Differences in Psychophysiologic Reactivity while Viewing Static vs. Dynamic Facial Affect

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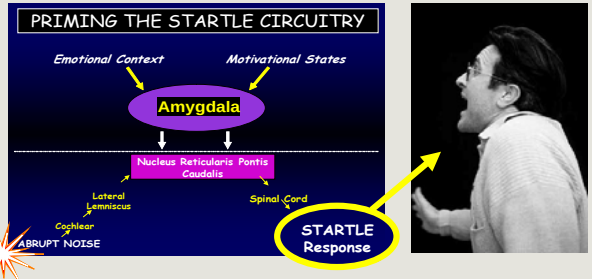
Background

• Many recent studies provide evidence that biased or impaired facial expression processing underlies many neurological and psychiatric disorders. These studies have typically used photographic stimuli, yet cognitive and neurobiological research suggests that the perception of moving (dynamic) expressions is distinct from static face perception. It is unclear, however, as to whether a distinction can be made in how facial affect is processed statically versus dynamically at a *physiological* level.

The Startle Reflex & Emotional Priming

• The **startle reflex** is an automatic withdrawal response to a sudden, intense stimulus (e.g., a flash of light or loud noise). In humans, the most reliable component of the startle response is the reflexive eyeblink. Numerous studies have shown that startle eyeblinks are larger during negative emotional states such as fear and anxiety. These potentiated responses presumably reflect the amygdala's role in danger detection and priming of subcortical circuitry. The amygdala also has strong reciprocal projections to cortical and neocortical areas that underlie the processing of emotion-related semantic knowledge during normal perception.



• The **skin conductance response** (palms) is an index of sympathetic arousal and is relatively independent of emotional valence.

Objectives of the Present Study

• We sought to elucidate differences in physiological reactivity (i.e., startle reflex, skin conductance response) between (a) perception of static vs. dynamic facial expressions, and (b) anger, fear, neutral, and happy facial expressions.

Hypothesis: viewing *dynamic*, or moving, faces will be associated with greater physiological reactivity due to better emotion recognition.

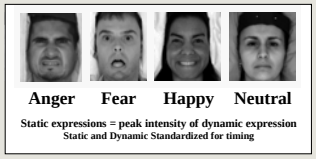
Participants

• **40 college students** (20 male) from the University of Florida

• **Exclusion criteria**: any neurological trauma, current use of medication for mood/anxiety, scores outside the normal range on clinical measures of depression (Beck Depression Inventory 2) or anxiety (State-Trait Anxiety Inventory).

Methods & Procedures

Static and Dynamic Faces: Two Novel Batteries

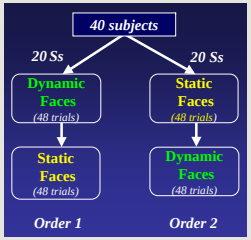


4 Emotions X 12 Actors
- *anger, fear, happy, neutral*

= 96 Stimuli / Subject
- *48 static faces (pictures)*
- *48 dynamic faces (movies)*
- *> 80% recognition for stimuli*

Overview

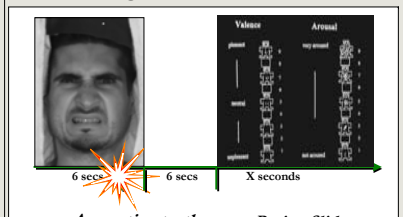
Psychophysiologic data were collected while subjects viewed 2 sequences of faces, 1 of static stimuli (48), and the other of dynamic (48). Participants were assigned randomly to *Order 1* or *Order 2* (see right). Individual slides were presented in pseudorandom order.

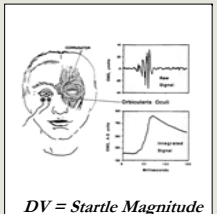


Startle Eyeblink Task

For each trial, a single face was shown for 6 seconds, during which time a 95 db white noise burst was delivered via headphones to elicit a startle eyeblink. The magnitude of the startle response (EMG peak - baseline) was recorded for each eye via electrodes over the orbicularis oculi muscles; these signals were amplified (gain = 30,000) and integrated (10 ms time constant). All measures were obtained on a trial-by-trial basis.

SAMPLE TRIAL

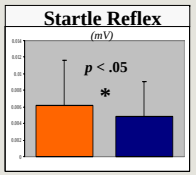


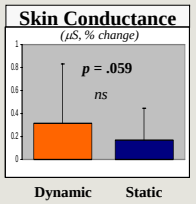


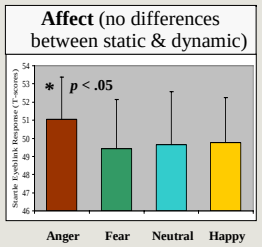
Results

In order to compare startle responses across the 4 different emotion conditions, the startle magnitude for each trial was first converted to **T-scores** (X=50, SD=10) for each participant to minimize between-subject variability. The data were analyzed using a ***Viewing Mode*** (Dynamic, Static) X ***Affect*** (A, F, N, H) x ***Order*** (1, 2) repeated-measures ANOVA, with Bonferroni-corrected post-hoc comparisons.

Psychophysiological Reactivity







1. The startle reflex was significantly greater ($p<.05$) for **dynamic** (vs. static) faces, but there was only a trend for skin conductance.
2. The startle reflex was also greater for **angry** expressions vs. fearful, neutral, and happy ones, regardless of display mode, corresponding with results from a previous study (Bowers et al., 2002).

Self Report

• Valence ratings indicated that **anger was viewed as more negative** than fear, although arousal ratings did not differ across emotional expression categories.

Conclusions

• Young adults experience greater psychophysiological reactivity to moving versus nonmoving emotional facial expressions, as measured by the magnitude of the startle reflex. There was a trend ($p = .059$) for skin conductance. Greater reactivity to moving faces is ostensibly mediated through greater extraction of visual affective information (e.g., 3-D facial contours, temporal dynamics of facial musculature).

• Angry expressions induced higher startle responses relative to other expressions, including fear. Angry expressions, vs. fearful ones, represent personally directed threat and induce a greater motivational propensity for action, either via confronting the source of aggression or via withdrawal / escape. These findings highlight the influence of initial social stimulus processing (i.e., expressions of fear or anger) on motivated behavior.

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