

Introduction

Age estimation (by computers or humans) is of great practical value, for example in cases where a minimum age is required to buy alcohol or cigarettes. Several factors may have an effect on perceived age, including facial expression¹.

We here describe two experiments showing that smiling and colored illumination can alter perceived age.

Method

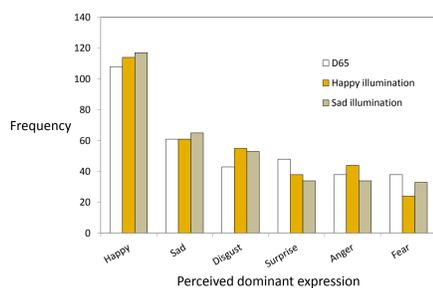
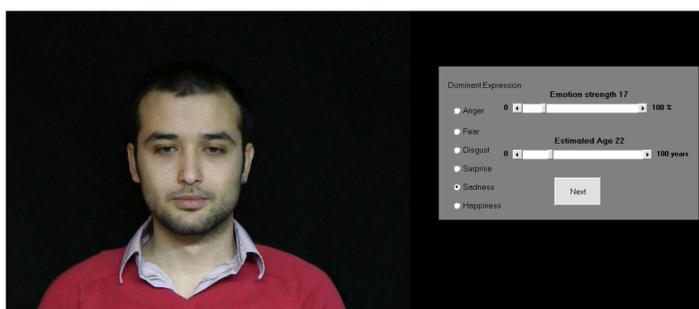
84 faces (42 M/42 F) were selected from the UvA-NEMO smile database^{2,3}. Age ranged from 8 to 76 years. From each video, two frames were extracted showing a neutral face and a spontaneous smile.

Images were captured under D65 illumination and rendered⁴ under two illuminants *Happy* and *Sad*. Under *Happy* and *Sad* illumination a white object will take on the color that people associate with a happy and a sad face⁵.



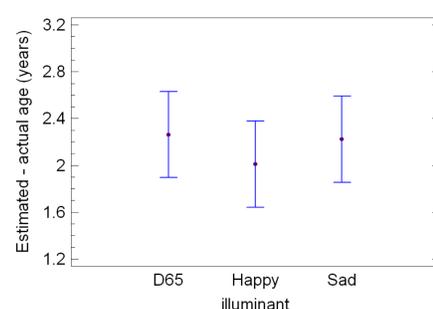
Images with faces were shown on a calibrated color monitor. 24 subjects rated type/strength of facial expression, and estimated the age.

Experiment 1: neutral faces



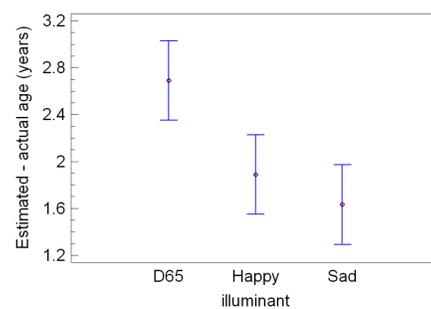
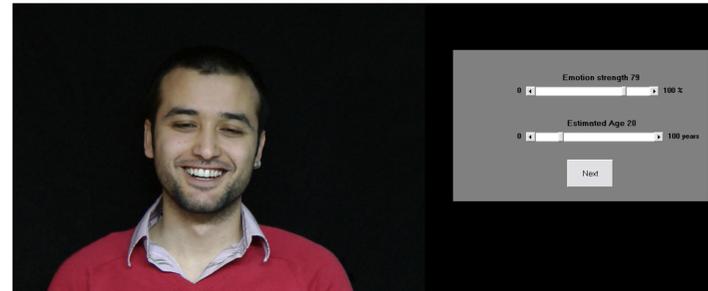
Subjects did not know faces were neutral

No significant effect of illuminant on perceived dominant expression ($p=0.64$)

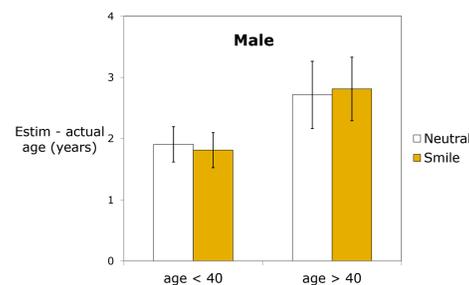


No significant effect of illuminant on estimated age ($p=0.77$)

Experiment 2: smiling faces

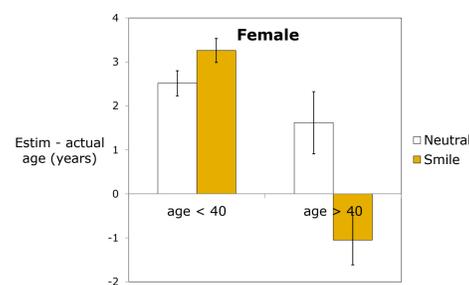


Significant effect of illuminant on estimated age ($p=0.004$)



No effect of smiling on estimated age for male faces

age < 40 $p=0.84$ age > 40 $p=0.78$



Effect of smiling on estimated age for female faces

age < 40 $p=0.016$ age > 40 $p < 10^{-4}$

Conclusion

Perceived age of faces is affected by smile and illumination. Under colored illumination age estimation is more accurate. When smiling, women younger than 40 look older, and women older than 40 look younger.

Acknowledgement

This research was part of Science Live, the innovative research programme of science center NEMO that enables scientists to carry out real, publishable, peer-reviewed research using NEMO visitors as volunteers.

References

- Voelkle, M.C., Ebner, N.C., Lindenberger, U. & Riediger, M. (2011, September 5). Let me guess how old you are: effects of age, gender and facial expression on perceptions of age. *Psychology and Aging*. Advance online publication. doi: 10.1037/a0025065
- Dibeklioglu, H., A.A. Salah, Th. Gevers, "Are You Really Smiling at Me? Spontaneous versus Posed Enjoyment Smiles," Proc. European Conference on Computer Vision (ECCV), Firenze, 2012.
- <http://www.uva-nemo.org/>
- Lucassen MP (2000). Application of smoothest reflectance functions for the visualization of spectral changes due to the illuminant. *Proceedings First International Conference on Color in Graphics and Image Processing*, 41-44.
- Oswaldo da Pos and Paul Green-Armytage., *Facial Expressions, Colours and Basic Emotions*, Colour: Design & Creativity, issue 1, <http://www.colour-journal.org/2007/1/2/07102article.htm>