The Effect of Sensory Priming in Polysemous Senses Processing

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Background: Polysemous words, i.e., words with multiple related senses (e.g., a letter), show a stronger among-senses priming effect compared to unrelated meanings of homonyms (e.g., a bank) [1]. The prevailing explanation for this effect lies in the concept of overlapping mental representations (MR) of polysemous senses, which form a shared core of a MR. However, the described difference between polysemy and homonymy does not consistently emerge in research [2]. With the goal of inspecting this effect more precisely, we seized the embodied cognition framework –specifically, the notion that MR is constituted from previous sensorimotor (SM) experience with an object [3, 4]. Our premise was that SM features that are common for both polysemous senses, i.e., shared (e.g., seeing a sealed letter and an italic letter), should be represented in the shared core, whereas SM features that are related to one, but not the other sense, should be represented uniquely in MR pertaining only to the sense in question, and even have inhibitory effect to the MR pertaining to the other sense [5]. Accordingly, boosting the core's activation should enhance the priming effect compared to boosting the non-shared features (e.g., *touching* a sealed letter but not an italic letter).

Method: In order to test this prediction, we created prime-target pairs of phrases, three words long. Our key stimuli were 42 prime-target pairs of polysemous (related) senses, denoted by a disambiguating context (e.g., *a sealed letter – an italic letter*). Whereas the targets were always constant (e.g., *an italic letter*), the primes were either presented without any verb (e.g., *a sealed letter*) or with an additional verb that denotes sensory modality. The verb could boost either the sensory modality shared by two senses (e.g., *to see a sealed letter – an italic letter*) or the modality unique to the prime (e.g., *to touch a sealed letter – an italic letter*). Above that, we also included 42 prime-target pairs of unrelated words (e.g., *a park bench – a natural light*) and manipulated the prime in the same way as in polysemous pairs – three prime conditions, counterbalanced. Participants (N = 112) completed a sensibility judgement task, i.e., responded if the phrase was semantically plausible. An additional set of nonsensical filler phrases (e.g., *a printed taste*) was included in order to balance the frequency of positive and negative responses.

Results: In our key test, targets primed by shared modality primes elicited shorter RTs compared to the unique modality condition, as we expected. Crucially, this difference was observed in polysemous pairs only (β = -0.04, $t(65.38) = 3.34$, $p < .01$) and not in the unrelated pairs (β = -0.06, $t(61.85) = 1.49$, $p = .14$). Unexpectedly, in polysemous pairs, the control group (with no sensory verb) elicited the shortest reaction latencies (shared: $\beta = 0.04$, $t(511.5) = 3.69$, $p < .001$; unique: $\beta = 0.08$, $t(59.53) = 6.62$, $p < .001$), which we interpret as possibly a consequence of the stronger syntactic priming, which we will address in our next studies.

Discussion: Our results strongly showed that polysemous senses profit from boosting the activation of the shared core of MR, as opposed to the activation of the SM features unique to the one sense only. The finding that this difference is present in the polysemous pairs only and not in the control pairs is what additionally confirms this claim. Therefore, our results support the concept of the shared core as a principle of representation of polysemous words. Also, these results encourage further utilizing the embodied cognition framework in the ambiguity research.

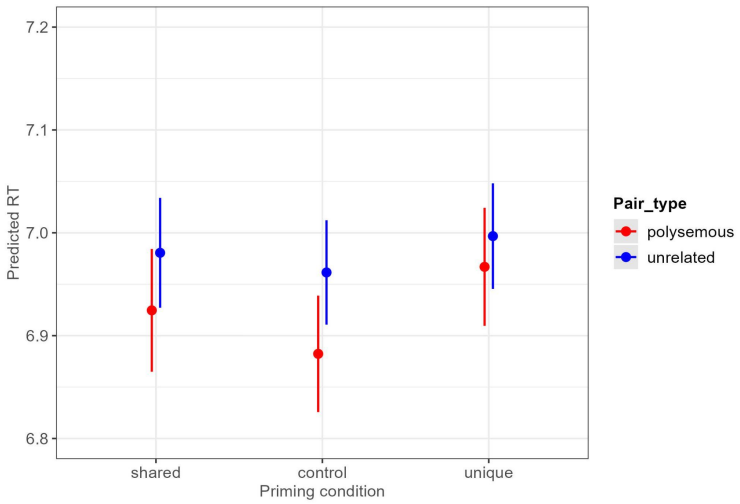

Figure 1: The predicted RT, based on the best-fitting lmer model, depending on the priming condition and the pair-type

References

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