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Input chunking and its effect on speech processing

Abstract

In both human and animal behaviors involving the processing and learning of sequences, temporal groups emerge. Such grouping has been associated with a domain-general process of “input” or “perceptual chunking” that reflects capacity limits of short-term memory. Objectively, input chunks are marked by changes in inter-response intervals or a lengthening of group-final elements (Terrace, 2001). As an example, in recalling series of non-sense syllables or lists of digits, chunks of no more than four items generally arise which facilitate short-term memory (with groups of three being optimal for serial recall; Cowan, 2001). With reference to this domain-general chunking, our previous investigations using ERPs demonstrated that listeners process speech in temporal groups or chunks. This was revealed by the fact that temporal groups elicited a specific neural component, a rising negativity followed by a rapid positive shift suggesting a buffering of information (Gilbert, Boucher & Jemel, 2010). The present study follows up on these findings and aims to verify if the *size* of perceived chunks affects short-memory of lexical items in heard utterances. To weigh these effects, we used behavioral measures and ERPs, especially the N400 component, which can index the *quality* of the memory trace for target lexemes. Variations in the amplitude of the N400 showed that lexemes presented in shorter temporal groups (3 syllables) were easier to recognize than lexemes presented in longer groups (4 syllables). These results suggest that a domain-general mechanism of input chunking enhances the buffering of sequential information on-line in processing heard speech.

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