Cross-Modal Effects on Novel Word Consolidation

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In line with two-stage models of memory, it has been proposed that memory traces for newly learned words are initially dependent on medial temporal structures and acquire neocortical, more lexical representations during the first night's sleep after training (Davis & Gaskell, 2009). Only after sleep-dependent consolidation are novel words fully integrated into the lexicon and are therefore able to enter into lexical competition with phonologically overlapping existing words. This effect, observable as a slowing down of responses to existing words with a novel competitor, has been demonstrated using various tasks including lexical decision, pause detection, semantic judgement, and word-spotting.

We investigated the time course of lexicalisation of novel words learned in the visual and auditory modality. Subjects were familiarised with novel words either in a visual task (letter monitoring) or an auditory task (phoneme monitoring), and subsequently performed an auditory pause-detection task on existing words that overlapped with the learned novel words. Results indicated that, as in previous work, words learned auditorily enter into competition with existing words after one night's sleep, but not immediately after familiarisation. However, competition effects for novel words learned from print emerged only after a week. The presence of a competition effect from visually learned words task indicates that at least after a week, novel words had acquired abstract representations that were able to influence recognition of existing words independently of their modality.

We discuss possible explanations for the delay in cross-modal lexicalisation. Since we observed a delayed, but nonetheless significant competition effect in participants who received written input, we argue that learning novel words from print does not preclude cross-modal lexicalisation. Furthermore, previous work has demonstrated competition effects after a single night in a visual within-modality paradigm (Bowers et al.; 2005). This strongly suggests that it is the cross-modal design rather than the input modality per se that caused the delay in lexicalisation in our cross-modal condition. Either a longer consolidation period, reactivation during the second session, or a combination of both may be necessary for cross-modal lexicalisation to take place. We therefore hypothesise that the formation of a truly abstract, modality-independent lexical representation is characterised by a longer and possibly more complex time course than has previously been assumed.

References

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