Investigating the impact of memory reactivation on the successful forgetting of negative memories

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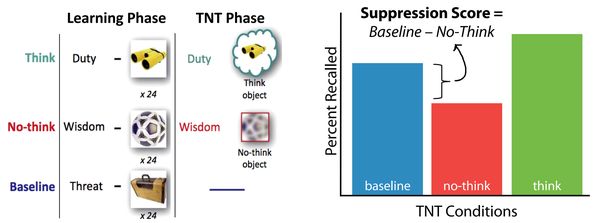
Introduction

Stopping an unwanted memory from coming to mind (i.e., memory suppression) might help to regulate negative memories. Memory suppression has commonly been studied using the think/no-think paradigm[1].



Anderson & Hanslmayr, 2014

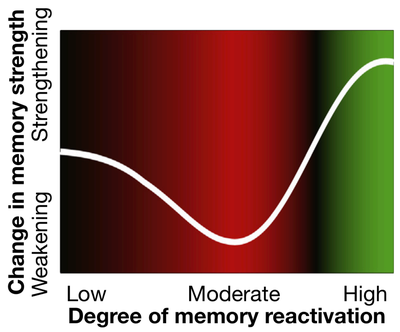
Although multiple studies[2] have demonstrated memory suppression effects, others have failed to replicate these findings[3,4].

What causes the suppression of negative memories to succeed or fail?

Hypothesis

We propose that *differences* in memory reactivation strength might lead to variability in suppression effects.

Nonmonotic plasticity hypothesis (NMPH)[5,6]



Some memories might be challenging to suppress because they are too strongly reactivated. In fact, individual variability (e.g., depression level) might impact memory reactivation and thus influence memory suppression effect.

Specifically, we predict an increase in memory reactivation as negative valence increases. We expect participants with more depression to reactivate negative stimuli more strongly than those with lower depression. In turn, this should affect subsequent memory performance.

Methodology

N = **26** (target sample size = 50)

DAY ONE

Depression & anxiety questionnaires

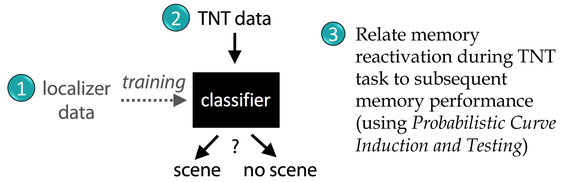
- 1-7 days apart
- Detailed schematic of day two on the right

