Individual variation in neurophysiological representation of negative emotional experiences is shaped by sociability: *A naturalistic neuroimaging approach*

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INTRODUCTION

- Emotion is vital for human functioning and social life, which also induce series of common and distinct neurophysiological activities across individuals and even cultures
- Mentalizing and empathy are essential sociability that would influence emotion perception and decision-making in social scenarios and evoke large individual differences
- Development of naturalistic neuroimaging and virtual reality would provide subjects with immersive and realistic emotional experiences

1. What is the common neurophysiological response pattern of negative emotion (angry, anxious, fearful, helpless)?
2. How does the individual variation in sociability (mentalizing & empathy) modulate the neurophysiological response of negative emotion ?

METHODS

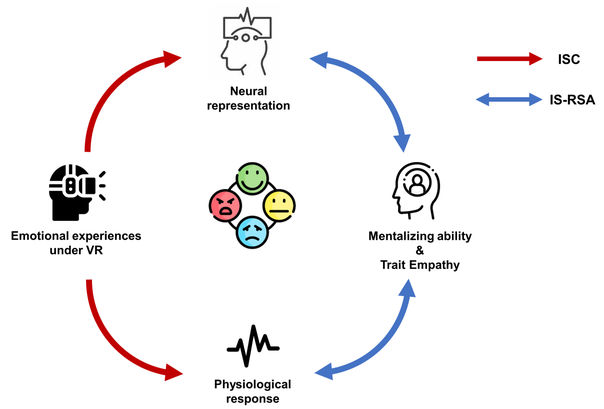
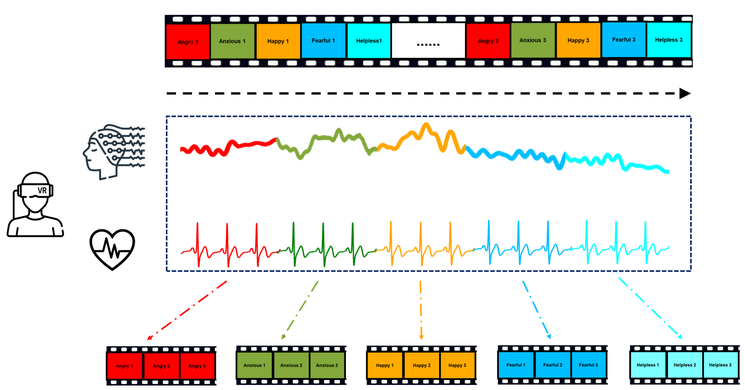
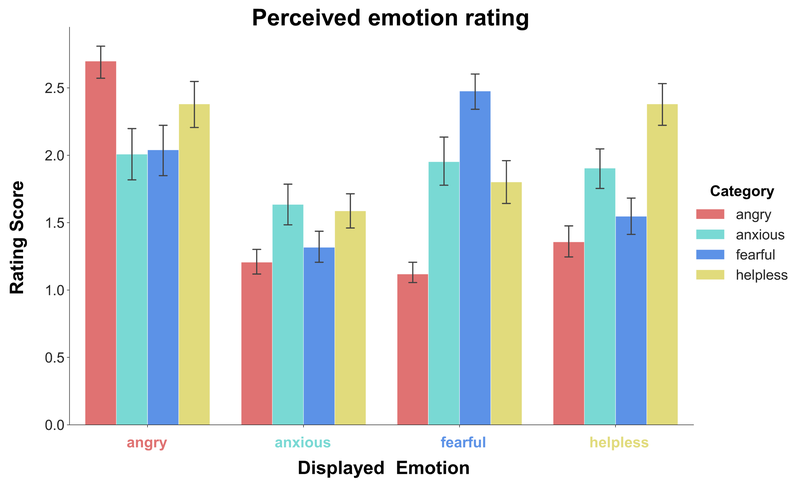


