Long(er)-term item-specific Gratton effects

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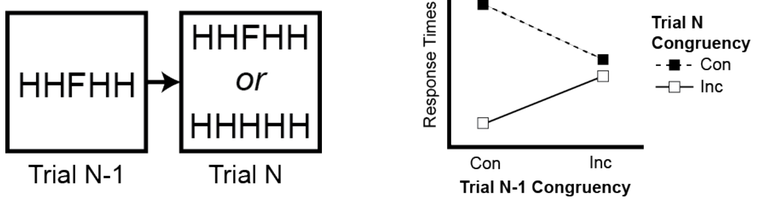
The N – 1 Gratton effect and cognitive control

The Gratton effect (Gratton, et al., 1992) is the common finding that the size of the congruency effect on any given trial (trial N), in part, depends on the congruency of the previous trial (trial N-1).

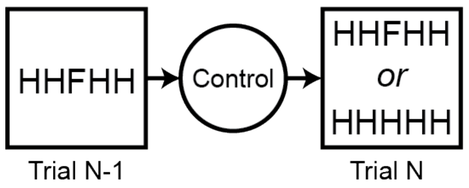
e.g., Flanker Task



Typically, the congruency effect is larger following a congruent trial as compared to an incongruent trial.

Conflict monitoring models

e.g., Botvinick et al., 2001, Braver, 2012

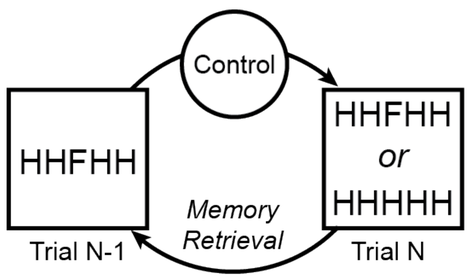


The traditional explanation is that cognitive control is adjusted in preparation for the next trial.

e.g., When conflict is detected, control increases for the next trial.

Possible memory influences

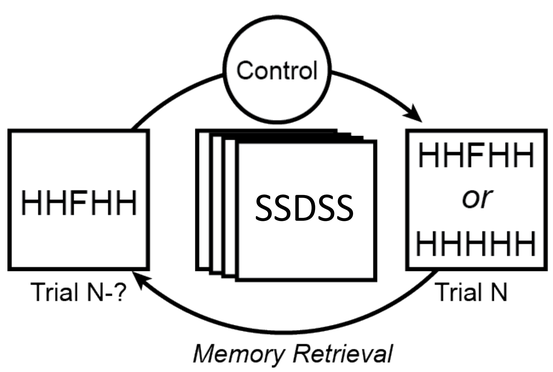
e.g., Egner, 2014, Spapé & Hommel, 2008



Some however, have suggested that memory retrieval plays a role in when and how control is adjusted.

Are there long-term Gratton effects?

If memory plays a role in adjusting cognitive control, then relatively distant previous-trials might be able to influence current control (i.e., the size of the congruency effect) provided there are effective retrieval cues.



Experiment 1: N – 8 Gratton effects

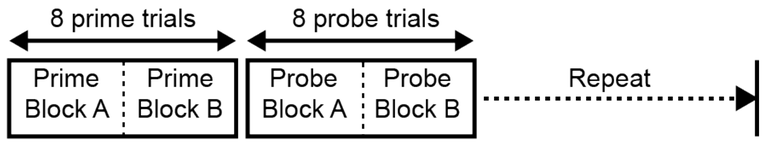
Color flanker task

Participants were instructed to identify the color of the center image (green or blue) while ignoring the colors of the flanking images which were either congruent or incongruent with the target.

Importantly, each image was only displayed twice during the experiment: once as a prime, and once as a probe.

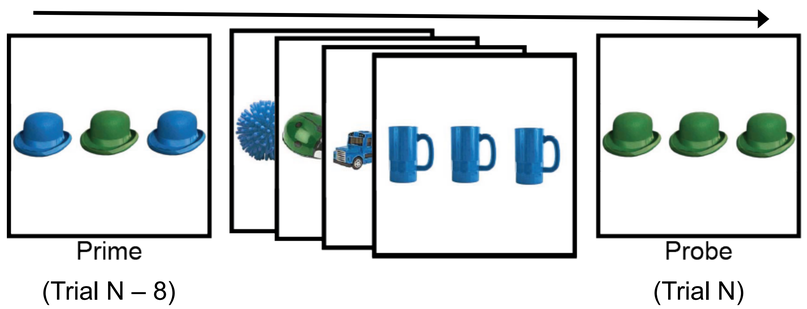
Will the congruency on the prime trials influence performance on the probe trials?

