

## The role of L1 and L2 frequency in cross-linguistic structural priming: An artificial language learning study

Merel Muylle (Ghent University), Sarah Bernolet (University of Antwerp), Robert J. Hartsuiker (Ghent University)

Hartsuiker and Bernolet's (2017) developmental account of shared syntactic representations postulates that, during second-language (L2) acquisition, the L2 representations evolve gradually from being item-specific to more abstract, and finally become shared with the native language (L1). Such sharing may be reflected in the emergence of structural priming between two sentences. The account assumes faster development of syntactic representations for frequent vs. infrequent L2 structures. If this is true, there may be earlier and stronger cross-linguistic priming for more frequent L2 structures. In addition, less frequent structures are often found to elicit more priming than more frequent ones (i.e., the so-called inverse frequency effect) and it has been shown that frequency of a structure in one language might affect priming in the other language. Still, it remains unclear how L1 and L2 frequency effects contribute to the acquisition of syntax in early stages of L2 acquisition.

In the current study, we investigated frequency effects at the onset of L2 learning using an artificial language (AL) learning paradigm (Muylle et al., 2020; see Table 1, Figure 1). L1 Dutch speakers ( $N = 96$ ) learned an AL that either had a prepositional-object (PO) dative bias (i.e., PO datives appeared three times as often as double-object datives, or DO datives) or a DO dative bias (i.e., DOs appeared three times as often as POs). Priming was assessed from the AL to Dutch (that has a strong PO bias). We put forward three contrasting hypotheses on how AL frequency modulates the sharing of syntax across languages: 1) the most frequent AL structure is shared before the less frequent one, 2) there is no sharing for either structure early on in the acquisition (and hence no frequency modulation yet), or 3) both structures are shared or at least connected between languages by the end of the training session, and priming effects will be modulated by both AL and L1 frequency effects in an additive way.

We analyzed the results (see Figure 2) using generalized linear mixed effects models with *PO answer* (binomial) as dependent variable and the interaction *Bias* (PO vs. DO) \* *Prime Structure* (PO vs. DO vs. baseline) as fixed effects ( $N$  of observations = 2913). This analysis showed that there was a main effect of *Prime Structure*, with marginally significant priming for DOs, but not for POs compared to a baseline condition with a transitive or intransitive prime. However, the difference between DO and PO priming was not significant. Importantly, the priming effect was similar across both bias conditions (i.e., no *Bias* \* *Prime Structure* interaction), which suggests that L1, but not AL frequency influenced immediate priming (i.e., when the prime is immediately followed by the target). Interestingly, participants in the DO bias group produced significantly more DO targets (10%) in Dutch than participants in the PO bias group, showing that AL frequency exerted cumulative priming effects on L1 productions.

Our findings suggest that both structures are shared, in line with the third hypothesis, but in contrast to our predictions, immediate priming effects seemed to be modulated by L1 frequency only (i.e., the less frequent L1 structure, DO, could be primed more easily from the AL). Importantly, cumulative priming effects indicated that AL frequency did exert an effect on L1 structural choices in general (i.e., the overall proportion of PO vs. DO responses was different for both bias groups). This pattern of results did not provide evidence for or against the hypothesis (based on Hartsuiker & Bernolet's developmental theory) that the representations of frequent L2 structures are shared with L1 before less frequent ones, but can be partly explained in terms of implicit learning accounts of structural priming.

Hartsuiker, R. J., & Bernolet, S. (2017). The development of shared syntax in second language learning. *Bilingualism: Language and Cognition*, 20, 219–234.

Muylle, M., Bernolet, S., & Hartsuiker, R. J. (2020). The role of case marking and word order in cross-linguistic structural priming in late L2 acquisition. *Language Learning*, 70, 194–220.

Table 1. Examples of sentences in the AL & Dutch.

