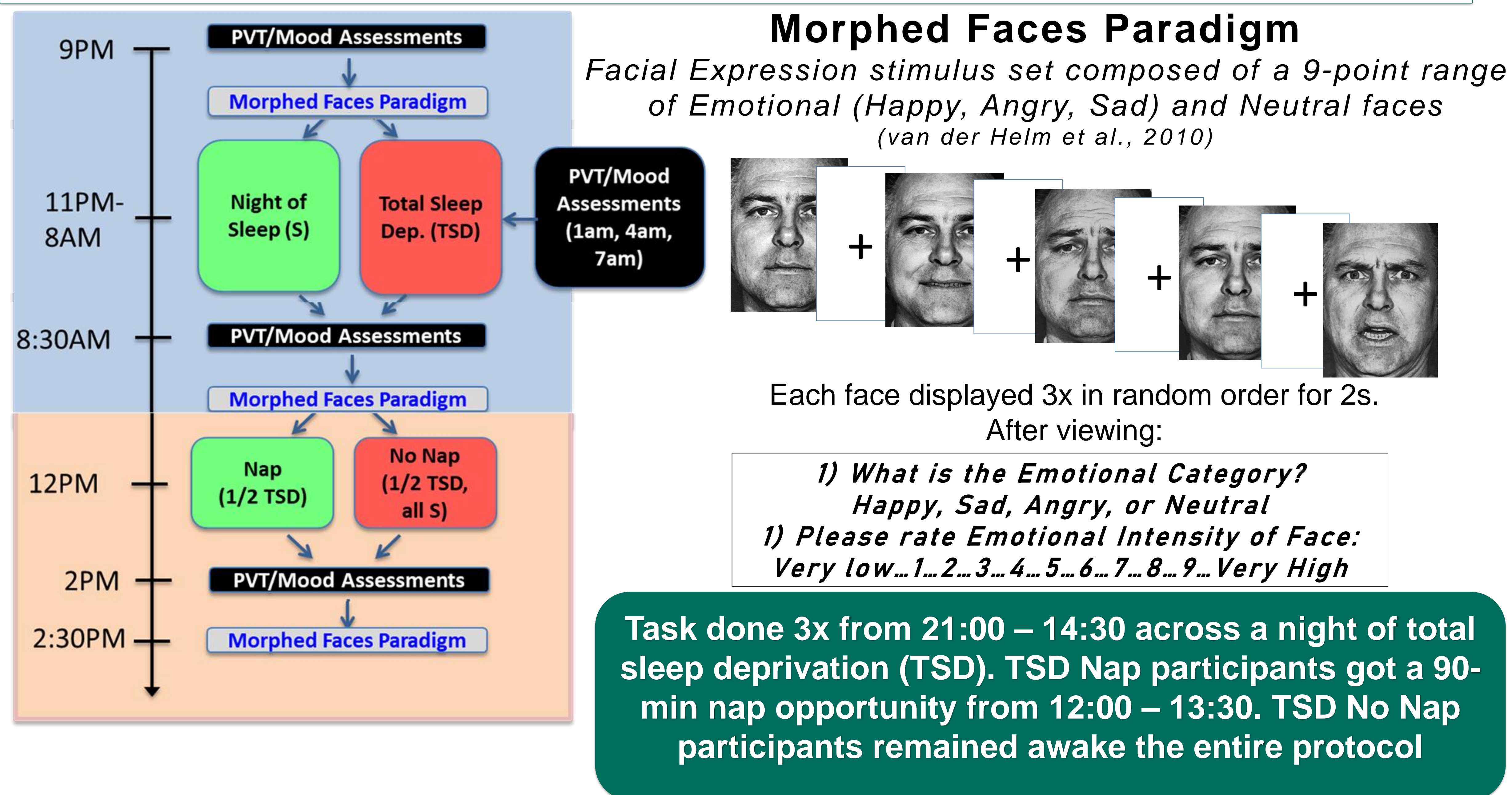


# The Effects of Recovery Sleep and Time of Day on Emotional Perception Abilities following Total Sleep Deprivation

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## Methods Summary



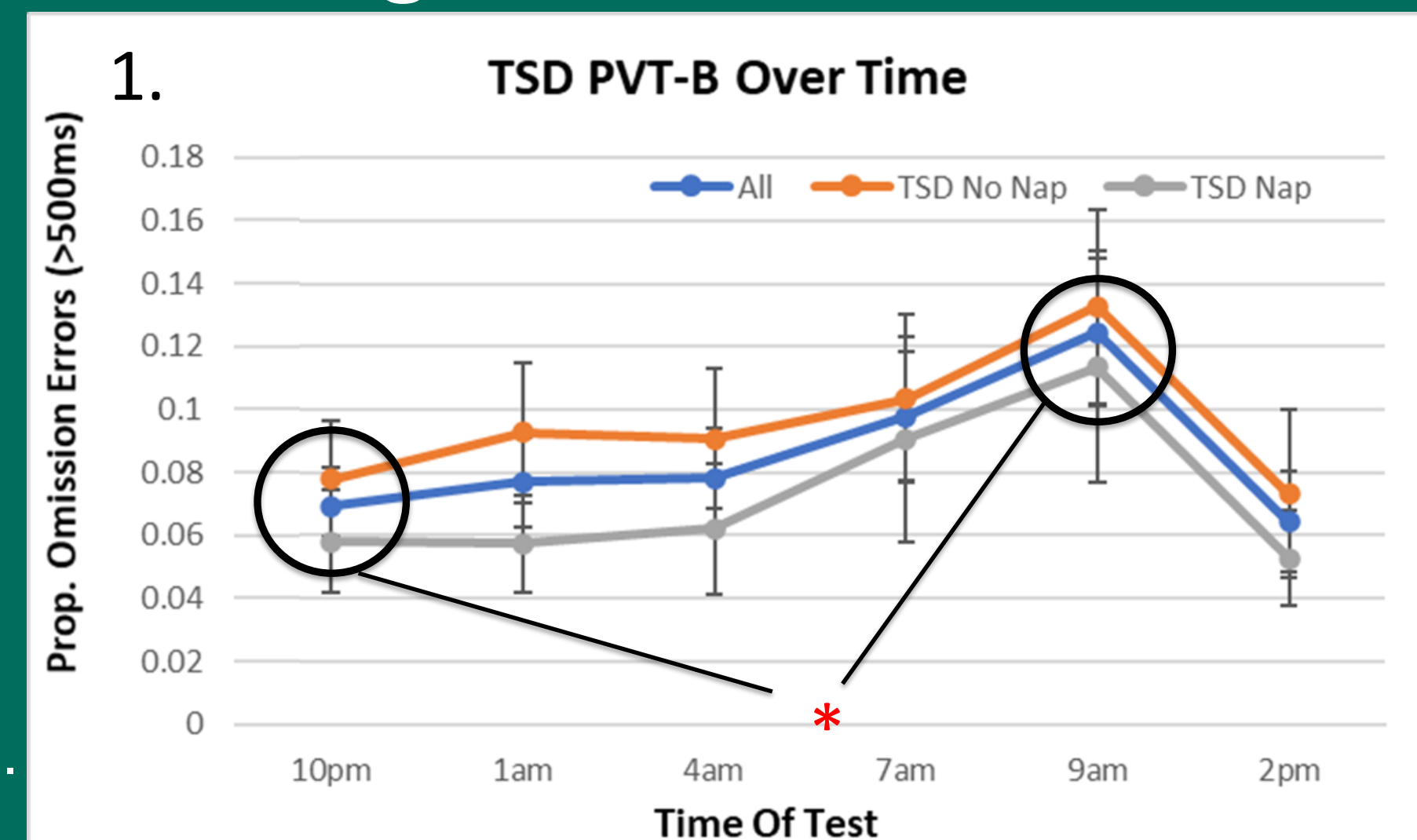
## Participants and PVT Results

46 healthy, young adults (18-35) with usable data completed TSD Protocol  
 TSD Nap Group N = 20  
 No Nap Group N = 26

| 10pm OE   | 9am OE    | t-score | p-value | 10pm MV     | 9am MV       | t-score | p-value |
|-----------|-----------|---------|---------|-------------|--------------|---------|---------|
| 0.7 (.01) | .12 (.02) | 2.9     | .005    | 347.6 (6.0) | 378.1 (13.9) | 2.4     | .02     |

Fig 1: Across a night of TSD, participants became significantly less vigilant from 10pm – 9am as measured by PVT. OE = Proportion of Omission Errors >500ms, MV = Median Value Reaction Time. Mean (SE).

## Psychomotor vigilance Task Results



## Introduction

Significant evidence indicates that sleep deprivation impairs cognitive function. We also know that even a relatively short period of recovery sleep can restore normal functioning. More recently, research has found that sleep loss also impairs emotional perception, however it remains unclear how this impairment evolves over time, and if, similar to cognitive functioning, a brief nap can restore healthy processing.

