

FACIAL PROFILE PERCEPTION OF YOUNG ADULTS BY DIFFERENT EXAMINERS

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Abstract: This study compares the facial profile perception by three groups: dentists, people with background in art (PBA), and laypersons, respectively. The profile photographs of two post-pubertal patients (a female and a male patient) of Caucasian origin were used in order to obtain digital images, modifying the anterior-posterior position of the mandible by one unit (3 degrees of SNB angle). The anterior-posterior position of the maxilla, assessed on cephalometric X-ray by the angle between cranial base and base of the maxilla - SNA angle, was normal and the same for all digital images. The facial profile was analyzed by three groups, aged 20 to 35 years old, who rated each digital image with a score, on a scale from 1 to 8. The most attractive profile, chosen by all three groups in our study, was the normal profile or the slightly convex one, excepting the male laypersons. The most convex male profile and the most concave female profile were considered the least attractive. The most attractive profiles are the ones closer to normal, whilst the most ‘extreme’ positions of the mandible, in anterior-posterior direction, are generally considered the least attractive.

Keywords: profile, esthetics, facial photographs, maxilla, mandibular position.

INTRODUCTION

The soft tissue paradigm has become a leading part in modern orthodontic diagnosis and treatment. It is a matter of the utmost importance and it must be taken into consideration under every circumstance when deciding upon treatment objectives. Facial appearance plays an important role in self-esteem, therefore proportions and harmony of the face are considered among the most important goals of the orthodontic treatment [1]. Nevertheless, the role of lateral facial soft and hard tissue in forensic facial reconstruction is one of utmost importance. Studies have previously highlighted the importance of the appraisal of the overall facial characteristics in terms of shape and contour for the facial models used in forensic facial approximation or comparison [2-8]. The use of linear and angular measurements [9-12], geometric morphometrics [13-14], mathematical models, and many other investigation methods help the facial

recognition process.

Cephalometric analyses are aimed to analyze the hard tissue norms and only secondarily, soft-tissue characteristics. Nowadays, the attention is emerging from the skeleton norms towards facial esthetics which can be very difficult to evaluate because of several factors involved. What is considered attractive can vary by culture, sex, education, age or race and also depends on the historical time [15-25].

In the era of new global migration, the general population characteristics change continuously, the genetic backgrounds varying as well. Esthetic norms that aren't ideal for the orthodontists could be perfectly normal from the layperson's (a potential orthodontic patient) perspective [16]. Also dentists might have a different opinion regarding an well balanced profile, because they are mostly used to evaluate the pleasant facial appearance from the frontal view. Of interest for orthodontists can be the assessment of facial profile by people with background in art (PBA), whose

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professional knowledge includes criteria for facial attractiveness [26-27]. The lip position, soft tissue profile and aspect of the chin are important variables of profile attractiveness, but there are few studies evaluating how these factors can influence the overall facial attractiveness [1,28-33].

Although it appears that across all cultures facial esthetics cephalometric norms are approximately the same, determining which profile is the most pleasant amongst different populations may help orthodontists to establish the treatment objectives in a more accurate way [34,35].

Therefore, the aim of the study was to assess and compare the facial profile perceptions of dentists, people with a background in art (undergraduate students from the last grade of the same university) and laypersons, respectively among the Romanian population.

MATERIAL AND METHODS

Profile photographs and cephalometric X-rays of two patients were used in order to obtain digital images of the profile. The photographs were taken from a standard distance of 2 m, with the head in natural position. The patients were one male and one female, both non-growing young adult persons of Caucasian origin, and both without a history of orthodontic treatment. Their profile photographs were first converted to black silhouettes, so that the respondents'

perception would not be distracted by factors such as skin texture, color or anything else that could defy the aim of our study. Then, the anterior-posterior position of the mandible was modified for each of the two patients, altering it by 3 degrees of SNB angle formed by SN line and NB line, at a time. The anterior-posterior position of the maxilla, assessed on cephalometric X-ray by SNA angle (the angle between SN line and NA line) was in normal range (82°) and remained the same for all digital images. Also, there were no changes made in the vertical plane. Eight profile images were obtained: one of them was the normal profile (SNB-80°), not modified at all, 4 of them were convex profiles (obtained by decreasing SNB angle by 3, 6, 9 and 12 degrees) and 3 were straight/concave profiles (obtained by increasing SNB angle by 3, 6 and 9 degrees). It was considered a normal, well balanced profile, that profile with the cephalometric norms for anterior-posterior position of the maxilla and mandible in a normal range. The program used to obtain the black silhouettes on white background was Adobe Photoshop 5.0 (Adobe Systems Inc., San Jose, Calif.). The digitized images were printed on the same sheet of paper, in random order, with the normal profile in the middle (Fig. 1).

