

INTRODUCTION

It has been commonly understood that certain emotional expressions have biological origins. In the 1960s, Paul Ekman verified six universally recognisable expressions: happiness, sadness, fear, anger, disgust, and surprise. More recent research by Jack and colleagues (2014) has challenged this basic emotion model. The authors proposed that early in the signalling stream, dynamic facial expressions transmit fewer action units that correspond with only four basic emotion categories, as the signals evolve from few biologically basic to more complex and socially specific. Due to early confusions between emotions, the authors concluded that early face signals enable the discrimination of only four emotion categories: Happy, Sad, Fear/Surprise, and Disgust/Anger. Previous research, however, has stressed the importance of multisensory integration when processing affective stimuli. This account was premised on a univariate investigation of a singular modality - facial expressions - though, in the natural world communication is temporal and multimodal.

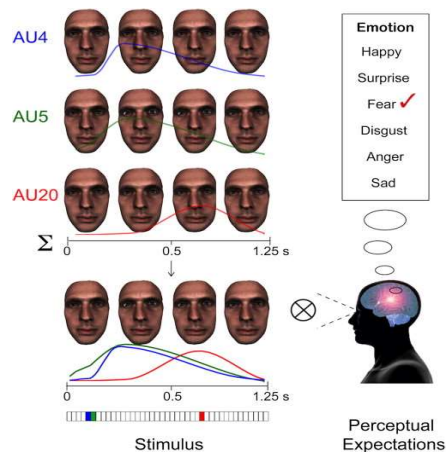


Figure 1 (Source: Jack et al., 2014)
In this seminal work by Jack and colleagues (2014), participants categorised 2,400 random facial animations according to six emotions. On each trial, a computer graphics platform randomly generated a 3D facial animation from a total of 41 a subset of action units and values determining their temporal parameters (represented in the above as colour-coded curves). The action units combined to produce a 3D animation. The present study used stimuli from real actors modelling their expressions on action units.

OBJECTIVES

To measure the notion that early availability of diagnostic information supports only four basic emotions categories, we will conduct an experiment to identify how easily participants can perceive expressions in the early stages of emotional transmission. If this proposition is valid, then we should expect to see the same results across different means of affective communication, audio and visual. This research will extend the research conducted by Jack et al (2014), by introducing multiple modalities, facial expressions and vocal utterances.

HYPOTHESIS

Based upon Jack et al's (2014) previous results, systematic early confusion should occur between specific emotion categories, reflecting that early emotional signals enable discrimination of only 4 emotion categories: 1. Happy, 2. Sad, 3. Fear/Surprise, 4. Disgust/Anger. If theoretically valid, this should remain consistent among different and integrated modalities.

MATERIALS AND METHODS

Experiment 1

Using a within-subjects design, participants will listen to audio stimuli from the Montreal Affective Voices database depicting 6 emotions: happy, sad, fear, surprise, disgust, and anger. All MP4s are clipped to various lengths to contain early and late emotional signalling: from the onset of expression to 100ms, 200ms, 300ms, and 400ms (see figure 2). Following each clip, participants will select on a computer keyboard which emotion they believe the audio is portraying.

Experiment 2

The Amsterdam Dynamic Facial Expression Set (ADFES) will be used for affective facial expression stimuli in this experiment. Using a within-subjects design, participants will be presented with visual stimuli depicting 6 emotions: happy, sad, fear, surprise, disgust, and anger. All movies are clipped to varying lengths: 50ms, 100ms, 150ms, and full (clipped at apex; see figure 3). Each video will also start with 100ms of neutral expression. Each experimental group will be played one length of all videos, with a small window of time after each clip to select which emotion is being conveyed.

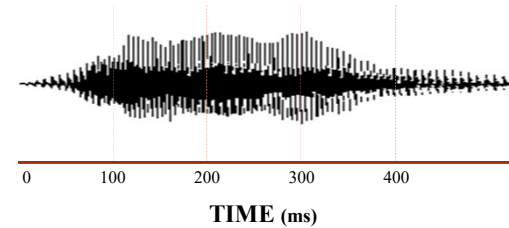


Figure 2.
Experiment 1 MP4 of anger expression – Actor 42 from Montreal Affective Voice database clipped at 4 lengths (depicted by red lines).

