Differential Feature Crowding

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Introduction

■ Background

▷ Crowding: distractor-induced elevation of identification thresholds for cued targets [1]

▷ Studied extensively for letters [4] and, to a lesser extent, for orientation [3, 1]

▷ Circumstantial evidence for crowding in other features [2, 5]

■ Questions

▷ Crowding in other features?

▷ If so, how do the effect strengths compare to each other?

■ Experiment

▷ Study how distractors affect identification of orientation, size, hue and saturation

Methods & Materials

■ Stimuli

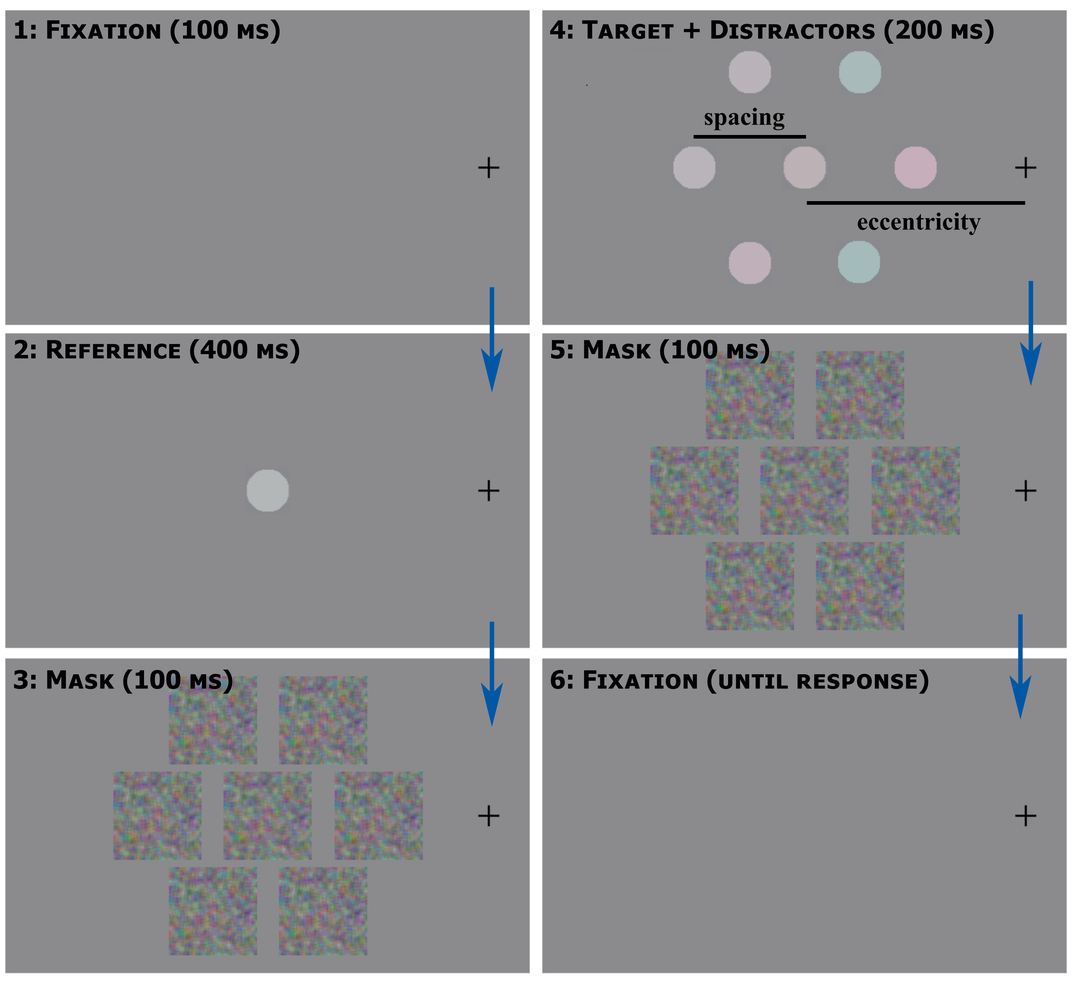

Figure 1: Schematic illustration of a hue judgment trial

■ Tasks

Judge whether centre item (target) is:

▷ tilted left or right from vertical reference (orientation)

▷ smaller or larger than reference (size)

▷ redder or greener than gray reference (hue)

▷ more or less saturated than reference (saturation)

■ Procedure

▷ Match distractor variation magnitude over features (prior to experiment proper)

▷ Measure 75% identification thresholds as function of distractor spacing (at eccentricities 0, 6, 10 deg.)

