Emotional Faces and Cognition: The Effects of Ekman's Emotional Expressions on Memory

Leyla Tarhan & Deborah Burke
Pomona College

Introduction

In the late 19th century, William James proposed that emotional physiology – a pounding heart, accelerated respiration, sweating palms, etc. – prompted the conscious experience of emotion. Building off of this tradition, Ekman (e.g.1992) reasoned that facial expression, as a part of emotional physiology, also plays a role in the experience of emotion. Whereas the majority of studies examining facial expression concentrate on the existence of a physiological response following a facial manipulation, others have investigated the cognitive effects of emotional expression. For example, Mori and Mori (2010) found an effect of facial expression on participants' ratings of neutral Tibetan characters. The current study continues the investigation of facial expression's effect on cognition by testing for Mood Congruent Memory (MCM). According to MCM, memory for mood-congruent items is enhanced over that for incongruent items (e.g. Vuoskoski and Eerola (2012)). We predicted that inducing a mood using Ekman's Directed Facial Action Task (DFAT) would allow MCM in recall of emotional pictures.

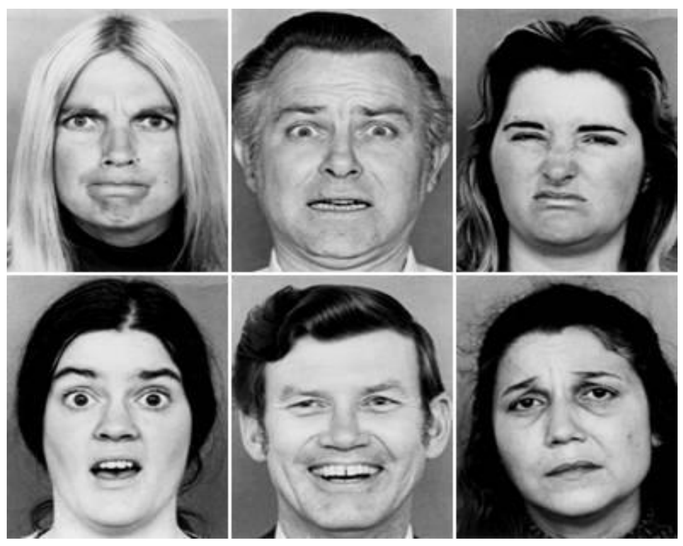
Method

Participants

38 Claremont Colleges students (mean age = 20.1; 27 F, 11 M). Galvanic Skin Response (GSR) was recorded for 21 participants.

Materials

Participants followed instructions for moving their face into one of Ekman's model expressions for "happy" or "sad" (sample: "Raise the inner corners of your eyebrows and pull them up and together in the center of your forehead. Pull the corners of your lips down and squint slightly" (sad)). GSR was recorded while they held a neutral face and the emotional one.



They then reported whether they felt any emotions while holding the face, and rated their intensity and pleasantness.

9 neutral, positive and negative images from the International Affective Picture System were presented at a rate of one per 1.5 seconds, and were later tested for free recall.

Positive

Neutral

Negative

After recall, participants completed a distracter task and then repeated the procedure for the other emotion.
Participants also completed mood-rating surveys before and after DFAT

Results

Galvanic Skin Response was calculated by finding the change between GSR recorded while participants held a neutral face and while they held the happy or sad face.

Reported change in mood rating correlated with change in GSR in the happy condition at a nearly-significant level, $r=0.32$ ($p=0.08$). Quality of facial expression correlated positively with reported change in mood rating for the sad condition, $r=0.48$ ($p<0.05$). Reported change in mood rating correlated positively with the difference between recall for mood-congruent and mood-incongruent items in the sad condition, $r=0.275$ ($p<0.05$) (see Table 1 for mean recall rates).

Table 1
Mean Recall Rates by Emotion and Picture Type[1,2]

Emotion	Happy			Sad		
Pic. Type	Neutral	Positive	Negative	Neutral	Positive	Negative
	0.27	0.49	0.57	0.30	0.47	0.58

[1] Calculated as a proportion of the total presented images in a given emotional category [2] N=38

In a 2 x 2 (emotion x picture type) ANOVA there was a significant main effect of picture type ($F(2, 37) = 46.077$, $p <0.001$). All correlations between change in GSR and difference in recall for mood-congruent and mood-incongruent items were insignificant ($r=-0.07$ for sad condition, $r=-0.04$ for happy condition, p=n.s.).

A 2x2 (sex x emotion) ANOVA was conducted to determine whether either sex or emotional condition had an effect on GSR response, but was not significant.

Conclusion

The data show no relationship between physiological response (GSR) and cognitive effects (mood-congruent memory). The data further failed to replicate Levenson, et al. (1990)'s finding of emotion-specific Autonomic Nervous System activity.

The Mood-Congruent Memory effect was confirmed in the sad condition by the positive correlation between reported emotional change and difference between recall for mood-congruent and –incongruent items.

The data imply that a more accurately emotional sad face will prompt a greater conscious experience of sadness.

Reported "happy" emotional change correlated positively with GSR response at a nearly-significant level ($p=0.08$). Although the causality of this relationship is not clear, this indicates that a greater conscious emotional response co-occurs with a greater physiological response.

References

Bower, G.H. (1981). Mood and memory. *American Psychologist, 36*, 129-148
Levenson, R. W., Carstensen, L.L., Friesen, W. V, & Ekman, P., (1991). Emotion, Physiology, and Expression in Old Age. *Psychology and Aging, 6* (1), 28-35.
Levenson, R. W., Ekman, P., & Friesen, W. V., (1990). Voluntary Facial Action Generates Emotion-Specific Autonomic Nervous System Activity. *Psychophysiology, 27* (4), 363- 384.
Vuoskosi, J.K. & Eerola, T., (2012). Can Sad Music Really Make You Sad? Indirect Measures of Affective States Induced by Music and Autobiographical Memories. *Psychology of Aesthetics, Creativity, and the Arts,* 1-10.

Acknowledgements

I would like to sincerely thank Debby Burke for the advice and wisdom she offered in designing and executing this study. In addition, Liz Graham provided essential advice concerning the statistical analyses. Professors Jessica Borelli and Pat Smiley also generously allowed me to borrow time in their lab, in order to use their physiological equipment. Jes Snavely patiently guided me through the physiological design and setup. And finally, I'd like to thank Sasha Winkler and Evan Zahniser, both for letting me steal their word searches to use as a distracter task, and for making this summer's work full of laughter and tea parties.