INTRODUCTION

Images can be represented in visual working memory not only on a pixel-by-pixel basis, but also in a more abstract way. In terms of their statistical structure. We previously showed (ARVO, 2002) that for 1st-order statistics (luminance) and local 4th-order statistics (higher-order structure), this representation is graded, not categorical. The goal of this study is to examine the timecourse of pixel-by-pixel and statistical representation of images in visual working memory.

METHODS

The range of variation of the statistical attribute is indicated by the two extremes paired above. Exemplified above. In each class, a single statistical attribute was varied: luminance, local fourth-order change, symmetry.

Symmetry: Even/Odd

No symmetric to random).

In the change condition, a stimulus was presented. In the no-change condition, the stimulus was replaced (e.g., dark to dark, odd to odd, symmetric to symmetric). In the change condition, the stimulus class was excluded from the analysis.

A change in image statistics leads to a greater effect of a statistical change was entirely due to the difference between Mirror Symmetry and the other two classes, as is seen by the loss of significance when the Mirror Symmetry class was excluded from the analysis.

With the Mirror Symmetry data excluded, there is a significant three-way interaction between the factors, indicating that the ISI Time x Statistical Change interaction is significantly different between Luminance and Even/Odd. This likely reflects a difference in stability of these statistics in memory. Our previous work (2002, 2001) has shown that 1st and 4th-order statistics are readily encoded within 100 ms. However, symmetry is not readily encoded within 100 ms. Thus, the interaction of ISI Time x Statistical Change for Mirror Symmetry likely reflects in part the dynamics of encoding, not memory.

RESULTS

Each of the main effects described above was significant at p < .0001, for both fraction correct and reaction time. However, the stimulus class effect was entirely due to the difference between Mirror Symmetry and the other two classes, as is seen by the loss of significance when the Mirror Symmetry class was excluded from the analysis.

A change in image statistics leads to a greater effect of a statistical change was entirely due to the difference between Mirror Symmetry and the other two classes, as is seen by the loss of significance when the Mirror Symmetry class was excluded from the analysis.

CONCLUSIONS

- A change in image statistics leads to a greater improvement in performance for the longer retention interval (1000 ms), than for the shorter retention interval (200 ms). Thus, memory for image statistics is more stable than memory for individual pixel values.

- All image statistics played a demonstrable role at the longer retention interval. The largest role was played by luminance statistics, and the next-largest role was played by local fourth-order statistics.

Supported by NIH EY7977