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A cognitive bias for Zipfian distributions? Uniform distributions become more skewed via cultural transmission

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Abstract

There is growing evidence that cognitive biases play a role in shaping language structure. We ask whether such biases contribute to the propensity of Zipfian word-frequency distributions, one of the striking commonalities between languages. Recent work suggests Zipfian distributions confer a learnability advantage, facilitating word learning and segmentation (e.g. Lavi-Rotbain & Arnon, 2019). However, it remains unclear whether this reflects the impact of prior linguistic experience with such distributions or a cognitive preference for them. Here, we use an iterated learning paradigm to see if learners change a uniform word distribution into a skewed one via cultural transmission. We exposed the first learner to a story where six nonce words appeared equally often, and asked them to re-tell it. Their output served as input for the next learner. Over time, word distributions became more skewed (lower entropy). The findings provide novel evidence for a cognitive bias for skewed distributions in language.