

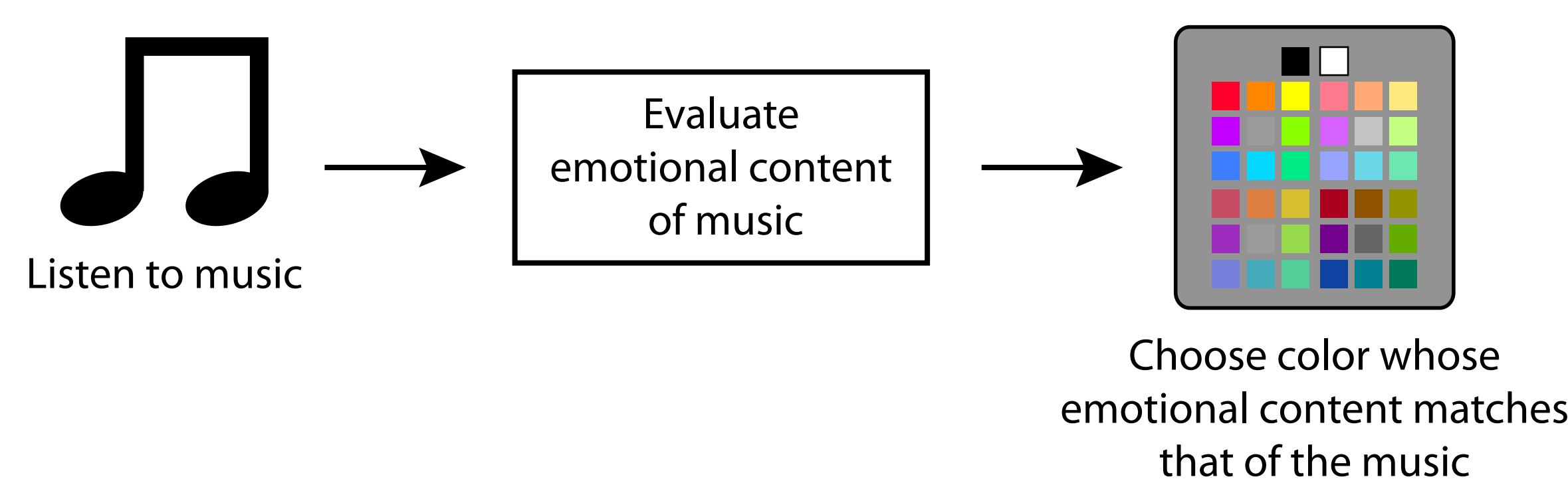
The Color of Faces

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Background

The Emotional Mediation Hypothesis relating color to music:

There is a systematic relation between music and colors that is mediated by emotional associations in both domains (Schloss, Lawler & Palmer, VSS-08)



Evidence for the Emotional Mediation Hypothesis:

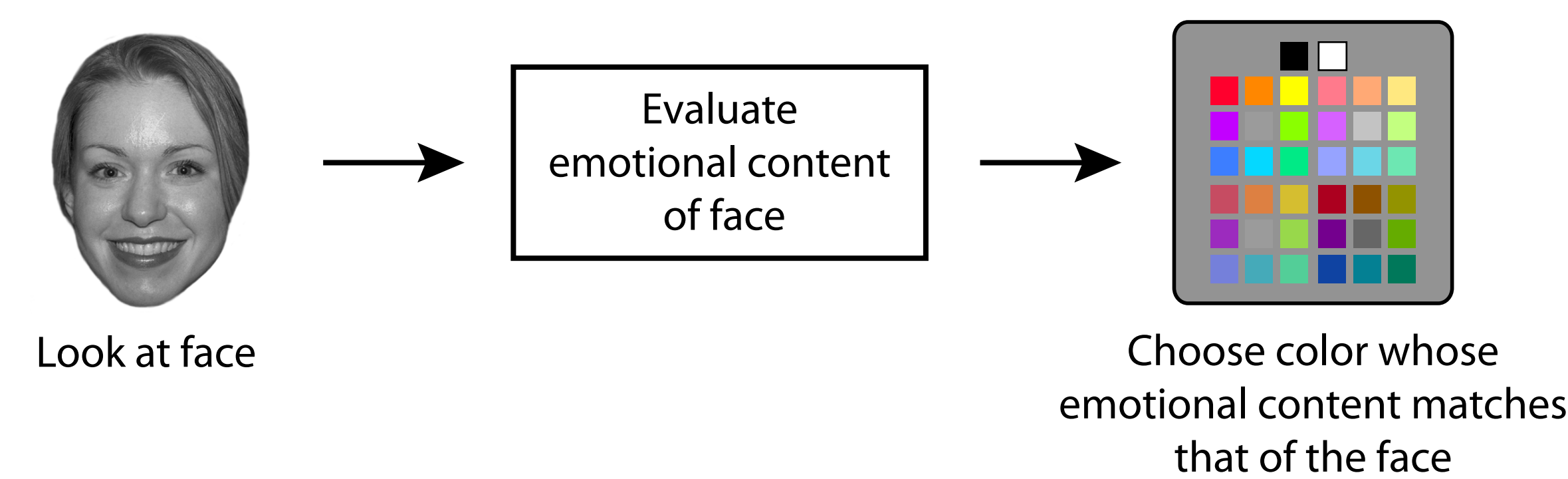
There is a strong correlation between the emotional content of music and emotional content of the colors that go with the music.

