"Change Blindness" in Grouping by Synchrony

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Background

Synchrony grouping occurs when multiple elements within an array change at the same time, even if they do not change in the same way.

Methods

Stimulus Example

| Stimulus Example | “No blank” condition Each frame is immediately followed by the next frame. Grouping is robust. A horizontal border is perceived in this example. |

Task

The task in all experiments was a two-alternative forced choice discrimination: to press one of two keys indicating the orientation of the perceived border (horizontal or vertical).

Experiment 1: Blank Duration

Conditions

<table>
<thead>
<tr>
<th>Blank Duration</th>
<th>Frame Duration</th>
<th>Frame Duration</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
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<td>2</td>
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Frame duration and blank duration were varied independently.

“Blank Duration” A brief blank frame of neutral gray appears between each movie for a variable duration. Grouping is predicted to be less robust due to “change blindness.”

Experiment 2: Blank Timing

Stimuli

Blank before Frame Change

Blank during Frame Change

Blank after Frame Change

Results

Accuracy decreases as the center of the blank interval approaches the frame boundary. Blank timing relative to frame change is plotted on the abscissa. The center three data points ("polarity reversals not present") represent trials in which polarity reversals were not present in the stimulus. Accuracy in the "no blank" condition is indicated by the dashed horizontal line.

Experiment 3: Grid Contrast Reversal

Conditions

To determine whether the "change blindness" effect is due mainly to the absence of element changes, we ran an experiment in which the contrast polarity of a grid of lines surrounding the circles changed at the same time as the circles did. The presence of these other synchronous changes in the display was expected to reduce subjects' ability to process grid and circle contrast were varied independently to find out whether change blindness mattered. Frame duration was always 6 refreshes.

Stimuli

“Grid Reversal” The grid reverses contrast polarity synchronously with the circles, but the circles are always visible. There is no blank in this condition.

Results

Accuracy decreases as grid contrast increases. Accuracy is lower, on average, for circles with lower contrast. Similarity between grid contrast and circle contrast does not appear to affect the results.

Conclusions

- Synchrony grouping can be thought of in terms of spatially and temporally localized change signals that occur whenever and wherever changes take place.
- The strength of the grouping depends on the relative magnitude of the changes that occur in different regions of the display at the same time.
- Synchrony grouping is disrupted by blanking and by changes in the contrast of the grid because both effectively mask the contrast changes in the to-be-grouped elements.

References & Acknowledgments


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