The respondents were divided into three categories: dentists, people with a background in art (PBA) and laypersons. Each group was comprised of 15 male and 15 female respondents, with ages varying between 20 and 35 years. Each respondent was asked

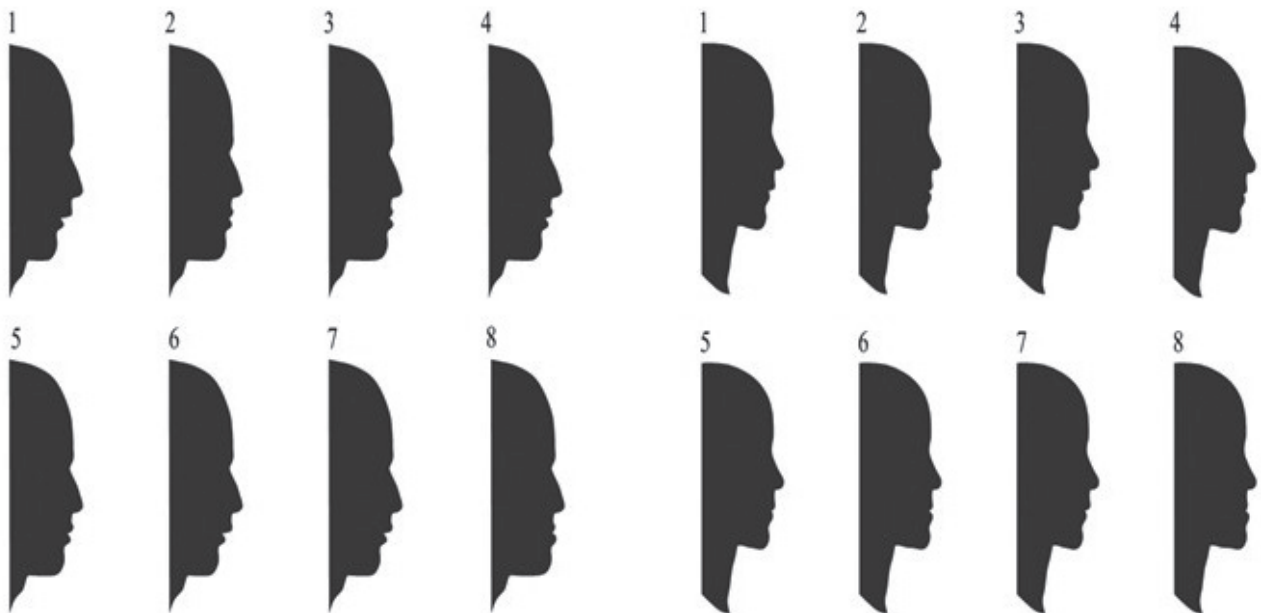


Figure 1. Digital images of male profiles (left): no.1-SNB-12; no.2-SNB+3; no.3- SNB+6; no.4-SNB-3; no.5- SNB; no.6- SNB-9; no.7 – SNB – 6; no.8 –SNB+9 and female profiles (right): no.1- SNB-9; no.2-SNB+3; no.3-SNB-12; no.4—SNB-4; no.5 – SNB; no.6-SNB+6; no.7- SNB –6; no.8-SNB+9.

to state his initials, gender and age, and then to rank the pictures using a visual analog scale (VAS) from 1 to 8, separately for the male and female profiles, where 1 represented the profile the respondent would find the least attractive and 8 the most attractive profile. They were instructed to mark a sign at the corresponding number on the VAS.

