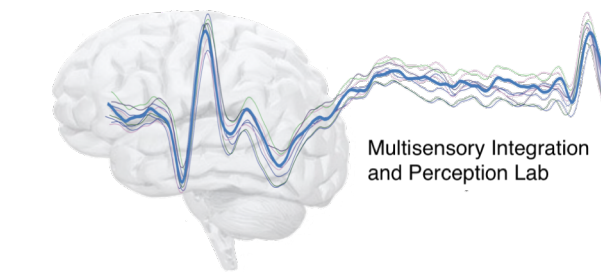


Feature-based attention spreads within and between objects

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Background

Feature-based attention has been defined by two core mechanisms:

1. Perceptual processing of the attended feature is enhanced throughout the visual field ^{1,2}
2. Attention to a single feature of an object results in spreading of attention to other features of that object ^{3,4}

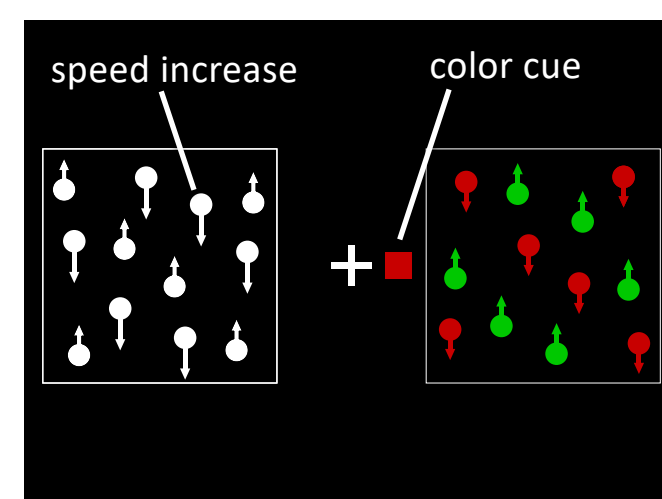
How do these mechanisms interact?

Method

Subjects completed two tasks:

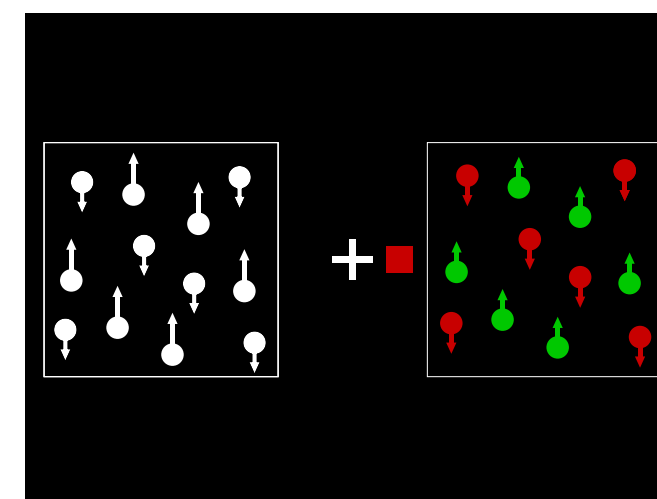
1. Detecting luminance decreases in dots of the attended color
2. Detecting speed increases in the white dots, regardless of direction