	AL	Dutch
Intransitive	Fuipam jaltsi <i>Cook waves</i>	De kok zwaait <i>The cook is waving</i>
Active	Fuipam zwifsi dettus <i>Cook kisses clown</i>	De kok kust de clown <i>The cook is kissing the clown</i>
Passive	Dettus nast zwifo ka fuipam <i>Clown is kissed by cook</i>	De clown wordt gekust door de kok <i>The clown is being kissed by the cook</i>
DO	Fuipam stiesi dettus sifuul <i>Cook shows clown hat</i>	De kok toont de clown de hoed <i>The cook is showing the clown the hat</i>
PO	Fuipam stiesi sifuul bo dettus <i>Cook shows hat to clown</i>	De kok toont de hoed aan de clown <i>The cook is showing the hat to the clown</i>

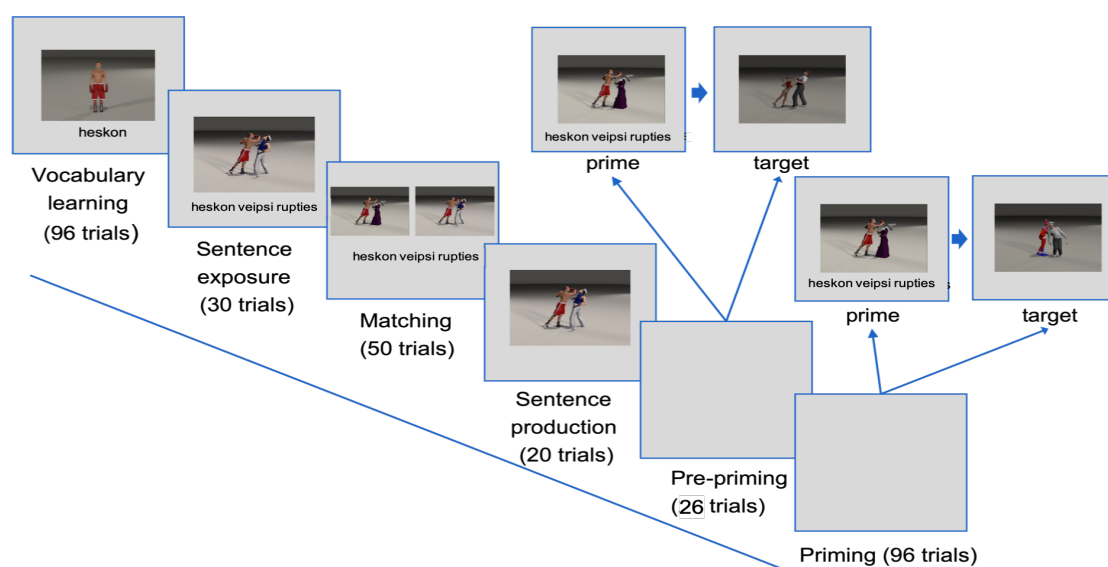


Figure 1. Sequence of the different experimental blocks in the AL learning paradigm.

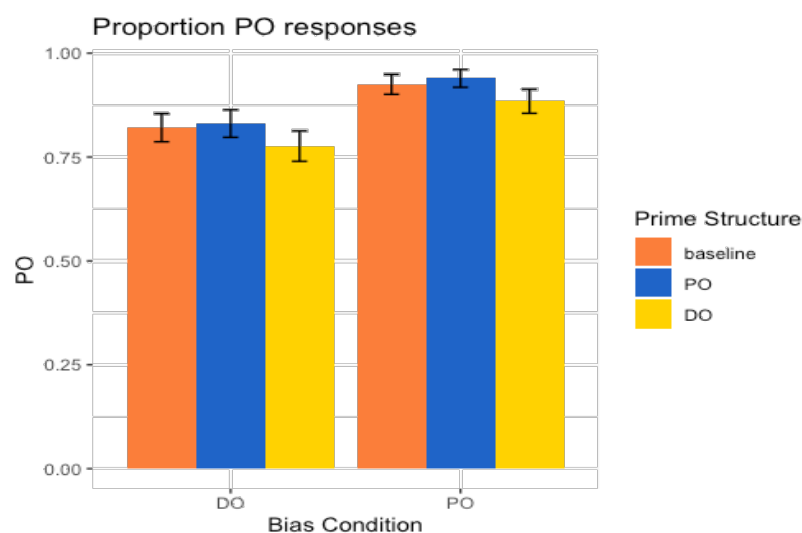


Figure 2. Proportion of PO responses in Dutch for each priming condition and bias (with 95% confidence intervals).