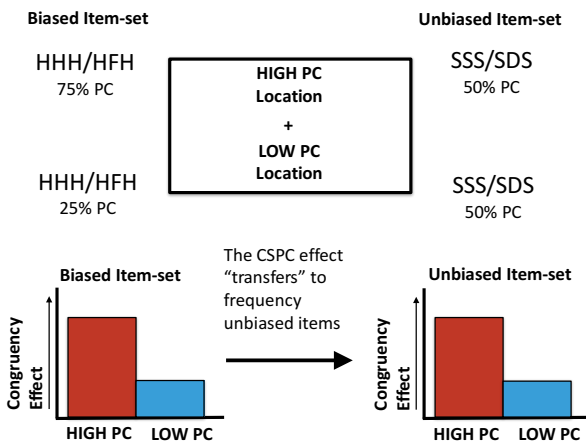# Same context, different control: Flexibly shifting between context-specific control settings

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Context-specific attentional control

In conflict tasks like Stroop or flanker, pairing a contextual cue with varying proportion congruency (PC) modulates the size of the congruency effect. Referred to as the context-specific proportion congruent (CSPC) effect, these modulations are thought to reflect changes in attentional control.

The CSPC effect can also transfer to frequency unbiased items presented in same context. This demonstrates that the context is able to become associated with, and cue rapid changes in attentional control.

Biased Item-set

HHH/HFH
75% PC

Unbiased Item-set

SSS/SDS
50% PC

HIGH PC Location
+
LOW PC Location

HHH/HFH
25% PC

SSS/SDS
50% PC

The CSPC effect "transfers" to frequency unbiased items

Biased Item-set

Unbiased Item-set

Congruency Effect — HIGH PC | LOW PC

Congruency Effect — HIGH PC | LOW PC

Flexible control or perseveration of control?

Context-specific control, although typically thought of as a "flexible" form of control, demonstrates rigid conformity to environmental statistics, without awareness or volition, and even when it is harmful to performance.

Can context-specific control be used in a flexible way?

Memory-guided selective attention

CSPC effects are the thought by some, to be the result of a cue-driven memory process. Under this view, there may be room for flexibility in determining which environmental features are used to cue prior experiences.

For example, presenting a green hat could cue the retrieval of previous "green" experiences, previous "hat" experiences, or only previous "green-hat" experiences.

Therefore, orienting to different features of a multi-feature context may allow people to exploit environmental regularities associated with either feature.
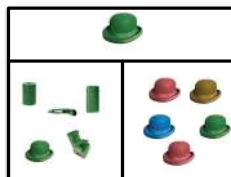
How flexible is context-specific control?

Questions:

1. Can people exploit an environmental cue associated with one level of conflict, while in the presence of a second cue, associated with a different level of conflict?

2. Can people shift between context-specific control settings?

3. Does contextual control require item-specific repetitions?

The current experiment

Primary task: indicate the direction of the center arrow (flanker task)
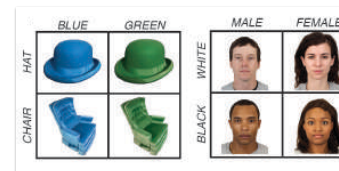
On each trial, a flanker stimulus was paired with a contextual cue defined by two feature dimensions.

Secondary task: count the number of trials that with a certain feature (e.g., blue).

Context-types:
- Object (color/identity)
- Social (gender/race)
- Social w/ non-repeating images

Participants were presented with **three** of the four possible feature-combinations. Each of the three contexts was paired with a different proportion congruency (PC)

- 0% or 100% (biased items), or 50% (unbiased items)
- Importantly, the unbiased context shared a feature with each of the biased contexts.

Context Cues		PC	Secondary Task
hat	blue	100%	Phase 1: Count "hat" trials
hat	green	50%	
chair	green	0%	Phase 2: Count "green" trials

We oriented participants to a particular shared feature by having them count the number of trials containing that feature. Halfway through the experiment, they were instructed to switch to the other shared feature.

- The secondary task order, as well as all feature, PC, and counting assignments were randomized for each participant.
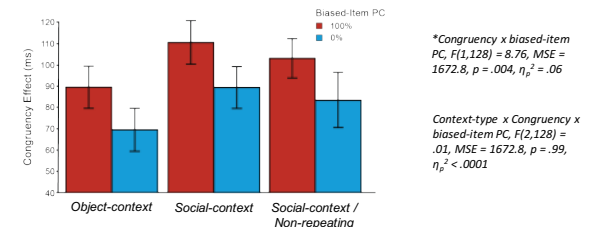
We tested three different kinds of contextual cues: objects, social, and social cues with non-repeating items.

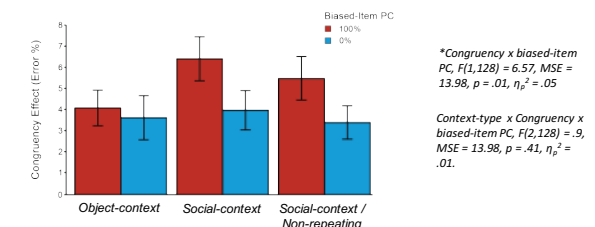## Results: Flexible control of context-specific control

Results show significantly larger congruency effects for *frequency unbiased items* when participants were oriented towards the feature shared with the 100% PC items rather than the feature shared with the 0% PC items.

The CSPC transfer effects were found in both reaction times and error rates, and there were no differences between CSPC transfer effects across context-types.

Frequency Unbiased items: Reaction times

Congruency x biased-item PC, F(1,128) = 8.76, MSE = 1672.8, p = .004, η_p^2 = .06

Context-type x Congruency x biased-item PC, F(2,128) = .01, MSE = 1672.8, p = .99, η_p^2 < .0001

Frequency Unbiased items: Error rates

Congruency x biased-item PC, F(1,128) = 6.57, MSE = 13.98, p = .01, η_p^2 = .05

Context-type x Congruency x biased-item PC, F(2,128) = .9, MSE = 13.98, p = .41, η_p^2 = .01.

Conclusions

- These results suggests that people are extremely flexible in how they use environmental features to guide attention

- Not only could participants adopt one context-specific control setting when faced with a competing cue, but they could also switch between control settings by orienting to a different feature

- Finally, CSPC transfer effects were found across simple shape/color and more complex social category cues, and found even when images did not repeat. This suggests a broad generalizability of CSPC transfer effects that cannot be attributed to item-specific learning.

Questions?
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