For example, happier colors were associated with happier music

Research Question: Analogous effects for colors and faces?

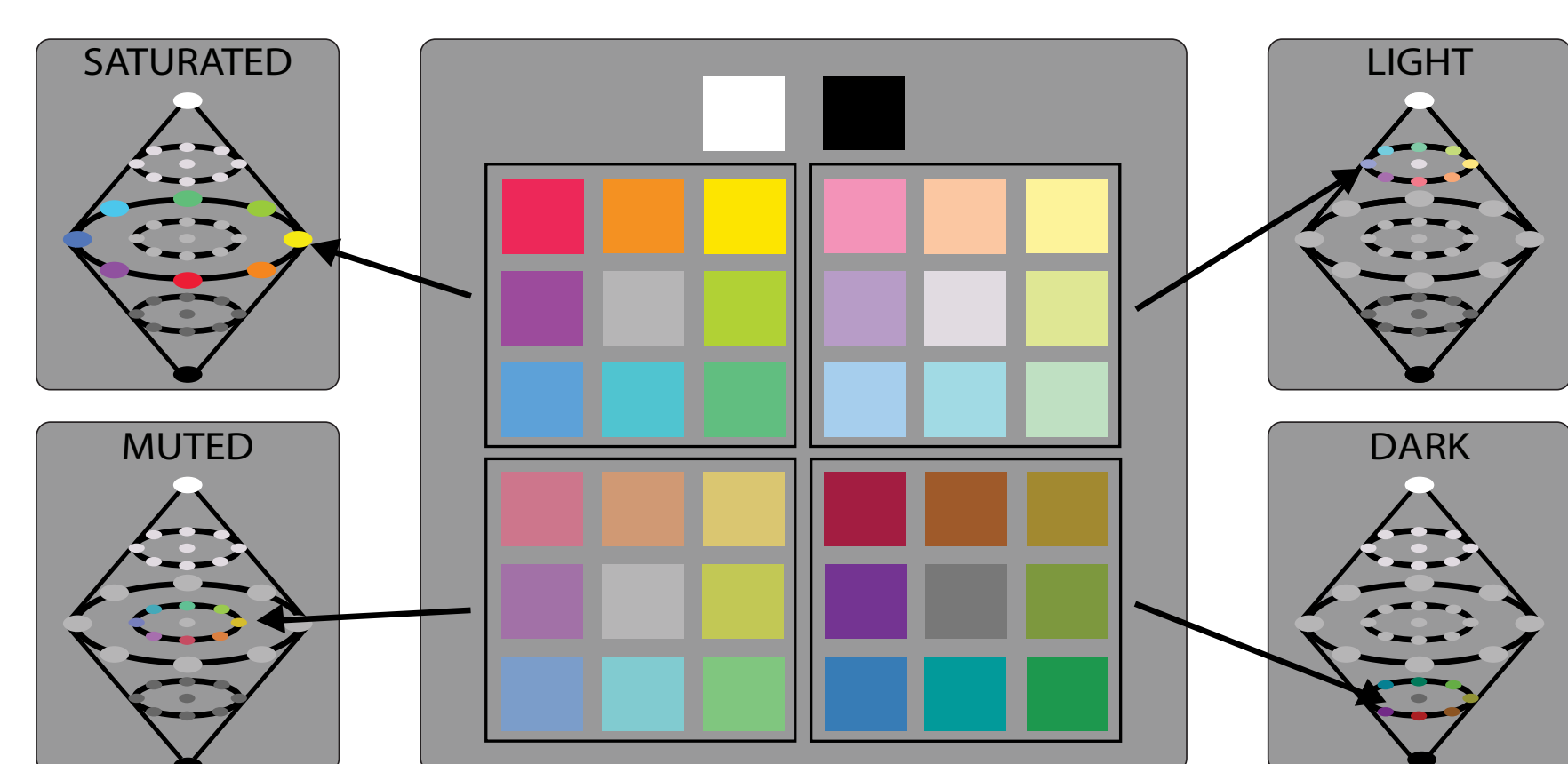
Faces provide direct and straightforward expressions of human emotions. (Ekman, Friesen & Ellsworth, 1972)