Analysis of variance (ANOVA) was used to determine statistically significant differences in mean responses for the facial profile perception among the Romanian young adults depending on image type and gender, respectively. A p-value of 0.05 was considered statistically significant. Statistical analyses were performed using Stata/IC 14 (Stata Corp. 2015. Statistical Software. College Station, TX, USA).

RESULTS AND DISCUSSION

According to the variance analysis, (one-way ANOVA test, $p < 0,0001$) there were statistically significant differences among almost all groups (Tables 1-3).

Thus, the most attractive male profile was considered the normal, well-balanced, profile (male profile number 5) with a normal SNB and a total score of 617 points, that was rated with the maximum score 8 in the highest percentage (44.44%). The least attractive male profile was considered the most convex male profile (male profile number 1) with a SNB value of normal SNB minus 12°, that was rated with the minimum score 1 in the highest percentage (62.22%). The highest mean value score recorded for male profiles

Table 1. PBA^a assessment results

<i>Scheme .</i>		<i>Female art students mean score (SD)</i>	<i>Male art students mean score (SD)</i>
Gender	SNB (°)		
Female	-12	1.53 (0.91)	1.53 (0.91)
	-9	6.6 (1.12)	6.6 (1.12)
	-6	4.73 (1.33)	4.73 (1.33)
	-3	5.93 (1.33)	5.93 (1.33)
	normal	7.06 (1.43)	7.06 (1.43)
	3	3 (1.13)	3 (1.13)
	6	4.4 (1.88)	4.4 (1.88)
	9	2.73 (1.79)	2.73 (1.79)
	-12	3.86 (1.59)	3.4 (1.8)
	-9	5.46 (1.45)	5.53 (1.8)
Male	-6	2.33 (1.49)	2.13 (0.99)
	-3	7.13 (0.83)	6.86 (1.18)
	normal	6.93 (1.4)	6.86 (0.83)
	3	3.26 (0.96)	4.06 (1.66)
	6	5.53 (0.99)	5.4 (1.4)
	9	1.46 (0.74)	1.73 (0.96)

Table 2. Laypersons' assessment results

<i>Silhouette</i>		<i>Female laypersons mean score(SD)</i>	<i>Male lay students mean score(SD)</i>
Gender	SNB (°)		
Female	-12	1.46 (0.91)	1.93 (1.9)
	-9	6.53 (1.3)	5.73 (2.21)
	-6	4.66 (1.91)	4.86 (1.8)
	-3	5.73 (1.22)	5.6 (1.68)
	normal	7.2 (1.01)	6.93 (1.09)
	3	2.73 (1.03)	3.33 (1.63)
	6	4.73 (1.79)	4.46 (1.64)
	9	2.8 (1.37)	3.13 (1.95)
	-12	4.4 (2.19)	3.86 (1.59)
	-9	5.86 (1.95)	5.86 (1.5)
Male	-6	3 (1.64)	1.73 (0.7)
	-3	6.06 (1.75)	6.6 (1.5)
	normal	5.8 (1.78)	7.2 (1.01)
	3	3.93 (1.57)	3.86 (1.24)
	6	5.66 (1.63)	5.06 (1.38)
	9	1.26 (0.59)	1.8 (1.08)

was 7.2 (SD 1.01), that is, for male profile 5, rated by the male layperson group. Generally, except for the male laypersons (who considered the slightly straight male profile number 2 to be more attractive), all groups of examiners generally preferred the normal male profile.

The most attractive female profile was considered the slightly convex profile (female profile number 4) with a SNB value of normal SNB minus 3° and a total score of 606, rated with the maximum score 8 in 34.44 % of cases and score 7 in 36.66 % of cases, in all three groups.

The least attractive female profile was considered the most concave female profile (female profile number 8) with a SNB value of normal SNB plus 9°, rated with the mini minimum score 1 in the highest percentage (64.44%). The highest mean value score recorded for female profiles was 7.2 (SD 1.91), that is, for female profile 5, rated by the female layperson group. Except for the dentists, male PBA and male laypersons (who considered the slightly convex female profile number 4, SNB minus 3°, to be more attractive), all groups

of examiners generally preferred the normal female profile. Also, the female subjects with a background in art considered the normal profile to be as attractive as the slightly convex one.

