A behavioural investigation of human visual short term colour memory

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Previous studies of Visual Short Term Memory (VSTM) have indicated the existence of high fidelity memory mechanisms for visual attributes such as orientation, spatial frequency, velocity and contrast in addition to colour. However, studies that have examined short term memory for colour have not produced consistent results. In this work, we assessed the effects of different time delays on the colour discrimination ability of 3 colour normal observers using a delayed match to sample task.

In preliminary experiments based on a colour categorisation process we identified 12 chromatic axes in DKL colour space, the 4 unique hues, the 4 adjacent colour categories and the 4 hues that are identified by the cardinal axes of the cone opponent mechanisms. As reference stimuli we used circular patches of these 12 hues. Test stimuli were rotations away from the reference axis within a 40º range (+/- 20º), we had 11 test chromatic axis per reference axis. Stimuli were equally saturated isoluminant circular sharp edged patches and their diameter subtended 1.5° of visual angle. Reference and test stimuli were presented simultaneously and with 1, 5, 10, 15 second time delays in a multiple probe design where 4 different chromatic axis and their corresponding test axes were combined in a random order in one experimental run.

Results were plotted as a percentage of the correct answers as a function of the chromatic axes. The increase in the retention interval resulted in an increase in discrimination thresholds and a decrease in sensitivity. However, we did not find significant or consistent hue shifts. We have been unable to identify relationships between memory performance and the different perceptual colour mechanisms.

These results suggest that there is only a small deterioration in colour memory during the course of the examined time delay.

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