

Vowel reduction and auditory discriminability in stressed and unstressed syllables: A mismatch negativity study

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Brazilian Portuguese distinguishes seven vowels in stressed syllables. The distinction between high-mid and low-mid vowels is neutralized in prestressed syllables, resulting in a canonical five-vowel inventory – the most common pattern across languages. A proposed motivation for such kind of vowel reduction is to avoid perceptually challenging distinctions in positions other than the most salient ones (Crosswhite 2004). We used the Mismatch Negativity (MMN) event-related brain response to investigate whether automatic auditory discrimination of vowel quality is enhanced in stressed syllables and whether vowel [e] is more discriminable from [i] than from [ɛ] – given the presumably higher degree of representational complexity involved in the latter distinction. We were also interested in exploring the possibility that discriminability (as assessed by MMN) decreases specifically for the distinction that undergoes neutralization, namely, the prestressed /e:ɛ/ distinction. Multiple exemplars of two-syllable pseudowords consisting of a single vowel followed by a /ga/ syllable were used as stimuli. The MMN was elicited by infrequent deviant 'ega' exemplars interspersed among frequent standard 'iga' or 'ega' exemplars. Responses to 'ega' deviants were measured relative to control 'ega' stimuli presented in sequences in which they were equiprobable with 'iga', 'aga', 'oga', 'oga', and 'uga' exemplars. The deviant vowel (hence, the distinction of interest) always occurred in the first syllable. In half of the stimulus sequences, the first syllable was stressed; in the other half, the second syllable was stressed. Thus, six conditions were defined: *e(i) stressed*, *e(ɛ) stressed*, *e(i) prestressed*, *e(ɛ) prestressed*, *control stressed*, and *control prestressed* – with standards indicated within parentheses. Twenty-two native Brazilian Portuguese speakers participated as volunteers in the experiment. The MMN peaked earlier in stressed than in prestressed conditions irrespective of whether 'ega' deviants were presented among 'iga' or 'ega' standards, suggesting a facilitatory effect of stress. This partially supports the suggestion that vowel reduction phenomena of the kind investigated here reflect constraints against perceptually confusing distinctions. However, although MMN seemed larger for distinction /e:i/ than for distinction /e:ɛ/ in stressed syllables, this difference did not reach statistical significance. As for the prestressed position, the MMN was detected for distinction /e:i/, but not for the neutralized distinction /e:ɛ/. The results provide evidence for a perceptual correlate of neutralization.

References: • Crosswhite, K. 2004. Vowel reduction. In B. Hayes, R. Kirchner & D. Steriade (eds.), *Phonetically based phonology*, 191–231. Cambridge: CUP.