Emotional Vocalizations and Speech Modulate the Processing of Facial Attractiveness

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INTRODUCTION

- In daily life, humans communicate different emotions using specific vocal cues, such as vocalizations ("ugh") or speech ("He wimmered the mesty yorn.") [1].
- These emotional voices can change how the brain evaluates a face [2, 3].
- In the current study, we were interested in how emotional speech and vocalizations influence the processing of facial attractiveness.
- To do so, we used event-related potentials (ERPs) to gain insights as to how vocal context modifies neural face processing at different time points.
- We focus on two early ERP components, namely the N1 and the P2. The N1 reflects early sensory, bottom-up processing, while the P2 encodes top-down information [4].

PURPOSE

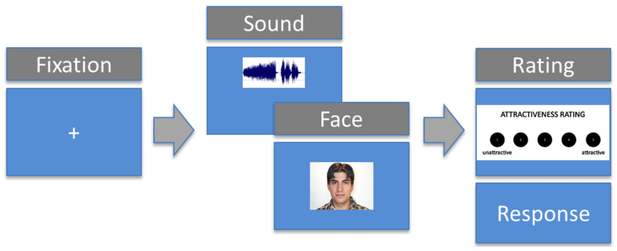
- Examine the influence of disgusting, happy, and neutral vocalizations and speech on ratings of attractiveness and age
- Use ERPs to study the time course of the socio-emotional bias.

MATERIALS & METHODS

- **Participants:** 24 young healthy adults (mean age 23, 12 female); 3 subjects were excluded for bad data quality, leaving 21 participants for further data analysis (10 female).

- **Setup:** In each experimental trial (240 trials total), subjects were presented with an auditory stimulus followed by a face 400ms later.

- **Stimuli:** The auditory stimulus varied in emotion (disgust, neutral, happy) and in voice type (speech or vocalization). Participants attended to the attractiveness or the age of the accompanying faces; age was added as a control task.



- **EEG recording:**
  - 67 active Ag/AgCl electrodes and pre-processed using EEGLab [5].
  - Sample rate: 250 Hz
  - Bandpass filter: 0.5 to 20 Hz
  - Data were epoched around the face stimulus using ERPLab [6].

- **Measurement:** Mean amplitude for N1 (70-120m) and P2 (185-235ms).

- **Statistics:** ANOVAs for voice type (speech and vocalizations) and emotion (disgust, neutral, happy) and in 5 different regions of interest (left-frontal, right-frontal, midline, left-parietal, right-parietal).

BEHAVIORAL RESULTS

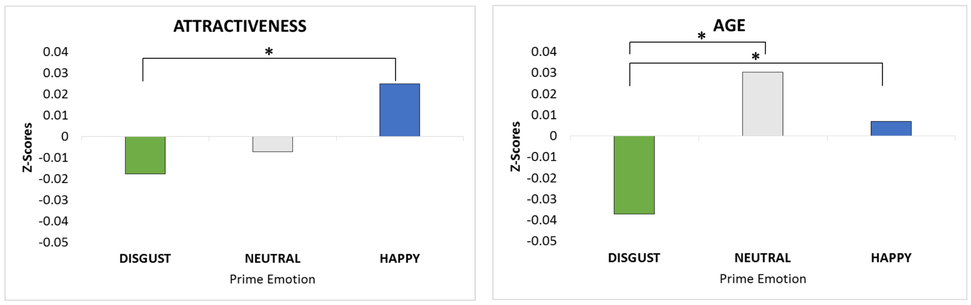


Figure 1: Rating results (z-normalized) per task and emotion.

A disgusted voice leads to lower ratings of attractiveness, and lower age judgements. Happy voices bias subjects to judge people as more attractive, while neutral voices lead them to judge people as older.

