



# Do You Feel Like We Do?: Development and Testing of an Objective Measure of Empathic Emotional Responding



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## Abstract

- ❖ This study sought to develop an objective measure of empathy
- ❖ Brief films depicting individuals having an emotional experience were selected and validated on a sample of undergraduates
- ❖ Corrugator and zygomatic EMG activity, acoustic startle reflex, and self-reported emotion were measured during emotional film viewing in another sample of undergraduates
- ❖ Results suggest these films are effective for eliciting physiological responses consistent with happy and sad emotion
- ❖ Results suggest that this task is a promising approach for eliciting and measuring empathy

## Introduction

### What is empathy?

- ❖ Empathy is the understanding and sharing of another's emotional state or condition
- ❖ It is comprised of two separate, but linked components: perspective-taking and affective response

### Why objectively measure empathy?

- ❖ Current measures are self-report and thus, subject to demand characteristics
- ❖ An objective measure removes the possibility of social desirability responding, which is particularly problematic in criminal justice samples
  - ❖ Accurate measures of empathy are needed in these populations for assessment, treatment, and research purposes
- ❖ The current study employs a multi-measure approach to assess state and trait levels of empathic responding using both self-report and psychophysiological indicators

## Method

### Stimuli Selection

- ❖ 100 undergraduates rated short digital films from the gettyimages® database which depict individuals experiencing discretely happy, sad, or neutral events
  - ❖ Participants rated each film on 5 discrete emotions (happiness, sadness, anger, confusion, and fear) on a 0 (not at all) to 8 (extremely) point scale
- ❖ The 10 films in each category rated most consistently with the intended emotion were chosen as the empathy-inducing stimuli for the psychophysiological study

### Stimuli Attributes

- ❖ Films are silent and range from 4 to 20 sec in length
- ❖ Characters are diverse with respect to age and ethnicity

Rating →	Happiness		Sadness		Other <sup>*</sup>	
Film ↓	Mean	SD	Mean	SD	Mean	SD
Happy	5.44	2.15	0.37	1.13	0.36	0.84
Neutral	0.73	1.41	0.77	1.49	1.31	1.35
Sad	0.31	1.09	5.15	2.31	2.02	1.96

**Table 1.** Emotion ratings for selected films, on a 0-8 scale  
<sup>\*</sup> Combined average for anger, fear, and confusion ratings

## Method (cont.)

### Sample Stimuli

Snapshots from a Happy film



Snapshots from a Sad film



### Measuring the Psychophysiology of Empathy

#### Subjects

- ❖ Undergraduate students (n=32) recruited from an introductory psychology course based on trait empathy scores
  - ❖ Top and bottom 10% on the Interpersonal Reactivity Index (IRI; Davis, 1983)

#### Procedure

- ❖ Participants viewed happy, neutral and sad films in randomized order while corrugator, zygomatic, and obicularis oculi EMG activity were continuously sampled
- ❖ Random 50 msec bursts of 95 dB white noise with instantaneous rise time were delivered binaurally during films
- ❖ Participants rated each film on valence and arousal using the Self-Assessment Manikin (SAM; Lang, 1980)
  - ❖ Ratings were given for each participant's emotion, as well as the emotion of the individual(s) in the film to assess perspective-taking abilities

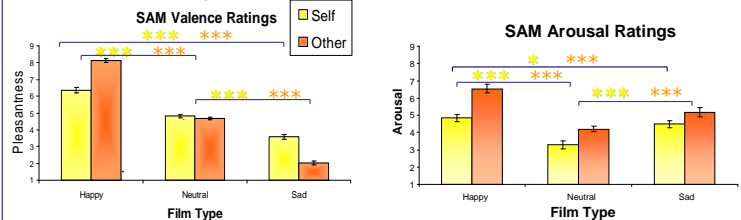
#### Data Processing

- ❖ All EMG signals were high-pass filtered at 12 Hz, rectified, and epoched locked to film times corresponding to peak emotion in pilot testing.
- ❖ Corrugator and zygomatic signals were averaged over the epoch, then these averages were ln-transformed and standardized within-subject. Each standard score was averaged according to valence to yield a score for happy, neutral, and sad films.
- ❖ The filtered-rectified obicularis signals were smoothed with a 40 Hz low-pass filter. Valid startles were identified if the maximum value in the 30-180 msec post-probe window was greater than the mean plus 2 SD of activity in the 50 msec pre-startle window. All valid startle peaks were then ln-transformed and standardized within-subject, and finally averaged across films of each valence.

