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Learning Foreign Words Under Dual-Task Conditions

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Within the working memory model (Baddeley, 1986), learning a foreign word relies on the phonological loop (a module that processes verbal information via both auditory and written pathways). When the phonological loop functions under dual-task conditions (for instance, when two verbal tasks are presented at once), short-term retention of verbal information is impaired. The present research examined the effects of simultaneous auditory and written presentation on foreign vocabulary learning. It was hypothesized that presenting auditory and written information simultaneously during foreign word learning would result in performance costs analogous to "dual-task" processing. Moreover, it was predicted that the effects of simultaneous auditory and written presentation would interact with the degree of similarity between native-language and foreign-language orthography-to-phonology mappings.

Four types of artificial foreign vocabulary were constructed, and the match between native and foreign orthography-to-phonology mappings was manipulated orthogonally. Sixty English monolingual adults were randomly assigned to one of four conditions ($n = 15$). In +P+O condition, foreign phonology and orthography matched English. In -P+O condition, foreign phonology mis-matched English, but orthography matched English. In +P-O condition, foreign phonology matched English, but orthography mis-matched English. In -P-O condition, foreign phonology and orthography mismatched English. In each condition, 48 foreign vocabulary items and their English translations were learned using Paired-Associated Learning. Half of the foreign vocabulary items were learned in auditory-only modality, and another half in both the auditory and the written modalities. Retention was tested using multiple-choice technique, where participants matched foreign words (received via auditory input) to their English translations. Retrieval efficiency and accuracy were analyzed by-subject (F_1) and by-item (F_2).

Findings indicate that participants in -P+O group, +P-O group, and -P-O group were slower at retrieving foreign vocabulary items learned in the auditory-and-written condition than items learned in the auditory-only condition (see Figure 1: -P+O : $F_1(1, 14) = 4.61$, $p < 0.05$, $F_2(1, 94) = 10.48$, $p < 0.01$; +P-O: $F_1(1, 14) = 7.41$, $p < 0.01$, $F_2(1, 94) = 4.86$, $p < 0.05$; -P-O: $F_1(1, 14) = 9.92$, $p < 0.01$, $F_2(1, 90) = 8.20$, $p < 0.01$). Efficiency of retrieval was impacted by auditory and written presentation to a greater extent than accuracy. Only participants in the -P+O group were less

accurate at retrieving foreign items learned in auditory-and-written condition ($M = 0.65$, $SE = 0.04$) than items learned in auditory-only condition ($M = 0.74$, $SE = 0.05$), $F_1(1, 14) = 4.44$, $p < 0.05$, $F_2(1, 95) = 7.12$, $p < 0.01$. The negative impact of auditory-and-written presentation on accuracy of retrieval in the -P+O condition was likely due to activation of conflicting native-language phonological representations, a finding consistent with connectionist models of native-language visual word recognition (e.g., Seidenberg & McClelland, 1989). When the foreign language matched the native language in both phonology and orthography (+P+O condition), auditory-and-written presentation did not impact either efficiency or accuracy of retrieval.

These results show that simultaneous presentation of auditory and written information negatively impacts learning of foreign words that mismatch English in phonology, orthography, or both. Conversely, simultaneous presentation of auditory and written information does *not* negatively impact learning of foreign words that match English in both phonology and orthography. These findings suggest that simultaneous auditory-and-written presentation results in "dual-task" performance costs, but only when the foreign language mis-matches the native language in orthography-to-phonology mappings.

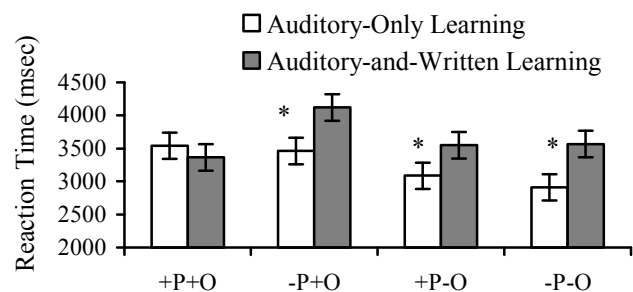


Figure 1: Speed of Foreign Word Recognition.

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