

# Finding the Green Ketchup Bottle: Investigating How Non-Essential Features Sometimes Aid in Search

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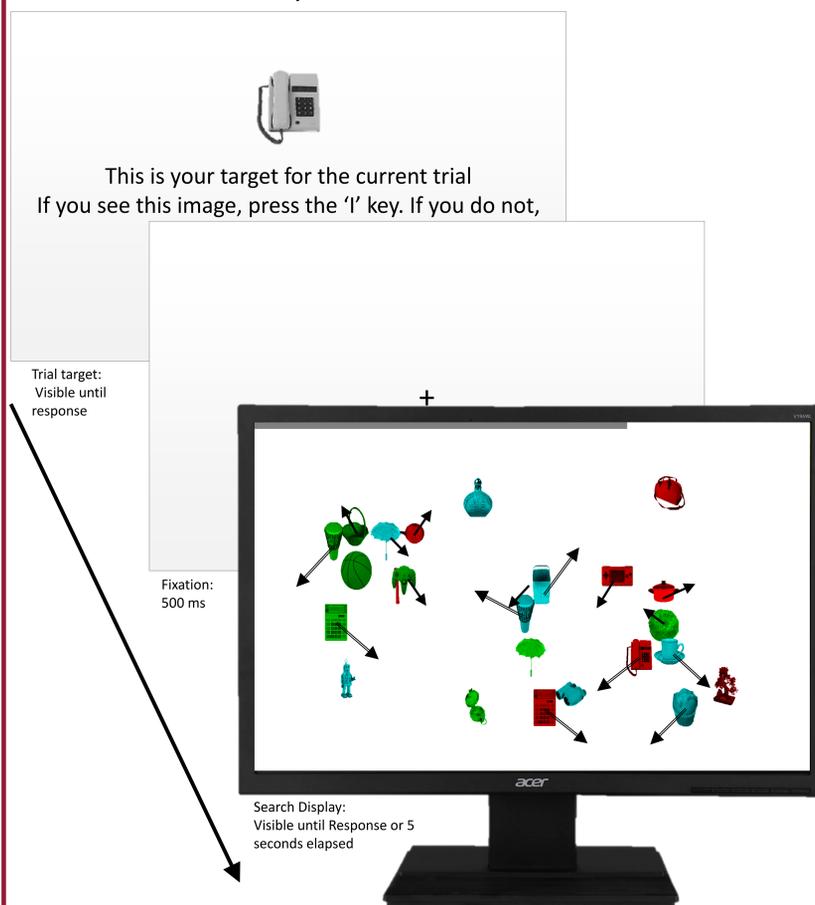


## Introduction

- A non-essential feature is one that does not define a visual target, but it is highly associated with it (French's mustard's bright yellow bottle and hourglass shape).
- Fan and Turk-Browne (2015) found that people store the expected location and color of a target in visual long-term memory (VLTm), even though those features did not explicitly define a target (pseudo-alphabetic character). Learned spatial patterns helped searchers guide attention to the targets, and the expected target color interfered with concurrent visual tasks.
- Scarince and Hout (poster, 2015) found that non-essential dynamic features (movement and blinking) affected how often targets were missed, depending on how often targets were comprised of those features. When a feature was strongly associated with targets, miss rates were lower compared to targets that had a feature that was weakly associated with targets. For example, when 60% of targets moved and 8% of them blinked, blinking targets were missed disproportionately more than moving targets.
- We conducted a pilot study to replicate the effect of a non-essential dynamic feature (motion) on target miss rates, and to test for similar effects from a static feature (color).