If the Emotion Mediation Hypothesis is true, there should be a strong correlation between the emotional content of faces and the emotional content of the colors that are judged to be consistent with the faces.



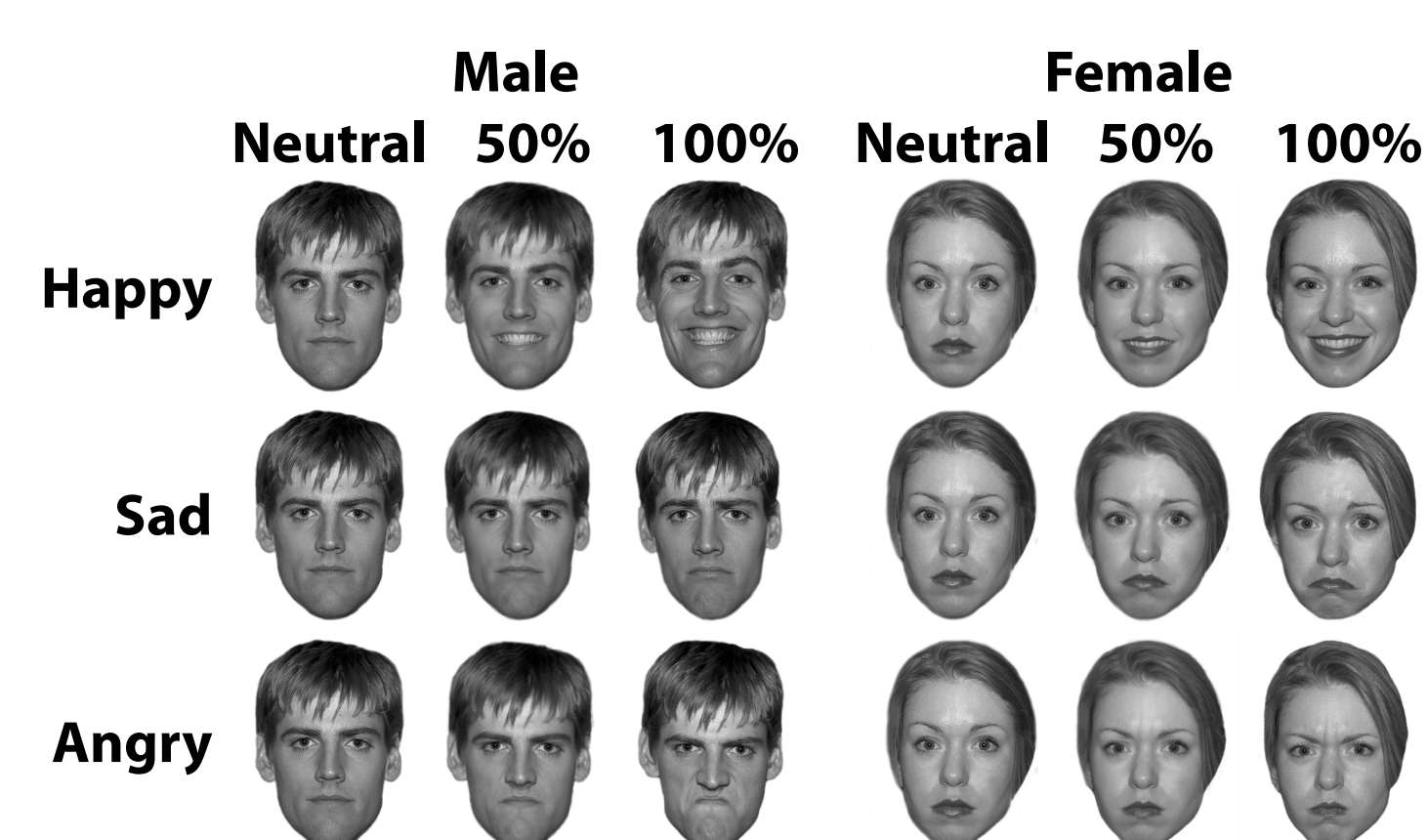
Color and Faces

Berkeley Color Project (BCP) 37 Colors



8 hues: red, yellow, green, blue, orange, chartreuse, cyan, purple
4 saturation/lightness levels ("cuts"): saturated, light, muted, dark
5 achromatic colors

