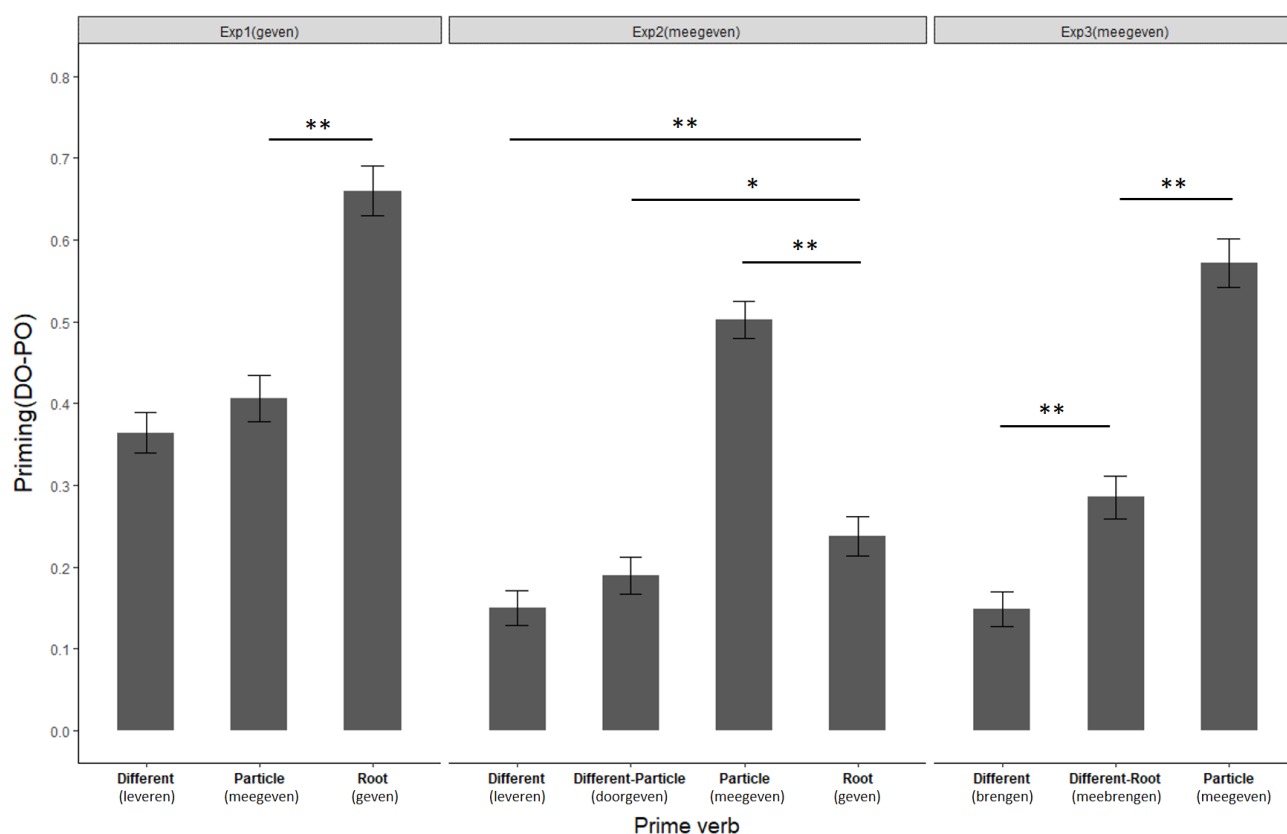# DO PARTICLE VERBS SHARE A REPRESENTATION WITH THEIR ROOT VERBS? EVIDENCE FROM STRUCTURAL PRIMING

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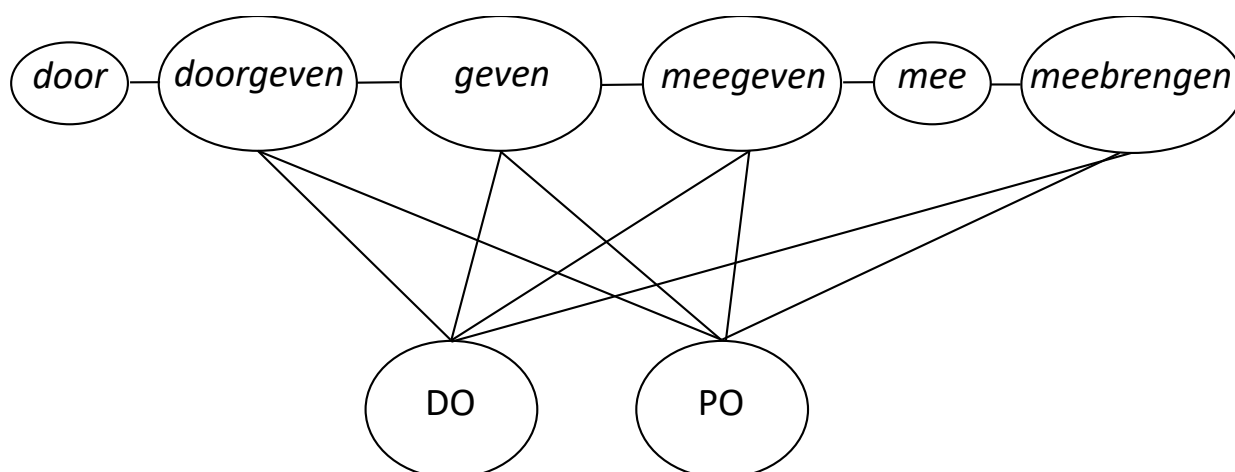xuemei.chen@ugent.be

In many languages, like Dutch, there are many particle verbs like *meegeven (give with)*, with the particle '*mee*' (*with*) sometimes attached to the root verb '*geven*' (*give*) (e.g., infinitive) but sometimes separated from the root verb (e.g., inflected verb). Do these particle verbs have a shared or separate representation from their root verb? In order to answer this question, we tested whether people reuse the structure of a prime sentence in the production of target sentence (i.e., *Structural Priming*), and in particular whether this priming effect is boosted by lexical overlap between prime and target verb (e.g., when the prime uses a particle verb and the target sentence uses a corresponding root verb).

