

Investigating the neural mechanisms for the production and perception processing of a productive alternation — evidence from Mandarin T3 sandhi

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To understand how phonological alternation is processed in production and perception, I report three ERP experiments on Mandarin T3 sandhi ($T3 \rightarrow T2 / _ T3$), a highly regular and productive tonal alternation pattern. In covert production after the speakers were cued by the underlying T3 tones of disyllabic words, our results showed that T3-sandhi words elicited significantly more positive ERPs than non-sandhi words in a time window that corresponds to the phonological encoding stage of production processing, indicating a cost for T3 sandhi computation. In overt production elicited by picture naming with phonological priming, stimulus-locked ERP results showed that T3 primes elicited more positive ERPs than control primes, while T2 primes did not, again in the phonological encoding stage of production processing; response-locked ERP results, on the other hand, also showed a T2 priming effect shortly before production. These production results suggest that both the underlying T3 and surface T2 tones are accessed, but with different timing, and that there is a computation cost associated with the alternation process. In an MMN experiment that investigated how the presence of T3 sandhi in the standard or the deviant influenced MMN, our results showed that T3 sandhi either in the standard or the deviant disrupts expected MMN, providing evidence for $T3 \rightarrow T2$ mapping even in preattentive processing of Mandarin words. Together, these results support the relevance of underlying representations in the neural processing of a highly productive alternation. Extensions of this line of research on other types of alternation with different generality and productivity will be briefly discussed as well.