Words take time: Auditory stimuli and strategic processing in semantic priming

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This study examines participants' task-related strategy use in auditory semantic priming experiments. Semantic priming (SP) occurs when lexical access to a target word is facilitated by a preceding semantically related word. Visual SP is frequently used to study access to the semantic representation of words (Neely, 1991). More recently, auditory stimuli have been used in SP paradigms for similar purposes. This is despite the fact that visual word presentation is holistic while auditory word presentation is incremental (Cutler, 2002; 2012). Visual SP has proven highly susceptible to strategy use (Neely, 1991). The main parameters that induce these strategic effects are, (1) a large inter-stimulus interval (ISI) between prime and target, giving a participant time to predict the upcoming target (den Heyer et al., 1983), and (2) a high proportion of related pairs, priming participants to expect semantically related targets (McNamara, 2005). The susceptibility of auditory SP to task-related strategy use has not yet been systematically studied. In this study, three experiments suggest that participants do not use target-prediction strategies in auditory SP when a minority of pairs are related, regardless of the length of the ISI. This differs markedly from visual SP, and highlights an advantage of using auditory SP for studying access to semantic representations.

***Experiment 1*:** Exp1 asks whether varying ISI in auditory SP has the same effect as in visual SP. 117 native English undergraduates completed a paired lexical decision task in which they heard 318 primes (randomised across 4 counterbalanced lists), followed by a 200ms or 800ms ISI, and then a related (⅓ of the items), unrelated (⅓), or nonword (⅓) target. RTs (in ms) to the target were measured from the onset of the target sound file. Minimal a-priori trimming and model criticism (Baayen & Milin, 2010) were done before fitting a linear mixed effects model in R. As expected, participants responded significantly faster to related targets than unrelated targets at both the 200ms (t = -25.9) and 800ms ISI (t = -22.1) (1)(3). Interestingly, the 52ms priming effect in the 800ms ISI condition is significantly smaller than the 64ms effect in the 200ms condition (t = 2.768).

This result suggests that either participants are not strategically predicting the targets in this experiment (despite > 90% reported awareness of related pairs in a post-test questionnaire), or participants are using strategies which boosts the priming effect in both ISI conditions, but rapid decay of auditory SP reduces the effect at the long ISI.

***Experiment 2*:** A possible explanation for the results in Exp1 is that the short ISI is not short enough to hinder strategy use. Exp2 uses a between subjects design for ISI with a 200ms ISI and a 0ms ISI to test this. 55 undergraduates participated in Exp2. We replicate the SP effect found with a 200ms ISI in Exp1 (t = -19.6), and find significant priming at the 0ms ISI (t = -19.46). Further, we find no difference in priming effects between the ISI conditions (t = -0.51).

***Experiment 3*:** An alternative explanation for Exp1 is that ⅓ related pairs is not a low enough proportion to thwart strategy use. Exp3 attempts to reduce the utility of strategic prediction by reducing this proportion to $1/6$ of the items. 110 native English speakers took part. Interestingly, we find very similar priming effects to Exp1 (2). Both the 200ms (t = -2.17) and 800ms (t = -2.75) ISI conditions yield significant priming, although now we find no difference across the ISIs.

So far, neither a reduction of the ISI from 800ms to 0ms, nor a reduction of the ratio of related pairs from ⅓ to $1/6$ reduced auditory SP magnitude. This contrasts with the visual SP literature that finds strategy use at ISIs over 200ms and ⅓ related pairs. The current results support a theory that no target-prediction strategies are being used in auditory SP. A planned Exp4 will push this hypothesis by increasing the related pairs to ½ to increase the utility of strategy use.

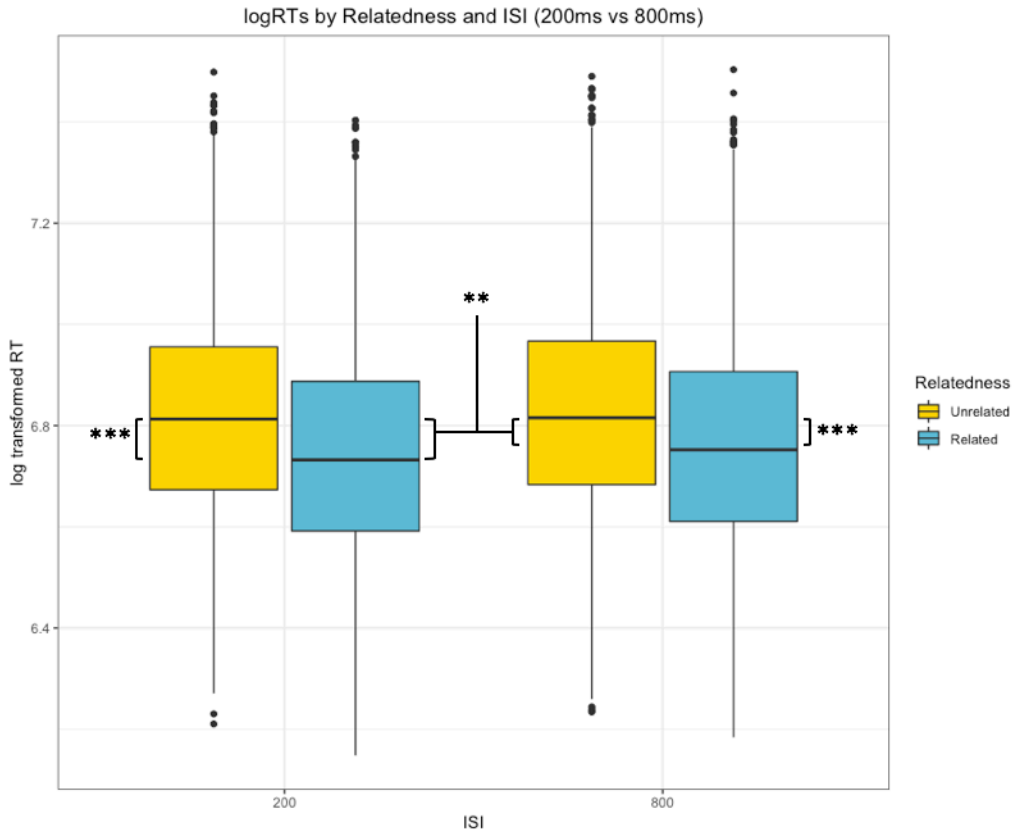
(1) Experiment 1 reaction times
in ms (with SD) and priming effects by ISI

	200ms ISI	800ms ISI
Unrelated	949 (183)	955 (182)
Related	885 (179)	903 (183)
Priming effect	64***	52***

(2) Experiment 3 RTs in ms (with SD)
& priming effects at a 200ms and 800ms ISI

	200ms ISI	800ms ISI
Unrelated	973 (183)	986 (181)
Related	922 (169)	923 (164)
Priming effect	51*	63**

(3) Log RTs by ISI for Experiment 1
*(*** = p < .000 , ** = p < .01, * = p < .05 , ns = not significant)*



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