeeper), establishing social solidarity (*I know what you mean* = agreeing with an interlocutor), and transacting specific information in a precise and understandable way (*Blood pressure is 150 over, 70*) (Schmitt and Carter, 2004). Michael Lewis and colleagues (2000) have argued for a language teaching methodology highlighting formulaic language, but the effectiveness of such an approach has not yet been empirically demonstrated to any degree. However, the small amount of research

available suggests that highlighting phrasal language to learners can have an impact. Jones and Haywood (2004) focused on formulaic language in a 10-week EAP class, and found that the students became much more aware of formulaic sequences by the end of the course, showed a slight improvement in the production of these sequences in C-tests, but demonstrated no noticeable improvement in their output of these sequences in composition writing. Boers *et al.* (2006) found that learners who were exposed to considerable listening and reading and made aware of the formulaic language in that input were later judged to be more orally proficient than learners who received the same input but were taught with a traditional grammar-lexis dichotomy.

As MacWhinney would predict, learning form-meaning mappings is not only about frequency but also salience. It is a commonsense notion that the more a learner engages with a new lexical item, the more likely they are to learn it. There have been a number of attempts to define this notion more precisely. Craik and Lockhart's (1972) *Depth/Levels of Processing Hypothesis* laid the basic groundwork by stating that the more attention given to an item, and the more manipulation involved with the item, the greater the chances it will be remembered (see **Depth of processing**, and **Rehearsal**, this volume). Hulstijn and Laufer (2001) reviewed a number of studies and found that vocabulary learning tasks with relatively more need, search, and evaluation elements were more effective in remembering vocabulary items (see **Involvement Load Hypothesis**, this volume). Research, however, shows that many other factors make a difference as well. For example, students can scan, engage, and interpret in many different ways, regardless of material design, and there is little way to know in advance exactly how (Joe, 2006). Students' motivation, attitudes, and strategic behavior matter, so even the best teaching materials may be useless if students do not engage with them. It appears that vocabulary learning is part of a cyclical process where one's self-regulation of learning leads to more involvement with and use of vocabulary learning strategies, which in turn leads to better mastery of their use.

Overall, it seems that virtually anything that leads to more exposure, attention, manipulation, or

time spent on lexical items adds to their learning. In fact, even the process of being tested on lexical items appears to facilitate better retention, as research designs that include multiple post-tests usually lead to better results on the final delayed post-test than similar designs with fewer or no intermediate post-tests (e.g. Mason and Krashen, 2004). Schmitt (2008) suggests the term *engagement* to encompass all of these involvement possibilities, and concludes that essentially anything that leads to more and better engagement should improve vocabulary learning. Therefore promoting engagement is the most fundamental task for teachers and materials writers, and indeed, learners themselves.

Summarizing the dynamic process of second language acquisition

Taking a usage-based perspective, we have shown that a second language is learned mainly through making form-meaning links in the L2 and then discovering how these are used by proficient speakers in conventionalized patterns. For the L2 learner, who already has entrenched form-meaning links in the L1, this means that the L1 can be both a help and a hindrance. Similarities at different levels—form, meaning, or use—in the L1 can be used to help uncover the intricacies of the L2, but differences have to be discovered through frequent exposure and/or some form of attention to these differences. There is no single route to master the new L2 conventions but exposure and engagement are essential.

See also: cognitive linguistics and SLA, competition model, Complexity Theory/Dynamic Systems Theory, lexical concepts, vocabulary learning and teaching, word knowledge

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Language testing and SLA

Sauli Takala

University of Helsinki

Testing and assessment, which have several functions in the life of individuals and in a variety of institutional domains, have a long history (reference is often made to early examples in China and in the Bible). Language tests also have a long history and some current language examination bodies