

Preferences for communicative efficiency in miniature languages are independent of learners' L1s

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Using miniature language learning methodology, researchers have claimed to have uncovered a variety of abstract cognitive biases giving rise to cross-linguistically frequent patterns (also known as language universals) [1–3]. However, since participants in these experiments are typically adults proficient in at least one language (their L1), it raises an important question of whether some aspects of learners' performance observed in miniature languages can be better explained by L1 influences rather than by more general pre-L1 biases. Indeed, recent work has shown that learners' preference for suffixing over prefixing, previously attributed to processing constraints, is better explained by the L1 [4]. Here, we ask whether learners' biases in communicative efficiency can be explained by L1 influences as well. Consider work by [5,6], where English speakers exposed to either fixed or flexible constituent order languages with optional case marking maintained case in their productions when it was informative about grammatical function assignment (flexible order) and dropped case when it was redundant (fixed order). This preference is consistent with a bias to efficiently trade off the effort required to produce case against message uncertainty as claimed by [5,6]. However, using less case in the fixed order language is also consistent with L1 influence: Learners of the fixed order language may have dropped case to bring the language closer to their L1 (English), which has fixed order and no case. We ask whether the preference for communicative efficiency holds across structurally different L1s. Specifically, we ask whether speakers of English (fixed order, no case), German (flexible order, 4 case categories), and Russian (flexible order, 6-7 case categories) restructure miniature language input to use more case where it is informative (suggesting a general bias at work) or show different preferences in using case and constituent order (suggesting an L1 influence).

Method: English, German and Russian L1 speakers (20 per L1/miniature language) learned a miniature language in 2 online sessions over 2 consecutive days. Both input languages had optional case marking on the object only (67% present). The languages had either flexible (VSO/VOS 50/50%) or fixed (VSO 100%) constituent order. Participants first learned alien character-name pairings and then learned the grammar by watching videos of transitive actions accompanied by miniature language descriptions. At the end of each session, participants described previously unseen transitive action videos using the miniature language. We assessed the use of constituent order and case in production.

Results: We analyzed learners' VSO and case use using generalized linear mixed effects models (with maximal converging random effects structure). All three L1 groups matched the input proportion of VSO in the fixed and flexible order languages (p 's > 0.11; Fig.1), replicating the behavior of English speakers in [5,6]. There were L1 differences in the overall amount of case used by learners: German speakers used the same amount of case as English speakers ($\hat{\beta}$ =0.46, z =0.94, p =0.34), but Russian speakers used less case than English speakers ($\hat{\beta}$ =-0.19, z =-2.43, p =0.01). Across all L1s, learners of the flexible order language used significantly more case compared to the learners of the fixed order language ($\hat{\beta}$ =1.28, z =6.34, p <0.001), suggesting a preference to use more case when it is informative. L1 did not interact with constituent order flexibility (p 's > 0.34), crucially suggesting that the preference to use more case in the flexible order language did not depend on the L1 (Fig.2). Thus, all three L1 groups restructured the input in the same way: They matched the input constituent order and, following a bias for communicative efficiency, used more case in the flexible order language compared to the fixed order language.

Conclusion: Our findings suggest that learners restructure miniature language input in a communicatively efficient way regardless of how case and constituent order are used in their L1. We add to a growing body of work investigating L1 influences in miniature language learning and show that by collecting crosslinguistic data, we can begin to understand precise circumstances of L1 influence and its interactions with more general universal biases in the paradigm.

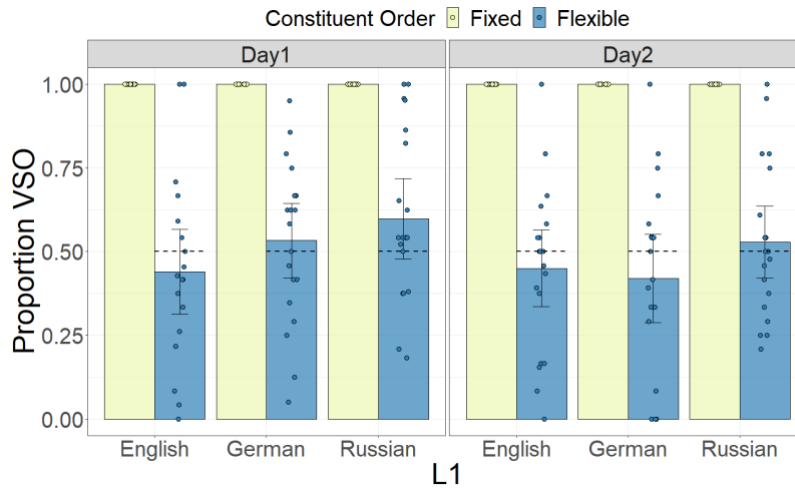


Figure 1: VSO use in production by day of training and L1 background. The dashed line represents the input proportion for the flexible order language (VSO input for the fixed order language is 1.0). Dots are individual participants' means. Error bars are bootstrapped 95% confidence intervals.

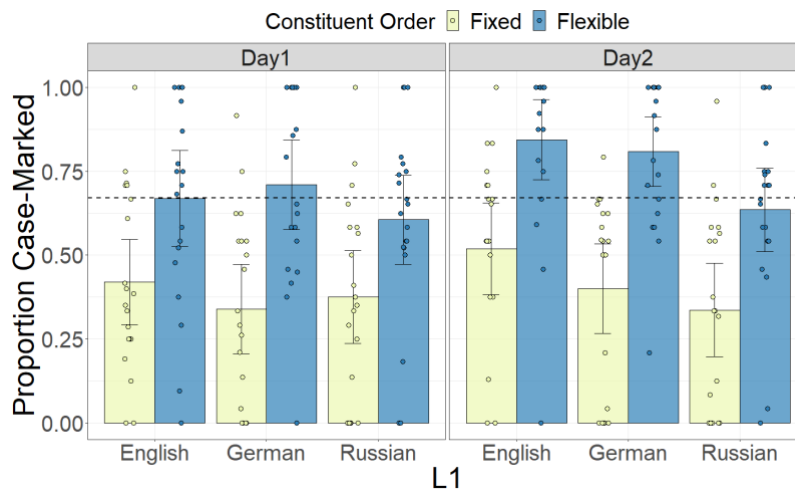


Figure 2: Case marker use in production by day of training and L1 background. The dashed line represents the input proportion (same across fixed and flexible order languages). Dots are individual participants' means. Error bars are bootstrapped 95% confidence intervals.

References

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