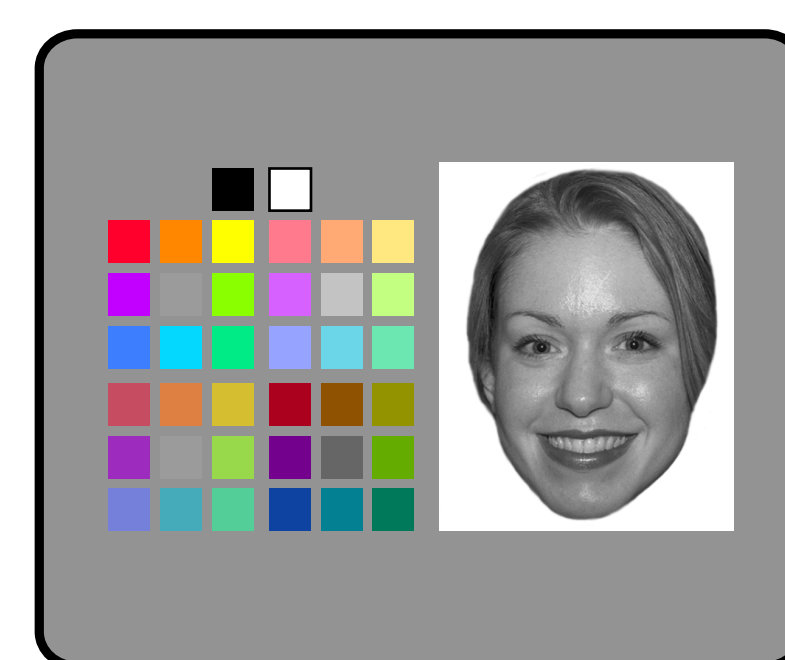
Emotionally Expressive Faces



Faces were morphed between neutral and 100% for each emotion using FantaMorph (www.fantamorph.com)

General Methods

Color-Face Associations

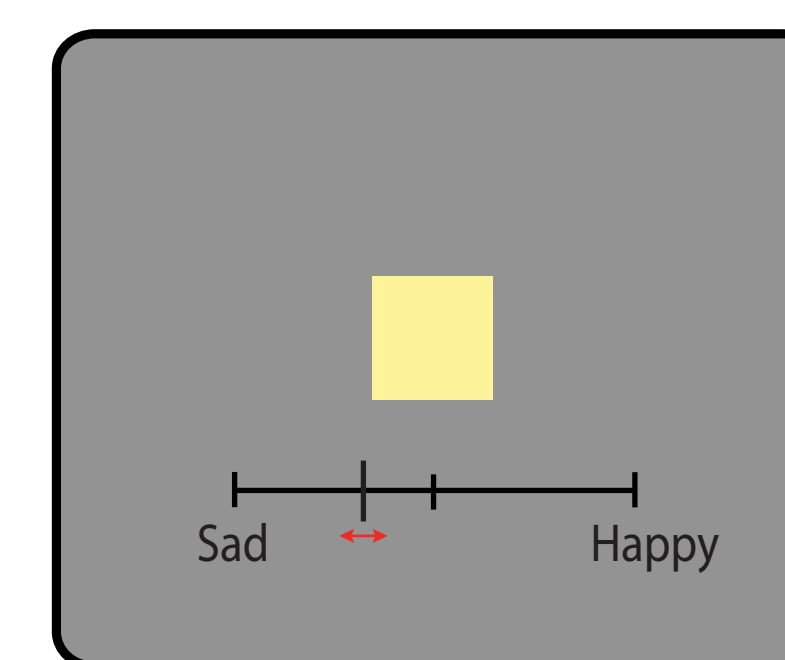


BCP-37 colors presented simultaneously with each face.

Task: Click 5 most consistent colors with the face in order from most to least.

Click 5 most inconsistent colors with the face in order from most to least.

Color-Emotion Associations



BCP-37 colors presented one at a time with an emotional scale (-100 to +100).