In Experiment 1 (N=90), native Dutch-speaking participants comprehended double object (DO) and prepositional object (PO) dative prime sentences and decided whether the following prime picture matched the sentence they just saw. They then produced a sentence for the target picture with a root verb (e.g., *geven*). There were 48 experimental trials. Structure was factorially crossed with type of prime verb (see **Table 1**): Root verb (*geven*, same verb as target), Particle verb (*meegeven*, root verb overlap), or Different verb (*leveren (send)*, no overlap). There was stronger priming after the primes with the Root verb (i.e., identical verb) than primes with Particle and Different verb, and no significant difference between the primes with the Particle verb and Different verb (see **Figure 1**). In Experiment 2 (N=160), we used particle verbs (e.g., *meegeven*) as the target verb, and again presented prime sentences that either had the same Root verb (*geven*), the same Particle verb (*meegeven*), or a fully Different verb (*leveren*). We further added a prime verb condition with the same root verb but a different particle from the target verb (e.g., *doorgeven (give through)*). There was stronger priming in the condition with the same Particle verb (i.e., identical verb) than in the Root-verb overlap conditions (Root verb or Different-Particle verb) and the no overlap condition (Different verb). Critically, primes with the Root verb exerted a stronger priming effect than primes with the Different-Particle verb, even though they had a similar amount of semantic and phonological overlap with the target verb. In Experiment 3 (N=90), we again used particle verbs (e.g., *meegeven*) as the target verb, and presented prime sentences that either had the same Particle verb or a Different verb. Additionally, we constructed a prime condition with the same particle but different root from the target verb (e.g., *meebrengen (bring with)*). There was stronger priming after the primes with the same Particle verb than with Different-root verb (particle overlap). Interestingly, the primes with Different-root verb yielded a stronger priming effect than the primes with Different verb.

These results are most compatible with an account assuming separate lemma representations for a particle verb and its root verb. Thus, we interpret these results in terms of a dual-lemma representation for particle verbs (Roelofs, 1998): one lemma for the verb-particle combination separate from the root verb and one lemma for the particle, which is shared with other particle verbs. Additionally, the stronger priming between the root verb (*geven*) and the particle verb (*meegeven*) than between the different particle verb (*doorgeven*) and the particle verb (*meegeven*; i.e., 24% vs. 19%) suggests that representations for particle verbs are separate from but connected to root verbs, but are not connected to each other (see **Figure 2**).

Figure 1. Priming effects in Experiment 1, 2 and 3. Prime verb condition of 'Different' means different verb from target verb, 'Particle' means particle verb with the same root verb(in Experiment 1) or the same particle verb(in Experiment 2 and 3) from target verb, 'Root' means the root verb of target verb, 'Different-Particle' means particle verb with a different particle from target verb, 'Different-Root' means particle verb with a different root from the target verb. Note: *$p < .05$, **$p < .01$. Error bars reflect standard errors from a by-participant analysis

Figure 2. A model for particle verb and root verb representations at the lemma level, based on Pickering and Branigan's (1998) residual activation model. It depicts the hypothesis of separate lemma account (Roelofs, 1998) when particle verbs store into two lemmas nodes: one for verb-particle combination (e.g., meegeven) separated from the lemma node of their root verbs (e.g., geven); one for particle shared with other particle verbs (e.g., meebrengen). The link between themselves (e.g., mee-meegeven) represents a syntactic combination. And the nodes for DO and PO represent combinatorial information corresponding to double object and prepositional object ditransitive sentences. The links between lemma nodes (e.g., root verb 'geven' and verb-particle combination 'meegeven') and combinatorial information (DO or PO) represents a syntactic combination between each other. The links between particle verbs and their root verbs indicate the co-activation in lemma level, which might develop through Hebbian learning (Munakata & Pfaffly, 2004).

Table 1

Sample stimuli in Dutch. The DO sentences below mean 'the policeman gives/delivers/brings the soldier a hat'; And the PO sentences mean 'the policeman gives/delivers/brings a hat to the soldier'.

Primes	Example	(Literal) Verb Translation
a. DO-Root	De politieman *geeft* de soldaat een hoed.	give
b. PO-Root	De politieman *geeft* een hoed aan de soldaat.	give
c. DO-Particle	De politieman *geeft* de soldaat een hoed *mee*.	give with
d. PO-Particle	De politieman *geeft* een hoed aan de soldaat *mee*.	give with
e. DO-Different	De politieman *levert* de soldaat een hoed.	deliver
f. PO-Different	De politieman *levert* een hoed aan de soldaat.	deliver
g. DO-Differ-Particle	De politieman *geeft* de soldaat een hoed *door*.	give through
h. PO-Differ-Particle	De politieman *geeft* een hoed aan de soldaat *door*.	give through
i. DO-Differ-Particle	De politieman *brengt* de soldaat een hoed *mee*.	bring with
j. PO-Differ-Particle	De politieman *brengt* een hoed voor de soldaat *mee*.	bring with