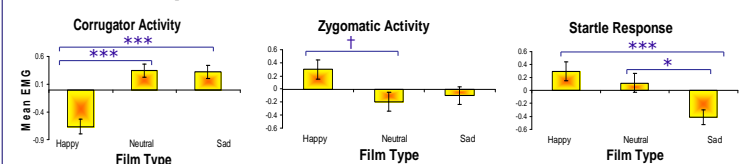
## Results

### Effects of Film Valence

#### Emotion Ratings (Mean ± Std. Error)



#### EMG Activity (Mean ± Std. Error)

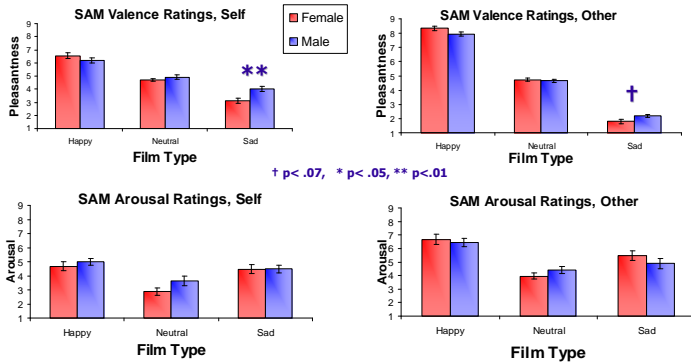


## Results (cont.)

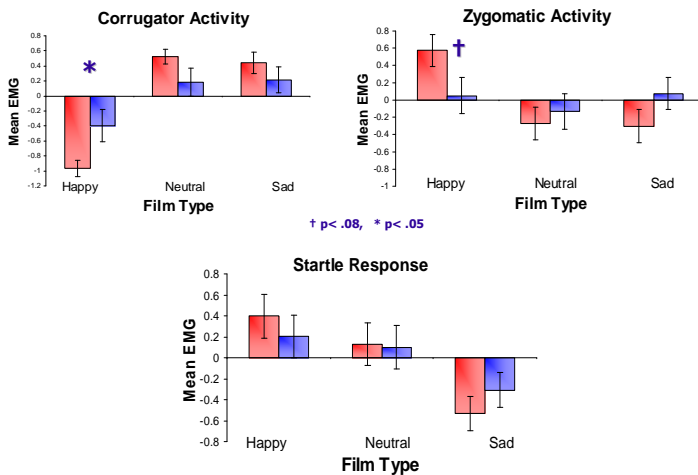
### Gender Differences

- ❖ Females (n=15) scored significantly higher on the IRI than males (n=17),  $F(1,30)=9.01$ ,  $p<.005$ , indicating higher reported levels of trait empathy

### ❖ Emotion Ratings (Mean ± Std. Error)



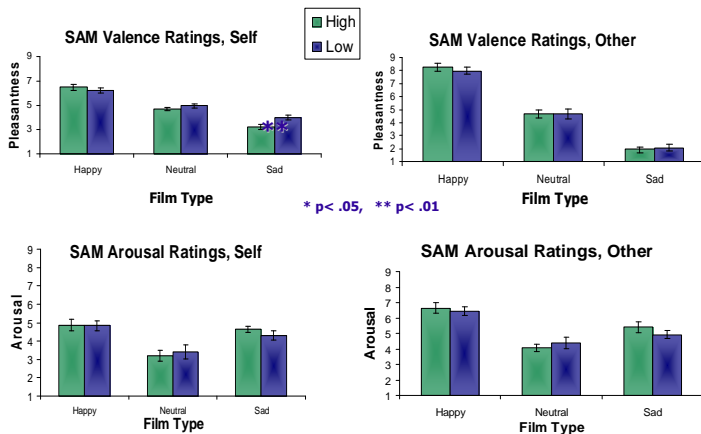
### ❖ Facial EMG (Mean ± Std. Error)