Task: Rate emotional content of each color (blocked by emotional dimension):
calm-angry
sad-happy
weak-strong

Face-Emotion Associations



14 faces presented one at a time with an emotional scale (-100 to +100)

Task: Rate emotional content of each face (blocked by emotional dimension):
calm-angry
sad-happy
weak-strong

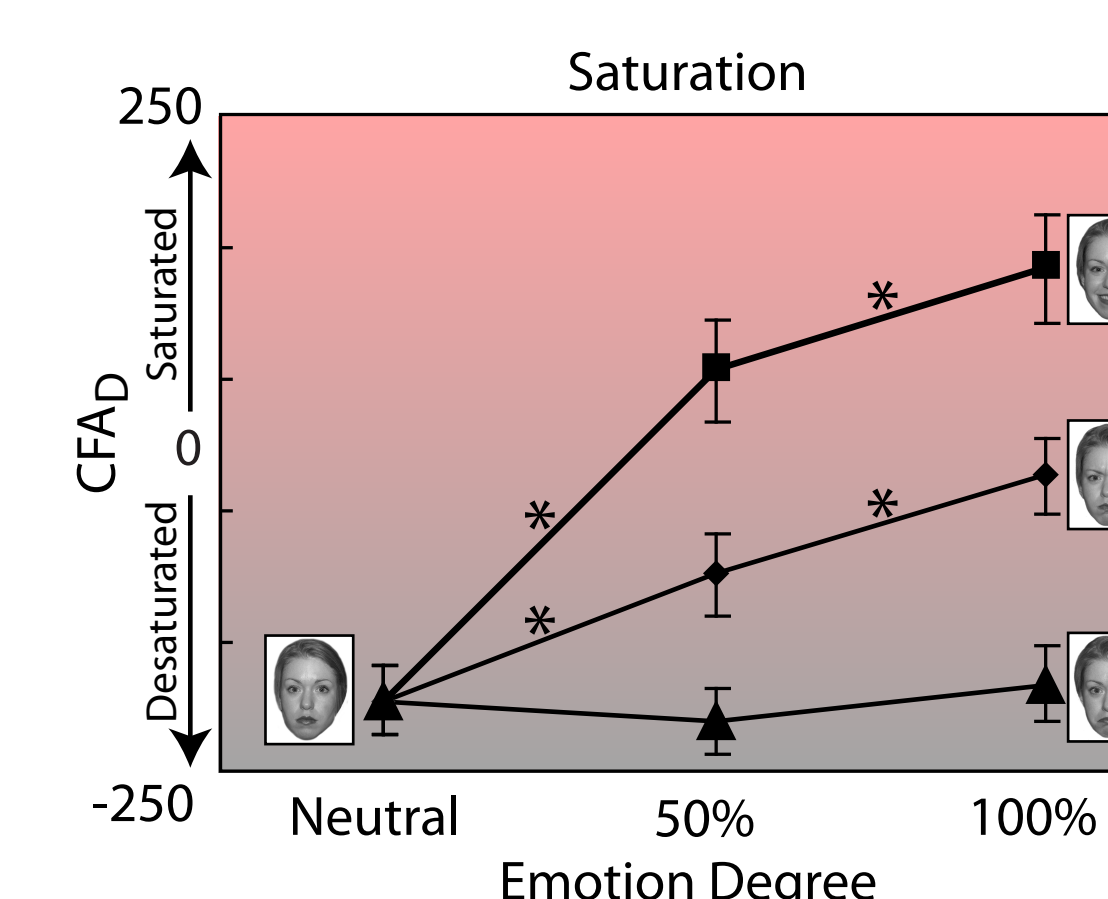
Relations between Color and Faces

Color-Face Associations (CFA) were calculated for each face (F) in terms of the color appearance dimensions (D) of the five colors that were **most consistent** with the face (C) and the five that were **most inconsistent** with the face (I).

