

LIMITS TO CROSS-MODAL SEMANTIC AND OBJECT SHAPE PRIMING IN SENTENCE CONTEXT

Joost Rommers (Max Planck Institute for Psycholinguistics) & Falk Huettig (Max Planck Institute for Psycholinguistics & Donders Institute for Brain, Cognition, and Behaviour)

joost.rommers@mpi.nl

Many studies have documented *semantic* priming effects from both words and pictures on word targets, but the literature on object *shape* priming in language processing is less well developed. Priming is typically observed with isolated words as targets. Some studies have shown that in sentence contexts, priming is not an automatic consequence of speech processing (Norris et al., *Cognitive Psychology* 2006). In addition, priming tasks tend to involve meta-linguistic judgments. In the present study we focused on cross-modal influences, which may occur when listening to spoken sentences while being situated in a visual environment. We tested effects of picture and written word primes on processing of target words embedded in sentences. The primes were related to the targets in meaning or object shape. We investigated whether these aspects automatically prime spoken-word processing even in sentence contexts and without a judgment task.

EEG was recorded from 23 adult native speakers who listened to spoken sentences and viewed written words and pictures. Each trial began with a short beep and a central fixation cross. A neutral sentence began playing (e.g., “She wrote a term paper about the eye”). 1000 ms before target word onset (“eye”), a prime appeared on the screen. The prime was either a written word or a picture. It was semantically related to the target (arm), had a similar visual shape to the target (ball), or was unrelated (javelin; $n=32$ items per condition, counterbalanced). After 500 ms, the prime disappeared and was replaced by the fixation cross. Participants were asked to carefully listen for comprehension while looking at the center of the screen. 64 word and picture filler primes which matched with the spoken words (e.g., a picture of a banana combined with a spoken sentence containing the word banana) were included to make the prime-target relationships less noticeable. To quantify the N400 component as an index of semantic processing, we averaged across a 300-500 ms time window and used a cluster-based permutation test to determine which electrodes showed differences. We also performed time-frequency analyses of oscillatory activity.

The ERPs to target words showed a clear N400 component in each condition. Within the written-word prime conditions, the N400 was attenuated in the shape condition relative to the semantic condition, whereas the other conditions did not differ from one another. Within the picture prime conditions, N400 amplitude did not differ reliably between the different prime-target relationships. Clear differences between picture and word primes during prime as well as spoken-target-word processing confirmed statistical power. The time-frequency analyses showed no effects of prime-target relationship during target word presentation, although during prime presentation alpha band power was lower for picture versus word primes.

The fact that prime-target relationship mattered for written word primes but not for picture primes suggest that there are limits to cross-modal priming. The present findings provide complementary evidence to previous studies on the automaticity of priming *from* speech, by showing that priming *of* speech processing is not an automatic consequence of seeing pictures.