TEXTURE DISCRIMINATION WITH SEGMENTATION BUT NOT LOCALIZATION CUES
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http://www-users.med.cornell.edu/~jdvicto/vps.html

INTRODUCTION

Dissecting the boundaries of objects embedded within a scene is a prerequisite for object recognition. Although statistical differences can be powerful implicit cues, explicit cues typically enhance image segmentation. Explicit cues such as a frame can act as both segmentation and localization cues. Here, we attempt to distinguish between these influences.

GENERAL METHODS

Stimuli consisted of four 8 x 8 arrays of black and white checks embedded within a same-size random check background.

In Expt. 1, the target array was drawn from one of four image classes and differed from randomness in first-order statistics (LUM), isotropic statistics (EVEN), spatial frequency (1D-corr), or mirror symmetry (SYM). In Expt. 2, the target array had mirror symmetry (SYM). In both experiments, three distractor arrays were colored at random.

Explicit cues were colored in red (vertical bar (VBAR), horizontal bar (HBAR), or an outline (FRAME)) and superimposed on all four arrays (target and distractors). Arrays, along with cues, were positioned jittered in locations about the fixation point.

METHODS

Image classes, the value c = 0 corresponds to randomness. A value of c = 1 corresponds to all-white (LUM), fully-even (EVEN), horizontal stripes (1D-corr), or completely symmetric (SYM). Values of c were chosen to span the range of psychophysical performance, as shown above.

RESULTS

For symmetry, a larger effect of cueing on performance was seen for a complete Frame than for cues that provided only partial segmentation (V-edge, H-edge, or Corners). However a frame, which provides both localization and segmentation cues, improves psychophysical performance across all statistical classes.

SUMMARY & CONCLUSIONS

➢ Symmetry, while visually salient, does not support segmentation by itself. Symmetry detection is improved to a greater degree when the target is surrounded by a cue that fully segments it (Frame), than when the cue provides similarly strong localization but only partial segmentation.

➢ For statistical classes that support segmentation (LUM, EVEN, 1-D corr), additional localizing cues do not improve psychophysical performance.

➢ However a frame, which provides both localization and segmentation cues, improves psychophysical performance across all statistical classes.

➢ The interaction between the orientation of the localizing bar and the orientation of the 1D-corr texture suggests that the cue influences the calculation of image statistics.