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Introduction

For a long time, second language acquisition research has been primarily concerned with how second language (L2) learners’ grammatical system develops. Although L2 vocabulary research has grown substantially in the past 30 years, Schmitt’s (2010) observation that we lack a comprehensive theory of vocabulary acquisition still holds today. Nevertheless, several important lines of research and theorizing can be identified that help us develop a better understanding of how lexical development forms an integral part of second language learning processes.

In this chapter, I will discuss what kind of input can promote vocabulary acquisition and how the expansion of vocabulary knowledge can be influenced by language comprehension and attentional processes. I will describe the features of input that can promote or hinder the noticing of novel lexical forms, meanings, and other aspects of lexical knowledge. This will be followed by an elaboration of how psycholinguistic theories account for the encoding of lexical knowledge in long-term memory. The chapter will highlight that vocabulary development is a complex process in which various input and learning conditions interact with factors that influence the allocation of learners’ attention to lexical items and the integration of new knowledge into an existing lexical system. The chapter will conclude with suggestions for future directions for a closer integration of vocabulary research and second language acquisition theories.

Critical Issues and Topics

The Role of Input in Vocabulary Learning

It is unquestionable that some kind of input is necessary to acquire previously unknown lexical items and to expand and enrich lexical knowledge (Gass, 1997). Nevertheless, language input, which can be any “potentially processable language data which are made available by chance or by design, to the language learner” (Sharwood Smith, 1993, p. 167), is no guarantee of L2 development because not every novel piece of information one is exposed to is
attended to and subsequently learned. Therefore, one critical issue for vocabulary research is what type of input enhances lexical development. L2 learners are exposed to many different types of input, including authentic and instructionally designed written and spoken texts, spoken interactions in and outside classrooms, traditional paper-based and computer-mediated vocabulary learning and practice tasks, and contextualized and decontextualized word lists. These can all be beneficial for lexical development, but their effectiveness can vary depending on the target vocabulary, students’ level of proficiency, existing lexical knowledge, and the instructional context.

Intentional Learning in Explicit Instructional Contexts

In the beginning stages of L2 learning, particularly up to the point of acquiring the first 2,000 to 3,000 words in the target language, the intentional learning of vocabulary is necessary (Coady, 1997). Intentional learning involves “cognitive processes that have learning as a goal rather than an incidental outcome” (Bereiter & Scardamalia, 1989, p. 363) and is associated with high levels of attentional focus and consciousness. Intentional learning is goal-oriented and its success strongly depends on the individual’s motivation to learn and the effective use of self-regulation strategies (Tseng, Dörnyei, & Schmitt, 2006). Intentional learning is usually supported by means of explicit, language-focused instruction (Nation, 2008). This type of instruction directs learners’ attention to various aspects of lexical knowledge (e.g., meaning, collocations, syntactic information associated with lexical items). Explicit instructional conditions tend to engage students in explicit learning processes, which are associated with a high level of attention control, targeted and sustained attentional focus, and assist in discovering patterns of relationships in the input (Ellis, 1994). The primary outcome of explicit learning is explicit knowledge, which can be defined as “facts that speakers of a language have learned” (R. Ellis, 2006, p. 95). Explicit learning can, however, also result in the development of implicit knowledge (McLaughlin, Osterhout, & Kim, 2004), which can be characterized as “abstract, unconscious and rule-like representations” (Ellis, 2007, p. 19).

One common type of highly explicit and intentional learning activity is when students are asked to memorize word lists. These word lists can be decontextualized and consist of lists of isolated words with either their definitions or meaning equivalents in the students’ first language (L1), or contextualized and embedded in sentences. Decontextualized word lists can be highly effective in enlarging L2 learners’ vocabulary size in the short and long term (for a review see Laufer, 2006) because students’ attention is focused on establishing a form-meaning link (Webb, 2007). In the early stages of L2 learning, the need to process the context in which novel words occur explains why the retention rate for contextualized word lists is lower than for decontextualized ones (Qian, 1999). It is, however, questionable whether depth of word knowledge, such as syntactic information, collocations, and associations, can be acquired if L2 learners encounter words devoid of context. Interestingly, Webb’s (2007) study found no significant difference in learning gains in semantic, syntactic, orthographic, and associative knowledge of words between contextualized and decontextualized contexts. He argued that as they lack context, L2 learners can rely on their L1 vocabulary knowledge and make successful inferences about the syntactic and semantic characteristics of L2 words.

