Voicing Assimilation during Silent Reading

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Previous experiments using the letter detection paradigm have shown that the sizes of reading units may be discovered using this task (Healy, 1994). An important factor affecting reading unit size has been word frequency (Healy, 1976); the unitization hypotheses postulate that the more frequent a word is, the more likely it is to be processed as a unit, with letter-level processing not being finished before the word is identified. Other factors have also been found to influence letter detection errors, including phonetic factors such as syllable stress (Drewnowski & Healy, 1982) and pronunciation of the target letter (Schneider, Healy, & Gesi, 1991).

Recently, we have been exploring whether this paradigm is also sensitive to different kinds of phonological rules of a language. German syllable-final devoicing was one such rule explored; Buck-Gengler and Healy (1993) found that syllable-final *d*s had a larger proportion of errors than either syllable-initial *d*s or syllable-final *t*s, which relates to the fact that *d*s in syllable final positions are pronounced differently than a canonical *d*.

The phonological rule explored in the current study is that of voicing assimilation in the English past tense, that is, the fact that the regular past tense in English has three pronunciations: syllabic [ə d] when the stem ends in an alveolar stop (/t/ or /d/), voiced [d] after a vowel or a voiced consonant other than /d/, and voiceless [t] after a voiceless consonant other than /t/. The hypothesis is that more *d*s that would be pronounced as [t] if spoken will be missed in letter detection than those that are pronounced as [d].

Method

Sixty-six participants read a short story with 36 regular past tense verbs: 12 in each of the three *-ed* conditions (voiced, voiceless, syllabic). The passage also had 68 other words with the letter *d*. Participants were in one of three conditions, articulatory suppression, which has been found to eliminate phonetic effects (Goldman & Healy, 1985), normal silent reading, and reading aloud. They were told to read for comprehension, and to circle any *d*s that they saw, but not to go back to circle *d*s that they realized they missed. The articulatory suppression group spoke the word "psychology" aloud over and over while reading and circling letters; the silent reading group read silently while circling letters; and the reading aloud group read the story aloud and circled the letters. All participants then answered four multiple-choice comprehension questions about the story.

Results and Discussion

When the non-syllabic endings are compared, as predicted, the *d*s pronounced as [t] were missed significantly more often than those pronounced as [d], and there was no interaction between the factors of group and pronunciation. Interestingly, when the non-syllabic endings were compared with the syllabic ending, overall, significantly more *d*s in the syllabic ending were missed than in the non-syllabic endings. Moreover, the articulatory suppression group missed significantly more of both kinds of endings than the other two groups, and the interaction between group and syllabicity of the ending was significant as well, reflecting the fact that the difference between non-syllabic and syllabic endings was largest for the articulatory suppression group. However, there was no difference between the reading aloud and silent reading groups in either analysis.

These findings, along with other phonetic effects investigated, indicate that phonological processing is taking place in silent reading, and that the letter detection paradigm is sensitive to that processing.

References

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