Block design



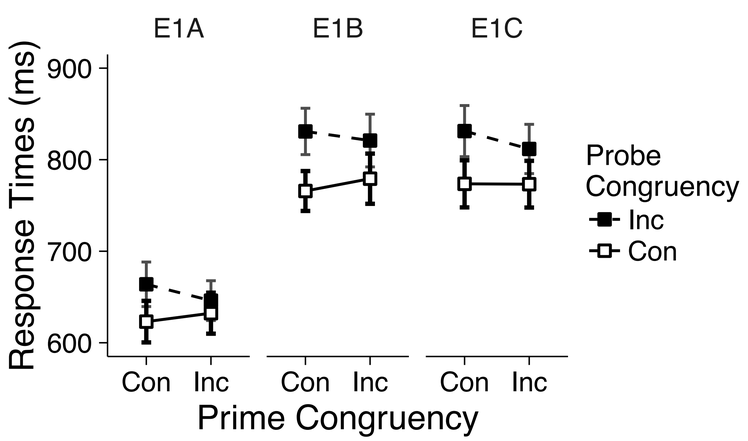
Distance between prime and probe trials

Trial order within each block was randomized so that the distance between any given prime/probe was 8 trials on average, and ranged from 4 to 11.



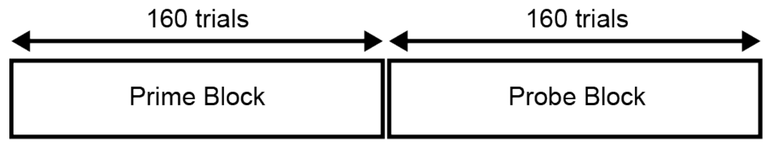
Results

Across three replications, we found a significantly larger congruency effect for probe trials following a congruent as compared to an incongruent prime ($p < .05$).



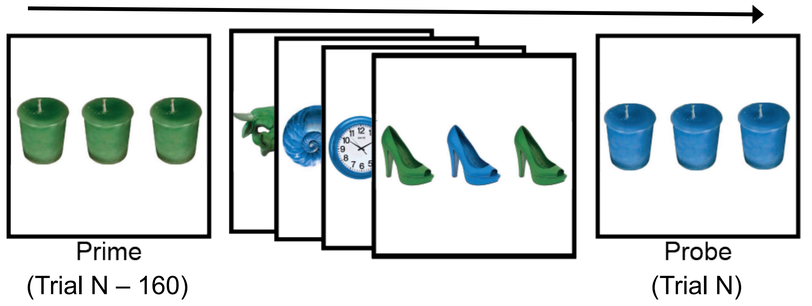
Experiment 2: N – 160 Gratton effects

Block design



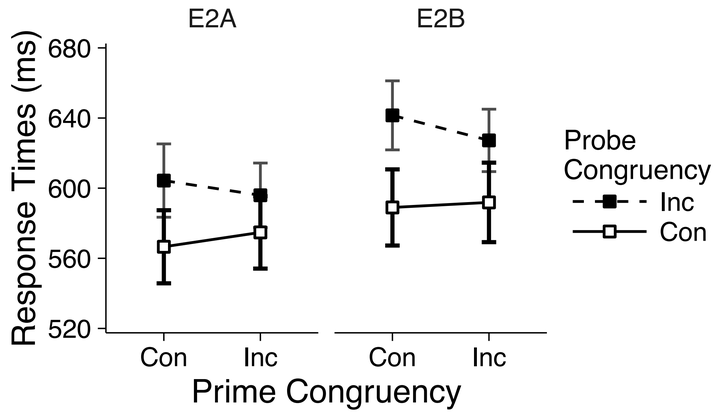
Distance between prime and probe trials

Trial order within each block was randomized so that the distance between any given prime/probe was 160 trials on average, and ranged from 1 to 319.



Results

Across two replications, we found a significantly larger congruency effect for probe trials following a congruent as compared to an incongruent prime ($p < .05$).



Summary and Conclusions

- Across five experiments, we found consistent evidence that the Gratton effect can persist much longer than previously thought: from 8 to 160 trials later.
- Previous work has suggested that N – 1 Gratton effects reflect short-term, transient shifts in cognitive control.
- However, the results of the current study suggest that Gratton effects may in part, be mediated by a memory retrieval process

Questions?
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