The Influence of Spatial and Temporal Features on Memory-Guided Saccade Sequences

S. Atputharaj¹,², D. C. Cappadocia¹,², J. Crawford¹,²,³,⁴;

¹Centre for Vision Research, Department of ²Kinesiology and Health Science, ³Biology, ⁴Psychology, York University, Toronto, ON, Canada

A saccade is a form of rapid eye movement that brings a location of interest on to the fovea, which is the location of highest visual acuity in the human eye. They have been extensively used as a tool to measure underlying cognitive processes such as visual working memory (VWM). VWM is a cognitive system with limited capacity that is responsible for actively maintaining visual information which will be used for ongoing tasks. The goal of this study was to identify the effect of spatial and temporal features on VWM using memory-guided saccade sequences. 14 participants (age 21-34) were presented with a series of targets on a computer monitor that differed with respect to two spatial features: structure and set size. The structure of the sequence could be 1) Continuous (targets appeared next each other forming a recognizable shape; 2) Semi-Continuous (targets did not sequentially appear next to each other but still formed a recognizable shape; 3) Discontinuous (targets appeared in random locations). The set size of a sequence could be 3, 4, 5 or 6 targets. The temporal feature examined was the order of target presentation. Results showed no significant difference in recall performance based on structure. However, there was a significant difference for motor error where continuous structures had the lowest error. Recall performance was also highest for sequences that had a fewer number of targets and for targets presented earlier within a sequence. These results show that visual working memory capacity is improved by the presence of spatial and temporal features.