### Empathy Group Differences

- ❖ The high empathy group (n=17) is comprised of males and females who scored in the top 10% for their sex on the IRI (mean=85.1, SD=6.7)
- ❖ The low empathy group (n=15) is comprised of males and females who scored in the bottom 10% for their sex on the IRI (mean=40.2, SD=7.7)
- ❖ There are no differences in gender distribution across empathy groups ( $\chi^2=.54$ , ns)

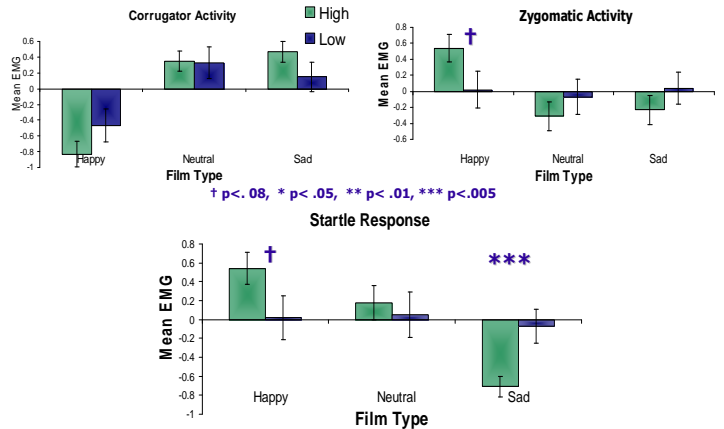
### ❖ Emotion Ratings



## Results (cont.)

### Empathy Group Differences (cont.)

### ❖ Facial EMG (Mean ± Std. Error)



## Discussion

- ❖ Preliminary results suggest these films are effective for eliciting happy and sad emotion, as represented by:
  - ❖ SAM ratings consistent with film valence
  - ❖ Increased corrugator EMG activity to sad films
  - ❖ Increased zygomatic and decreased corrugator EMG to happy films
  - ❖ Modulation of the acoustic startle reflex
    - ❖ Sad films elicit attenuated startle responses compared to happy and neutral films. This differs from startle responses to other unpleasant but threatening stimuli.
    - ❖ Arousal effects cannot account for the finding, given that sad films have an attenuated effect compared to both neutral (less arousing) and happy (more arousing) films.
    - ❖ We thus propose the attenuated startle to sad films may represent an approach tendency toward the sad individual, suggesting an empathic or helping response.
- ❖ Gender differences in behavioral ratings and facial EMG are consistent with the literature
  - ❖ Females report experiencing more emotion and exhibit greater facial muscle reactivity to the emotional films
- ❖ Although differences in reported trait empathy were not associated with differences in reported state empathy, they were associated with differential psychophysiological responses
  - ❖ High empathy individuals showed:
    - ❖ Increased facial muscle reactivity to emotional films
    - ❖ Greater startle modulation to emotional films
- ❖ Overall, these results suggest the promise of this approach for eliciting and measuring empathy
  - ❖ Recruitment is ongoing and inclusion of additional participants is necessary to corroborate the findings and more fully explore individual differences

## References

- Davis, M. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44, 113-126.
- Lang, P.J. (1980). Behavioral treatment and bio-behavioral assessment: Computer applications. In J.B. Sidowski, J.H. Johnson, & T.A. Williams (Eds.), *Technology in mental health care delivery systems* (pp. 119-137). Norwood, NJ: Ablex Publishing.

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Handouts available: [www.psychofizz.org](http://www.psychofizz.org)