

English lexical stress and spoken word recognition: An eye tracking and visual world study

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English lexical stress is of interest as it involves both suprasegmental and segmental cues (reduced vowels). Studies that have explored the role of lexical stress in English have shown that it contributes to spoken word recognition. More specifically, a trochaic stress pattern facilitates target word recognition more than an iambic stress pattern does (e.g., Cutler & Norris, 1988; Cooper, Cutler & Wales, 2002). Though some studies have shown reduced and unreduced unstressed vowels have different effects on the perception of stress (e.g., Fear, Cutler & Butterfield, 1995), most studies have explored the issue by quantifying suprasegmental cues to distinguish stressed syllables from unstressed syllables. The present study investigates how English speakers process lexical stress information with and without vowel quality cues during spoken word recognition, employing an eye tracking methodology.

Twenty three English speakers and twenty English speakers participated in two separate eye tracking experiments that had the same experimental design with different sets of stimuli. In both experiments, participants were trained over three sessions to associate drawings of novel 'aliens' with trisyllabic nonword names that had primary stress either in the first or second syllable. The first experiment had full vowels in both stressed and unstressed syllables, whereas the second experiment included the reduced vowel, *schwa*, in unstressed syllables. After the training session, eye movements were monitored as listeners followed the auditory instruction, "Click on the (alien name) now" and selected a correct alien from a set of three: the target (e.g., *JAKuner*), a stress competitor with the alternate stress pattern to the target (e.g., *jaKUna*), and an irrelevant distractor (e.g., *FUgiser*).

To examine the strength of bias toward the target over the competitor word, the log gaze probability ratios for the target over the competitor was compared to 0 by conducting *t*-tests in successive 200 ms windows after the offset of the first syllable. In the first experiment, both item and subject analyses revealed that there were significantly more looks to the target over the competitor after the first syllable during trochaic word recognition and after the second syllable during iambic word recognition ($ts(15) > 2$, $ps < .05$), suggesting that the word recognition process was initiated when listeners encountered the stressed syllable in a word. In contrast, the second experiment showed significantly more looks to the target over the competitor after the first syllable for both trochaic and iambic words with a comparable strength in the subject analysis ($ts(15) > 2$, $ps < .05$) and after the second syllable in the item analysis ($ts(15) > 2$, $ps < .05$). This indicates that, though there was some variation in the first syllable effect (needs to be further explored), listeners exploited the segmental distinction between stressed and reduced-vowel unstressed initial syllables to constrain the activation of stress competitors during word recognition.

The finding that stressed syllables initiate English word recognition when spoken words do not provide any segmental correlate to lexical stress is consistent with previous studies in the literature. The current work further provides empirical evidence that an unstressed syllable with reduced vowel may serve as an equally important cue to the activation of a target word at the early stages of word recognition.

References

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