**Performance on each task was individually adjusted to ~70% correct*



Match trial

speed increase happens in downward moving dots, matching attended color



Non-match trial

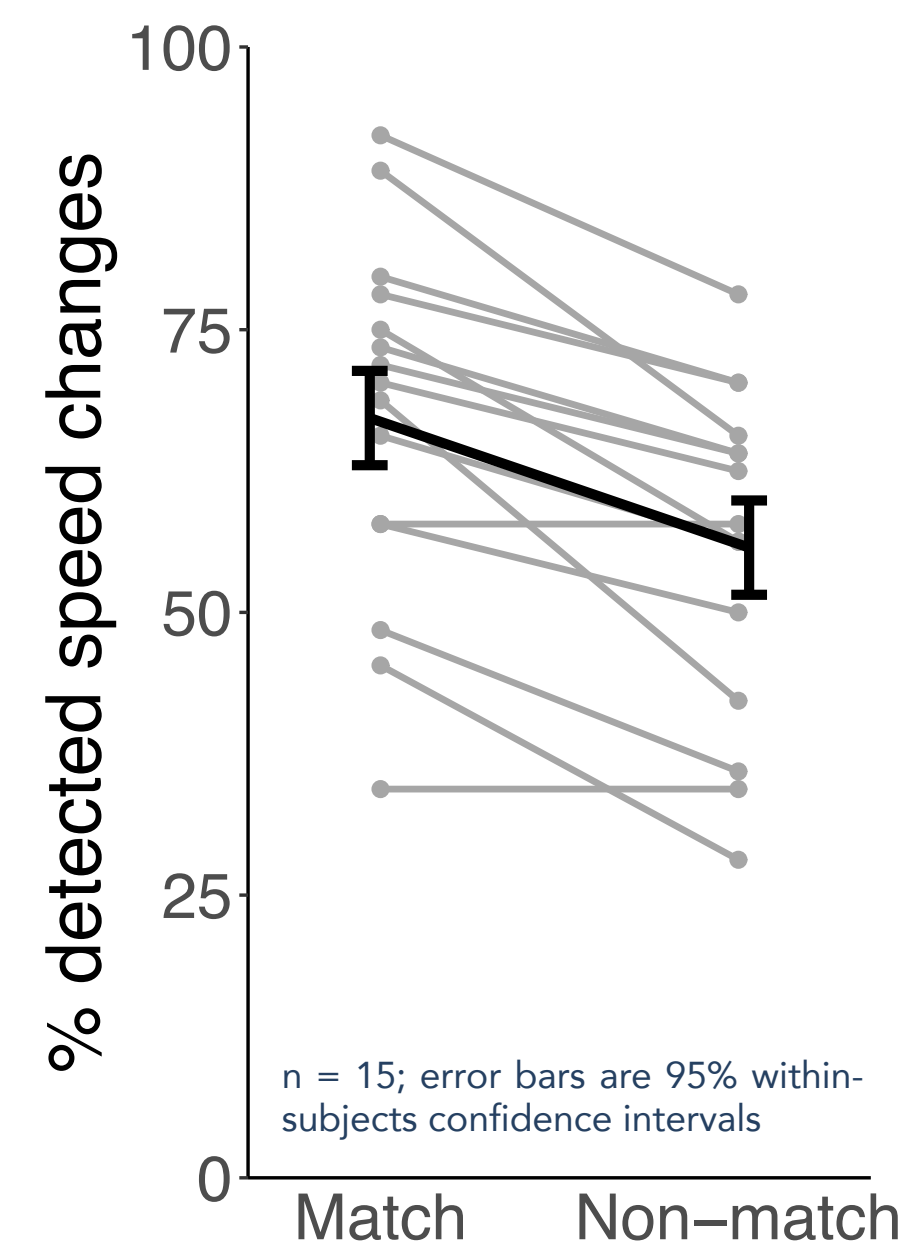
speed increase happens in upward moving dots, not matching attended color

Logic of analysis (example trial):

Attend red → Red incidentally moves downwards → Are speed changes more likely detected when they occur in downwards moving dots?

