De-Correlating face attributes: A race-gender face space

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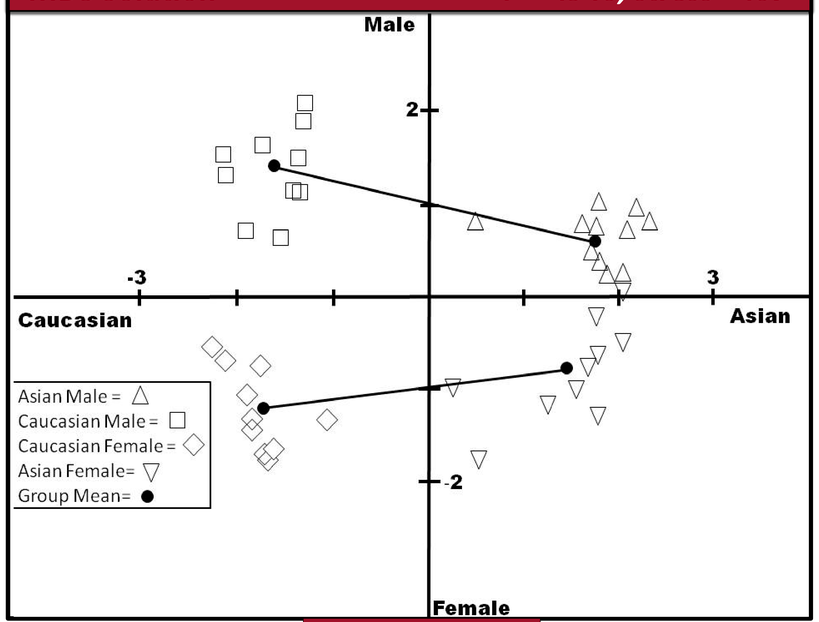
Introduction

- Similarity between faces can be specified in a face-space, where each face is represented by a point in multidimensional coordinate plane.
- Face-spaces often include a dimension of race, or of gender, but none have included both.
- Race and gender may naturally covary across dimensions in psychological space (Johnson, Freeman, & Pauker, 2012; Galinsky, Hall & Cuddy, 2013).
- Studies reporting effects of one dimension (i.e. race or gender) may be unintentionally measuring the effects of the other.
- There is a need for a face space that specifies race and gender relations simultaneously, and removes the covariance.

Experiment 1

- Began with 10 faces representing each race (Asian & Caucasian) and gender combination.
- Collected similarity ratings of all pairs and plotted relationship with a Multidimensional Scaling solution
- Race and Gender were the first and second dimensions.
- Caucasian faces were significantly more gendered than Asian faces
  - **Caucasian Male > Asian Male** (t_{18} = 4.18, p<.001)
  - **Caucasian Female < Asian Female** (t_{18}= 1.95, p<.05)