A recently developed way of offering rich context for intentional vocabulary learning is data-driven learning (DDL), which uses corpus linguistic tools to present authentic situations of lexical usage to learners (Johns, 1990). Data-driven learning is based on usage-based theories of second language acquisition, which argue that learning happens through the probabilistic extraction of regularities from the input rather than rule-based learning.
Usage-based theories postulate no clear separation between grammar and lexis and argue that the grammatical system emerges as a result of logically organized vocabulary, and patterns of language use are acquired through repeated encounters with words (Hoey, 2005). This assumption is particularly important for the acquisition of multiword lexical units and DDL approaches have been applied to teaching these elements of the lexicogrammatical system. DDL exposes learners to sentences or longer stretches of phrases which contain examples of target lexical items. They are a form of input enhancement, whereby the salience of a lexical item is increased by both providing several examples and highlighting them in some way. These enhancement techniques help learners to focus their attention on target items and analyze patterns of lexical use such as syntactic, stylistic, and pragmatic features and collocations (Flowerdew, 2015). DDL approaches were found to be more efficient than traditional word-list teaching approaches in Cobb and Boulton’s (2015) meta-analysis of previous research with learners of English and were shown to be an effective teaching tool for lower-level learners in Vyatkina’s (2016) study with students of German. These results provide evidence for the significance of enriched input and guided discovery in developing not only form-meaning links but also depth of lexical knowledge.

Vocabulary Development in Incidental Learning Contexts

In the previous section, I presented the role of explicit input through which learners acquire lexical knowledge intentionally. The analysis of incidental learning of vocabulary by means of different types of input is, however, less straightforward because in incidental learning lack of intentionality is more difficult to establish. One of the issues surrounding the distinction of intentional vs. incidental learning is that intentionality can be perceived as a continuum (Barcroft, 2004). The focus and level of attention and the concomitant learning effort can vary while students engage in vocabulary learning tasks. Students might make conscious attempts to discover form-meaning associations while being exposed to extensive and intensive reading and listening texts, but they might lack intentionality to commit them to long-term memory (Ender, 2014). Therefore, it is important to recognize that both explicit and implicit learning processes can operate in incidental learning contexts. Furthermore, L2 learners might approach tasks and input differently, and even though researchers or teachers create conditions in which learners are not meant to learn words intentionally, they might still engage consciously with novel words.

In incidental learning contexts students can take several courses of action to deal with unknown lexical items. First of all, they can decide to ignore them. Second, they can choose to discover the meanings of unknown words or phrases and apply lexical processing strategies (Fraser, 1999). Third, at higher levels of proficiency, L2 learners can “implicitly absorb the meaning of an unknown lexical item and map it onto a given form” (Ender, 2014, p. 556). Ender points out, however, that this implicit learning mechanism usually occurs after the word or phrase has already been repeatedly encountered.

A number of arguments support the significance of exposure to large quantities of reading and listening texts for promoting vocabulary development through incidental learning. One of them is based on studies of L1 acquisition that demonstrate that extensive reading and listening to input such as stories is highly beneficial for enriching children’s vocabulary size and depth (Nagy, Herman, & Anderson, 1985). Moreover, the development of vocabulary knowledge beyond the first 2,000 to 3,000 words mostly happens through incidental learning by means of reading or listening (Coady, 1997). Additionally, certain aspects of lexical knowledge, such as grammatical knowledge related to lexical items, collocations, or
constraints on use, are primarily acquired implicitly (Ellis, 1994), and for implicit learning to result in measurable gains a substantial amount of input is necessary (Ellis, 2002).