Here, we aimed to understand how sleep loss affects emotional perception over time, and if a brief nap can restore normal functioning.

## Conclusions

Our findings suggest that a night of total sleep deprivation initially impairs vigilance and ability to normally perceive the category and intensity of faces ranging in emotion. Both a 90-min nap and circadian or time of day influences restore vigilance and emotional categorization, but neither restore perception of emotional intensity. This suggests that emotional categorization may rely heavily on processes related to vigilance, while intensity ratings may rely on more complex mechanisms that neither a nap nor circadian influences sufficiently restore.

## Emotion Perception Results

### Emotional Categorization

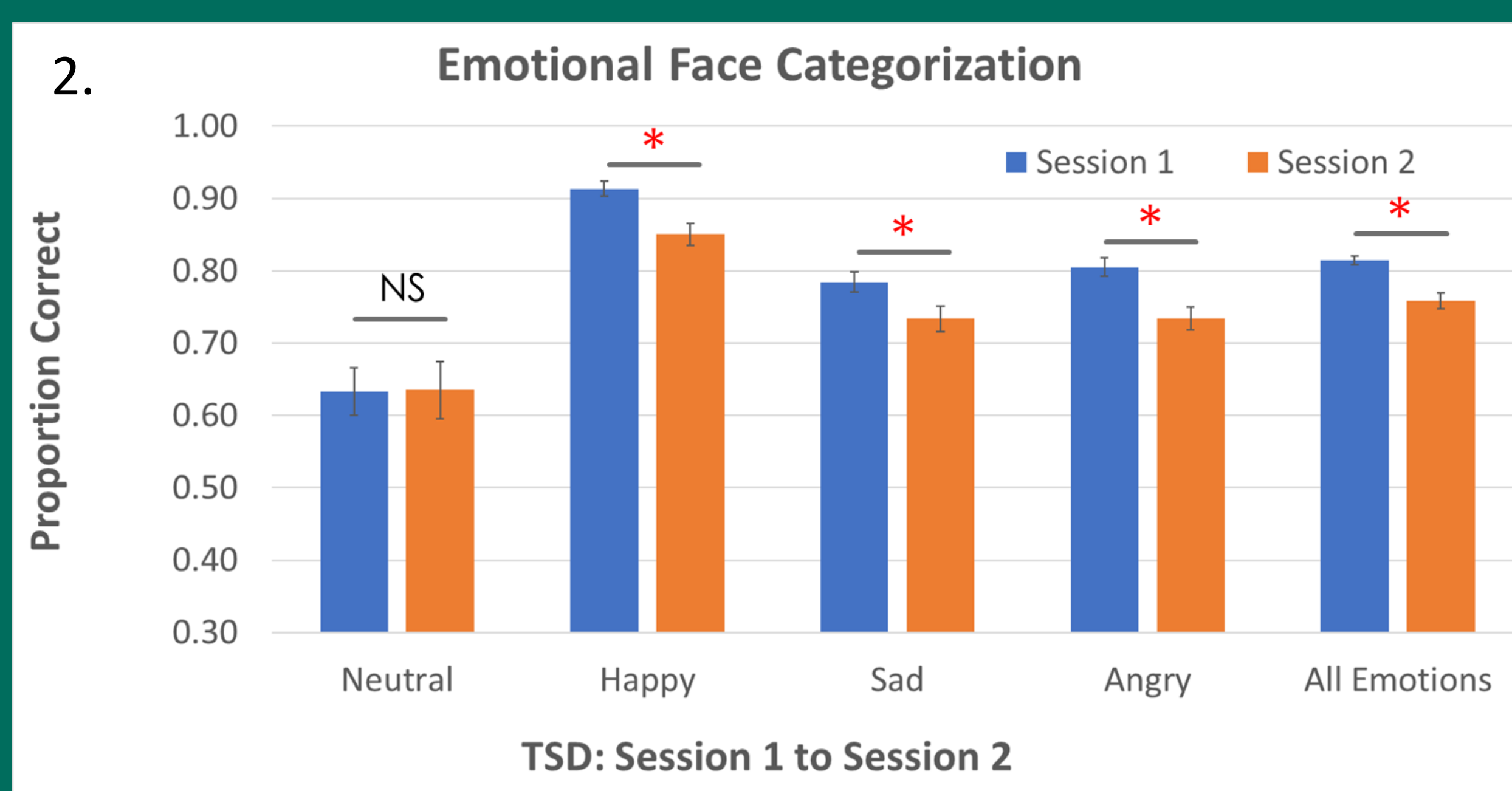


Fig 2: Across a night of TSD, participants became significantly less successful at correctly categorizing emotional faces (\* = p < .05).

