Feature based templates-for-rejection are ineffective at suppressing threat-related distractors in visual search

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BACKGROUND

Earlier research has found that when participants are cued with the distractor feature on each trial, they are faster to identify the target compared to when they were given no information about the upcoming target or distractor features (Stilwell & Cunningham, 2019).

This has been taken as evidence that individuals can utilise a representation in working memory to suppress stimuli matching this feature in the environment. Though some contradictory evidence suggests that this could be counter-productive and actually exacerbate attentional capture by these distractors depending on the task context (Woodman & Koster, 2012).

In this investigation we investigated what pattern of attentional inhibition or capture emerged for real-world threat-related stimuli which individuals would be motivated to avoid and ignore (Stilwell & Cunningham, 2016).

• Successful inhibition hypothesis: The distractor cost (vs no distractor baseline) will be decreased after being cued with the feature that was cued when given prior information.

• Unsuccessful inhibition hypothesis: There will be no difference in distractor cost (vs no distractor baseline) when the distractor is cued when given prior information.

• Elevated capture hypothesis: The distractor costs (vs no distractor baseline) will be increased when cued with the feature that was cued when a non-informative cue is presented.

RESULTS

Specific Bayesian priors

• Successful inhibition of distractor costs below no cue baseline: -24ms decrease (from Cunningham & Egeth, 2016; Exp 1, Block 1)

• Elevated attentional capture cost above no cue baseline: 40ms increase (from Cunningham & Egeth, 2016; Exp 1, Block 1)

Calculate as a half-normal distribution centred on zero - reflecting the null (Dienes, 2014)

Bayes factor interpretation:

- BF > 3 = Favours experimental hypothesis
- BF = 1 = Inconclusive
- BF < 0.33 = Favours the null hypothesis

KEY BAYESIAN PAIR-WISE COMPARISONS

Distractor cue conditions

Evidence suggested evidence against inhibition, and inconclusive evidence for capture, by neutral distractors when comparing cue vs no cue: (39) = 1.04, p = .305, g = .16.

- Evidence against inhibition: BF = .42
- Evidence for capture: BF = 1.09

Evidence suggested evidence against inhibition, and evidence for capture, by neutral distractors when comparing cue vs no cue: (39) = 2.18, p = .035, g = .34.

- Evidence against inhibition: BF = .14
- Evidence for capture: BF = 5.79

Target search cue conditions

- When cued with a target prior to neutral distractors, the neutral distractor cost was non-significantly lower versus the no cue condition: (39) = 2.75, p = .009, g = .43.

- When cued with a target prior to related distractors, the neutral distractor cost was lower versus the cue condition: (39) = 3.8, p = .007, g = .60.

Exploratory block analysis (3 blocks)

There was no significant interaction between cue-type, distractor, and block, F(4, 78) = .86, p = .492, ηp2 = .02. Suggests no difference depending on experience or practice.

SUMMARY

- Templates-for-rejections were ineffective at reducing attentional capture by both neutral and threat-related distractors and actually increased attentional capture by threat-related stimuli.

- Trait anxious individuals were more distracted by threat-related stimuli when they were cued beforehand with this stimulus feature.

- Disruption of attentional control? (Brown et al., 2020)

- Priming automatic detection goals? (Brown et al., 2020)

- Despite this there was no evidence of overall attentional capture by threat-related stimuli.

- Searching for specific target features did appear to reduce attentional capture, though this was only significant for neutral stimuli.

- Conventionally, attentional capture then attention has been thought to reflect a vigilance-avoidance pattern (Woodman, 2019). The current data suggest that actually deliberate avoidance may induce automatic vigilance/capture by threat.

Limitations

- Search goals and avoidance goals may disrupt one another when within the same block. Distractor cued distractor costs correlated with target cued distractor costs, r = .60*** consistent with this (Brown & radioactive, 2019).

- Filler colours may have greater colour overlap with threat-distractor (i.e., red blood) meaning this may have been exposed to greater passive suppression. May explain lack of overall threat attentional capture.

Future research

- Contrast the ability of templates-for-rejection to suppress real-world vs novel/abstract shapes

- Explore template-for-rejection effects and target cued effects in isolation.