Nonetheless, there are a number of constraints on how efficient incidental learning can be through extensive and intensive reading and listening. As mentioned earlier, students often ignore unknown words, especially if they are non-salient and if a sufficient level of understanding can be achieved without them (Vidal, 2011). Even if students decide to make a conscious attempt to discover the meaning of words, they might not have a sufficient level of existing vocabulary knowledge to allow them to understand a text and apply successful lexical inferencing strategies (Elgort & Warren, 2014). Another frequent obstacle to incidental vocabulary learning can be a lack of contextual clues (Huckin & Coady, 1999; Webb, 2008) to support learners in analyzing the meaning of unfamiliar words. Furthermore, for certain types of words, such as verbs, it is not only important that learners encounter them frequently but that they meet them in diverse contexts (Crossley, Subtirelu, & Salsbury, 2013). Varied contexts also help learners to develop rich semantic representations and depth in other types of word knowledge (Ellis & Ferreira, 2009).

Another reason for the relatively modest learning gains made through extensive reading and listening (e.g., Horst, Cobb, & Meara, 1998; Waring & Takaki, 2003) is that a large number of encounters are necessary for learners to acquire depth of word knowledge. In order to develop a rich and accurate lexical representation, learners might need between 5 and 16 repetitions of an item in the input (Nation, 1990; Pellicer-Sánchez & Schmitt, 2010; Webb, 2007). These repetitions also need to be phased so that forgetting does not occur before a new encounter occurs (Baddeley, 2003). Therefore, the frequency of words above the 2,000 level in “naturally occurring” and instructionally unmodified texts might not be high enough to allow for repeated encounters. Nation’s (2014) corpus linguistic analysis of authentic novels suggests, however, that it is likely that manageable amounts of extensive reading provide enough repeated encounters of words for vocabulary learning to occur for words up to the 9,000-word frequency level.

**Effect of the Modality of Input on Lexical Development**

Vocabulary learning outcomes might also differ depending on whether students encounter novel words through listening or reading, or in both modalities. The written mode is more permanent and allows the reader to revisit the text and unfamiliar words, whereas the spoken mode is momentary and language processing usually takes place under time pressure. The comprehension of spoken and written material is influenced not only by the features of a text, but also the characteristics of readers or listeners. One important cognitive individual difference that affects language comprehension and vocabulary learning is working memory capacity. Working memory is a multi-component memory system consisting of the central executive, which coordinates two modality-specific subsystems, the phonological loop and the visuo-spatial sketchpad. The phonological loop is responsible for the manipulation and retention of speech, and the visuo-spatial sketchpad processes visual and spatial information (Baddeley, 2003). The central executive controls the focus and maintenance of attention and regulates the flow of information through the system (Gathercole, 1999). The acquisition of words through listening is more strongly constrained by working memory limitations, and consequently tends to be less successful than the learning of words through reading (see, e.g., Nelson, Balass, & Perfetti, 2005 on L1 vocabulary learning and Brown, Waring, & Donkaewbua, 2008 on L2 word learning). The acquisition of words through listening requires higher numbers of repeated encounters than the learning of words.
through reading (Brown et al., 2008), although similarity to L1 and whether a word is relevant for the comprehension of key ideas in the listening text are also significant determiners of successful vocabulary learning (Vidal, 2011). The question is, however, whether these observations regarding the advantage of the reading mode persist with the development of L2 proficiency.

