

Word skipping in eye movements during sentence reading: Effects of lexicality of the letter string in parafoveal preview

Wonil Choi & Peter C. Gordon (University of North Carolina, Chapel Hill)

wichoi@email.unc.edu

Word skipping; Word recognition; Lexical status; Eye-tracking during reading; English

Patterns of eye movements provide basic information about the coordination of sentence comprehension, word recognition and attention during reading. Particularly, word skipping is a phenomenon strongly influenced by oculomotor factors (visual acuity and saccade accuracy) and by the linguistic properties of the word in parafoveal preview, such as its predictability or frequency¹. Lexical properties affect skipping only when the previewed letter string is an actual word, not when it is a nonword created by transposing the positions of two internal letters of a word (e.g., jugde derived from the base word judge). Skipping of these transposed-letter nonwords is not affected by repetition or frequency of their base words², even though they are visually very similar to the base words and provide high levels of lexical priming in a variety of tasks; an alternative possibility is that lexical effects in these cases were blocked by disruption of sublexical orthographic or phonological patterns. The two experiments reported here investigated whether lexical status of the letter string in parafoveal preview influences word skipping, using conditions involving pseudohomophone and homophone previews, neither of which causes any disruption in sub-lexical orthographic or phonological representation. They used the boundary technique³ to vary the letter string in parafoveal preview to determine how lexical status affects the targeting of saccades during reading. Experiment 1 used pseudohomophone previews and Experiment 2 used homophone previews.

Experiment 1 investigated the rate at which a critical target word embedded in a sentence was skipped under three parafoveal preview conditions: valid preview (e.g. brain-brain), pseudohomophone preview (e.g. brane-brain), and orthographic nonword control preview (e.g. brant-brain). If lexical status of the preview string is a necessary condition for language-based skipping, then higher skipping rates should be observed for the valid preview condition (where the preview string is a word) than for the pseudohomophone and orthographic-control preview conditions (where the preview strings are nonwords that preserve the phonological and orthographic patterns found in the target words). Experiment 2 also investigated three preview conditions: valid preview (e.g. beach-beach), homophone preview (e.g. beech-beach), and orthographic control preview (e.g. bench-beach). If word skipping were influenced by lexical status we would expect no skipping difference among these three conditions because the letter string in parafoveal preview is a word, and word frequency and word predictability are controlled across conditions.

Higher skipping rates were observed in Experiment 1 for the valid condition (27.4%) where a word was in preview than for the pseudohomophone (18.9%) and orthographic-control (18.8%) conditions where a non-word was in preview ($F_1=7.09$, $p<.05$; $F_2=3.70$, $p<.05$). In contrast, no difference in skipping rates was observed in Experiment 2, where the valid (25.2%), homophone (22.2%) and orthographic control (24.2%) conditions all involved preview of a word ($F_s < 1$, ns).

This pattern indicates that advancement of the eyes during reading is critically related to processes that are sensitive to the lexical status of letter strings in the periphery, and that the lexical status of briefly-seen words in the parafovea is assessed by mechanisms that target saccades during the reading of sentences.

Sentence Examples

1. Valid/Pseudohomophone/Orthographic Control Preview:

Wendy had always wanted to study the complex brain/brane/brant:**brain** activity involved in problem solving.

2. Valid/Homophone/Orthographic Control Preview:

Taylor expected the nearby beach/beechn/bench:**beach** to be crowded, but it was deserted when she got there.

References

1. Brysbaert, M., Drieghe, D., & Vitu, F. (2005). Word skipping: Implications for theories of eye movement control in reading. In G. Underwood (Ed.), *Cognitive processes in eye guidance* (pp. 53-77). Oxford: Oxford University Press.
2. Choi, W., & Gordon, P. C. (2011). Word recognition during sentence reading: Lexical effects on parafoveal preview processing during reading, Paper presented at the 24th Annual CUNY Conference on Human Sentence Processing, San Francisco, CA.
3. Rayner, K. (1975). The perceptual span and peripheral cues in reading. *Cognitive Psychology*, 7, 65-81.