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 psychophysiologic 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

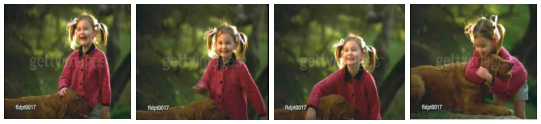
Rating →	Happiness		Sadness		Other*	
Film ↓	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Happy	**5.44**	2.15	**0.37**	1.13	**0.36**	0.84
Neutral	**0.73**	1.41	**0.77**	1.49	**1.31**	1.35
Sad	**0.31**	1.09	**5.15**	2.31	**2.02**	1.96

Table 1. Emotion ratings for selected films, on a 0-8 scale
** 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.

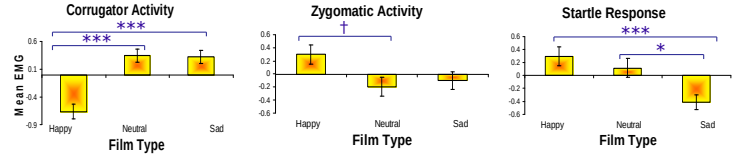
Results

Effects of Film Valence

- **Emotion Ratings** (Mean ± Std. Error)

* p< .05, ** p< .01, *** p<.005
Significance across valences is represented in yellow for 'self' ratings and orange for 'other' ratings

- **EMG Activity** (Mean ± Std. Error)



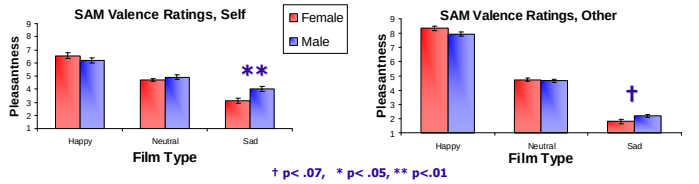
† p< .06, * p< .05, ** p< .01, *** p<.005

Results (cont.)

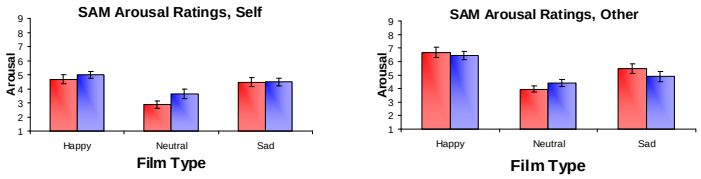
Gender Differences

- 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

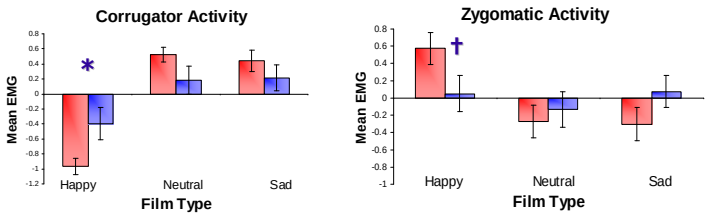
- **Emotion Ratings** (Mean ± Std. Error)



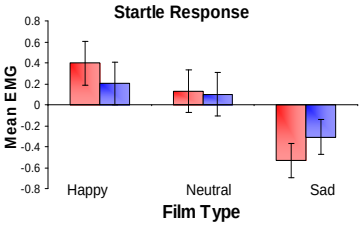
† p< .07, * p< .05, ** p<.01



- **Facial EMG** (Mean ± Std. Error)



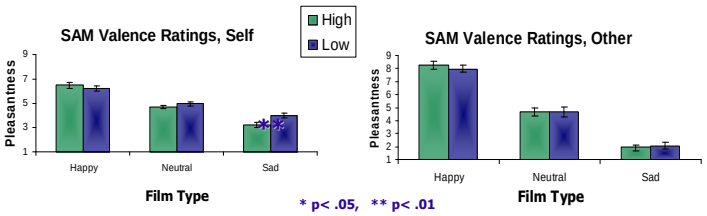
† p< .08, * p< .05



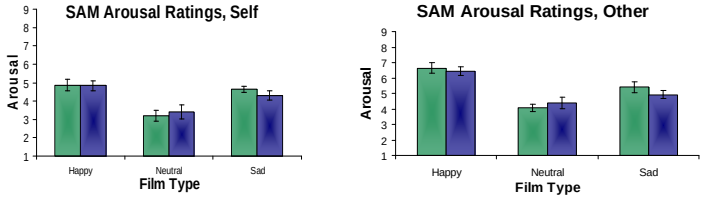
Empathy Group Differences

- 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 ($X^2=.54$, ns)

- **Emotion Ratings**



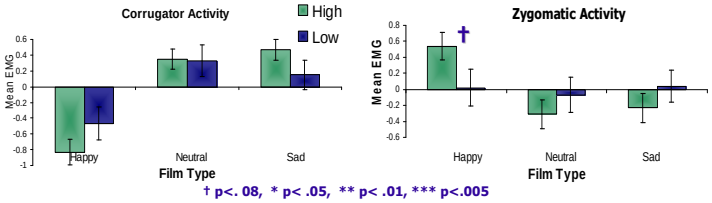
* p< .05, ** p< .01



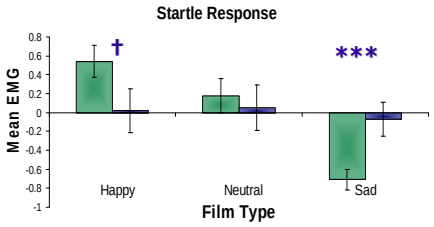
Results (cont.)

Empathy Group Differences (cont.)

- **Facial EMG** (Mean ± Std. Error)



† p<. 08, * p< .05, ** p< .01, *** p<.005



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