Vidal’s (2011) study revealed that, overall, students were able to retain more novel words that they encountered in academic reading texts than unfamiliar vocabulary they heard in lectures. Interestingly, however, the benefits of reading written texts decreased for high proficiency learners. This change can be explained with reference to the psycholinguistic mechanisms involved in spoken language comprehension. These comprise the perception of sounds in the stream of speech, the segmentation of the speech signal into words, the retrieval of the meaning of recognized words, and syntactic analysis. In a quick sequence of parallel processing, this linguistic analysis results in the establishment of the meaning of an utterance which is aided by relevant background knowledge and the discourse context (Anderson, 1995). As low proficiency L2 learners’ phonological and attentional system is still strongly attuned to their L1, and they might lack sufficient level of automaticity in processing, these learners might experience particular difficulties in recognizing unfamiliar words during listening. They might also find it challenging to apply lexical inferencing strategies under time pressure and to hold relevant information in working memory that would aid them in the successful establishment of an accurate form-meaning link (Goh, 2000). In comparison, high-proficiency learners can carry out low-level linguistic processing of spoken information automatically and efficiently, and might have sufficient attentional resources not only for comprehending the meaning of a text, but the ability to apply lexical inferencing strategies and encode new word meanings in long-term memory. Vidal’s study also showed that in a delayed posttest for advanced level participants, the difference between spoken and written modes disappeared. She argued that high proficiency participants benefit from hearing unknown words because it allows them to process verbal information directly in phonological short-term memory, which operates with sub-vocally rehearsed material (Baddeley, 2003). When words are presented in the written mode, they first need to be processed orthographically, i.e., the letters need to be recognized. This is followed by phonological processing, which involves the conversion of letters into sounds, the combination of sounds into syllables, and finally phonological activation of the word form. In this process of written word recognition, several problems can occur, which might result in inaccurate decoding of the phonological form of a word. Vidal (2011) concludes that “direct – in some cases repeated – access to the phonological storage might result in more stable, distinct and durable memory traces” (p. 244).

Another question worth asking is what benefits multimodal input, such as listening to a text while reading, brings for the development of lexical knowledge. The access to read-aloud technology and video subtitling makes this type of input easily available to an increasingly large group of language learners. Brown et al.’s (2008) study suggests that vocabulary gains through reading while listening are commensurate with reading only, and significantly higher than through listening only (for similar results see also Webb & Chang, 2012). They argue that listening to a text that is being read out with appropriate sentence intonation assists low-proficiency learners in processing the meaning of larger semantic units. Furthermore, when a text is read as well as listened to, it is processed in both visual and auditory working memory, which assists in retaining information and building connections between them (Moreno & Mayer, 2002). This explains findings in educational psychology that have shown that multimodal presentation can enhance the comprehension and recall of information (for a recent review see Wood, Moxley, Tighe, & Wagner, 2018).
In the discussion so far, the role of comprehended and comprehensible input has been considered. At the same time, however, a certain proportion of the input also needs to contain unfamiliar or incomprehensible elements, otherwise it only serves to reinforce existing knowledge and does not contribute to the acquisition of previously unknown lexical items. Previous research suggests that between 95% (Laufer, 1989) and 98% (Hu & Nation, 2000) of words in a written text need to be familiar to learners so that they gain a sufficient understanding of the text and this understanding supports vocabulary development. A key process that assists learners in transforming incomprehensible input into new forms of lexical knowledge has been traditionally called “noticing the gap” (Schmidt, 1990) in the field of second language acquisition. The role of attention, noticing, and engagement will be discussed in the next section.

The Role of Attention and Engagement in Vocabulary Development

One of the major factors that determines whether or not input will become intake is the attention paid to it (Schmidt, 1990). Although attention is a key concept in the field of SLA research, as well as in cognitive psychology, there is still no consensus as to what attention actually is (Shinn-Cunningham, 2008). Two characteristics of attentional processing, however, seem to be key to all conceptualizations of attention, namely that attention is subject to intentional control and is selective (e.g., Smith & Kosslyn, 2006; Styles, 2006). The term consciousness is often used interchangeably with attention. It is, however, important to distinguish consciousness, which is the understanding of one’s experiences (Max Velmans, 2009), from attention. Consciousness assists in summarizing information that “pertains to the current state of the organism and its environment and ensuring this compact summary is accessible to the planning areas of the brain” (Koch & Tsuchiya, 2006, p. 17). While attentional processing might take place without consciousness, attention, with consciousness, is necessary for the registration of stimuli in working memory, and thus people can distinguish between stimuli and provide a full report of them (Koch & Tsuchiya, 2006). The ability to offer a report on consciously perceived information that has been processed by the attentional system is regarded as awareness (Lamme, 2003).

