Evaluating the Impact of Spatial Frequencies on the Perception of Gender

Jake Kurczek and Clark Ohnesorge
St. Olaf College, Northfield, Minnesota

INTRODUCTION

Face perception is fundamentally important for judging the characteristics of individuals, such as identification of their gender, age, ethnicity or expression (Webster, Kaping, Mizokami, & Duhemel, 2004). It has been hypothesized that gender perception takes place in higher level visual processing areas. Little, DeGiovanni, & Jones (2003) suggest that distinct neural populations may code for subcategories of faces for which expertise-derived configurural processing is equivalent (i.e., male and female faces). They suggest that visual after-effects are thought to reflect changes in the responses of neural mechanisms underlying face processing and cannot be attributed to retraining (i.e., lower level adaptations). The after-effects are robust to difference in the retinal location and size of faces at exposure and post-exposure testing (Little, DeGiovanni, & Jones, 2005). In a study by Webster et al. (2004), temporal perception of faces was examined based on gender, ethnicity and expression. Observers made forced-choice responses to categorize images along the continuum; for example responding to whether a face from a gender morph appeared “female” or “male.” The boundary for gender represents an ambiguous image intermediate to the female and male exemplars and could be set consistently by observers. However, after adapting to a male face, the previously ambiguous image appeared distinctly feminine. Conversely, adaptation to the female face induced the opposite changes. This effect is similar to results found in visual after-effect studies. In a different investigation by Cellarino, Borghetti, and Sartucci (2004), the after-effect studies. In a different investigation by Cellarino, Borghetti, and Sartucci (2004), the effect of pixilation on gender identification was conducted. The photos became more pixilated as identification of their gender, age, ethnicity or expression (Webster, Kaping, Mizokami, & Duhamel, 2004) varied.

METHODS

Participant characteristics
18 participants were tested (11 female, 7 male).
St. Olaf College students, between the ages of 18 and 22 with normal or corrected vision

Procedure
Study was conducted using Psychophysics
All participants sat 28 inches (71 cm) from the computer screen
Three adaptation conditions were presented and counterbalanced by order.

No adaptation frequency (for baseline ratings)
Adaptation at 0.625 cycles/visual angle° (4.5 cycles per face)
Adaptation at 2.25 cycles/visual angle° (17 cycles per face)
Adaptation at 9 cycles/visual angle° (68 cycles per face)

RESULTS

Figure 1. Subject’s ratings of gender by varying levels of spatial frequency adaptation.

Figure 2. Subject’s ratings of gender by varying levels of sinusoidal frequency and spatial frequency adaptation level.

DISCUSSION

- Some believe that there are higher level processing areas that code for gender categories. Evidence for this process could be found in IMRI and PET (where these areas would be highlighted identifying gender) studies or in clinical cases where these areas are lesioned or damaged and the subject is unable to categorize a certain gender.

- In this study, a lower level visual process was studied and may explain or show that this higher level process may be explained for by lower level processing.

- Subjects were adapted significantly from the control in both the male and female directions using high and low spatial frequencies respectively.

- This may provide evidence for either gender categorization being accomplished by lower level processes or by the higher level area also processing information such as spatial frequencies.

For additional information please contact:
Jake Kurczek or Dr. Clark Ohnesorge
Saint Olaf College Department of Psychology
Jake.kurczek@stolaf.edu, clarkohnesorge@stolaf.edu

The authors would like to acknowledge Matt Rockledge

INTRODUCTION

- Some believe that there are higher level processing areas that code for gender categories. Evidence for this process could be found in IMRI and PET (where these areas would be highlighted identifying gender) studies or in clinical cases where these areas are lesioned or damaged and the subject is unable to categorize a certain gender.

- In this study, a lower level visual process was studied and may explain or show that this higher level process may be explained for by lower level processing.

- Subjects were adapted significantly from the control in both the male and female directions using high and low spatial frequencies respectively.

- This may provide evidence for either gender categorization being accomplished by lower level processes or by the higher level area also processing information such as spatial frequencies.

For additional information please contact:
Jake Kurczek or Dr. Clark Ohnesorge
Saint Olaf College Department of Psychology
Jake.kurczek@stolaf.edu, clarkohnesorge@stolaf.edu

The authors would like to acknowledge Matt Rockledge