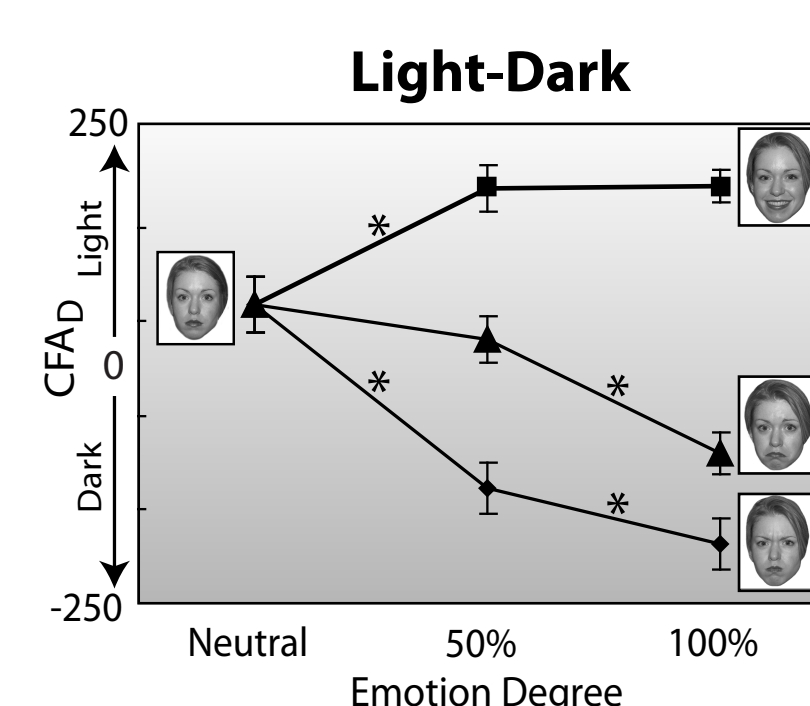
$$C_D = (5c_{1-D} + 4c_{2-D} + 3c_{3-D} + 2c_{4-D} + c_{5-D})/5$$

$$I_D = (5i_{1-D} + 4i_{2-D} + 3i_{3-D} + 2i_{4-D} + i_{5-D})/5$$

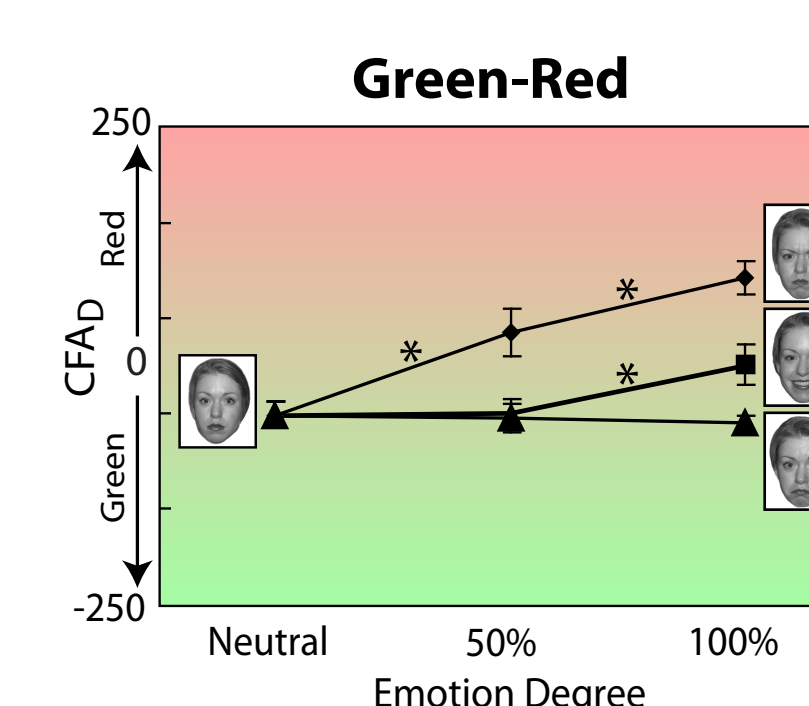
$$CFA_D = C_D - I_D$$



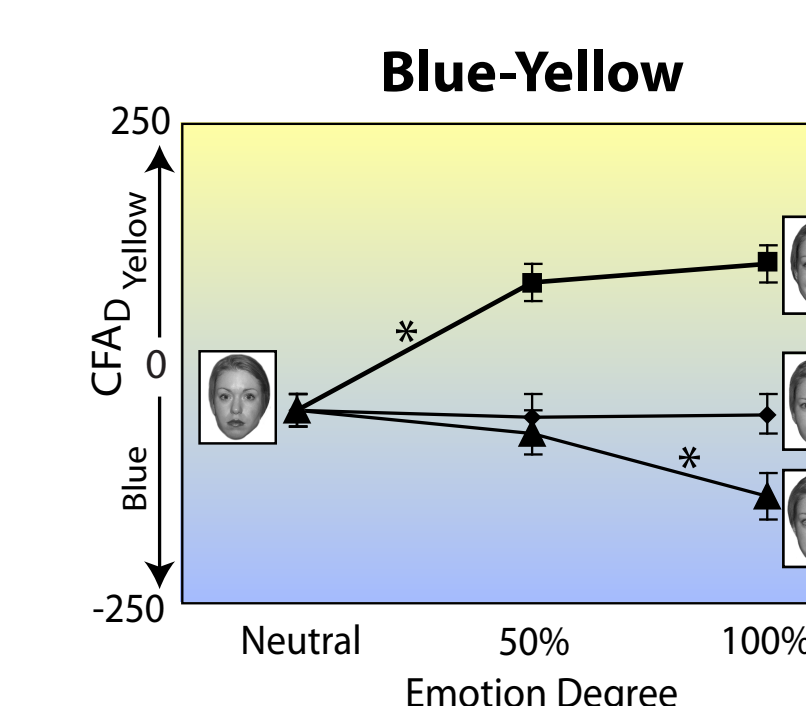
Happier faces: more saturated
Angrier faces: more saturated
Sad faces: desaturated



