

# Categorical biases in visual memory as a result of verbal coding

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Categorical biases in working memory can impact our recollection of visual stimuli. Individual colors, locations, and orientations are often biased towards or away from boundaries and prototypes of stimulus categories (like 'red' or 'vertical'). Color naming data can be used to predict these biases in behavioral and neural data. This suggests that sensory working memory performance is affected by the strategic use of verbal or semantic labels for memorization.

Here, we investigated whether we could find a link between categorical biases and verbal labels for orientation and spatial working memory. 40 subjects performed standard orientation and spatial working memory tasks. These tasks were followed by a series of prompts to freely label orientation and location stimuli by typing words they would use for memorization.

Replicating prior work, we report that participants' accuracy is significantly higher when recalling cardinal locations and orientations compared to non-cardinal ones. Moreover, recall error for non-cardinal stimuli was biased away from cardinals. This pattern of cardinal and non-cardinal recall errors resembled verbal labeling strategies: Terms for cardinal stimuli were used sparsely and precisely (e.g. vertical, horizontal, up) while terms describing non-cardinal stimuli were used more liberally and unspecifically (e.g. diagonal). Furthermore, we observe several spatial imbalances in word use suggesting that (1) orientation working memory relies on spatial representations of the upper visual field and that (2) lateral terms (left, right) are more dominant than vertical terms (e.g. top) during spatial working memory.

This suggests that cardinal biases in both orientation and location stimuli could be explained in part by the use of verbal or semantic strategies during sensory working memory. In other words, visuospatial working memory might be in part verbal. Finally, these results highlight the need to study how different cortical stores implement these different categorical and non-categorical facets of spatial and orientation stimuli.