Individual differences in face processing ability and consistency in visual strategies.

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Introduction

Individual ability to recognize faces is associated with different perceptual and cognitive mechanisms (e.g. Pachai et al., 2013; Richler et al., 2011; Royer et al., 2015). Previous results obtained using the Bubbles method (Gosselin & Schyns, 2001) suggest that the use of the eye area of faces is particularly linked to optimal face recognition (Royer et al., VSS 2016 meeting). However, the visual strategy used by individuals with lower face recognition ability was not as clear. The present study investigates possible reasons for this, by looking at inter- and intra-observer consistency in the use of facial information.

Method

Bubbles task
10-AFC task, 2000 trials/participant.

Face and object processing ability
Measured using composite score of performance in three face processing and 3 object processing tests (Principal component analysis):

- Cambridge Face Memory Test (CFMT)
- Cambridge Face Perception Test (CFPT)
- Glasgow Fae Matching Test (GFMT)
- Cambridge Car Memory Test (CCMT)
- Cambridge Hair Memory Test (CHMT)
- Horse Memory Test

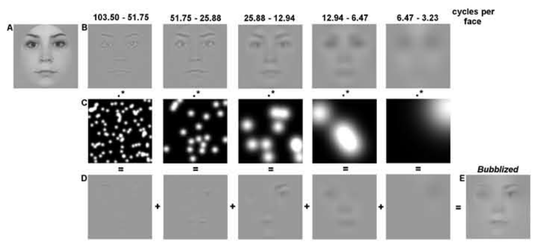

Figure 1. Creation of a bubblized stimulus. Random areas of the image are revealed through Gaussian apertures (bubbles), in 5 non-overlapping SF bands on a trial-by-trial basis. The amount of information shown (i.e. the number of bubbles) is continuously adjusted with individual accuracy. After many trials, we are able to map the use of information for accurate face recognition for each observer in a classification image (CI).

Measuring consistency in visual strategies

- Inter-observer consistency was measured by correlating the individual CIs (i.e. the information used by each observer to accurately recognize faces) of the subjects with similar levels of face recognition ability.
- Intra-observer consistency was measured by correlating, for each observer, their use of information based on half of the trials (i.e. how their use of information on even number trials compared to their use of information in odd number trials).

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Results

Use of information for optimal face processing

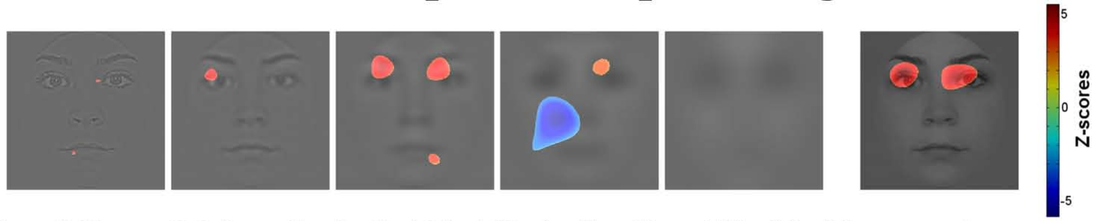

Figure 2. Diagnostic information for the high ability (red) and low ability (blue) face recognizers revealed by weighting the individual CIs with face processing ability.

Face processing ability and consistency in visual strategies

We obtain a significant correlation between face recognition abilities and consistency in visual strategies, even when factoring out the variance attributable to general visual recognition abilities (i.e. score obtained on object processing tasks).

Inter-observer consistency:

- $r_{inter} = 0.68$; $p < 0.001$
- $r_{partial,inter} = 0.62$; $p < 0.001$

Intra observer consistency:

- $r_{intra} = 0.43$; $p = 0.002$
- $r_{partial,intra} = 0.32$; $p = 0.02$

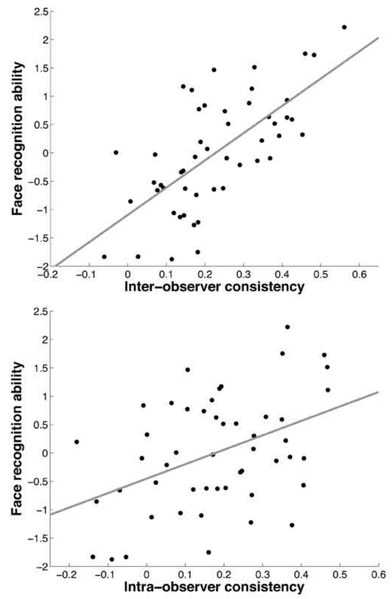

Figure 3. Correlation between face recognition abilities and consistency in visual strategies at the inter-observer (top) and intra-observer (bottom) level.

Conclusion

Our results suggest that low-ability face recognizers tend to rely on idiosyncratic and variable strategies to identify faces. High-ability face recognizers, on the other hand, use much more stable and similar processing strategies.

References

Gosselin, F., & Schyns, P. (2001). Vision Res, 41, 2261-2271.
Furl et al. (2011). J Cogn Neurosci, 23(7), 1723-1740.
Pachai et al. (2013). Front Psychol, 4.
Richler et al. (2011). Psychol Sci, 22(4), 464-471.
Royer et al. (2015). J Exp Psychol Human, 41(5), 1179-1183.

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