The Perceptual Time Course of Coarticulatory Nasalization

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Abstract

Coarticulatory nasalization is the systematic lowering of vowel height due to nasal consonant influence. Natural-speech recordings were manipulated to vary the amount of nasalized vowel. The vowel nasalization was manipulated to be light or heavy, and the nasal consonant was manipulated to be present or absent. English-speaking participants' eye movements were monitored as they heard manipulated natural-speech recordings presented over headphones. Each C ˜VNT-CVT and C ˜VN-CVN version of the word bend-bent was presented multiple times. Participants learned the name of each picture prior to the main task. Picture familiarization. Participants learned the name of each picture prior to the main task.

Hypothesis 1: Absence of anticipatory vowel nasalization (i.e., an oral vowel) predicts C.

Hypothesis 2: Presence of coarticulatory information is more informative than its absence (Stevens are not simply a matter of the level of auditory nasal cue; e.g., Stevens & Rhinehart, 2001).

Hypothesis 3: English-speaking listeners see C ˜V stimuli (light or medium nasalization) more than oral [C ˜V], whereas for C ˜VN stimuli (small nasalization) their nasalization is more apparent when nasal cues are absent (e.g., Wood & Moreton, 2006). For C ˜VN stimuli, nasalization was more apparent when nasal cues were absent (e.g., Wood & Moreton, 2006).

For naturally produced words of the form CVNC-CVC (e.g., bend-bed), CVNC-CVNC (bend-bent), and CVNC-CVN (e.g., bend-lent), listeners' moment-by-moment processing of anticipatory vowel nasalization and coarticulatory cues was investigated. English-speaking participants' eye movements were monitored as they heard manipulated natural-speech recordings presented over headphones. Each C ˜VNT-CVT and C ˜VN-CVN version of the word bend-bent was presented multiple times.

Participants

40 native English-speaking undergraduate students at the University of Michigan. Participants were tested in small groups (2-3 participants per testing session) in two different sessions. Each session lasted approximately 1 hour.

Materials

The stimuli consisted of 12 pairs of words: bend-lent, bend-bed, bend-bend, bend-leading, bend-broad, bend-bridging, bend-wind, bend-wing, bend-bird, bend-wide, bend-siped, and bend-bred. Each pair consisted of two words: the target word and the voiceless competitor word. The target word was always bend, and the voiceless competitor word was always led, block, bred, bridged, siped, or bred.

Procedure

Listeners were seated in a sound attenuated box and wore earphones with ear-tip apparatus. The experiment was controlled with the PsyScope 3.0 software. Each trial consisted of a fixation point appearing in the center of the computer screen for 1000 ms, followed by the presentation of the target word. The target word was presented at a rate of 0.5 Hz. After the presentation of the target word, a blank screen appeared for 500 ms, followed by a word. The word was presented at a rate of 0.5 Hz. The word was displayed in the center of the screen and was 900 pixels wide and 200 pixels high.

Results

The time course of coarticulatory nasalization was investigated. English-speaking participants' eye movements were monitored as they heard manipulated natural-speech recordings presented over headphones. Each C ˜VNT-CVT and C ˜VN-CVN version of the word bend-bent was presented multiple times. Participants learned the name of each picture prior to the main task. Picture familiarization. Participants learned the name of each picture prior to the main task.

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Discussion

The current study investigated the perceptual time course of coarticulatory nasalization as listeners identify words that are nasalized or oral. The study utilized natural-speech recordings and eye-tracking measures to investigate the role of coarticulatory nasalization in listeners' lexical processing. The results suggest that listeners actively track information in the coarticulated signal and that this information speeds the time course of lexical activation.

References