Memory Processing of Emotional Faces

Jared Datzman & Robert J. Polewan
Department of Psychology
Stephen F. Austin State University

Introduction

Past esearch has shown that people remember human faces better than animal faces or other objects, but do humans remember Emotional faces better than Neutral faces? While it is known that activity in the fusiform gyrus is linked with our ability to remember people's faces better than other visual stimuli (Gauthier et al., 2000), it is unknown if there is a link between emotional faces and an improved memory of that face. It is also unknown whether Emotional faces take longer to process than Neutral face, since there is more information, not only the face but the emotion that person is feeling as well, it is certainly likely that this is the case.

Evolutionarily it would make sense that people would be able to process Emotional faces more efficiently since a person's face is hardly ever static and associating people with certain emotions, particularly fear or disgust, could be quite adaptive. It was hypothesized that participants would have a higher percent correct when identifying old faces vs. new and that the emotional faces would have a higher percent correct than the neutral faces which would be have a higher percent correct than houses. It was further hypothesized that the participants would have a higher percent correct for happy faces than for disgusted faces

Methods

Participants (*N*=162) were recruited from Stephen F. Austin State University and from Tehran & Qom, Iran (N= 34). Each participant was shown 60 grey-scale images (20 per face type) of houses, human faces with a Neutral expression, and human faces showing either happy or disgust for 50 milliseconds. All images were shown twice (120 trials), so that a "New" face was a face that had not previously seen, whereas an "Old" face was a face that had been previously seen. After each image participants were asked if the image was new or old and they chose accordingly by using a computer mouse to click on boxes labeled "New" and "Old." The dependent variables were the percentage correct on the memory task and the latency of their response on the memory task.

Figure 1: Images shown in the program. (Kanade, Cohn, & Tian, 2000; Lucey et al., 2010)

Results

2.

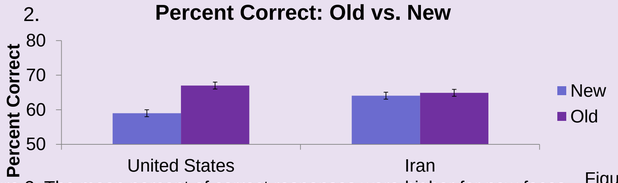

Figure 2: The mean percent of correct responses were higher for new faces. This was not seen in the Iranian data.

3.

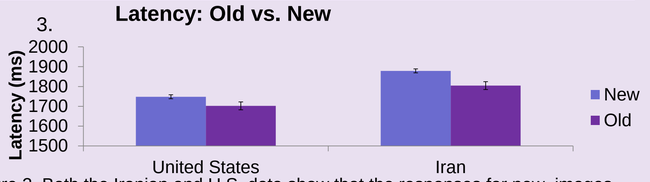

Figure 3. Both the Iranian and U.S. data show that the responses for new images was slower than for old images.

4.

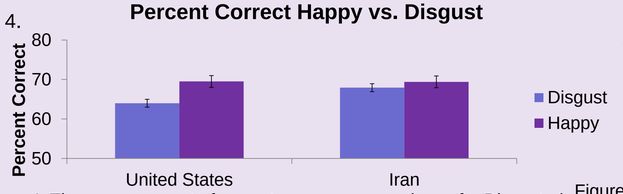

Figure 4: The mean percent of correct responses were lower for Disgusted faces than for Happy faces but not significantly.

5.

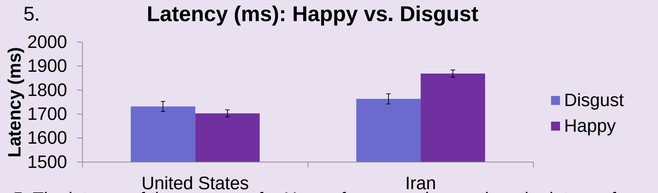

Figure 5: The latency of the response for Happy faces was longer than the latency for Disgusted faces in the U.S data (though not significantly). The opposite was seen in the Iranian data.

6.

