

Verbal interference with visual working memory

Visual working memory is believed to make use of both visual-sensory and more abstracted, categorical neural representations. While sensory neural codes are near-veridical and therefore continuous representations of the memorized feature (e.g. orientation angle), categorical representations institute a transformation on sensory inputs (e.g. using verbal codes). Existing literature suggests that orientation recall can be facilitated, for example, by lexical labeling. It has remained unclear, however, whether it is possible to selectively interfere with this process using verbal distractors. Here, we directly test this hypothesis.

162 subjects performed a delayed orientation recall task. During the delay, there was either silence or an auditory lexical distractor was repeated. The distractor stimuli consisted of ten spoken word-sounds, eight words related to orientations (e.g. 'diagonal') and two color words. Orientation-related distractor words were identified using a separate experiment where subjects were asked to freely name orientations with different angles.

We found that orientation recall was significantly impaired by both orientation-related and color words resulting in increased errors when comparing these conditions to silence. For orientation-related words this effect was most pronounced for words describing cardinal orientations ('horizontal', 'vertical') and direction ('left', 'right'). We also found that while in all conditions recall errors were larger for non-cardinal than cardinal orientations, these biases were even larger when distraction occurred.

These results demonstrate that even simple featural working memory for orientation can be affected by verbal distraction. Prior work has shown similar effects for complex object and spatial memory when the verbal distractors were task relevant. It is for now unclear whether this behavioral effect can be traced to a selective disruption of verbal neural representations facilitating visual working memory or a more global disruption of mnemonic neural activity. The amplification of cardinal biases under distraction, however, suggests that categorical representations are uniquely affected.