The Influence of Age and Facial Image Attractiveness on Pupillary Response.

Thanapoom Boonipat, BS; Tiffany Brazile BA, Oliver Darwish, Philip Montana BA, Kevin Fleming PhD, Mitchell Stotland, MD.

Disclosure/Financial Support: No financial support. None of the authors have any financial interest in any of the products, devices, or drugs mentioned in this manuscript.

INTRODUCTION: Facial difference affects quality of life, and ample evidence suggests that social bias and stigmatization often persist even after the provision of high-quality facial reconstruction[1]. Because emotional arousal is reflected in the magnitude of pupillary dilatation[2-4], we have investigated the influence of both facial image attractiveness and observer age on observer pupillary response. We have also secondarily examined the related effect of facial age (of image, including a subset of images of patients with cleft lip) and cultural background (observer) on attractiveness rating.
Purpose: Our aim is to study the visual markers that lead to differential perception of patients with congenital or acquired facial difference by examining the early stages of visual processing. Here we examine the influence of age and attractiveness on autonomic reaction as manifested by pupillary response. This information may better inform surgeons' conversations with patients by improving their understanding of how faces are reflexively interpreted by others.

METHODS: 118 experimental and 79 control facial images were obtained from the senior author's practice.
Experimental images included: 29 cleft lip, 22 facial aging, 18 facial lesion, 16 ear deformity, 14 HIV lipodystrophy, 11 nasal deformity, 6 dermatochalasis.
481 subjects rated the images for attractiveness (40 ratings/image).
Twenty lookzone regions were mapped onto each facial image.
A separate group of 265 subjects observed a randomly chosen subset of 40 images while an infrared eye-tracking camera recorded their pupillary response.
Factorial ANOVA analysis was performed to determine significance of differences between groups.
Outcomes Measured:
Image attractiveness was rated on a 1-7 Likert scale.
Ages of both individual photographed and eye-tracked observer were obtained.
The eye-tracking camera measured average pupil diameter/lookzone region during all image observations.

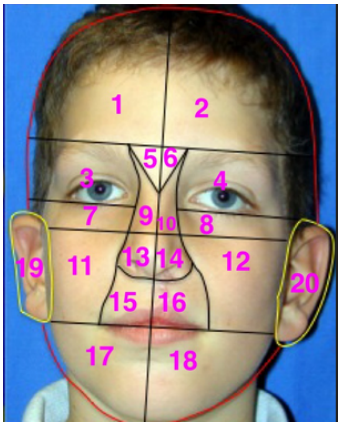
RESULTS: The following observations were statistically significant at $p<0.01$ level:

(i) cleft images: rated less attractive than control images
(ii) increasing age (image): associated with step-wise decrease in attractiveness in both cleft and control images
(iii) higher attractiveness (image): associated with larger average observer pupil size
(iv) increased age (observer): associated with smaller average observer pupil size