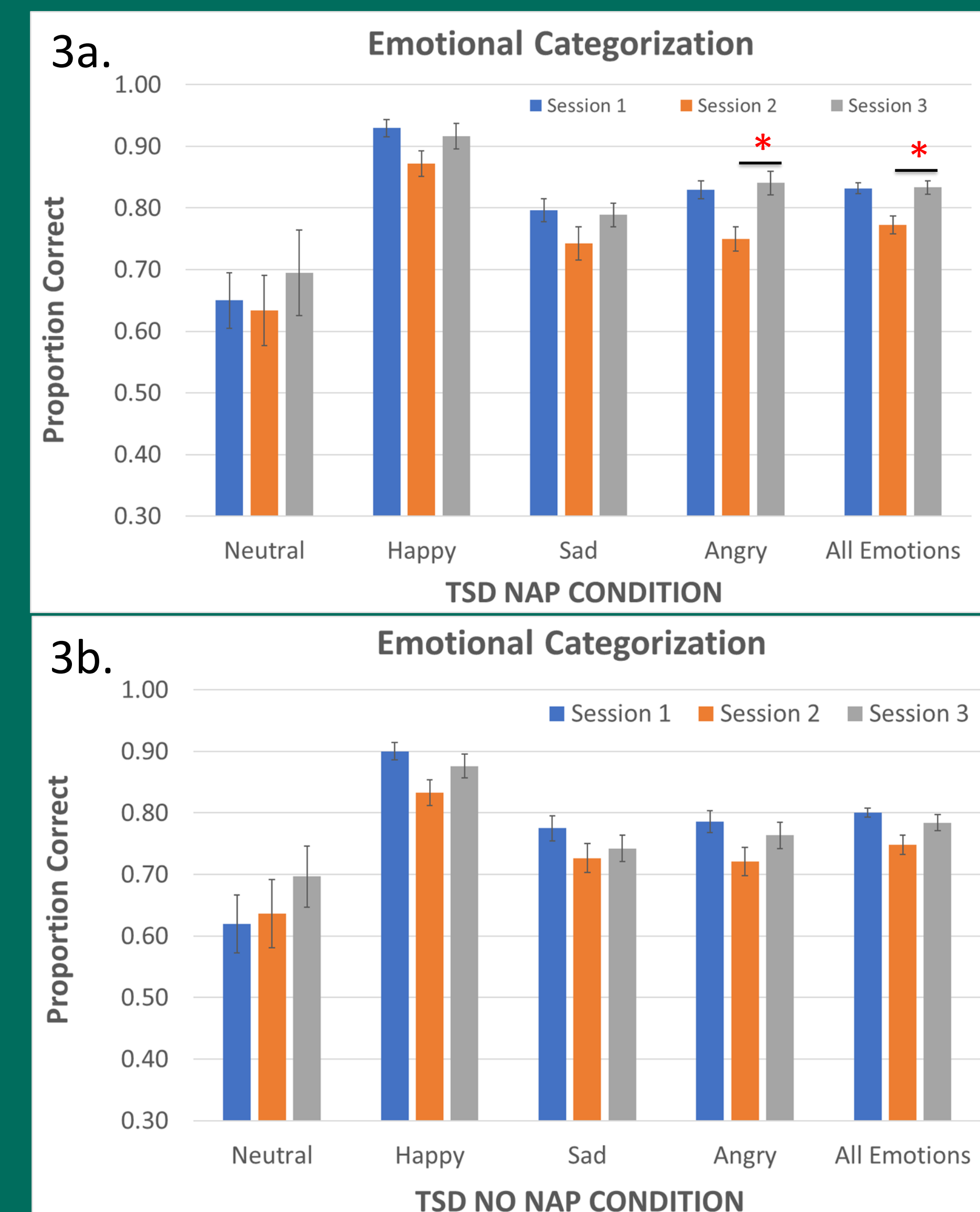
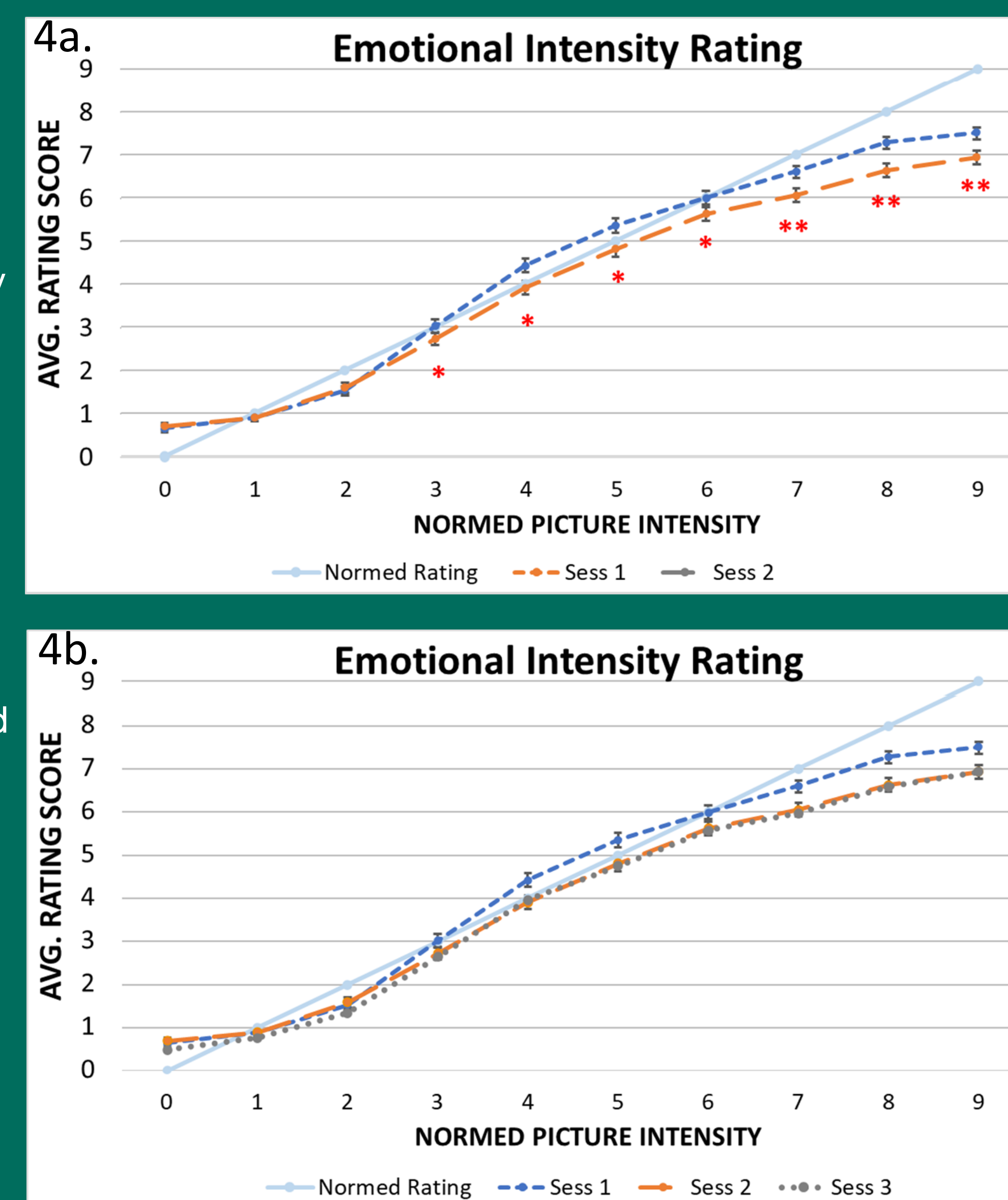


Fig 3: After (a) a nap or (b) continuing to remain awake until the afternoon session, participants showed similar behavioral patterns, recovering some lost ability to correctly. While only the TSD Nap group shows significant improvement in any discrete categories (Anger and across All Emotions, p < .05), there was no main effect or interaction with Group.

### Emotional Intensity

Fig 4: (a) Across a night of TSD, participants rate emotional faces as significantly less intense, particularly for the expressions at the highest end of the normed arousal ratings (\* = p < .05; \*\* = p < .001). (b) At the afternoon session, there is no significant change from Session 2, and the ratings remained suppressed compared to Session 1. There is no Group x Time interaction, suggesting neither group significantly alter from their Session 2 ratings by the afternoon.



## HIGHLIGHTS

- TSD impairs Vigilance, Emotional Categorization, And Perception of Emotional Intensity
- Both a Nap and Circadian influences restore Vigilance and Emotional Categorization
- Neither a Nap nor Circadian influences can restore baseline perception of emotional intensity

