Motivational Effects on Item & Source Memory Encoding during Cognitive Control Performance

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Introduction

Memory is an adaptive process that allows us to use past decisions to guide future behavior

Cognitive control gives us the ability to flexibly regulate the thoughts and actions behind those decisions[1].

Memory and cognitive control have traditionally been studied separately, but memory encoding may vary with cognitive control state at the time of encoding, with memory benefit for task-relevant stimuli encoded under conflict vs. non-conflict[2]

Reward is also associated with enhanced associative and source memory, potentially because of dopamine input to hippocampus[3]

We aimed to test incentive effects on cognitive control as well as downstream item and source long-term memory (LTM).
Predictions: Reward incentive would lead to: 1) greater accuracy during Stroop task, 2) better LTM for task-relevant stimuli

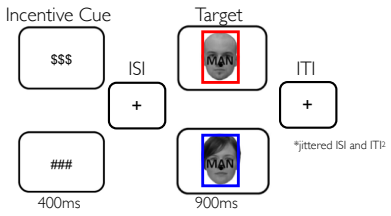
Methods

N = 37 healthy young adults (ages 18-35 years)
22 Female

Participants underwent two testing sessions, 24 hours apart

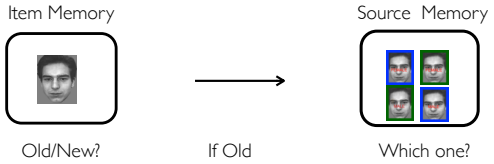
Day 1: Reward memory encoding

Familiarization - Saw all faces in Stroop task 3 times
Stroop - completed Stroop task making gender judgements
72 trials baseline block, 144 trials reward block (50% incentivized)
- Task-relevant information: face
- Task-irrelevant information: word label
- Incidental information: colored border



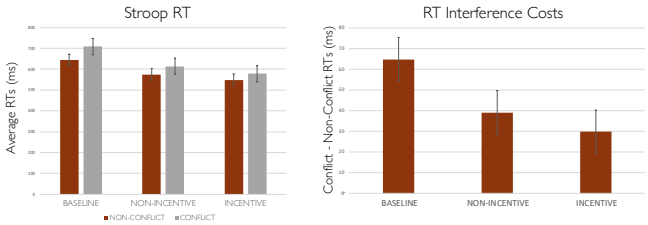
Methods

Day 2: Memory retrieval
Recognition task (216 old faces, 216 new faces)



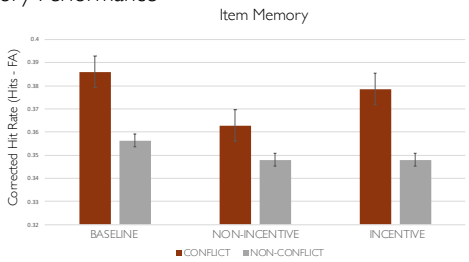
Results

Stroop Performance



RT improved in the incentive condition ($F(1,29) = 16.356$, $p < .001$).
Incentive specifically benefited conflict vs. non-conflict trials as evidenced by decreasing interference cost ($F(1,29) = 5.187$, $p = .008$).

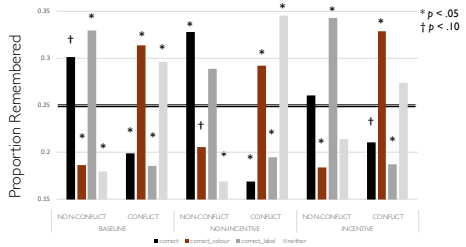
Memory Performance



Marginally improved memory for stimuli encountered during conflict trials ($F_{(1,29)} = 4.102$, $p = .052$).
Surprisingly, no significant effect on incentive on memory performance ($F_{(2,58)} = .347$, $p = .708$).

Results

Source Memory

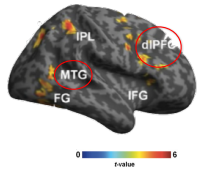


Significant incentive x conflict x response interaction: conflict modulates what aspects of the source context are most likely to be recognized. $F(6, 174) = 2.984$, $p = .008$).

Discussion

Results indicate that while reward may enhance cognitive control, and control influences both item and source memory encoding, reward enhancement of controlled performance may not be directly associated with enhanced subsequent memory.

Future work will examine punishment influences on cognitive control and memory, and examine neural mechanisms underlying these processes (especially PFC-MTL interactions[2]). We will also examine how these processes are modulated by individual trait anxiety.



References

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2. Krebs, R. M., Boehler, C. N., De Belder, M., & Egner, T. (2015). Neural conflict–control mechanisms improve memory for target stimuli. Cerebral Cortex, 25(3), 833-843.
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