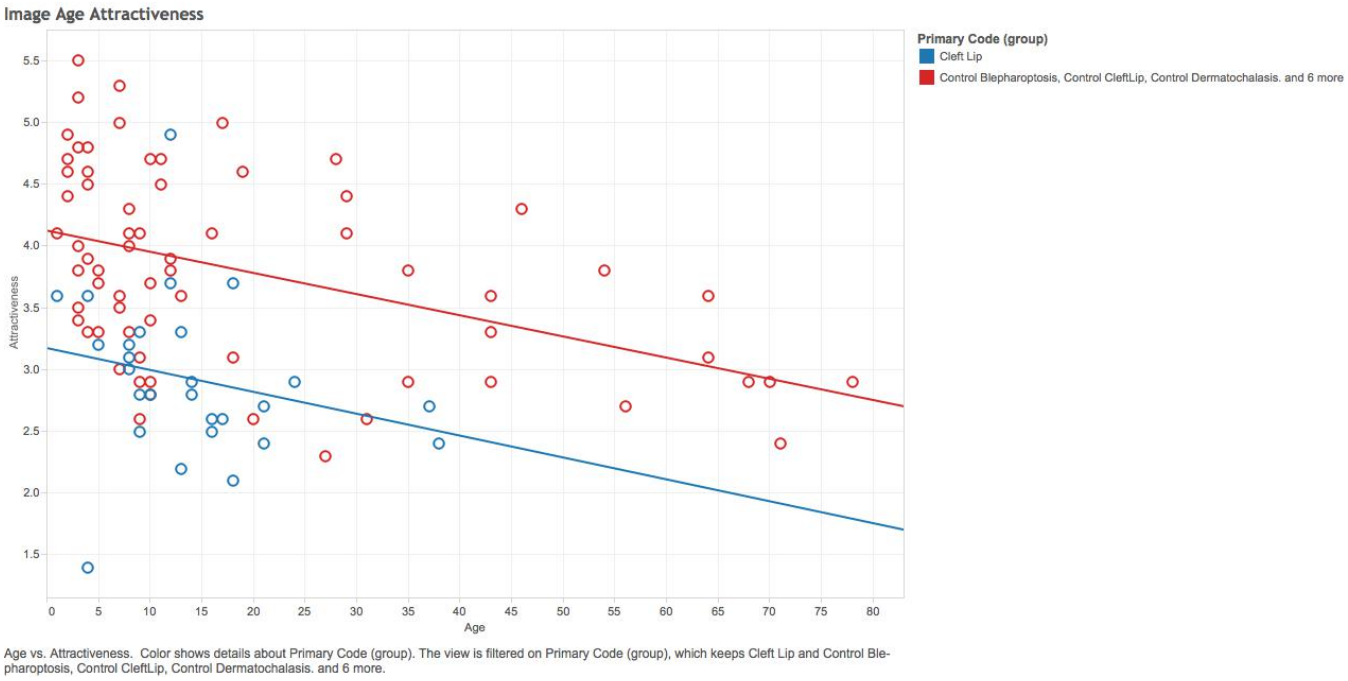
CONCLUSIONS: Cleft faces are rated as less attractive, and with increasing age attractiveness diminishes (paralleling the same phenomenon seen with control faces). Increasing age of the observer is associated with diminishing average pupil size, whereas more attractive facial images stimulate pupil dilation.

REFERENCES:

1. Berger Z, Dalton L. Coping with a cleft: Psychosocial adjustment of adolescents with a cleft lip and palate and their parents. Cleft Palate Craniofacial J. 48:435–443 Dec 2009
2. Kahneman D, Beatty J (1966) Pupil diameter and load on memory. Science 154:1583–5.
3. Hess EH, Polt JM (1960) Pupil size as related to interest value of visual stimuli. Science 132:349–50
4. Winn B, Whitaker D, Elliott DB, Phillips NJ Factors Affecting Light-Adapted Pupil Size in Normal Human Subjects Invest Ophthalmol Vis Sci 35:1132-1137 Mar 1994

