



Facial Asymmetry and Self-Perceived Facial Attractiveness

Vasoglou G.* , Gkantidis N. , Halazonetis D.* , Kanavakis G.***

**Department of Orthodontics, School of Dentistry, National and Kapodistrian University of Athens, Athens, Greece*

*** Department of Orthodontics and Dentofacial Orthopedics, University of Bern, Switzerland*

References

1. Little AC, Jones BC, DeBruine LM. Facial attractiveness: evolutionary based research. *Philos Trans R Soc Lond B Biol Sci.* 2011; 366(1571):1638–59.
2. Zaidel DW, Aarde SM, Baig K. Appearance of symmetry, beauty, and health in human faces. *Brain Cogn.* 2005;57(3):261–3.
3. Dongen S V. Fluctuating asymmetry and developmental instability in evolutionary biology: past, present and future. *J Evol Biol.* 2006;19(6):1727–43.
4. Klingenberg CP. Analyzing Fluctuating Asymmetry with Geometric Morphometrics: Concepts, Methods, and Applications. *Symmetry* 2015; 7(2):843–934.
5. Valen L Van. A Study of Fluctuating Asymmetry. *Evolution (N Y).* 1962;16(2):125.
6. Ekrami O, Claes P, Assche EV, Shriver MD, Weinberg SM, Marazita ML, et al. Fluctuating Asymmetry and Sexual Dimorphism in Human Facial Morphology: A Multi-Variate Study. *Symmetry.* 2021;13(2):304.
7. Dongen SV, Gangestad SW. Human fluctuating asymmetry in relation to health and quality: a meta-analysis. *Evol Hum Behav.* 2011;32(6):380–98.
8. Özener B, Fink B. Facial symmetry in young girls and boys from a slum and a control area of Ankara, Turkey. *Evolution and Human Behavior.* 2010;31(6):436–41.
9. Muñoz-Reyes JA, Iglesias-Julios M, Pita M, Turiegano E. Facial Features: What Women Perceive as Attractive and What Men Consider Attractive. *PLoS One.* 2015;10(7):e0132979.
10. Koehler N, Simmons LW, Rhodes G, Peters M. The relationship between sexual dimorphism in human faces and fluctuating asymmetry. *Proc R Soc Lond Ser B: Biol Sci.* 2004;271(suppl_4):S233–6.
11. Penton-Voak IS, Jones BC, Little AC, Baker S, Tiddeman B, Burt DM, et al. Symmetry, sexual dimorphism in facial proportions and male facial attractiveness. *Proc Biol Sci.* 2001;268(1476):1617–23.
12. Ferrario VF, Sforza C, Ciusa V, Dellavia C, Tartaglia GM. The effect of sex and age on facial asymmetry in healthy subjects: A cross-sectional study from adolescence to mid-adulthood. *J Oral Maxillofac Surg.* 2001;59(4):382–8.
13. Rikowski A, Grammer K. Human body odour, symmetry and attractiveness. *Proc Biol Sci.* 1999 May;266(1422):869–74.

14. Claes P, Walters M, Vandermeulen D, Clement JG. Spatially-dense 3D facial asymmetry assessment in both typical and disordered growth. *J Anat.* 2011;219(4):444–55.
15. Adams DC, Rohlf FJ, Slice DE. Hystrix, the Italian Journal of Mammalogy A field comes of age: geometric morphometrics in the 21 st century. *Associazione Teriologica Italiana.* 2013;24(1):7–14.
16. Brown WM, Price ME, Kang J, Pound N, Zhao Y, Yu H. Fluctuating asymmetry and preferences for sex-typical bodily characteristics. *Proc Natl Acad Sci U S A.* 2008;105(35):12938–43.
17. Pound N, Lawson DW, Toma AM, Richmond S, Zhurov AI, Penton-Voak IS. Facial fluctuating asymmetry is not associated with childhood ill-health in a large British cohort study. *Proc Biol Sci.* 2014;281(1792).
18. Rhodes G, Simmons L. *Symmetry, attractiveness and sexual selection.* Oxford University Press; 2007. p. 333–64.
19. Aitken RCB. Measurement of feelings using visual analogue scales. *Proc R Soc Med.* 1969;62(10):989–93.
20. Gunz P, Mitteroecker P, Bookstein FL. Semi-landmarks in Three Dimensions. *Modern Morphometrics in Physical Anthropology.* 2006;73–98.
21. Mitteroecker P, Gunz P, Windhager S, Schaefer K. Hystrix, the Italian Journal of Mammalogy A brief review of shape, form, and allometry in geometric morphometrics, with applications to human facial morphology. *Associazione Teriologica Italiana.* 2013;24(1):59–66.
22. Slice DE. Geometric morphometrics. Vol. 36, *Annual Review of Anthropology.* 2007. p. 261–81.
23. Klingenberg CP, Mebus K, Auffray JC. Developmental integration in a complex morphological structure: how distinct are the modules in the mouse mandible? *Evol Dev.* 2003; (5):522–31.
24. Klingenberg CP. *Developmental Instability.* 2003;14–34.
25. Caldara R, Seghier ML. The Fusiform Face Area responds automatically to statistical regularities optimal for face categorization. *Hum Brain Mapp.* 2008;30(5):1615.
26. Moreno Uribe LM, Vela KC, Kummet C, Dawson D V., Southard TE. Phenotypic diversity in white adults with moderate to severe Class III malocclusion. *Am J Orthod Dentofacial Orthop.* 2013;144(1):32–42.
27. Moreno Uribe LM, Howe SC, Kummet C, Vela KC, Dawson D V., Southard TE. Phenotypic diversity in white adults with moderate to severe Class II malocclusion. *Am J Orthod Dentofacial Orthop.* 2014;145(3):305–16.
28. Grammer K, Thornhill R. Human (*Homo sapiens*) facial attractiveness and sexual selection: the role of symmetry and averageness. *J Comp Psychol.* 1994;108(3):233–42.

