

IMAGE ANALYSIS IN FACIAL SYMMETRY EVALUATION

Patrik Fiala, Pavel Kasal, Lubomír Štěpánek, Jan Měšťák

Anotace

For an objective view at the attractiveness of a human face, there are several methods evaluating various aspects of esthetic impressiveness used and they are also applied differently. As a starting point, it is possible to use a rule arising from golden ratio and neoclassical canons. An alternative solution consists in symmetry rating which provably pertains to the most significant factors in this respect. Due to the known fact of right and left half face differences, symetrization procedures, for adjustment of which makeup or surgery is used, could be a possible solution. However, a problem arises when deciding which half of a face shall be approximated to the resulting appearance.

Key words:

Image analysis, Facial symmetry, Cephalometric analysis, Face attractiveness

1. Methods

Picture symmetrization: Standardized pictures of 21 students aged 18 - 23 years were taken. It was necessary to artificially symmetrize these originally assymetric faces for the purpose of rating the symmetry of a face. The program Adobe® Photoshop® was used as an instrument. The processing result was a creation of images consisting of three pictures - original, left-sided and right-sided symmetrical ones (Figure 1). Artificially symmetrized portraits were further adjusted by final cropping eliminating particularly hairstyle portrayal.



Figure 1 — Original picture, left-sided symmetrization, right-sided symmetrization

Attractiveness rating: Symmetrized pictures were used as an input for subjective rating made by raters (20 persons of 4 vocational groups in total). Their task was to assess attractiveness of each particular proband, separately for capture of original picture, left-sided and right-sided symmetrization. Each rater rated subjectively and successively which of these three pictures is the most attractive, neutral and the least attractive.

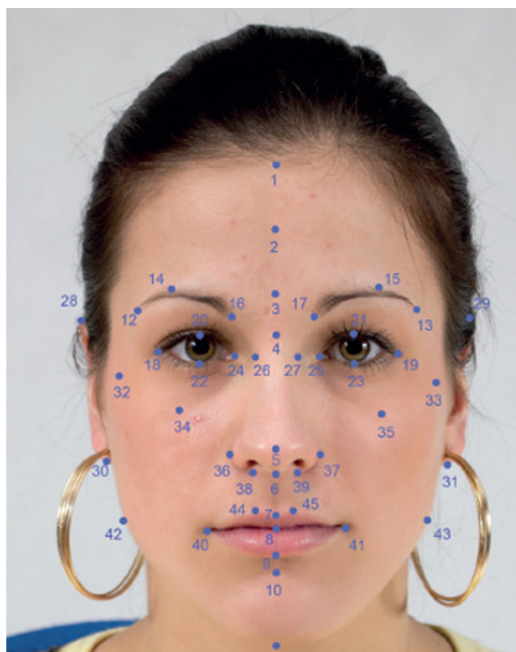


Figure 2 — Facial landmark points used

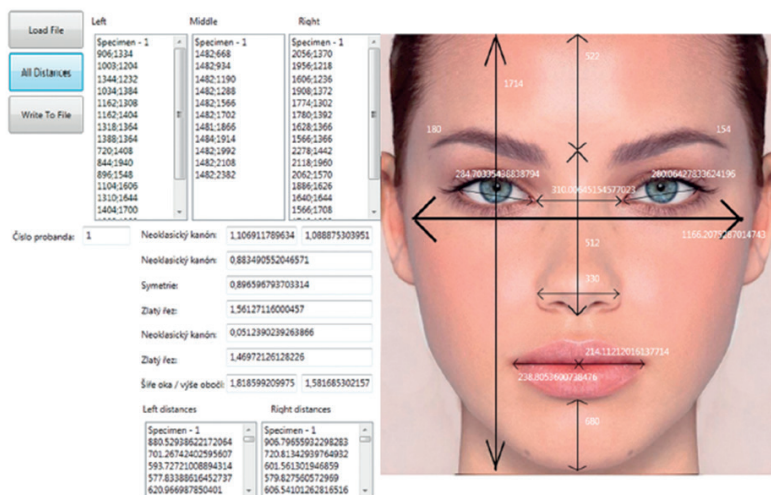


Figure 3 — Program for evaluation of cephalometric data

Cephalometric analysis: Facial landmark points were situated on the pictures (Figure 2). A program for face proportion rating within coordinate system including calculation of subsequent indexes (Figure 3) was developed. There were chosen those face proportion data that are, according to literature, the most significant ones as to the correlation with face attractiveness:

- **Neoclassical canons** (Ratio = 1): 1. Right or left palpebral fissure width/interocular distance, 2. Face width/4x nose width, 3. Forehead height/nose height/lower face height (coefficient of variation is rated)
- **Golden ratio** (Ratio = 1.6): 1. Mouth width/interocular distance, 2. Face height/face width
- **Symmetry** (Ratio = 1): Ratio of both upper lip halves

