Mood-congruency modifies face-sensitive N170 component in response to affective outgroup faces

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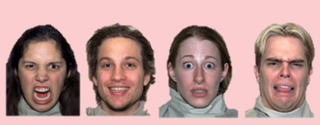
Background

- Behavioral research has shown that people are typically **better at remembering or attending to emotionally salient stimuli** vs. neutrally valenced stimuli, even if stimuli are presented very rapidly (Harris & Pashler, 2005; Kensinger & Corkin, 2003).
- **Congruency** between a participant's current emotional state and the emotional valence of presented visual stimuli **affects the processing of faces and facelike objects**
- Mood manipulation has been correlated with shifts in attention to mood congruent stimuli: studies of inattentional blindness found that participants more often reported seeing unexpected mood congruent face-like stimuli vs. mood incongruent stimuli (Becker & Leinenger, 2011)

- Emotional priming in behavioral paradigms has been shown to elicit a **faster and more accurate identification of prime-congruent faces** vs. prime-incongruent faces (Heitanen & Astikainen, 2012).
- ERP research has shown that the face-sensitive N170 component is modulated by emotional facial expressions when the processing of a face is an **implicit** part of the task (Blau, Maurer, Tottenham, & McCandliss, 2007), which **mimics real-world instances of emotion recognition**.
- **Central research question:** Are electrophysiological responses to faces modulated by mood congruency?

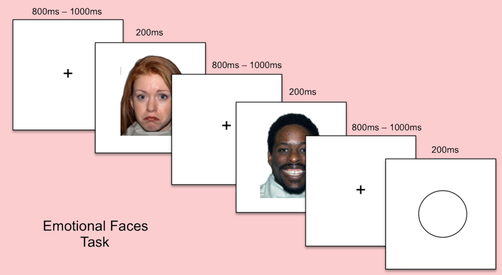
Event-Related Potentials (ERPs)

- Event-related potentials are EEGs that are timelocked to a stimulus.
  - **N170**
    - Typically a visual component
    - Most often correlated with **visual presentation of faces and objects of expertise**
    - Negative polarity that occurs **~170ms post- stimulus presentation**
    - Found maximally over right occipitotemporal cortex (fusiform gyrus)
    - Can be modulated by social and categorical information such as race, gender, and emotion (Freeman, Ambady, & Holcomb, 2010; Jacques & Rossion, 2007; Blau, et al., 2007), and is also sensitive to inversion effects



Methods

- **Participants:**
  - 10 right-handed Hampshire College undergraduates, aged 18-21
  - No family or personal history of any mood disorders, anxiety disorders, autism spectrum disorders, or epilepsy, or any personal history of traumatic brain injury or use of psychotropic medication
- **Mood Manipulation:**
  - Completed through introspective writing exercise
  - Participants asked to recall an experience that made them feel happy (sad)
    - Given 4 minutes to write down sensory details, emotions, or incomplete sentences about their chosen event, and were allowed to terminate the activity after 90 seconds if they felt that was sufficient.
    - Manipulation checks were administered before and after the writing exercise to assess the participant's mood and arousal on four seven-point Likert-type scales (unpleasant/pleasant, tired/alert, happy/sad, tense/relaxed).
- **Emotional Faces Task (ERP):**
  - All participants were shown a series of faces and were asked to press the space bar when they saw a shape (square or circle) rather than a face
  - 10 trials of 100 faces (displayed for 200ms) for a total of 1000 faces, and non-face shape distractors (circle/square, displayed for 200ms) were weighted at 15:1
  - Sets were randomized across race, gender, and facial expression, and all faces were presented multiple times



Emotional Faces Task

- **Electrophysiological Recordings (EEG):**
  - Electroencephalograms (EEGs) recorded from the scalp with 32-channel electrode cap
    - Average mastoid reference was used, and electrode impedances were kept below 5.0kΩ
    - Vertical and horizontal electrodes (VEOG and HEOG) were used to record EOGs to control for interference from eye-blinks
    - Data was segmented into 1200ms long epochs, (-200ms – 1000ms) filtered with a band pass filter (high pass = .1Hz, low pass = 100Hz, 12 dB)
    - The peak amplitude of the N170 component was identified within a time window of 170-190ms

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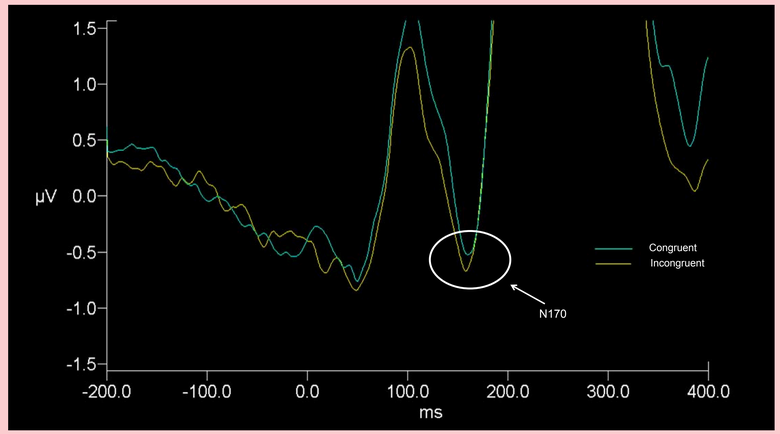
ERP Results

Presentation of mood incongruent faces elicits a larger N170 response than presentation of mood congruent faces



(negative is plotted down)

- A 2X2 (condition*congruity) repeated measures ANOVA compared **peak N170 amplitudes** at the **TP8** occipitotemporal electrode site for the congruent and incongruent conditions (p=.020).
  - **N170 is augmented for mood incongruent emotions in comparison to mood congruent emotions**
    - Results are consistent with N170 research involving processing of social outgroup faces, including cross-race faces and studies utilizing minimal group designs (Stahl, Wiese, & Schweinberger, 2008; Ratner & Amodio, 2013).
    - No significant main effects of condition (happy/sad) on N170 amplitude between subjects

Discussion and Future Directions

- Presentation of **mood incongruent faces elicited an augmented N170 response in comparison to the presentation of mood congruent faces**, displaying the importance of one's current affective state on face processing.
- Results are **consistent with research findings of other out-group modifiers** of the N170 component.
- **Emotional priming facilitates processing of others' emotional states**, and has potential to facilitate processes of and related to affective empathy.
- Future directions will further explore **affect in minimal group paradigms** in contrast to social category outgroups such as race and gender, both behaviorally and with ERPs
- Additionally, further research will more explicitly examine the role **trait empathy** plays in mood congruency as well as in the idea of **affect as a social category**

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