

# Age and Gender: Similarly Cued from Silhouetted Face Profiles

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## Introduction

Our ability to recognize one another relies heavily on our capacity to extract identifying information from faces. Since most faces share the same basic features and configurations, we must attend to more subtle differences to successfully distinguish among them.

Prior to identifying individual faces, we must be able to extract socially relevant information such as gender and age. Wild et al. (2000) showed that people can identify gender from faces in the absence of sex-stereotyped cues. Here we further this claim and show that both gender and age can be determined from information-scarce images of faces. A linear model reveals that the cues we use to estimate age overlap with those we use for gender identification.

## Method and Results

### Human ratings

Using a graphics editor, images of 48 face profiles (24 male, 24 female, ranging in age from 16 to 58 years old) were reduced to black & white silhouettes, as shown in Figure 1A. Undergraduate subjects ( $n = 383$ ) each rated 16 of the faces on either *approximate age* (“teens”, “20s”, “30s”, “40s”, “50s”, or “60s”) or *gender* (“male” or “female” with a 7-point confidence score). Ss who rated age were given either no gender information (Group 1,  $n=54$ ) or correct gender information (Group 2,  $n=54$ ). Ss who rated gender were either given no age information (Group 3,  $n=164$ ) or informed incorrectly that all the faces were of 21-year-olds (Group 4,  $n=56$ ) or 40-year-olds (Group 5,  $n=55$ ).

### Accuracy

When given no additional information, Ss correctly judged age and gender well above chance ( $p < .000001$ ). Ss in Groups 1 and 2 estimated age to within one age bin 63.9% and 58.9% of the time, respectively, with chance performance at 44%. Ss in Groups 3, 4, and 5 identified gender 69.5%, 69.2%, and 69.8% of the time, respectively, with chance performance at 50%.

Providing Ss with gender information affected their ratings of age, and vice versa. Labeling female faces as “female” caused Ss to rate them as *older*, and labeling male faces as “male” caused Ss to rate them as *younger*. This suggests that some of the face cues indicative of youth may also be indicative of femininity. Consistently, labeling faces as “21-year-olds” resulted in more male ratings, though this effect was only significant for gender-ambiguous faces (as determined by Group 3). Labeling faces as “40-year-olds” had no reliable effects.

## Linear Model

All 48 faces were parameterized by normalizing their size and orientation and identifying 11 key points along their contours (Figure 1B). A principal components (PC) analysis was performed on the informative coordinates from the key points. This produced 18 independent variables for two linear regression models aimed to predict perceived age and gender. PCs 1, 4, 5, and 6 reliably predicted age, and PCs 1, 4, and 9 reliably predicted perceived gender. PCs 1 and 4 were positively correlated with age and masculinity.

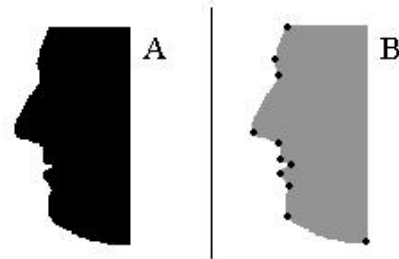


Figure 1. An example of a silhouetted face profile (A) and the 11 key points used for the parameterization (B).

## Discussion

Results from human raters and the linear models suggest that similar cues from silhouetted face profiles predict age and gender. Specifically, face features that correlate with youth also correlate with femininity, and features that correlate with old age also correlate with masculinity. The parameterization method described above can be used to extract other socially relevant information from face profiles, such as race, attractiveness, expression, familiarity, and distinctiveness, as well as to construct “morphed” faces that vary arbitrarily in any of these attributes. We are currently examining how these attributes are inter-correlated and what this may reveal about human face representation.

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## References

Wild H., Barrett S., Spence M., O’Toole A., Chenh Y., & Brooke J. (2002). Recognition and sex classification of adults’ and children’s faces: examining performance in the absence of sex-stereotyped cues. *Journal of Experimental Child Psychology*, 77, 269-291.