Explicit memory effects on structural priming

Roger P.G. van Gompel, *University of Dundee,* Laura J. Wakeford, *University of Abertay,* Leila Kantola, *Umeå University*

r.p.g.vangompel@dundee.ac.uk

An important question in research on structural priming concerns the memory systems that underlie it. In particular, accounts such as the implicit learning model by Chang et al. (2006) and the ACT-R model by Reitter et al. (2011) assume that abstract structural priming (priming in the absence of word repetition between prime and target) is subserved by different memory mechanisms than the lexical boost effect (enhanced priming when a word is repeated). In particular, according to Chang et al., abstract structural priming is due to implicit learning, whereas the lexical boost is due to explicit memory for the prime structure. This contrasts with accounts such as the residual activation model by Pickering and Branigan (1998), which suggests that similar mechanisms underlie both priming effects. Some research has tackled this issue by investigating the duration of abstract structural priming and the lexical boost. Hartsuiker et al. (2008) found that abstract structural priming lasts across intervening sentences between prime and target, whereas the lexical boost effect decays, consistent with accounts that assume that they are the result of different memory systems. However, Malhotra et al. (2008) have shown that such findings can also be modelled in a residual activation model.

In order to investigate the memory systems involved, we conducted two parallel structural experiments during which participants either carried out an explicit memory task or not. The experiment with explicit memory task included filler sentences that were repeated 2-4 trials later with a missing word (in addition to fillers that were not repeated). Participants had to read aloud the repeated sentence and fill in the missing word based on their memory of the earlier sentence. In the experiment without memory task, filler sentences were also repeated, but there was no missing word and participants simply had to read the sentence aloud. Our prediction was that, if abstract structural priming and/or the lexical boost involve explicit memory for the prime sentence, these effects should be stronger when participants have to carry out an explicit memory task, because they should encode the prime sentences more strongly in their explicit memory than when there is no such task.

Forty participants in each experiment read aloud 48 ditransitive PO or DO primes (*The undertaker handed/gave the necklace to the widower/the widower the necklace*) followed by a target fragment (*The baker gave …*) that they had to complete using pictures (e.g., of a baker, fireman and cake). The verb from the prime (e.g., *handed/gave*) was either repeated in the target or not.

The results of the two experiments were analysed together and the means are presented in Figure 1. Averaged across the experiments, we found evidence for abstract structural priming as well as a lexical boost. Most importantly, structural priming interacted with task (β = 0.122, z = 2.22, p = .026), but the lexical boost effect did not (β = 0.005, z = 0.10, p = .916): The explicit memory task equally enhanced priming when the verb was repeated (3 vs. 11%) and when it was not (19 vs. 30%).

In conclusion, our results suggest that explicit memory subserves structural priming both when the verb is repeated and when it is not; we found no evidence that the memory task affected priming more when the verb was repeated. This does not support the idea that structural priming with and without verb repetition are due to different memory mechanisms. As such, our results are most consistent with structural priming models that do not assume different memory mechanisms for abstract structural priming and the lexical boost.

References

Chang, F., Dell, G. S., & Bock, K. (2006). Becoming syntactic. *Psychological Review, 113*, 234-272.

Hartsuiker, R. J., Bernolet, S., Schoonbaert, S., Speybroeck, S., & Vanderelst, D. (2008). Syntactic priming persists while the lexical boost decays: Evidence from written and spoken dialogue. *Journal of Memory and Language*, *58*, 214-238.

Malhotra, G., Pickering, M., Branigan, B., & Bednar, J. A. (2008). On the persistence of structural priming: Mechanisms of decay and influence of word-forms. In B. C. Love, K. McRae, & V. M. Sloutsky (Eds.), *Proceedings of the 30th annual conference of the cognitive science society* (pp. 657–662). Austin, TX: Cognitive Science Society.

Pickering, M. J., & Branigan, H. P. (1998). The representation of verbs: Evidence from syntactic priming in language production. *Journal of Memory and Language*, *39*, 633-651.

Reitter, D., Keller, F., & Moore, J. D. (2011). A computational cognitive model of syntactic priming. *Cognitive Science*, *35(4)*, 587-637.

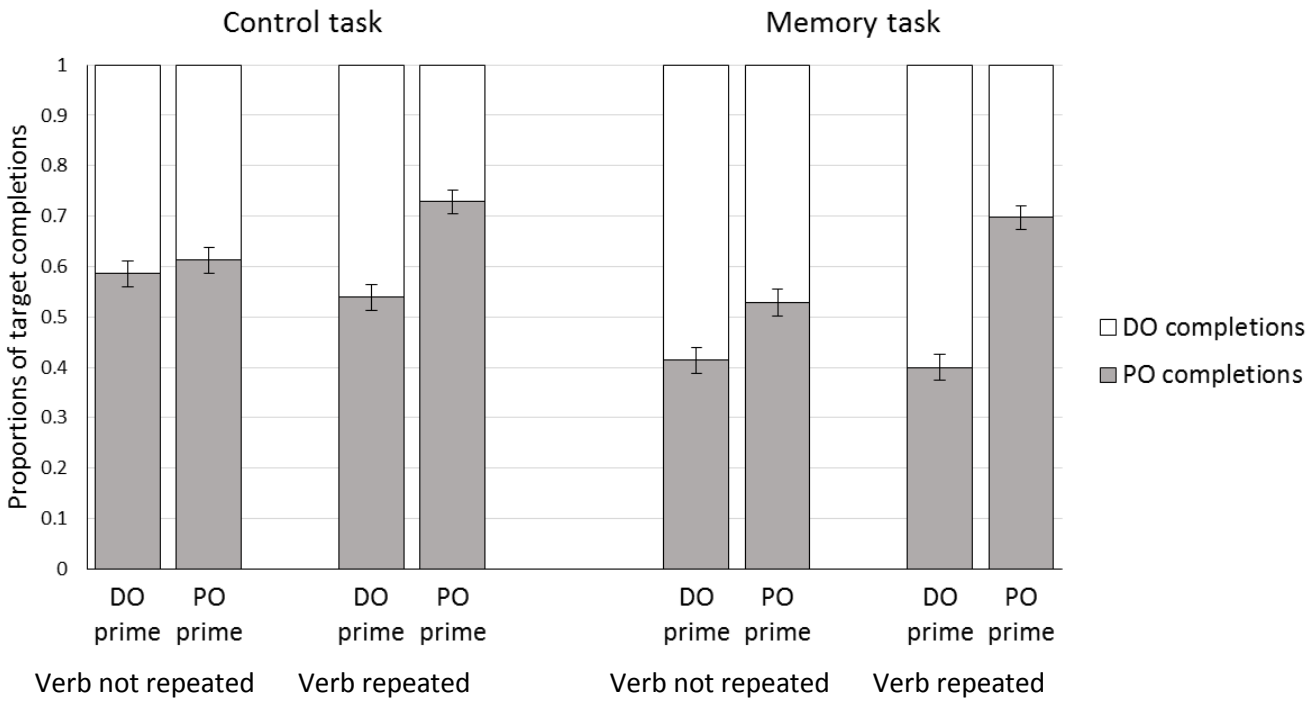

Figure 1: Mean proportions of PO and DO target completions out of all PO and DO completions by condition (error bars show standard errors of the means)