Illustration of the structure of the study

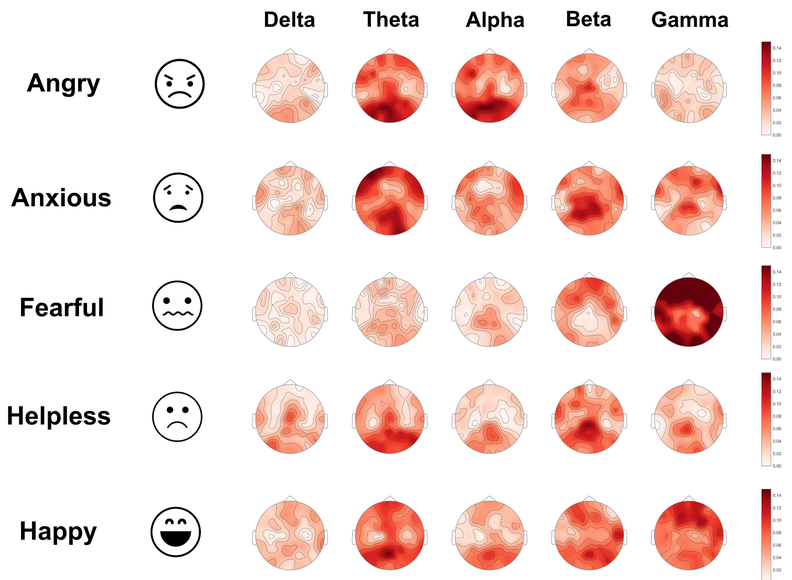


- **Paradigm:** Naturalistic viewing under virtual reality
- **Neurophysiological measures**: EEG & ECG recording
- **Analysis method:** Intersubject similarity analysis & Intersubject representational similarity analysis

RESULTS 1

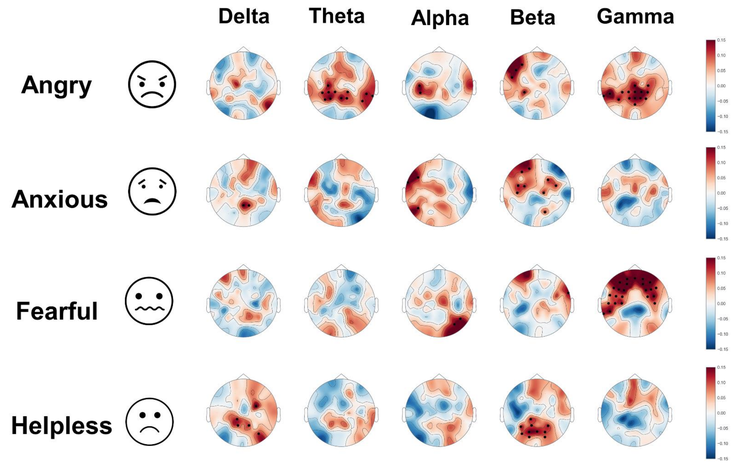


- At the behavioral level, the emotional arousal rating score were highest regarding the displayed emotion in each negative emotion condition

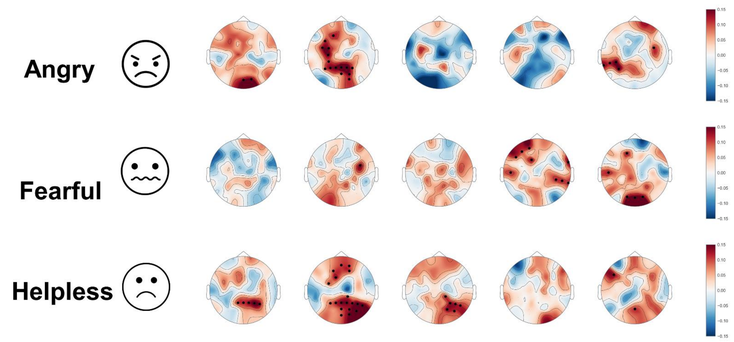


- At the neural level, the intersubject similarity topographies indicated a common representational pattern across different negative emotions
- Specifically, a prominent intersubject similarity pattern was found at both frontal and occipital region in fearful condition
- There was also intersubject similarity regards the heart rate variability across different negative emotions

RESULTS 2



IS-RSA results of neural representation & Mentalizing ability



IS-RSA results of neural representation & Trait empathy

DISCUSSION

- We found that negative emotion synchronize both EEG and ECG response and exhibited shared representation pattern
- Furthermore, it was revealed that the neurophysiological representation would capture the individual differences in mentalizing ability and trait empathy
- Our results demonstrated the involvement of sophisticated social cognition in individualized emotion processing
- These findings supports the utility of virtual reality in social cognitive affective neuroscience

Every individual makes a difference: how we perceive, understand, and represent the emotion in social settings can be modulated by how we reason and feel the mental states of others

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