EXPECTED RESULTS

Based on previous research, it is expected that participants will perform best (identify the correct emotion from the clip) in the happy and sad trials in the audio and visual trials respectively, as these emotions are not thought to be confused with any of the other basic emotion categories. Participants are expected to perform with the least accuracy in the fear, surprise, disgust, and anger trials – especially in the shortened clips that contain fewer emotional signals. In future experiments, multimodal trials (audio-visual) should also retain a higher accuracy, as speech should facilitate the discrimination of emotional content from facial expression stimuli. Future explorations of multi-modal integration may include body language and posture as additional emotional modalities.

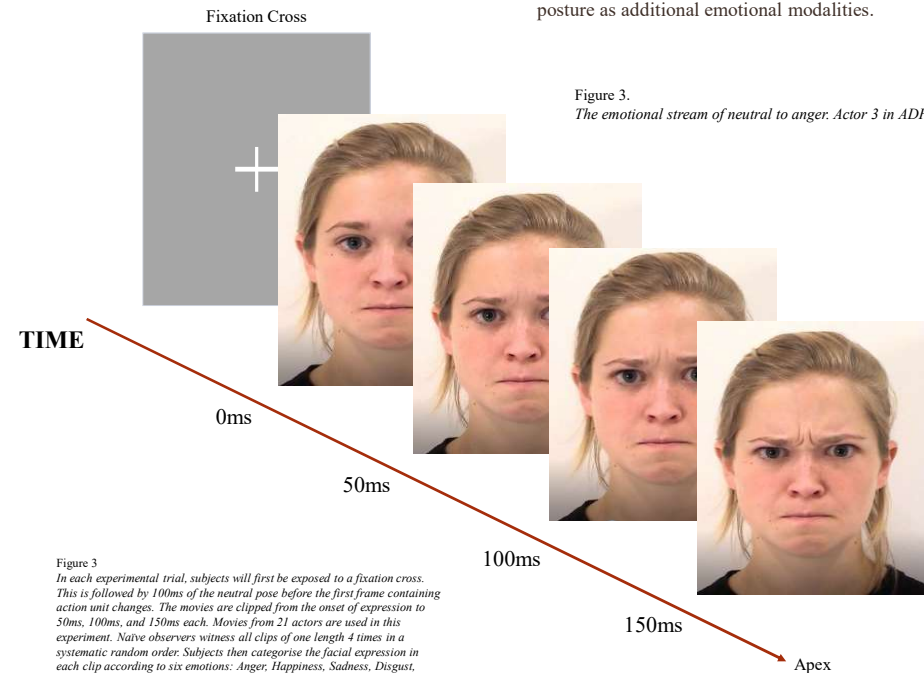


Figure 3.
The emotional stream of neutral to anger. Actor 3 in ADFES

Figure 3
In each experimental trial, subjects will first be exposed to a fixation cross. This is followed by 100ms of the neutral pose before the first frame containing action unit changes. The movies are clipped from the onset of expression to 50ms, 100ms, and 150ms each. Movies from 21 actors are used in this experiment. Native observers witness all clips of one length 4 times in a systematic random order. Subjects then categorise the facial expression in each clip according to six emotions: Anger, Happiness, Sadness, Disgust, Surprise, and Fear.

References

- Belin, P, Fillion-Bilodeau, S, & Gosselin, F. (2008). The Montreal Affective Voices: A validated set of nonverbal affective bursts for research on auditory affective processing. *Behavior Research Methods*, 531-9.
- Jack, R, Garrod, O, & Schyns, P. (2014). Dynamic Facial Expressions of Emotion Transmit an Evolving Hierarchy of Signals over Time. *Current Biology*, 187-192.
- Wingenbach TSH, Ashwin C, Brosnan M (2016) Validation of the Amsterdam Dynamic Facial Expression Set – Bath Intensity Variations (ADFES-BIV): A Set of Videos Expressing Low, Intermediate, and High Intensity Emotions. *PLOS ONE* 11(12)