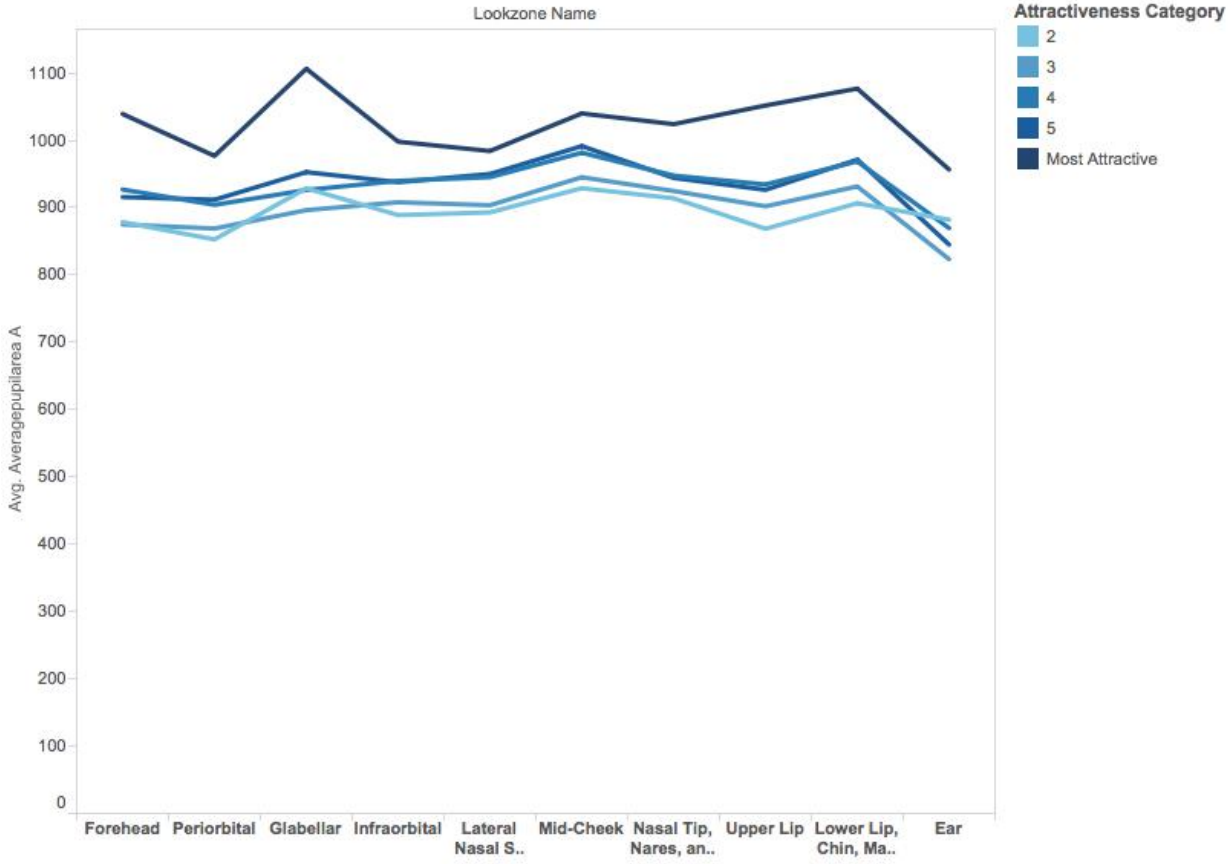


Lookzone Regions: R/L:
1/2: forehead
3/4: periorbital
5/6: glabellar
7/8: infraorbital
9/10: lateral nasal sidewall
11/12: mid-cheek
13/14: nasal tip, nares, and columella
15/16: upper lip
17/18: lower lip, chin, mandible
19/20: ears
(Note the lookzones 1 and 2 are bordered by the eyebrow, 3 and 4 borders by the lower eye, 7 and 8 by the eyebags, 15 and 16 by the midlip opening, 11 and 12 by the nasolabial fold, and 17 and 18 by the chin)