Out of all three groups, the dentists ranked the normal profiles (female and male profiles number 5, with a normal SNB) with the highest score (grade 8) in the largest percentage (48.33%), followed by the laypersons (33.33%) and the people with a background in art who were close behind with a percentage of 31.66% (Figs 2, 3).

There was no statistically significant difference between the three groups, regarding the maximum score given for the most aesthetic female and male profiles (profile number 5). We did not find any statistically significant difference between the ranking scores given by men and women for the same male or female profile. There was no significant difference in the rank scores for profiles number 2 and 6. However, significant differences were found in the rank scores for the rest of the profiles. Comparisons of rankings

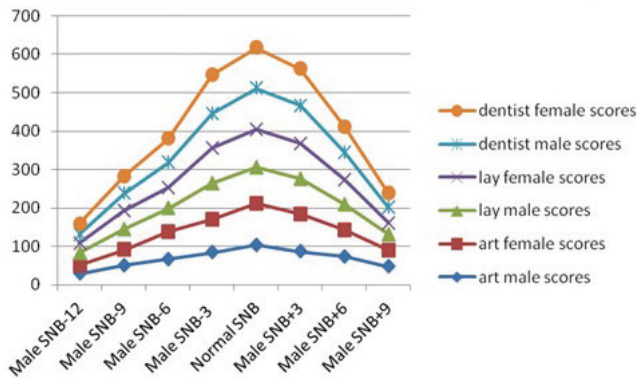


Figure 2. Chart of ranking scores for the male profiles.

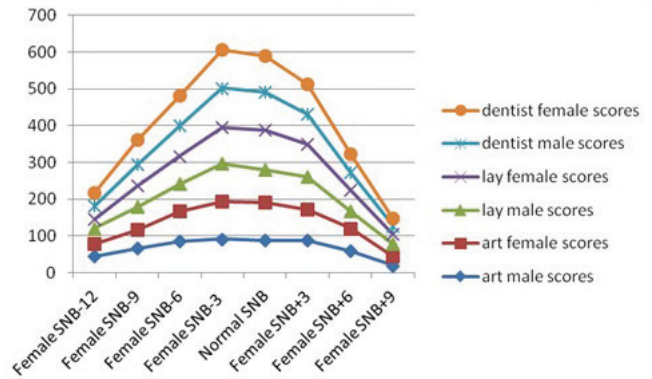


Figure 3. Chart of ranking scores for the female profiles.

Table 3. Dentists' assessment results

Gender	Silhouette SNB (°)	Female dentists mean score (SD)	Male dentists mean score (SD)
Female	-12	1.86 (1.18)	2.06 (1.27)
	-9	6.6 (1.29)	6.53 (1.59)
	-6	4.53 (1.35)	4.4 (1.99)
	-3	6.53 (0.99)	6.26 (1.66)
	normal	7.13 (1.3)	6.2 (1.61)
	3	3.53 (1.3)	3.53 (1.5)
	6	3.86 (1.4)	4.06 (1.98)
	9	2 (1.13)	2.8 (2.04)
	-12	4.06 (2.49)	4.46 (1.45)
	-9	6 (1.43)	5.4 (1.29)
Male	-6	2.86 (1.64)	2.46 (1.18)
	-3	6.8 (1.14)	6.93 (1.83)
	normal	6 (1.46)	6.53 (1.8)
	3	3.06 (1.53)	3.33 (1.44)
	9	2.2 (1.97)	1.4 (1.05)

between the three groups showed that profiles 2, 3, 4, 5, 6, and 7 had differences regarding the lowest ranking score, while profiles 1, 3, 4, 6, 7, 8 showed differences regarding the highest ranking scores.

We specifically didn't choose orthodontists, as examiners, because their answers could be influenced by their training in this field and also because they might "over-evaluate" the facial profiles. In our opinion, the dental professionals don't have the same training as orthodontists do, in this field, and their opinion is more subjective; this was proven by the fact that there was little statistically significant difference between them and the laypersons when considering the most attractive and the least attractive profile. The difference becomes more relevant when comparing the PBA with the rest, as many of them offered a detailed motivation of their choice. The PBA seemed to be the most critical and objective in assessing the silhouettes due to the fact that they are more perceptive to aesthetic details. The same pattern was observed in another similar study, where white orthodontists, dental students, and laypersons demonstrated similar trends in ranking Asian-Chinese profiles [34].