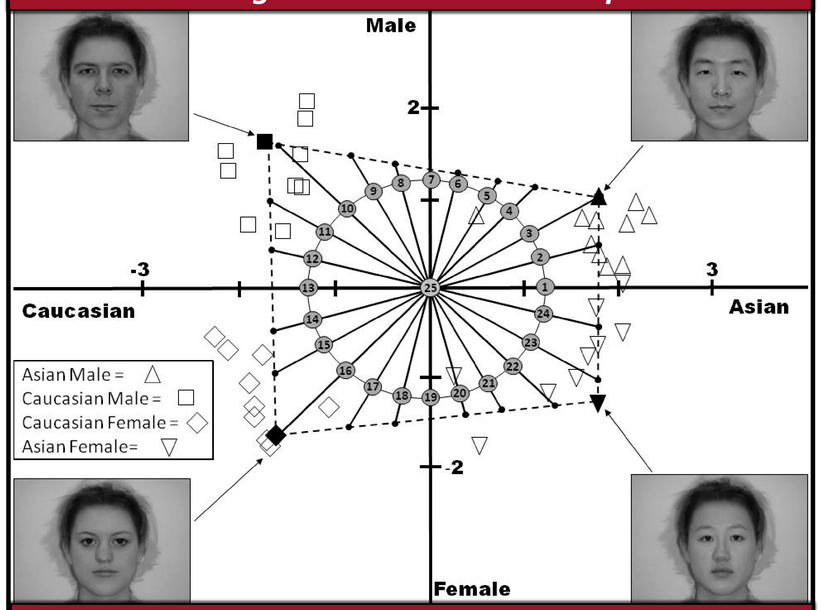
MDS Solution r^2 = .946, stress = .07



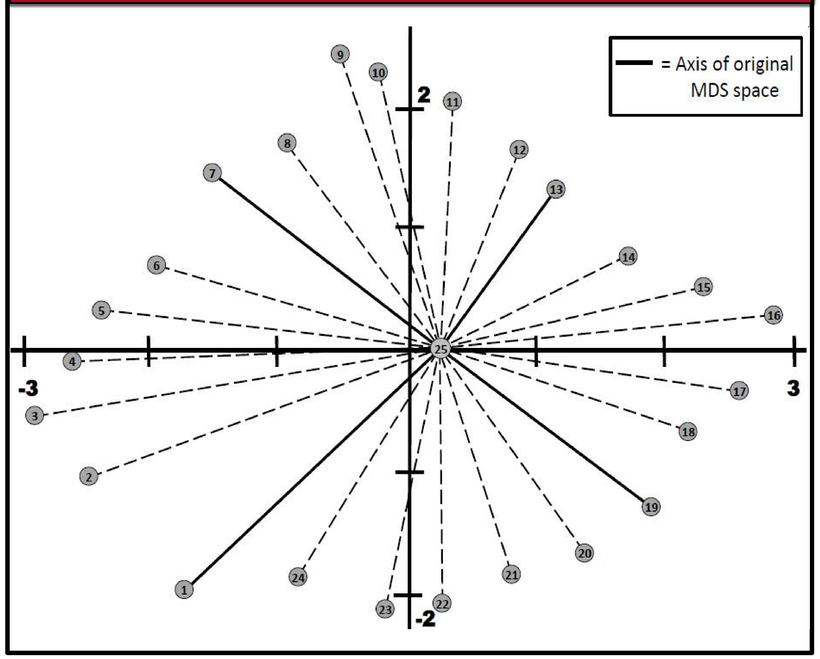
Experiment 2

- From the faces used in Experiment 1, a 'parent' was selected for each of the race/gender categories.
- New intermediary faces were created between parent faces and morphed with the face 180° around the space
- This created 24 new evenly spaced faces, with equal mean similarity between categories.
- Collected similarity ratings of all pairs and plotted relationship with a Multidimensional Scaling solution.
- Predicted ordering and location were confirmed
  - 99% CI for angle between neighbors = [12.06,17.93]
- Race and Gender were equally weighted

Creating the Normalized Face Space



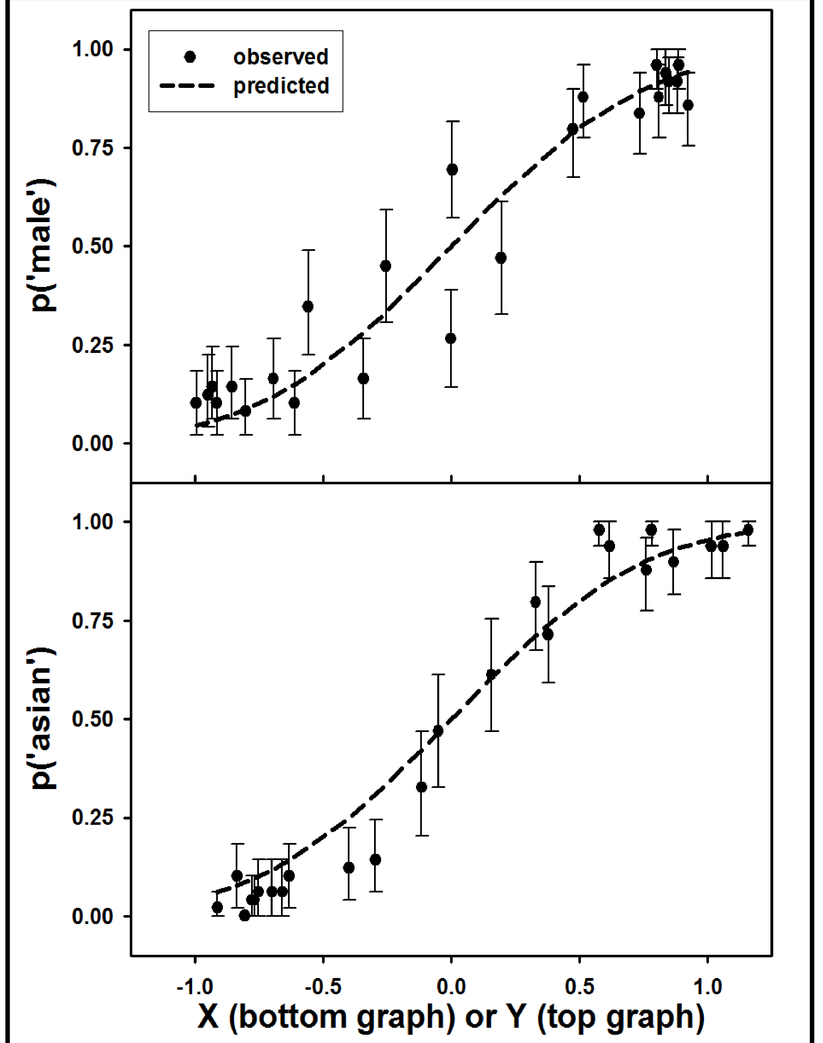
Morphed MDS Solution r^2 = .96, stress = .08



Experiment 3

- Asked for race and gender judgments for each face to verify the dimensions of the new face space.
- Threshold model with one free parameter accurately predicted the observed category judgments for each face from its *X* and *Y* values.
- For this face space, the gain parameter indicates judgments of race and gender were non-categorical.
- This suggests that race and gender category knowledge was incorporated into similarity judgments.

Category Membership (Observed & Predicted)



Conclusions

- Faces vary on many dimensions, and faces selected to vary on one dimension may unintentionally vary on others.
- 'Other race' effects found with Asian and Caucasian faces might have reflected gender differences.
- To address this problem, our morphing algorithm created stimuli that were decorrelated in terms of race and gender.

References

- Galinsky, A.D., Hall, E.V. & Cuddy, A.J.C. (2013). Gendered Races: Implications for Interracial Marriage, Leadership Selection, and Athletic Participation. *Psychological Science*, 24, 498-506.
- Johnson, K. L., Freeman, J. B., & Pauker, K. (2012). Race is gendered: How covarying phenotypes and stereotypes bias sex categorization. *Journal of Personality and Social Psychology,* 102(1), 116-131