

Entrenchment in comprehension constrains semantic extension in production

Zipf (1949) has argued that high frequency of a form-meaning mapping makes the form likely to be extended to novel uses by making the form more accessible. On the other hand, research on language acquisition has suggested that high frequency of a form-meaning mapping makes one more confident that the form is not used for other purposes (entrenchment; Braine & Brooks 1995). In this work, we reconcile these results by showing that high frequency causes semantic extension in production but entrenchment in comprehension. Furthermore, entrenchment in comprehension results in a system of one-to-one form-meaning mappings that can then be transferred to production.

We exposed 136 adult native English speakers to one of two miniature artificial languages, Dan or Nem. Both languages had two plural non-diminutive suffixes and two singular diminutive suffixes. The languages differed only in the identity of the suffix that was more frequent than others: the plural non-diminutive suffix -dan in Dan and the diminutive singular -nem in Nem.

Participants learned the languages through passive exposure to spoken suffixed nouns paired with pictures. They were then tested in production and comprehension. In the production test, participants had to name pictures using one of the suffixes. In the comprehension test, they had to click on the right picture given a suffixed noun. Importantly, the tests included a novel meaning, diminutive plural (DIM.PL), never presented in training.

We varied the order of the two tests. When production preceded comprehension in Experiment I, participants extended the frequent suffix to the novel meaning in production: a form was significantly more likely to be chosen to express DIM.PL when it was frequent during exposure ($\beta=8.46$, $z=2.89$, $p=0.00385$; based on a logistic mixed-effects model with maximal random effects structure). Out of 70 participants who experienced this order of tests, 49 (70%) were 'extenders'. For these participants, the form used most often for DIM.PL was a form used most often to refer to one of the original meanings. At the same time, the frequent suffix was the least likely suffix to be mapped onto the novel meaning in comprehension; forms were mapped onto DIM.PL significantly less often when they were frequent in training ($\beta=5.883$, $z=4.00$, $p<0.0001$).

When comprehension preceded production, in Experiment II, the frequent suffix was least likely to map onto the novel meaning in both comprehension and production. In particular, forms were less likely to be used to refer to DIM.PL when they were frequent ($\beta=-8.509$, $z=-2.633$, $p=.00846$), a reversal in the effect of frequency within the production task relative to Experiment I. Out of the 66 participants in Experiment II, only 14 (21%) were extenders; the others assigned one form to each of the three meanings (a significantly lower proportion of extenders than in Experiment I; $\chi^2(1)=30$, $p<0.00001$).

We conclude that entrenchment in comprehension can constrain semantic extension of frequent forms by causing participants to settle into a system of mutually exclusive form-meaning mappings.

References:

- Braine, M. D. S. & Brooks, P. (1995). Verb argument structure and the problem of avoiding an overgeneral grammar. In M. Tomasello & W. Merriman (Eds.), *Beyond names for things: Young children's acquisition of verbs*. Hillsdale, NJ: Erlbaum.
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