Negative Templates: Differences in Task Design May Lead to Contradicting Results

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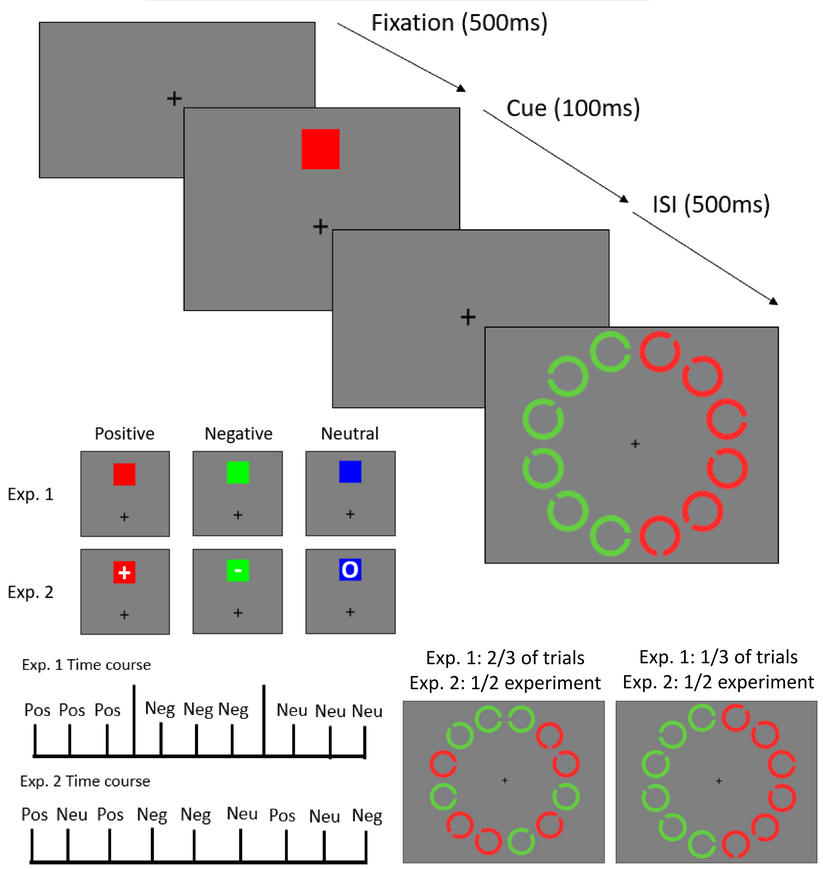
Introduction

We compared different accounts for how negative attentional templates are deployed in visual search.

Automatic Rejection: Negative cues are automatically ignored[1]
Register-and-Destroy: Attention is initially captured by a few cue-matching distractors before searching other stimuli[2,3,4]

Alternatively, the task design may influence negative template use:
Location/Feature-Based Recoding: Negative cues may be converted into a location cue[4,5]
Practice Effects: Negative template effects may simply be due to repeated practice with the same cue[3]

Method



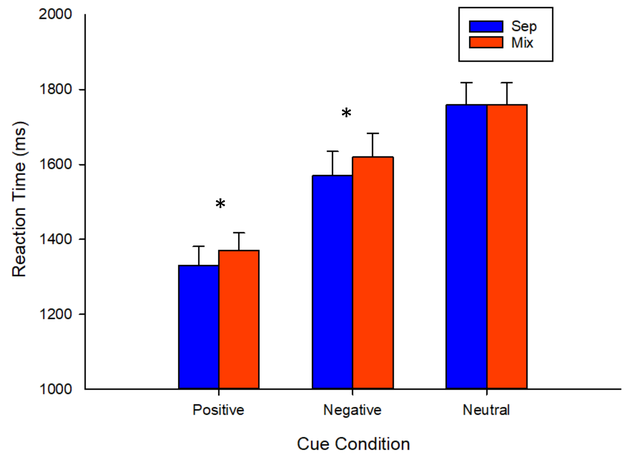
Conditions
Cue Type: Positive, Negative, Neutral
Array Type: Separated, Intermixed

Exp. 1 (N=72): Blocked by cue type
Exp. 2 (N=75): Blocked by array type
Cues were presented randomly.