ERP RESULTS

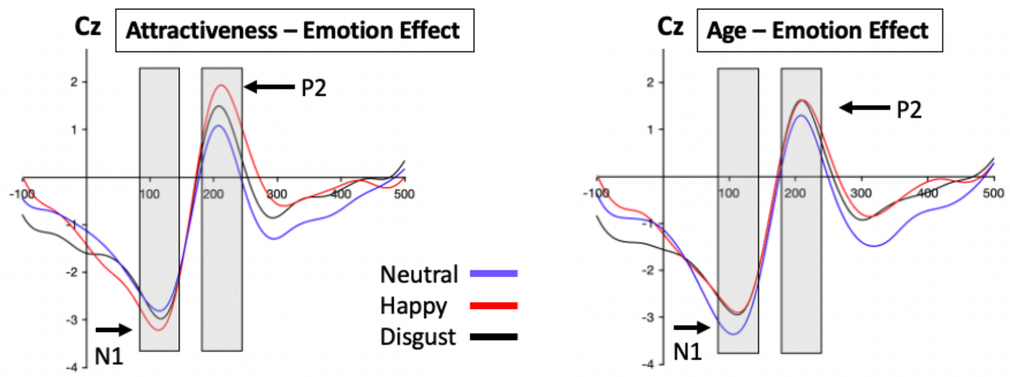


Figure 2: Emotion Effects for Attractiveness and Age, focusing on N1 and P2 for Cz electrode. Attractiveness (N1: p = .02988, P2: p<.0001). Age (N1: p<.0001, P2: p<.0001).

Modulations of both components (N1, P2) are based on the preceding vocal effects between the different emotions, They are much more pronounced in the attractiveness task. Notice that the neutral emotion line does not match near peaks with happy or disgust. Happiness seems to have a stronger effect for attractiveness.

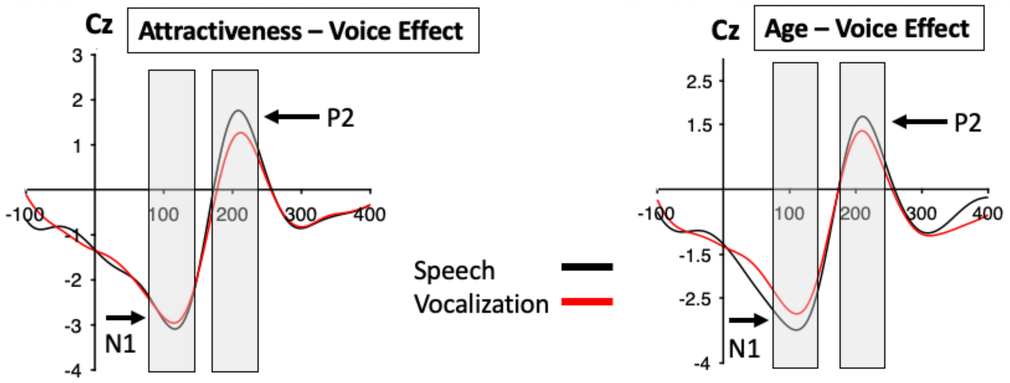


Figure 3: Voice Effects for Attractiveness and Age, focusing on N1 and P2 for Cz electrode. Attractiveness (N1: p=0.0003, P2: p<.0001). Age (N1: p=.9266, P2: p <.0001).

Modulations for P2 from both tasks (attractiveness, age). Only significance for N1 for attractiveness task, despite difference shown above. We see that speech has stronger effect on P2 for both tasks.

DISCUSSION

- The behavioral data reveal a response bias based on the vocal cue for the attractiveness task, as has been found in previous studies using different tasks [2].
- In particular, a disgusted sound led to lower attractiveness ratings, while happy sounds had the opposite effect.
- Unexpectedly, an effect of emotion was also found for the age tasks.
- The ERP results reveal modulations of the N1 and the P2 component based on the preceding vocal information.
- Effects between the different emotions are more pronounced in the attractiveness task. We assume that this result is based on the social nature of the task, and that the vocal cues can be interpreted as social commentary.
- Between the different vocal cues, vocalization modulated the N1 more profoundly while speech seemed to affect the P2 more. We believe this to be due to the primitive and less complex nature of the vocalizations affecting the bottom-up processing during the N1. Additionally, the P2 could be more easily modulated by the more complex top-down processing of Speech.
- Previous findings show how less attractive faces by itself elicit greater disgust and negative affect than more attractive faces [7]. It is possible that our results are mediated in part by congruency effects between the affect elicited by the auditory prime and the affect elicited by the face.
- Future studies will explore the effects of individual variables such as age or community of practice.

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