Results

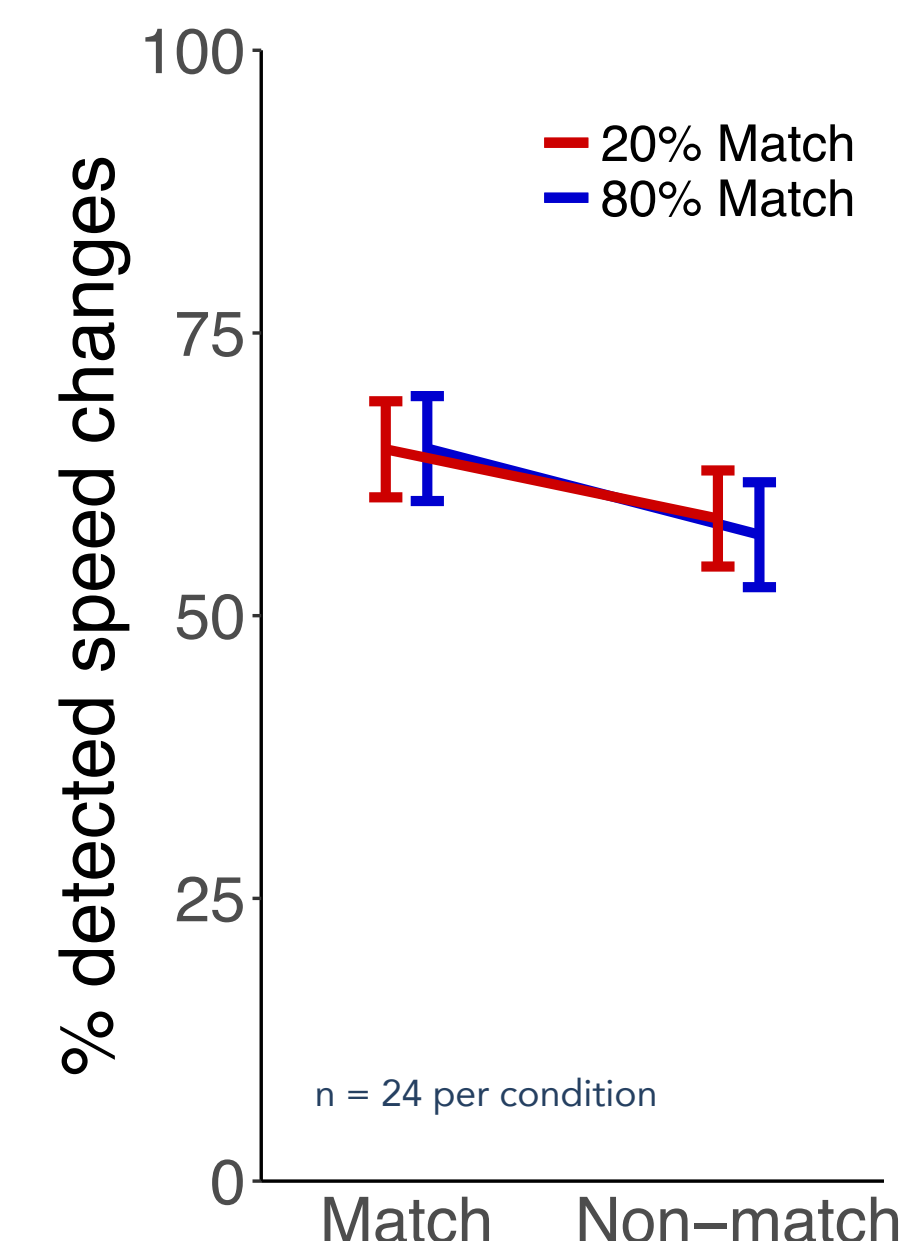
Exp. 1:
Are irrelevant features of attended objects enhanced across the visual field?



Subjects better detected speed changes that occurred in dots moving in the **same direction** as the attended color (mean difference of 11.5% hit rate, $p < .001$).

Attention to the colored dots enhanced processing of their motion direction across the visual field.

Exp. 2:
Does this feature spreading persist even when it is disadvantageous?



Even when matches occurred on only 20% of trials, we still found evidence of spreading (no difference between groups, $p = .625$).

Attentional spreading appeared to be robust and persisted even when detrimental for task performance.

Conclusions

- Subjects' detection of **speed** changes was affected by the direction of the dots in the **color** they attended
- Attentional enhancement may not be confined to attended objects but spreads to features at other locations
- This spreading might rely on perceptual grouping between objects (e.g., common fate)



Within-object spreading from color to motion direction

Across-location spreading of motion direction

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