Hypotheses
Automatic Rejection: Pos = Neg, both < Neu
Register-and-Destroy: Pos ≠ Neg, both < Neu
Feature Recoding: Sep < Mix

Practice:
Exp. 1: Performance improves over block
Exp 2: RTs worse than Exp 1

Experiment 1 Results

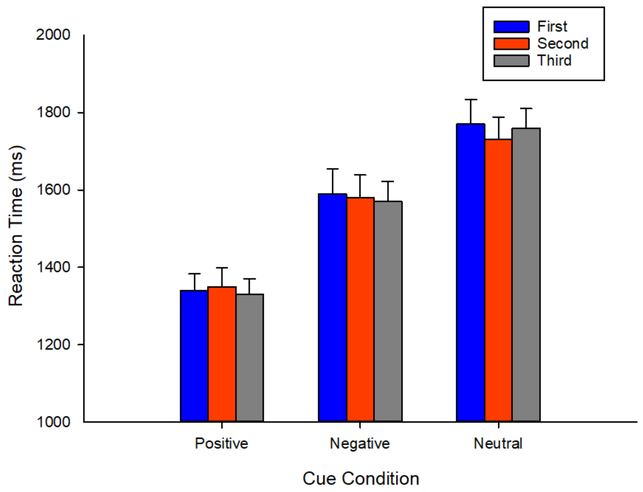


Accuracy (p<.001): Subjects were more accurate for positive cues (M= .97) than negative (M= .96) and neutral (M= .94).

Cue Type (*p*<.001): Faster RTs for positive cues (M = 1,350ms) than negative (M = 1,650ms) and neutral (M = 1,770ms) cues, supporting **Register-and-Destroy** account.

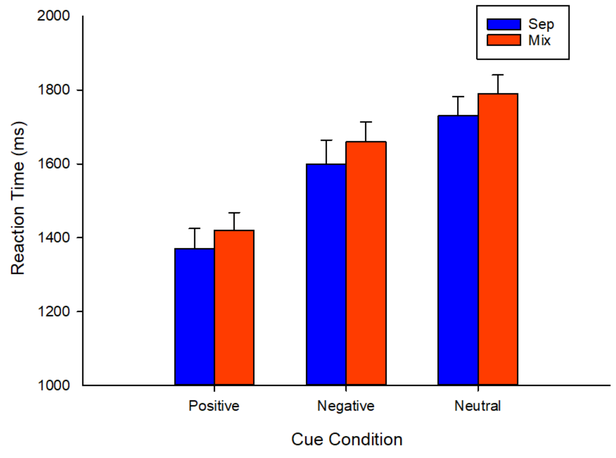
Array Type (*p*=.006): Faster RTs for separated (M = 1,560ms) than intermixed (M = 1,590s) arrays, supporting **Location/Feature-Based Recoding** account.

Cue x Array (p=.050): Faster RTs for separated than intermixed in positive (*p*=.008) and negative (*p*=.003), but not for neutral (*p*=.927).



Practice Effects (p = .353): No significant RT improvement with time, arguing against the **Practice Effect** account.

Experiment 2 Results



Accuracy (p< .001; p = .011): Subjects were more accurate for positive cues (M = .97) than negative (M = .96) and neutral (M = .94) and were more accurate for separated (M = .97) than intermixed (M = .96).

Cue Type (*p*<.001): Faster RTs for positive cues (M = 1,400ms) than negative (M = 1,640ms) and neutral (M = 1,770ms) cues, supporting **Register-and-Destroy** account.

Array Type (*p*=.006): Faster RTs for separated (M = 1,580ms) than intermixed (M = 1,630s) arrays, again, supports **Location/Feature-based** account.

With cues being presented on a trial-by-trial basis, there is no opportunity to practice using the same strategy. This rejects the **Practice Effect** account.

Conclusions

1. Effects of Cue Type (Positive < Negative < Neutral) support Register-and-Destroy account, but not Automatic Rejection account.
2. Effects of Array Type (Separated < Intermixed) support Location/Feature-Based Recoding account.
3. We found no evidence for Practice Effects:
   - In Exp. 1, subjects did not get faster as blocks advanced
   - RT values were not significantly different between Exp.1 and Exp2 (*p*=.376).

References

[1]Carlisle, N., & Nitka, A. (2019). Location-based explanations do not account for active attentional suppression. *Visual Cognition*, *27*(3-4), 305–316.
[2]Moher, J. & Egeth, H. (2012). The ignoring paradox: Cueing distractor features leads first to selection, then to inhibition of to-be-ignored items. Attention, Perception & Psychophysics, 74(8), 1590–1605.
[3]Berggren, N., & Eimer, M. (2020). The guidance of attention by templates for rejection during visual search. Attention, Perception, & Psychophysics, 83(1), 38–57.
[4]Beck, V. M., & Hollingworth, A. (2015). Evidence for negative feature guidance in visual search is explained by spatial recoding. Journal of Experimental Psychology: Human Perception and Performance, 41(5), 1190–1196.
[5]Becker, M., Hemsteger, S., & Peltier, C. (2015). No templates for rejection: a failure to configure attention to ignore task-irrelevant features. Visual Cognition, 23(9-10), 1150–1167.