False memory and the generation effect

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People tend to remember what they say better than what they hear. This arises in part from the generation effect, the finding that people remember the words they generate better than the words they read or hear (e.g. Jacoby, 1978). Previous work has shown that generation strengthens conceptual and lexical representations of items: generation of picture names helps people remember the names better at a later test (Zormpa et al, 2019). The current work extends this finding to false memory by testing how generation affects memory for different exemplars in a stimulus set normed for conceptual and linguistic properties. We examine whether participants falsely accept previously unseen foils in a delayed memory test, whether this is impacted by having to generate the picture's name in a study phase (see Figure 1), and the link between false memory, language, and other properties of images. This explores how language influences our understanding and knowledge of the world.

In particular, testing whether generation influences false alarms is important because it informs the relationship between language production and memory. One possibility is that generation will increase false alarm rates because producing picture labels boosts links to the item concept and overshadows perceptual information (Schooler & Engstler-Schooler, 1990; Lupyan, 2008). A second possibility is that generation will decrease false alarm rates because heightened effort at encoding boosts both lexical and conceptual representations of items (Conway & Gathercole, 1987). This false memory paradigm therefore diagnoses how important the word name is in item memory, compared to conceptual properties.

Two norming studies were first conducted, with the aim of measuring properties known to affect false memory for pictures (target-foil manipulation, familiarity, prototypicality, and target-foil similarity). In the first norming study, we selected a set of 261 candidate words with three photos ('tokens') of each word varying in item state, exemplar, or color (see Figure 2). 120 participants performed a web-based task where they saw all three tokens of 87 items to name and rate for familiarity and prototypicality on a five-point scale. Of these, we selected items with at least moderate name agreement (> 60% synonymous responses). Two tokens each of 234 items were picked for the next studies, divided equally across target-foil manipulations. In the second norming study, we assessed the similarity of the 234 items in a spatial arrangement paradigm. In this paradigm, 50 participants rated 52 sets of 27 items by placing like images together on a computer screen (Goldstone, 1994). Physical distances of items in the resulting sorts indexed the similarity of token pairs and the maximum dissimilarity of each token to the whole set of objects (a proxy for item distinctiveness).

The main study used a paradigm from Zormpa et al. (2019). 46 participants each named 174 pictures with the picture name or scrambled letters superimposed. Then, after a 20 minute delay, they completed a Yes/No memory recognition task where they saw one of three things: the same picture as at study (target), a different exemplar of the picture shown at study (lure), or a completely new picture (foil). Primary analyses using generalized linear mixed models examined the overall false alarm rate, the false alarm rate conditioned on generation, and the impact of the lure manipulation on false alarm rates. Generation increased hits for targets, and decreased false alarms for lures varied in state and exemplar, but increased them for lures varied in color: language improves memory for some concepts, but overshadows others. Secondary analyses using lasso regression examined whether any normed predictors (token familiarity, token prototypically, word frequency, token similarity, token distinctiveness) mediated the false alarm rate, replicating earlier work (e.g. Brady et al., 2012; Roediger & McDermott, 1995). Factors associated with lexical retrieval effort (word frequency and familiarity) increased accuracy for targets and decreased it for lures, but did not interact with generation. In sum, the results show that language does not affect all aspects of memory equally, and disclose how effort in preparing speech can sometimes also cause us to mis-remember what we have seen previously.

Figure 1. Items appeared in all combinations (generate, no generate study conditions) x (target, foil) across participants. Items were also paired with distractors at test (not pictured).

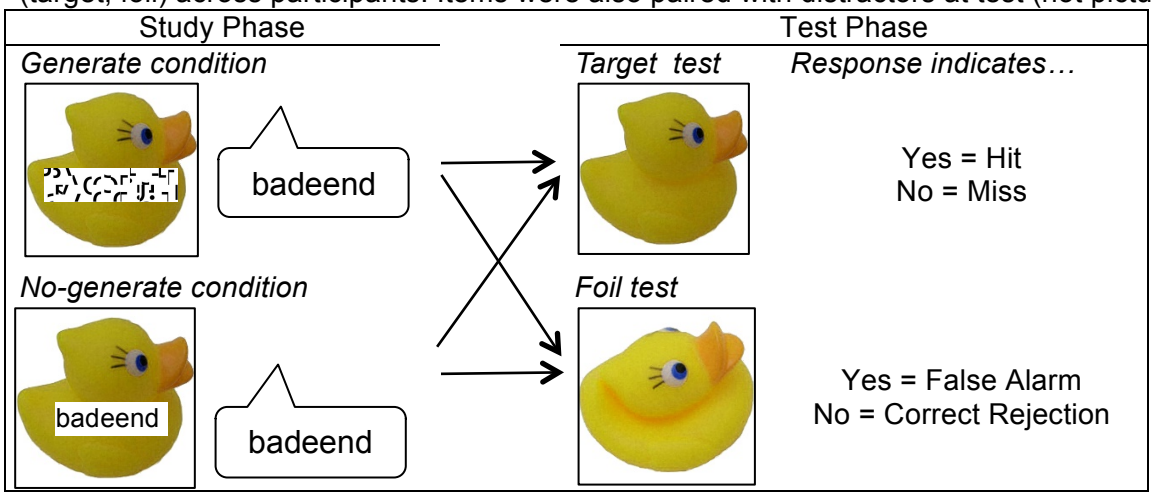

Figure 2. Items varied in target-foil manipulation. Tokens of *badeend (*rubber duck*), lolly,* and *piano* from norming study 1. Selected items per set are outlined in black.

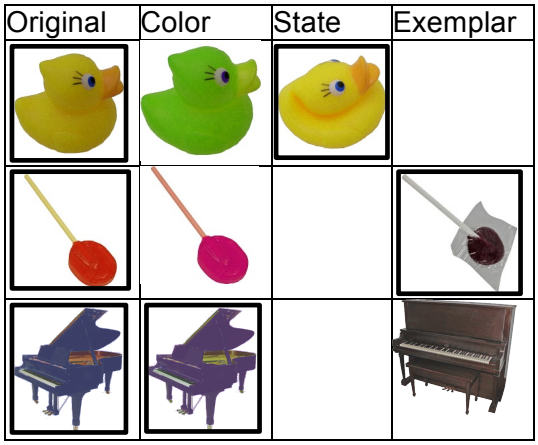

Figure 3. Sample final spatial arrangement of items from norming study 2.

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