The influence of top-down control and storage dynamics on interactions between items held in working memory

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Although some frameworks portray working memory (WM) as a state in which items are shielded from interference, it is well-documented that items currently in WM can interact with each other. How might the strength of these interactions vary as a function of top-down control? Concurrent with EEG recording, subjects performed two tasks. For double serial retrocuing (DSR),two gratings were presented serially, then the item to be recalled was cued on two successive occasions with a digit referring to ordinal position ("1" or "2;" 100% valid cues, each with 50% probability). For single retrocuing (SR), the cue was uninformative ("0") with a digit ("1" or "2") accompanying the recall dial (i.e., these were "load of 2" trials). In both experiments, on each trial the memoranda could differ in orientation by 0, 22.5, 45, or 67.5 degrees. Behavioral performance revealed an attractive inter-item bias that was positively related to angular difference. Importantly, the bias was smaller for DSR trials than for SR trials, thereby revealing a shielding effect of prioritization. To explore neural correlates of inter-item interactions we applied demixed PCA to the EEG data from the post-cue delay period. For the DSR task, trial-by-trial variability in the efficacy of the priority-based transformation of the uncued item was found to be larger on trials with larger inter-item bias. For the SR task, trial-by-trial variability in the efficacy of context coding (i.e., the transition to a "1st item" subspace) was larger on trials with larger inter-item bias.