Relation between rating of left and right symmetrization

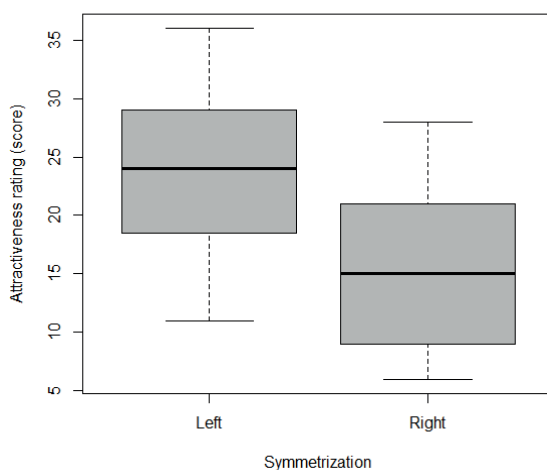


Table 1 — Attractiveness rating in terms of lateralization

2. Results

Laterality rating: The left-sided pictures were rated higher than the originals ($p=0.003$), the right-sided pictures were rated lower than the originals ($p=0.0001$) (Table 1)

Gender of rated persons: As regards the right-sided pictures, males were rated higher ($p=0.015$)

Gender and age of raters: Females rate attractiveness less critically compared to males (Table 2)

Males aged over 30 years rate the original (-asymmetric) pictures of females significantly higher ($p=0.003$)

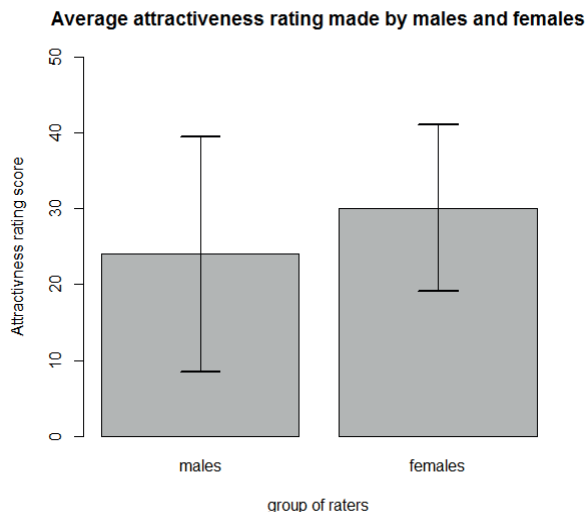


Table 2 — Attractiveness rating in terms of gender of raters

Deviation in aesthetical parameters of our population sample - in comparison with average for Caucasians noted in literature, the following significant deflections related to the assessed parameters were proved in our sample: narrower face, higher forehead, smaller nose, narrower nose, bigger eyes, always with significance higher than $p=0.05$

3. Discussion

A number of factors of attractiveness has been described in literature, both from artistic and anthropological viewpoint [1, 2]. The fact that particular weights of their application are not noticed in most literature creates a difficulty. Overall esthetic impression depends on a combination of these factors with varying degrees of their expression. Moreover, extent of application of a particular factor differs in cases of different somatotypes and their standards are culturally, historically and regionally different.

There are differences in rating with respect to age and gender of raters as described in literature [3]. Such aspect was verified in this work with the aim to particularize interpretation of results. The mentioned fact has really manifested and a significant relation between higher rating of the original picture and higher age of male raters was proven.

There are 37 possible factors of attractiveness - 9 neoclassical canons, 11 symmetry parameters and 17 golden ratios described in total in this work. Only a minimized number including basic horizontal facial structures (always one parameter for eyebrows, eyes, nose, lips and mouth) was used for rating in this work. According to literature, the chosen parameters are the most

significant ones from the perspective of gender of both the probands and raters that are applied significantly in ratings [4].

The results confirm the generally described higher attractiveness of the left side of a face that was manifested in the majority of rated factors. In case of right-sided pictures, the males have unequivocally higher rating, where a probably less emotive look is rated as acceptable in several cases.

The proven shifts of average values with respect to some factors in comparison to published standards are quite surprising. According to the preliminary results, these are particularly bigger eyes, narrower nose and narrower face as compared to the foreign data.

4. Conclusions

1. The program for evaluation of cephalometric data within coordinate system including calculation of subsequent indexes was developed.
2. Standards for quantitative representation of attractiveness factors discovering shift of average values with respect to some factors of the investigated dataset in comparison with published standards.
3. The application of attractiveness laterality was proven as well as influence of age and gender of raters on rating of attractiveness .

Literatura

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Kontakt:

Bc. Patrik Fiala

Doc. MUDr. Pavel Kasal

MUDr. Lubomír Štěpánek

Department of Biomedical Informatics

Faculty of Biomedical Engineering

Czech Technical University, Prague

Tel.: 224358493

e-mail: patrik.fiala@fbmi.cvut.cz

Doc. MUDr. Jan Měšťák, CSc

Department of Plastic Surgery

1st Faculty of Medicine

Charles University, Prague.