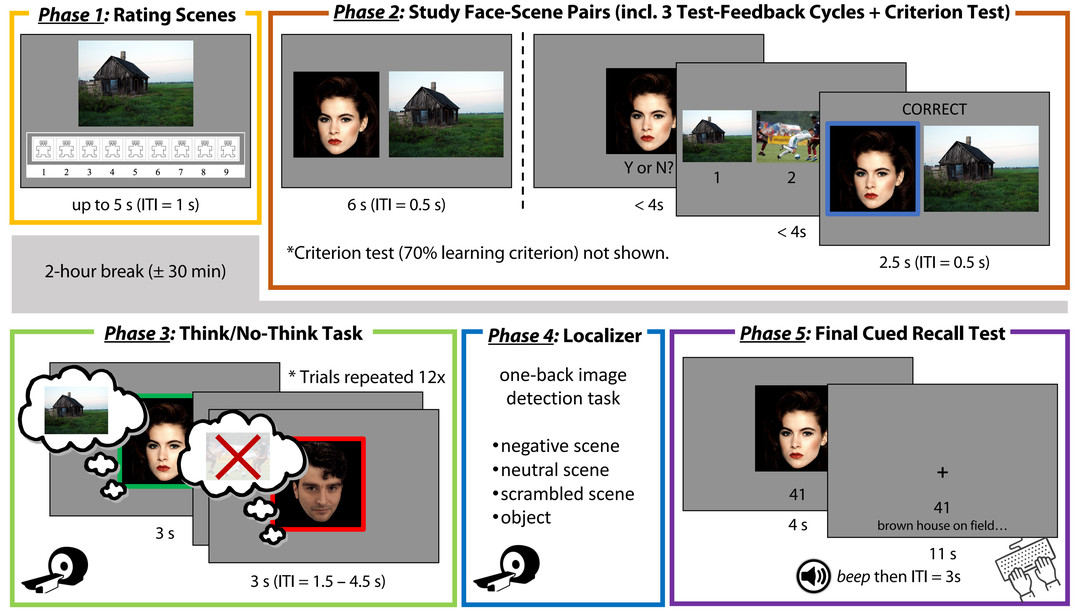
DAY TWO

Study face-scene pairs

Think/no-think (TNT) memory suppression

Surprise memory test

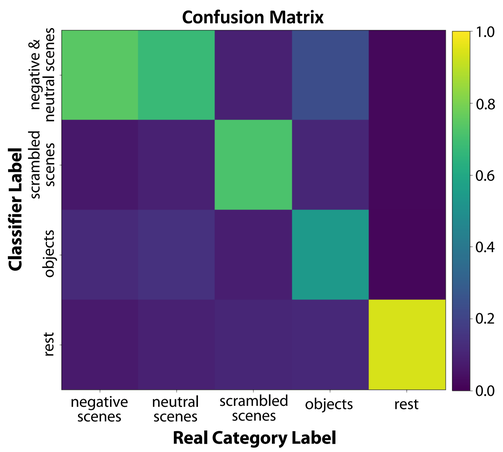




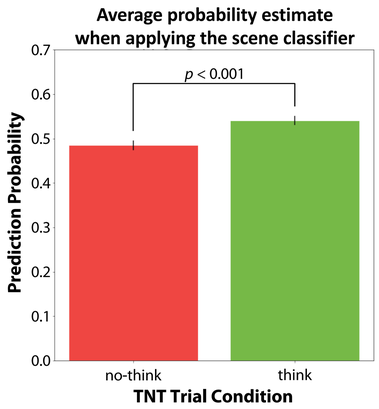
Preliminary Results

used bilateral occipitotemporal mask

1 Built logistic regression (L-2 regularized, penalty λ = 50) scene classifiers

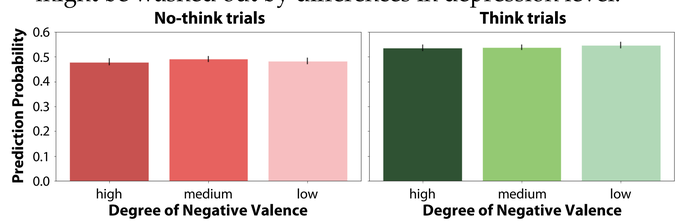


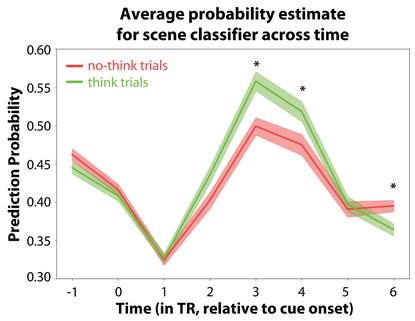
2 Applied scene classifier TNT data



We looked at the response 3 and 4 TRs after cue onset (accounting for hemodynamic lag). As expected, there was a higher probability estimate for scenes for think versus no-think trials.

Surprisingly, there were no differences in scene prediction probability across negative valence level. However, any effect might be washed out by differences in depression level.





We also examined the time course of the prediction probability relative to the cue onset of the think and no-think trials. We see a peak in activity 3 and 4 TRs after the cue onset.

Asterisks denote significance.

Next Steps

- Only use TNT trials that participants got correct in the criterion test, in line with prior work[7].
- Take into account individual variability in depression level, since this might impact the degree of memory reactivation.
- Relate memory reactivation during the TNT trials to memory performance during the surprise cued recall task (3). We expect to see a relationship similar to the NMPH schematic.

Special thanks to Sam Nastase and Lizzie McDevitt for fMRI guidance.

[1] Anderson & Green, 2001; [2] Anderson & Hanslmayr, 2014; [3] Bulevich, et al., 2006; [4] Hertel & Mahan, 2008; [5] Detre et al., 2013; [6] Ritvo, Turk-Browne, & Norman, 2019; [7] Küpper et al., 2014