

SOCIAL BIASES VERSUS EFFICIENT COMMUNICATION: AN ITERATED LEARNING STUDY

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A crucial question in the evolution of language concerns the “problem of linkage” (Kirby, 1999, 20): How do the constraints acting on individual language users give rise to observed patterns of linguistic diversity? For instance, recent work has suggested that some properties of language benefit efficient information transmission (e.g., Piantadosi et al., 2011), and Fedzechkina et al. (2012) showed experimentally that efficiency can increase through restructuring by language learners. A number of other experiments investigating the problem of linkage have employed the iterated-learning model (ILM), which simulates cultural transmission by using the output of one learner as the training data for the next (Kirby et al., 2014). A typical simplification is that learners are exposed to data undifferentiated by source, very often from only one individual. Real-world transmission, by contrast, involves multiple models distinguished by such variables as contact frequency and social status, which are known to influence the spread of linguistic variants (Labov, 2001). An interesting case concerns situations where social pressures apparently run counter to efficiency. For instance, modern plural second-person pronouns in English (*yous*, *y’all*, *yinz*) reduce ambiguity, but are often avoided on social grounds (leaving ambiguity, or requiring less efficient workarounds). Social factors may also explain the retention of distinctions that do little communicative work, such as *who/whom*.

In this study, we focus on two questions left open by prior work: a) Is the increase in efficiency observed by Fedzechkina et al. amplified by iterated learning? b) How is this process influenced by the presence of social pressures that run counter to communicative efficiency? To investigate this, we conducted an iterated learning experiment on Amazon Mechanical Turk, in which participants were exposed equally to two dialects of an “alien language”. Both dialects exhibited strict SOV word order, but one dialect redundantly marked case, while the other did not. Participants in the *Bias* condition were encouraged to view the aliens speaking the redundant dialect as potential trading partners. In the *No bias* condition all aliens were potential trading partners. There were five chains in each condition, with two

participants in each generation, whose output in the test phase was presented as the redundant dialect to the next generation. Case marking behaved significantly differently in the two conditions (Figure 1). All first-generation participants were exposed to 50% case-marked sentences. In the No bias condition, this proportion declined fast and disappeared completely within four generations for all chains. In the Bias condition, it also declined, but more slowly, disappearing eventually in only three chains. Our results suggest that the effect of learners' biases towards efficiency is amplified by transmission and can thus account for (some) observed cross-linguistic typological patterns. However, while languages in both conditions became more efficient over generations, the biases towards efficiency were modulated by social factors—redundant case-marking persisted longer when associated with a preferred social group.

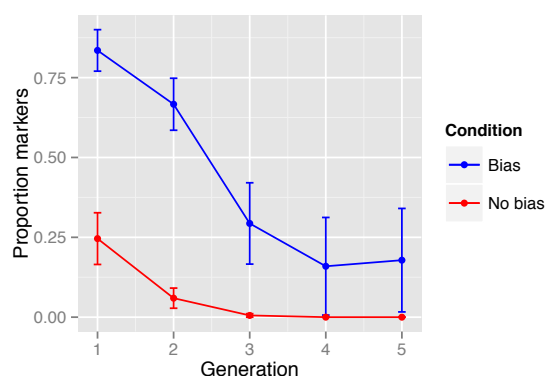


Figure 1. Mean proportion of sentences produced with case markers per generation.

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