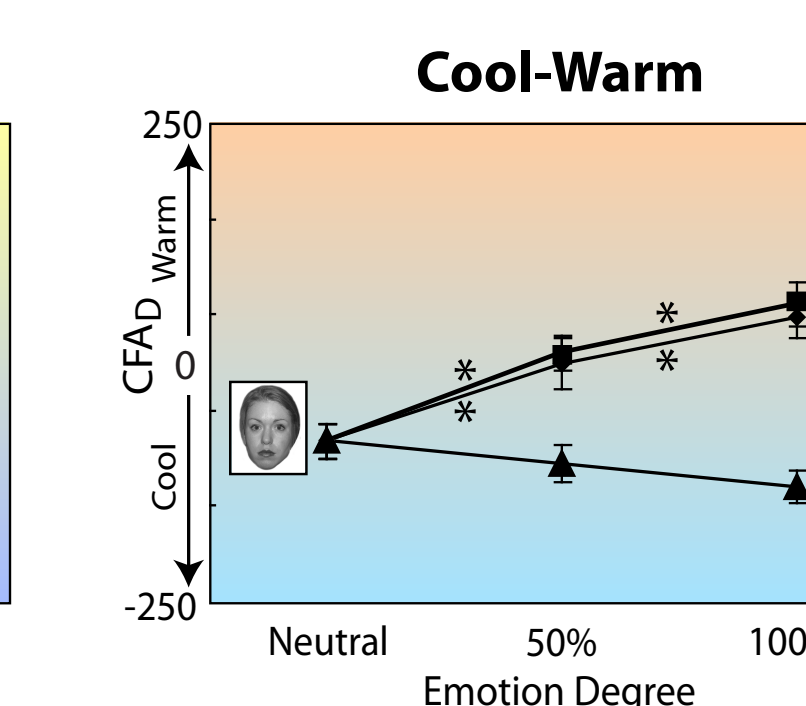
Happier faces: lighter
Angrier faces: darker
Sadder faces: darker



Happier faces: redder
Angrier faces: redder
Sad faces: neutral



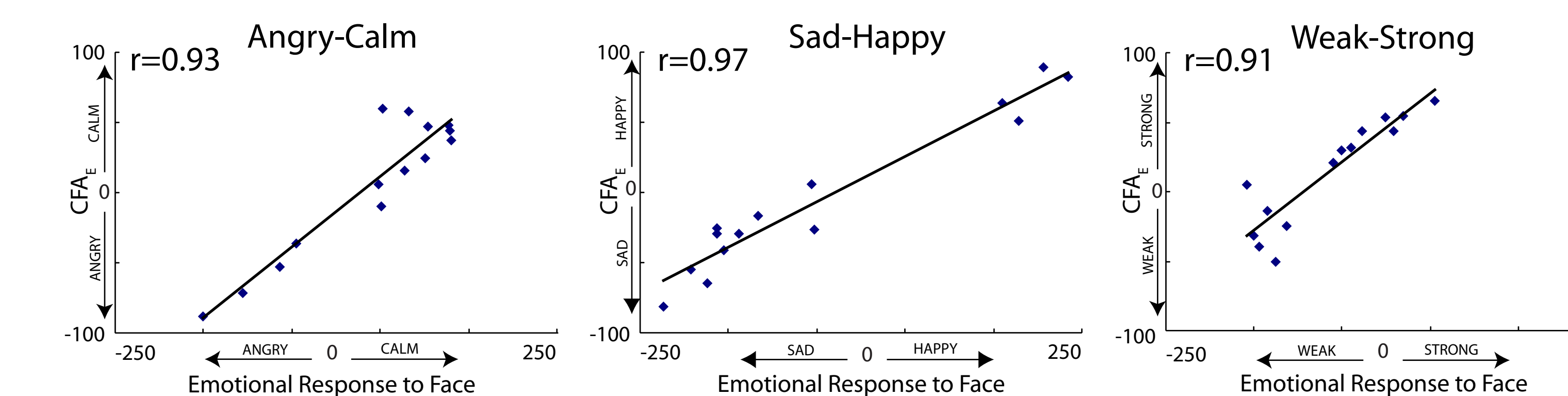
Happier faces: yellower
Angrier faces: neutral
Sad faces: bluer