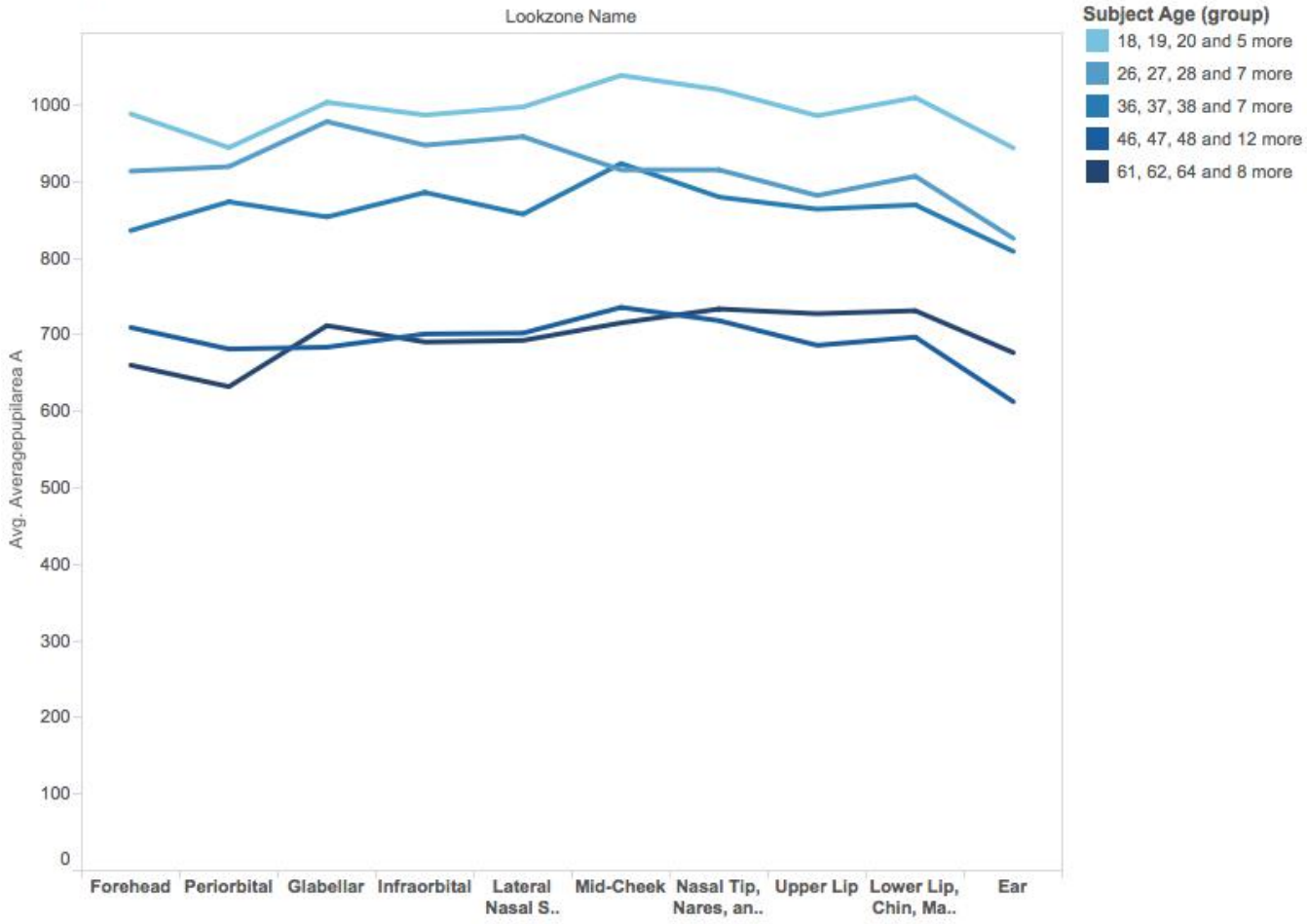
Age vs. Attractiveness. Color shows details about Primary Code (group). The view is filtered on Primary Code (group), which keeps Cleft Lip and Control Blepharoptosis, Control CleftLip, Control Dermatochalasis. and 6 more.

PupilArea Attractiveness



The trend of average of Averagepupilarea A for Lookzone Name. Color shows details about Attractiveness Category. The data is filtered on Pupil Area >0, which keeps True. The view is filtered on Exclusions (Attractiveness Category,Lookzone Name) and Attractiveness Category. The Exclusions (Attractiveness Category,Lookzone Name) filter keeps 59 members. The Attractiveness Category filter keeps 2, 3, 4, 5 and Most Attractive.

Subj Age Pupil Area



The trend of average of Averagepupilarea A for Lookzone Name. Color shows details about Subject Age (group). The data is filtered on Pupil Area >0 and SS#. The Pupil Area >0 filter keeps True. The SS# filter keeps 1, 2 and 3. The view is filtered on Subject Age (group), which keeps 18, 19, 20 and 5 more, 26, 27, 28 and 7 more, 36, 37, 38 and 7 more, 46, 47, 48 and 12 more and 61, 62, 64 and 8 more.