**Domain-specific working memory loads selectively increase negative interpertations of surprised facial expressions**

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# intro

## Facial expressions and individual differences (what is valence bias?)

### Facial expressions are an important social signal

### Individuals differ (trait) in their tendency to interpret ambiguous images, like a surprised face.

### Despite the bias, everyone seems to show an initial negativity bias – positivity is associated with emotion regulation

### Behavioral data support the initial negativity hypothesis

#### Faster RTs for negative interpretations (Neta & Whalen 2009)

#### LSF

#### Oddball

### Brain data support the initial negativity hypothesis

#### Overriding negativity relies on regulation of amygdala responses by frontal areas (i.e., vmPFC) (Kim et al., 2003; Petro et al., 2018/9)

## Cognitive loads / task interference (could WM loads affect bias?)

### In our daily lives, these resources are not always available.

#### We often encounter distractions in daily life. E.g., a phone notification, noises in the office, etc.

### Active WM maintenance affects concurrent processes.

#### WM maintenance can recruit resources away from the “emotional brain” (Van Dillen et al., 2009)

#### Emotional expression categorization is worse during high, compared to low, cognitive load (Ahmed, 2018)

### Other work has tested the effects of cognitive load on valence bias (Mattek et al., 20\*\*), but did not find an effect for interpretations of surprise. This could be due to domain-specific effects of cognitive load (Egner & Etkin, 20\*\*, others)

## *The present study*

### In this study, we predict:

#### *H1: WM loads with emotional content will result in more negative interpretations of ambiguity than WM loads with neutral content.*

#### *H2: This effect may be larger for larger WM loads (specifically with emotional content)*

# Methods

## Stimuli

Describe faces, IAPS.

## Procedure

Within-subjects design, 2 Load (low, high) x 2 domain (emo, neu) design

We manipulated the WM domain and load across trials. Participants were instructed to hold images from an image matrix in WM while they rated happy, angry, and surprised faces. After, participants saw a single probe image and indicated whether or not this probe was present in the previous image matrix.

Show an example in **Figure 1**?

Participants were randomly assigned to a version of the task (response buttons counter-balanced, image locations in matrices counter-balanced).

## Data Analysis

Shapiro-wilks test to assess normality. Data from non-normal distributions analyzed with Friedman’s and Wilcoxon signed rank tests. Data from normal distributions analyzed with repeated measures ANOVA. All analyses Bonferroni corrected.

# Results

**Subjective Ratings**

We found a significant effect on subjective ratings of surprise. Specifically, ratings from trials with an emotional WM load were more negative than those with a neutral WM load. There was no effect of load (low vs. high). **Figure 2?**

**MD Effects**

**MD is larger under high cognitive load, with no effect of load type**

## DISCUSSION

## Summary of the results

### Cognitive loads with emotional properties shift bias towards negativite

### High cognitive load, more generally, results in larger MDs

## The shift towards negativity under cognitive load with emotional properties supports the initial negativity hypothesis.

### Cognitive loads with emotional properties interfere with resources for regulation

### Discuss why domain-specificity matters.

## Larger MD effects under high cognitive load suggest a successful load manipulation (cognitive load theory)

### Cognitive load theory states that under high cognitive load people will be less able to ignore distractors or task-irrelevant information

### MDs, a measure of response competition, were higher during high cognitive load, which may mean that participants were considering alternatives (or potentially distracted) during the response process.

### This is consistent with Mattek?

## Limitations and future work

### Working memory performance was near ceiling

#### Future work could address by…?

### Positive and negative loads were not manipulated independently, so we do not know if valence of the cognitive load affects interpretations differently, but this would be hard to tease apart when thinking about how positive or negative loads might prime interpretations by providing context.

## Wrap up: Our work extends previous work testing the effects of high cognitive load on subjective interpretations on ambiguity, highlighting the importance of domain-specificity. In other words, only cognitive loads which tax the resources used for interpreting ambiguity as positive will alter interpretations.

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