Positions priming in briefly presented search arrays

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Published in:
Perception

Publication date:
2011

Document version
Peer reviewed version

Citation for published version (APA):
Introduction

In efficient visual search, priming of pop-out (PoP; Majkovic & Nakayama, 1994, 1996) is usually reported as a speeded response when a target feature is repeated on consecutive trials.

Feature facilitation accounts: Sensitization to features via short-term memory. Priming at target feature is repeated on consecutive trials.

Post-perceptual accounts: PoP affects response times, not accuracy, via response repetition benefits, decision bias or other "late" effects.

Questions:

1. Do color and/or position repetitions increase accuracy at brief exposure durations?

2. If so, is a category weighting account viable an explanation of the PoP observed when applied within a TVA-framework (Bundesen, 1990)?

Accounting for repetition priming within TVA (Bundesen, 1990)

A Theory of Visual Attention (TVA) is a combined theory of selection and recognition. It has been mathematically formalized in a fixed capacity, independent race model (PRR). The central assumptions of the theory are described by the rate and weight equations (figure 2).

In TVA selectivity is obtained by adjusting attentional weights for perceptual categories by differentiating their pertinent values (v). Pertinence can be adjusted voluntarily by current goals or instructions, but involuntary factors can also affect it.

Here we treat it as a parameter that can be incrementally altered from trial to trial by varying target identity during a task. The assumptions is that m-calculations are ongoing and the current importance of a target category is affected by its importance on the previous trial.

Results

- A 2x2 within subjects analysis revealed significant main effects of position and color repetition (p <0.001 and 0.003, respectively). No interaction was found between the two (p=0.619).

- Position priming effects ranged from 2.5-11.4 pp, between subjects.

- Color priming effects ranged from 1.7-11.8 pp, between subjects.

- All subjects showed the same pattern of lowest accuracy under the "no-repetition" condition and highest accuracy under the "both repeated" condition. These within-subject differences ranged between 0.2-10.61 pp.

- Figures 5 and 6 show the curves predicted by the model.

Conclusions

- PoP affects accuracy at very brief exposures.

- The effects cannot be explained by reference to response related mechanisms.

- The results suggest a perceptual component in PoP. This does not in exclude response related PoP.

- A simple additive TVA model can be fitted quite well to experimental data.

- Recent literature suggests that repetition are the result of two or multiple mechanisms (see Lamy & Yashar, in press; Kristjánsson & Campana, 2010).

References