Happier faces: warmer
Angrier faces: warmer
Sad faces: cooler

Emotions Mediate Color-Face Associations

There are strong correlations between emotional ratings of each face* and emotional ratings of colors consistent with the face (CFA_E).**



*Each data point represents a face

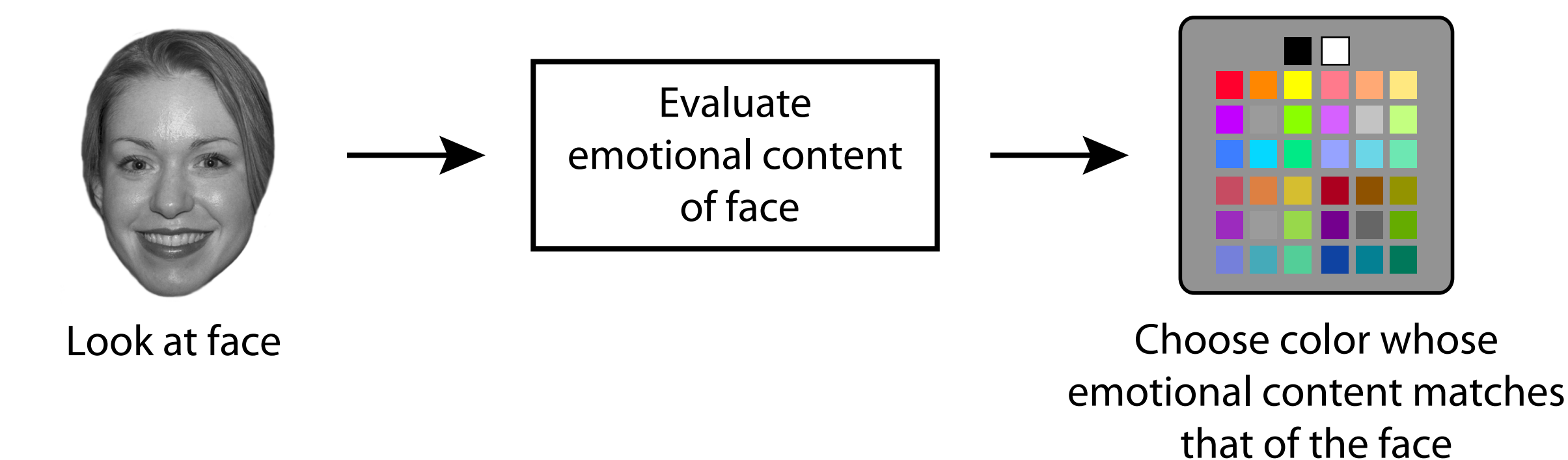
** CFA_E is analogous to CFA_D , but using emotional dimensions rather than color appearance dimensions.

These correlations show that emotion mediates the relation between color and faces.

Conclusion

As predicted by the Emotional Mediation Hypothesis:

There is a clear mapping between the emotional expressions of faces and the emotional content of the colors associated with those faces.



This direct evidence for the Emotional Mediation Hypothesis supports Schloss, Lawler and Palmer's (VSS-08) conclusion that emotions mediate the relation between colors and music.

Future Directions: Test the Emotional Mediation Hypothesis on other types of displays such as shapes, lines, and gestural poses.

References and Acknowledgement

Ekman, P., Friesen, W., & Ellsworth, P. (1972). *Emotion in the Human Face: Guidelines for Research and an Intergration of Findings*. Oxford, England: Pergamon Press.
Schloss, K. B., Lawler, P. & Palmer, S. E. (VSS-2008). "The Color of Music." Presented at the 8th Annual Meeting of the Vision Sciences Society, Naples, FL, May 2008. www.fantamorph.com.

Acknowledgements

We thank Diane Marian for help with face stimuli, Jonathan Gardner and William Griscorn for help with Photoshop, Mieke Leyssen, Sarah Linsen, Lily Lin, Jessica Jemenez, Chris Lau, Daisy Liu and Tiffany Lee for their help in collecting data, as well as Rosa Poggessi for collecting data and help with Illustrator. We also thank Amy's Natural Frozen Foods, the National Science Foundation (#BCS-0745820) and Google for financial support.