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Word Learning and Lexical Development Across the Lifespan

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Synonyms

Lexical acquisition; Lexicalization

Definition

The scientific study of word learning across the lifespan is concerned with how adult language users come to acquire words in their own language, and how these lexical representations develop over time. This can be distinguished from the study of vocabulary acquisition in children and in second language learning, though these fields share common goals in seeking to understand the processes involved in the acquisition of novel word forms, meanings, and the linking of forms to meaning.

Theoretical Background

It is sometimes assumed that a language contains a relatively fixed set of words, and that by adulthood, the word learning process is essentially complete. However, it is easy to underestimate the lexical resources available to adult language users. The 2006 Google n-gram corpus contains approximately 13 million distinct English words. Focusing just on lower case words with alphabetic symbols still leaves 1.5 million words. Estimates of the size of nature of adults' mental lexicons vary enormously. One conservative rough estimate is that adult native speakers of English know 20,000 word families (Nation and Waring 1997), while other estimates put the figure closer to 60,000 individual words. These figures suggest that we never come close to acquiring all the words that exist in a language, and there is a great deal of individual variation on what portion of the ever-growing available word space will be captured.

Words are acquired by children at a prodigious rate. To reach adult competence, from birth, we must learn at least 1,000 words a year on average. This remarkable growth in vocabulary overshadows the fact that as adults, we continue to acquire novel words throughout our lifetime. Infrequent words are typically learned later in life, and new words are constantly being introduced due to technological innovations, foreign imports, and proper names. While we may increase the size of our lexicons as we age, access in later life can be limited by normal aging and dementia, which are associated with word finding difficulties and memory loss.

Perhaps the most important question in adult native word learning research is how a word becomes ► lexicalized, that is, represented in a specialized lexical memory system, and hence exhibits behaviors similar to that of existing words. However, ► lexicalization should not be taken to mean that word learning is an all-or-nothing process, that once a word is lexicalized, learning ceases to occur. Instead, researchers are increasingly emphasizing the dynamic state of the mental lexicon. This is particularly true of exemplar models of lexical processing, where a word form is based on a composite made up of all previous encounters of that word. Given a dynamic view of the mental lexicon, the lexicalization process may never reach completion. Instead of a relatively fixed and stable repository of long-term knowledge, word forms and meanings can be thought to undergo a continual process of lexical development based on exposure and use throughout life.

While there is no agreed consensus on the limits of what can properly be termed part of the mental lexicon, at a minimum, a lexical entry should provide form information, a link to a meaning, and syntactic class. Words are characterized by a hierarchical structure, and can be decomposed into multiple levels of arbitrary sound-meaning correspondences. For the purposes of recognition, words have representations across multiple input modalities, and words also have the power to be easily outputted, most obviously in speech, but also in modalities such as writing, typing, or signing. Given the myriad different forms of memory associated with a word, lexical learning involves learning across a wide variety of memory systems. Knowledge of word form and meaning can be considered part of declarative memory, while production

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part of procedural memory. As such, studies of word learning can potentially be informative about learning in these different memory systems, and their interaction.

Important Scientific Research and Open Questions

The multi-faced nature of words makes studying word learning a complex task. Given that word learning in adults can be taken to involve the learning of a new form, a meaning, and a link between form and meaning, efforts to study word learning have often focused on one or more of these components. In the case of form, much research has looked at how a newly acquired word becomes entrenched as a word within an individual's mental lexicon. Researchers have used a variety of different paradigms to assess the representational status of a novel word. Following a single lexical encounter, we are immediately able to recognize and reproduce that word, supported by form-based representations. However, rapid storage of word does not necessarily lead to a status like that of existing words. Studies of word learning have shown that some lexical behaviors take time to develop (Gaskell and Dumay 2003; Leach and Samuel 2007). For example, behavior that relies upon integration and interaction with other words in the lexicon, such as participation in the process of lexical competition during auditory word recognition, is not available for rapidly acquired form-based representations (Gaskell and Dumay 2003). An explanation for this time-course dissociation is that word forms and meaning are initially stored using an episodic memory system involving the medial temporal lobes. Over time, words become consolidated in long-term memory in the neocortex specialized for lexical representation. This systems-level consolidation involves a paradigmatic case of the integration of new information with existing knowledge. Further research in this area should see increased understanding of how systems-level memory theories can explain lexical development in adults, and how these theories can be applied to understanding word learning in children and in L2 learners. Furthermore, studies of word learning in adults will also potentially be useful in understanding the role of consolidation in memory more generally.

While studies of form-only learning have revealed much about the word learning process, some would argue that a word without meaning is missing an essential part of lexical representation. Accordingly, much research has looked at the role of meaning in the acquisition process (cf. Leach and Samuel 2007). In second language learning, acquisition of a novel form typically involves pairing that form with a preexisting native form, and to a preexisting meaning. In contrast, native word learning usually involves creating a direct mapping from a word form to a novel meaning. As such, a full account of word learning will need to account both acquisition of novel forms and of novel meanings.

We are in the early stages of understanding the neural basis of word learning, and this will continue to be an active area of investigation for much time to come. A fruitful strategy has been to find neural markers for nonword processing, and comparing these with processing of existing words. In electroencephalography, a neural response called the N400 is heighted for nonwords. Given sufficient training, this brain response can be reduced as a novel word becomes more word like. In functional magnetic resonance imaging, modality specific areas have been identified which are associated with nonword processing, principally the left lateral fusiform gyrus for orthographic forms and the left superior temporal gyrus for auditory forms. As a word begins to become lexicalized, reduction of activity in these areas should occur, and the brain response to novel words will become more like that of existing members of the mental lexicon.

A further important line of research in word learning with children and neuropsychological patients has indicated that there are close links between verbal working memory and word learning (Baddeley et al. 1998). We expect to find increasing evidence for the role of short-term memory processes in leading to long-term acquisition of words in adults. This relationship is also prevalent in computational models of word learning (Gupta and MacWhinney 1997). A guiding principle has been the use of frameworks which can account for short-term and working memory processing alongside language learning, with a focus on memory for serial order. These models also reflect the trend of seeking to understand word learning as a consequence of general learning and memory principles, rather than as an outcome of a specific modular mechanism for language learning.

Cross-References

- ▶ Memory Consolidation and Reconsolidation
- ▶ Second Language Learning
- ▶ Vocabulary Learning
- ▶ Vocabulary Learning in a Second Language
- ▶ Word Learning

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