The definition of attention in SLA research is ambiguous, as different studies interpret it in different ways. Some consider attention as a cognitive mechanism that involves conscious awareness (e.g., Schmidt, 1990), whereas others make a distinction between awareness and attention (e.g., Godfroid, Boers, & Housen, 2013; Robinson, 1995; Tomlin & Villa, 1994). Noticing, according to Schmidt (1995), is an attentional process that involves both consciousness and awareness. Schmidt (1990) also highlights that noticing is a “private experience, although noticing can be operationally defined as availability for verbal report, subject to certain conditions” (p. 132). According to the definitions in cognitive psychology just cited, awareness involves the possibility of offering verbal reports, and therefore what Schmidt calls “noticing” can be equated with “awareness”. In a more recent discussion, Godfroid et al. (2013) separate awareness and attention and view them as two sides of the same coin. They argue that a certain level of attention is sufficient for registering new stimuli in long-term memory. This is similar to the views of both Tomlin and Villa (1994) and Robinson (1995), who argue that awareness is not a necessary condition for the development of new linguistic knowledge. In line with Robinson (1995), Godfroid et al. (2013) define noticing as “a cognitive process in which the amount of attention paid to a new language element in the input exceeds a critical threshold, which causes the language element to enter WM and become the object for further processing” (p. 493). Nevertheless, the question remains
of how to determine the threshold beyond which a stimulus enters WM. Indrarathne and Kormos (2017) suggest that given these theoretical problems and the fact that the concept of noticing is not present in the psychological literature, it might be expedient to use the construct of attention instead of noticing in investigating how L2 learners process input.

The investigation of attentional processing of lexical items in the input has received a major boost with the availability of eye-tracking technology that allows researchers to establish where learners focus their attentional resources while they read. For example, Godfroid et al.’s (2013) eye-tracking study revealed that “for every second longer that a participant looked at a novel word while reading, she was 8% more likely to identify that word correctly on the subsequent vocabulary test” (p. 507). Strong associations were also found between total fixation duration, i.e., the length of time spent gazing at a word, and the ability to recall the meaning of target words in Pellicer-Sánchez’s (2016) study, and between total fixation duration and meaning recall and recognition in Godfroid et al.’s (2018) research. These studies provide strong support for the important role of attentional processing in the acquisition of L2 word form-meaning associations. They indicate that lexical items that come into L2 learners’ attentional focus are further processed in working memory. These working memory processes can involve sub-vocal rehearsal in phonological short-term memory, which assists learners to keep verbal material active before it can be encoded in long-term memory (Baddeley, 2003). Additionally, rehearsal might also help the elaboration of material in working memory, which can help L2 learners acquire additional meanings of words and collocations, patterns of spelling and pronunciation or grammatical information related to lexical items (Dóczi & Kormos, 2016). Recent eye-tracking research by Elgort, Brysbaert, Stevens, and Assche (2018) and Godfroid et al. (2018) also offers insights into how many exposures might be necessary for the reliable establishment of meaning representations and the elaboration of semantic information. The eye-movement patterns of L2 learners in both of these studies indicate that the first five to ten encounters with novel words serve to strengthen the knowledge of the form of a word, and only after the seventh to tenth encounters do learners start linking the form of words with their meaning.

Attention also forms a key part of Craik and Lockhart’s (1972) depth of processing model, on which Laufer and Hulstijn’s (2001) Involvement Load Hypothesis (ILH) is based. In this hypothesis, involvement is assumed to consist of three components: need (to learn a given word), search, which refers to how the meaning of a word is discovered, and evaluation, which entails the comparison of the word’s meaning with other words, a specific meaning of a word with its other meanings, or comparing the word with other words in order to assess whether a word does or does not fit its context.

(p. 544)

