Unimodal load selectively reduces recruitment of sensory cortices for working memory storage

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Does working memory capacity depend on sensory areas? Previous research has shown a decline in decoding accuracy from neural activity patterns with increased visual working memory load. This suggests that the decodable information reflects capacity limitations. In this study, we show that unimodal working memory load selectively reduces neural information in visual cortices. We used a delayed estimation task with a retro-cue after the delay, where participants had to memorize two sequentially presented items. Visual items consisted of orientations, auditory items of pure tones. Crucially, this means overall working memory load was constant at two items, but unimodal load varied between one or two items. We analyzed fMRI data from healthy adults (n=81) using multivariate decoding to identify orientations as continuous representations during the delay. In visual cortex, we observed a decreased decoding accuracy with increased unimodal working memory load across the whole delay period. However, in anterior regions we observed no difference in decoding accuracy between conditions late in the delay. Across participants, decodable information in visual cortex correlated with behavioral performance in both conditions. The results suggest that capacity for low-level visual features depends on the ability to recruit visual cortices for storage. Information about items in anterior brain regions, where they could be represented in a less precise and more abstract format, does not seem to decline with unimodal load. It is unclear whether the reduction in decoding accuracy in visual cortex results from interference or reallocation of information to other brain regions.