■ Rationale

▷ In case of crowding, thresholds will increase as spacing decreases

▷ Larger total threshold elevation (ceiling/floor ratio) means stronger crowding

Results & discussion

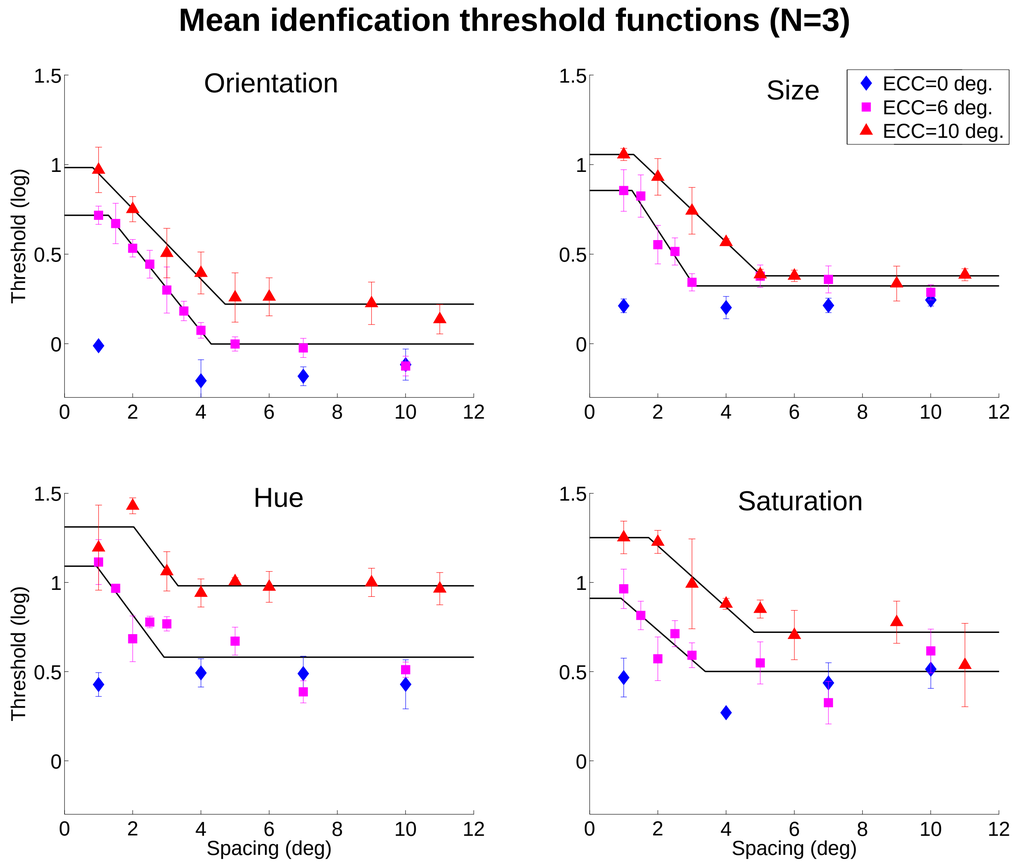

Figure 2: Identification threshold as a function of spacing (at eccentricities 0, 6, 12 deg)

Figure 3: Threshold elevations (ceiling/floor ratios)

■ Foveal crowding: None

■ Peripheral crowding:

▷ Found in all tested features

▷ Strongest for orientation

▷ Weaker for size

▷ Weakest for hue and saturation

■ Further research

▷ Study a broader range of eccentricities

▷ Study stimulus size (in)dependence

▷ Assess findings in light of Pelli et al.'s crowding criteria [4]

■ Acknowledgements

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References

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[5] Van den Berg, R., Cornelissen, F.W., Roerdink, J.B.T.M. Perceptual dependencies in information visualisation assessed by complex visual search. *Submitted*