These three factors can form a continuum and can be present in vocabulary learning contexts to different degrees. Hulstijn and Laufer (2001) found empirical support that the higher the involvement, the more successful is lexical learning (for a meta-analysis see Huang, Eslami, & Wilson, 2012). In addition to noticing, Schmitt’s (2008) concept of engagement also includes features of involvement and attributes an important role to “increased attention focused on the lexical item, increased noticing of the lexical item; increased intention to learn the lexical item and increased amount of time spent engaging with the lexical item” (p. 339). Engagement in a broader sense has also become a focus of recent research in the field of second language acquisition. Engagement is a “heightened state of attention and involvement...
in which participation is reflected not only in the cognitive dimension but in social, behavioural and affective dimensions” (Philp & Duchesne, 2016, p. 3). Therefore, self-regulated vocabulary learning, which is a joint behavioral and affective realization of engagement, also influences how L2 learners allocate their attention to lexical items and what effort they exert in learning them (e.g., Tseng et al., 2006; Elgort & Warren, 2014). Nation and Webb’s (2011) Technique Feature Analysis (TFA) has recently expanded Laufer and Hulstijn’s (2001) ILH and Schmitt’s concept of vocabulary engagement. In their extended framework five factors determine the depth of processing in vocabulary learning tasks: motivation, noticing, retrieval, generation, and retention. In a comparative study, Hu and Nassaji (2016) found that TFA provided better estimates of the success of vocabulary learning through different types of tasks than ILH.

It is also important to consider what features of a lexical item are likely to attract learners’ attention in the input. In addition to the role of frequency, which was discussed earlier, other factors, such as salience, similarity with L1 and predictability, also play a role in determining what learners pay attention to. The adaptation of Wickens’ (Wickens, 2007) model of attention to the context of vocabulary learning can offer useful insights into features that draw learners’ attention to a word. According to the model, four factors determine what aspects of the input receive attention: Salience, Effort, Expectancy, and Value (SEEV). The model predicts that when different pieces of information enter into a competition for attentional resources, individuals pay attention to stimuli that are salient, require less effort to process, are expected in the given situation and have high value in terms of the task to be undertaken. This model can explain why learners might ignore unknown L2 words that are not relevant for an acceptable level of understanding of a listening or reading text, or that do not fit with the students’ schemata of co-text and context. Vidal’s (2011) study showed that a significant factor in drawing students’ attention to unknown words was whether they were technical words necessary for comprehension of a lecture. Similar results were obtained by Elgort and Warren (2014), who found that key content words in a reading text were remembered better than words that had lower key content value.

In the field of second language acquisition, in addition to frequency, perceptual salience, morphological regularity, and semantic complexity have been found to determine overall salience (Goldschneider & DeKeyser, 2001). These factors can also explain attentional processing of vocabulary in the input. For example, predictability from word form and word parts was found to be a better indicator of the learnability of words through listening than frequency of occurrence in the input in Vidal’s (2011) study.

The characteristics of L1 are also an important factor in what lexical items L2 learners consider salient in the input. The concept of learned attention can explain that L2 learners’ attention tends to be tuned to features in the input that are consistent with their L1 system (N. Ellis, 2006). L2 learners often ignore cues in the input that are not in line with their L1 at different levels of language, such as phonology, morphology, and semantics. In other words, these cues might not attract sufficient attention because they are unexpected (see Wickens’ 2007 model, explained earlier). This might be one of the reasons why cognate words, i.e., words similar in phonological and/or orthographical form in L1 and L2, are noticed and learned more successfully than noncognate ones (de Groot & Keijzer, 2000; Ellis & Beaton, 1993; Vidal, 2011). Learned attention can also influence the processing of false cognates (“false friends”), which are words that are similar in phonological and/or orthographic form in L1 and L2 but have different meanings in the two languages. These words have been found to cause difficulties in acquisition because the difference in meaning or form in the two languages might not be salient for learners (Laufer, 1990). In addition, learned attention
can be an obstacle to acquiring other aspects of vocabulary knowledge, such as syntactic, phonological, orthographic, sociolinguistic and collocational characteristics of words that are potentially similar in the learners’ L1 and L2.