## Method

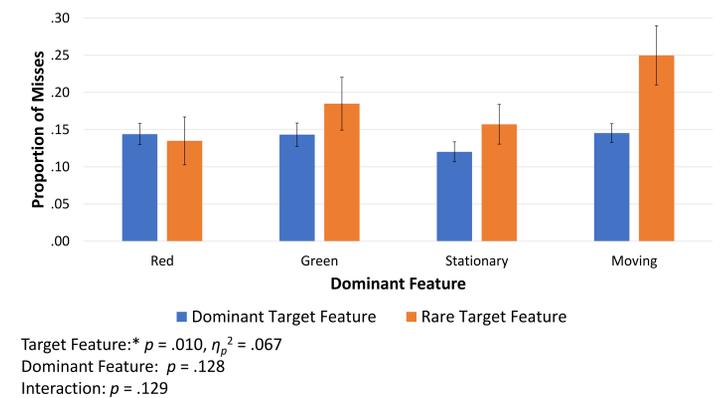
- 100 participants searched displays of 24 items, in 120 trials (across 4 blocks).
- Each trial had a unique target presented in gray-scale. Participants looked for that specific item, regardless of its color or movement during the trial.
- All stimuli in the display (including the target, if present) were assigned one of three colors and one of three movement speeds.
- To encourage the use of non-essential features to guide search, participants had a time limit of 5 seconds to respond.



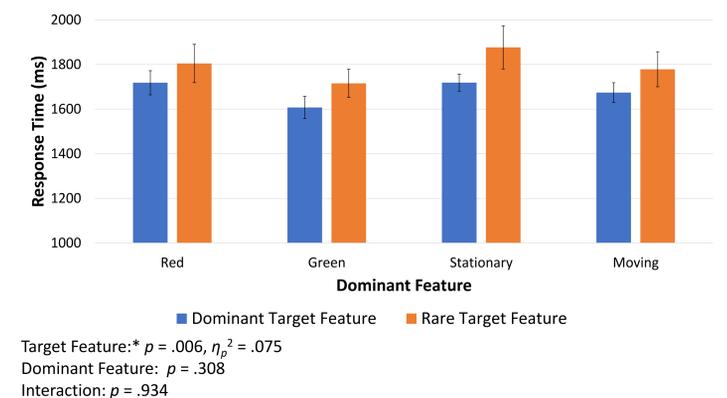
Dominant Feature	90%	10%	Neutral
Red			
Green			
Stationary			
Moving (slowly)			

## Results

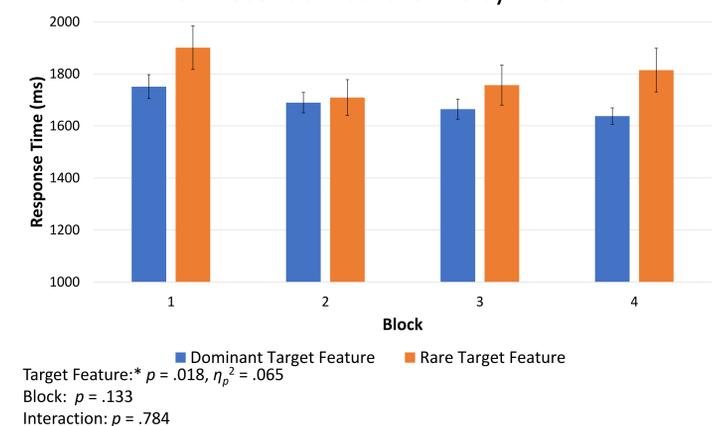
Miss Rate of Dominant and Rare Target Features



Response Time to Dominant and Rare Target Features



Non-Essential Feature RTs by Block



## Discussion

- Non-essential features (those that did not define the target) generally had an effect on target miss rates (Cohen's  $d = 0.255$ ) and time to find the target (Cohen's  $d = 0.284$ ).
- Hit responses for dominant features did not significantly speed up over blocks, suggesting that this relationship might be learned very quickly.
- Future experiments should explore how these biases develop, as well as their implications in applied scenarios. For instance:
  - Law enforcement tracking down a suspect based on characteristics that can easily be altered (e.g., hair color, clothes, facial hair, etc.).
  - Interface design for complex systems that are frequently updated.