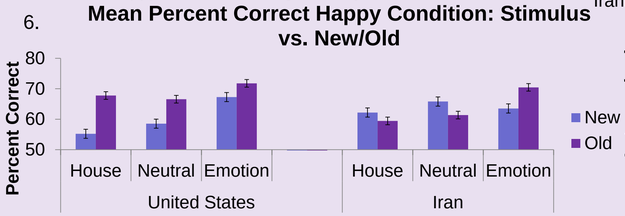

Figure 6: In the U.S. and Iran the emotional faces were identified best followed by neutral faces with houses having the lowest percent of images correctly identified.

7.

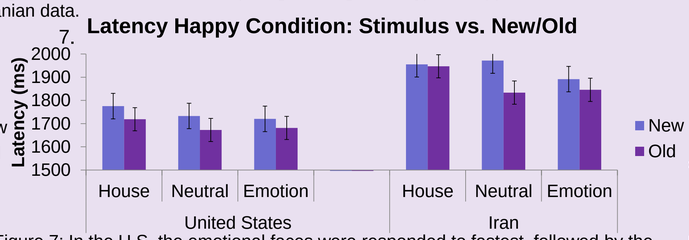

Figure 7: In the U.S. the emotional faces were responded to fastest, followed by the neutral faces with houses having the longest latency to response. In Iran a similar emotional faces were remembered faster but all response times were longer than in the U.S.

8.

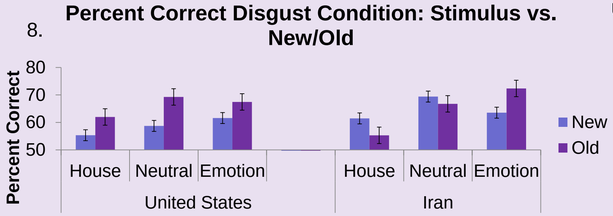

Figure 8: In both the U.S. and Iran emotional and neutral faces had a higher percent of images correctly remembered than houses.

9.

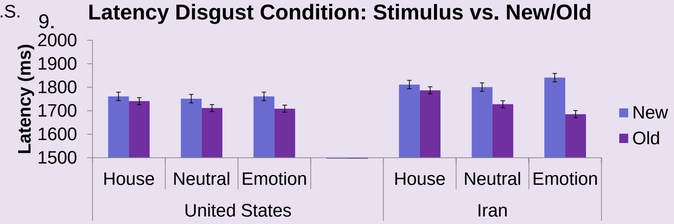

Figure 9: In both the U.S. data and Iran data, the Old human faces, and emotional faces in particular, were responded to faster.

Conclusion

- The U.S. data was analyzed using both traditional and Bayesian methods, which did not differ in their results, suggesting that:
  - Participants correctly identified images that they had seen before (Old) faster and at a higher percentage than faces they had not seen before (New).
  - Participants correctly identified emotional faces faster and at a higher percentage than neutral faces and neutral faces were recognized more accurately than houses.
  - Participants who saw happy faces correctly identified the emotional faces faster and at a higher percentage than those who saw disgusted faces.
- The data collected in Iran as analyzed traditionally suggest that:
  - Participants correctly identified emotional faces at a higher rate than neutral faces and neutral faces at a higher rate than houses.

References

Gauthier, I., Tarr, M. J., Moylan, J., Skudlarski, P., Gore, J. C., & Anderson, A. W. (2000). The fusiform "face area" is part of a network that processes faces at the individual level. *Journal of cognitive neuroscience*, *12*(3), 495-504.

Kanade, T., Cohn, J. F., & Tian, Y. (2000). Comprehensive database for facial expression analysis. Proceedings of the Fourth IEEE International Conference on Automatic Face and Gesture Recognition (FG'00), Grenoble, France, 46-53.

Lucey, P., Cohn, J. F., Kanade, T., Saragih, J., Ambadar, Z., & Matthews, I. (2010). The Extended Cohn-Kanade Dataset (CK+): A complete expression dataset for action unit and emotion-specified expression. Proceedings of the Third International Workshop on CVPR for Human Communicative Behavior Analysis (CVPR4HB 2010), San Francisco, USA, 94-101.

Contact Information

Jared Datzman: Jareddatz@gmail.com
Robert Polewan: polewanrj@sfasu.edu
Lab website: bcnlab.weebly.com