**Encoding Lexical Knowledge in Long-Term Memory**

In the previous sections I discussed how the input L2 learners are exposed to is processed and how it can become intake for lexical development. In this section I will describe theories that can account for how long-term memory traces of lexical knowledge are created. Many models of L2 vocabulary acquisition are built on Aitchison’s (1994) conceptualization of the processes of lexical development in children. The first step in Aitchison’s theory is called *labeling*, which is the stage when children associate an initial semantic meaning with the form of a lexical item. In the next *packaging* phase, this initial semantic meaning is fine-tuned. Fine-tuning involves an analysis of how far the semantic field associated with a particular phonological form can be extended and to what extent it can be further specified. For example, in the initial stages of word learning, children might call any animal that has four legs and whiskers a cat, and they need to gain sufficient experience to establish which animals are in fact cats and not lions or pumas. The final process of vocabulary learning involves linking the newly acquired lexical item with other words in the existing lexical system. More recent models of adult vocabulary learning in L1 also assume that new word learning involves the establishment of memory traces of the formal characteristics (e.g., spelling, pronunciation) of a word and its meaning, and then building up strong associations between form and meaning (Tamminen & Gaskell, 2013). These connections between form and meaning are reinforced by each encounter with the word, which also create memory traces of the context in which the word was seen or heard (Bolger, Balass, Landen, & Perfetti, 2008). Repeated exposure to novel lexical items also assists in refining the various meanings of words and developing rich lexical representations so that word recognition and recall can proceed quickly and without effort (Perfetti, 2007).

In both monolingual and bilingual child language acquisition, vocabulary learning might take place quickly, which is called *fast mapping* (Hu, 2012). In this fast-mapping process, children can connect a new L2 word form with the relevant concept without reference to its L1 equivalent although, as Hu’s findings suggest, the memory traces for these words might not be long-lasting. Adults’ vocabulary learning, however, is assumed to be a two-stage process (Davis & Gaskell, 2009). First, an episodic memory trace of the new word is established quickly, which is then followed by consolidation processes, “such as stabilization (strengthening of a memory trace), generalization (extraction of gist/rules), and integration (formation of new relations between novel and old knowledge)” (van der Ven, Takashima, Segers & Verhoeven, 2015, p. 1). These consolidation processes require time and might be better supported by a written than a spoken context (van der Ven et al., 2015).

Truscott and Sharwood-Smith’s (2004) Acquisition by Processing Theory (APT) offers a similar account of vocabulary learning in L2, and it also describes how syntactic information related to words is encoded. Truscott and Sharwood-Smith propose that upon the first encounter with an unfamiliar word, an empty syntactic structure that corresponds to the phonological form of the word is created. Next, the grammatical category for the syntactic structure of the word is identified based on the context. For example, if the learner hears the word “selfie” for the first time in the sentence “He took a selfie”, they will construct a syntactic structure for a noun because “selfie” is preceded by an article. The following steps in Truscott and Sharwood-Smith’s (2004) theory are similar to the previously described
models of L1 vocabulary learning and involve the establishment and consolidation of the meaning of a word.

In L2 vocabulary learning, it is important to consider that most L2 learners already have a well-developed mental L1 lexicon (see Dóczi, this volume). The different aspects of lexical information represented in the L1 mental lexicon are strongly interlinked and are activated simultaneously or with very brief intervals (Levelt, 1989). In L2 learning, however, all these aspects of knowledge need to be developed and are intertwined with the existing L1 system (for a review of these relationships see Kormos, 2006). In many L2 learning contexts, the first step in word learning often involves nothing more than the establishment of the phonological and/or orthographic form of the L2 word, which is the creation of an episodic memory trace that lacks semantic or syntactic elaboration (Jiang, 2000). In the following consolidation phase, an association between the form and meaning of the word is established, and semantic, morphological and syntactic information of a corresponding L1 word might also be transferred. Jiang (2000) postulates that in the final stage of development, which learners might not always reach, a rich lexical representation of the L2 word is established and inaccurately transferred L1 features are weakened.

**Vocabulary Development From the Perspective of Dynamic Systems Theory**

Vocabulary development is a complex process in which various input conditions and characteristics interact with factors influencing the allocation of learners’ attention to lexical items. The establishment of rich memory traces in long-term memory and their integration into the learners’ mental lexicon is also a dynamic and interactive process. Therefore, Dynamic Systems Theory (DST) (Larsen-Freeman & Cameron, 2008) can prove useful for elucidating some of the complexities of lexical development.

An important assumption of DST is that initial conditions, such as learners’ existing knowledge system, resources and characteristics, and the context, have a strong influence on developmental patterns (Verspoor, de Bot, & Lowie, 2011). With regard to vocabulary development, this means that learners’ existing L1 mental lexicon interacts with newly acquired L2 lexical items and the conditions and context in which these words are learned. The dynamic interaction of these factors can make development unpredictable and changes in vocabulary growth might not take place along a smooth incremental path (see e.g., Dóczi & Kormos, 2016).

DST also helps us explain that there are periods when the lexical system expands and is enriched, but there are also phases of stabilization, i.e., plateaus when no observable development takes place. For example, Spoelman and Verspoor’s research indicates (2010) that phases of lexical and syntactic development might alternate. As explained earlier, usage-based theories of second language acquisition postulate that lexical and syntactic systems are strongly interrelated (Ellis, 2014). Therefore, development in the areas of lexis and syntax can be mutually supportive, as indicated by Spoelman and Verspoor’s (2010) results. On other occasions, lexical and syntactic processes were found to be interdependent. This was demonstrated in Verspoor, Schmid, and Xu’s (2012) study, where lexical change was a precursor to syntactic development. DST can also offer an explanation for negative developmental changes, such as periods of “backslide” in L2 lexical knowledge, which is being particularly prone to forgetting if knowledge is not used regularly and over long periods of time (de Bot & Weltens, 1995). In Dóczi and Kormos’ (2016) longitudinal study conducted in an EAP context in the UK, some learners, instead of increasing their vocabulary size, demonstrated a lower level of vocabulary knowledge at the end of the academic year than at the beginning. Finally, from a dynamic view of development, it follows that there is no final
stage or end state that a learner can or needs to reach; as de Bot, Lowie, Thorne, and Verspoor (2013) point out, “some changes caused by internal reorganization may not be externally visible or may appear to be stable but the underlying processes may have changed. There will always be some degree of variability in a system” (p. 212).

Future Directions

Existing research in the field of vocabulary learning has mostly focused on the interrelationship of the cognitive processes involved in acquiring L2 lexical knowledge and L2 development. Although we have a fairly detailed understanding of how students learn new form-meaning associations from input intentionally and incidentally, less is known about how other aspects of vocabulary knowledge, such as syntactic, collocational, stylistic, and orthographic knowledge related to lexical items, develop. Further studies on how lexical knowledge can influence syntactic development would also assist in a closer integration of vocabulary and second language acquisition research. Future investigations using eye-tracking and introspective methods could shed light on how the context in which a lexical item occurs affects the development of various types of lexical knowledge.

It is also important to extend the line of studies on vocabulary learning to interactive contexts. L2 learning is rarely a solitary activity, and second language acquisition often takes place in interaction with others. Interactions foster L2 learning by allowing language users to test their hypotheses, gain feedback and receive support, and as a result consolidate and expand their lexical knowledge (Doughty & Pica, 1986). There is a scarcity of studies that have investigated how negotiation of meaning and feedback in interactive situations can contribute to L2 development (for exceptions, see Ellis & He, 1999; Newton, 2013). Further research that focuses on the micro- and macro-social context of learning would yield new insights into how sociocultural factors affect lexical development.

Further Reading


This chapter discusses vocabulary learning in various theories of second language acquisition in depth. It also gives a detailed account of how learners process input for learning new words, and how interaction and output opportunities contribute to lexical development.


This book offers a comprehensive overview of the development of different types of vocabulary knowledge. It also includes a wide array of research instruments applied in investigating the breadth and depth of vocabulary knowledge.


This article presents an important piece of research on the differential effect of reading and listening to academic texts on incidental vocabulary acquisition. Vidal also investigates how features of unknown words in the input influence incidental learning in written and spoken modes and how proficiency differences affect the uptake of words in these two modes.


Ender’s research offers detailed insights into the psycholinguistic mechanisms of implicit and explicit vocabulary learning. Her study relates the use of lexical inferencing strategies to the
development of implicit and explicit knowledge. Based on her findings, she proposes a multilevel model of factors that influence incidental vocabulary acquisition.

**Related Topics**

Incidental vocabulary learning, deliberate vocabulary learning, factors affecting the learning of single-word and multiword items, mental lexicon

**References**


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