The statistical analysis showed that our respondents did not use scientific criteria to compare the profiles, demonstrated by significant differences encountered between almost all groups and both genders. Although it could have been given the respondents a set of criteria to choose from, because it would have simplified the assessment of the silhouettes. It was chosen not to do that, because we searched for a more subjective and uninfluenced description of the images.

Similarly, to a previous study, we found that sex and education affect the public's profile preferences [15,35]. The soft tissue profile analysis is extremely important for orthodontists because the movement of the teeth on the basal bone may alter the profile, including lip position, nasolabial and labial-mental angles [1]. It was only the anterior-posterior position of the mandible that was modified on the two profiles. The SNB angle was modified by 3° between each of the silhouettes, thus making the difference clear to every respondent. We considered also modifying the anterior-posterior position of the maxilla for a more complete assessment of the aesthetics of the profile [36], but we decided against it because the distinction between the silhouettes would have been harder to establish by the respondents. To achieve the aim of the study we had to simplify the choice by rendering the variables to a minimum.

There was a small statistical difference between the most and the second most attractive profile, this being more obvious when analyzing the scores of the male and female dentists (Table 3) and the male and female PBA (Table 1).

There was also an identical score for the most and the second most attractive male profile analyzed by male PBA (table 1). A larger sample size of respondents may be useful in order to generalize these results in the study population. In comparison with the Japanese population, where a bimaxillary protrusion is considered to have a high attractiveness rate, the results of our study showed that Romanians consider the slightly convex profile to be the most attractive [37]. Meanwhile, a study that compared the perception of Caucasians and Mexican-Americans concluded that the latter ones preferred lips to be less protrusive in females [38]. In a previous study, similar results were reported regarding the attractiveness of Class I profile on Jordanian population, with the objection that the least attractive profile was the skeletal Class II profile, in both male and female profile, a slight Class III being accepted as attractive.

Modarai *et al.*, in an article that studied the ideal facial esthetics of Asian-Chinese profiles evaluated by white persons in a multi-ethnic metropolitan community, all examiners preferred the normal Class I or bimaxillary retrusive profiles in both sexes [38]. In another study regarding the facial profile preferences among various layers of Turkish population, the orthognathic profile in both sexes was selected as the most preferred profile. The public also admired a prominent chin in males [15]. When studying the perception of facial esthetics by native Chinese participants by using manipulated digital imagery techniques, Matoula *et al.* (2006) observed that the native Chinese participants in this sample found that the profile distortions most acceptable were the "flatter", or bimaxillary retrusive distortion, in the male stimulus face [39]. According to Ghorbanyjavadpour *et al.* class I Persian subjects with normal overbite and overjet the more convex (or less concave) profile might look more attractive to Iranian laypersons [40].

In some articles that studied the perception of profile among laypeople, dental students and orthodontic patients, the subjects who perceived their own profiles as being different from average were more likely to be unhappy with their facial appearance and more aware of their dentofacial deformities [41-45].

The patients (laypeople) perception of facial profile is also important for orthodontists in presenting

the treatment plan and the result of the orthodontic treatment. The patients should understand precisely the changes of the facial profile due to the orthodontic treatment, which have to be in accordance with patient chief complaint. Sometimes an well-balanced profile is the result of the association of the orthodontic treatment with the orthognathic surgical treatment and the patients should be informed that their expectations regarding facial profile could not be obtained by orthodontic treatment alone. So, a good correlation between patient profile perception, patient expectations and treatment plan might avoid legal problems after orthodontic treatment.

In conclusion, the results of our study revealed that the most attractive profiles are the ones closer to normal, an well-balanced profile. In light of our findings, it is safe to say that the most 'extreme' positions of the mandible, in anterior-posterior direction, are generally considered the least attractive. We also believe that variation between profile norms in different populations can be quite large, which is why orthodontists need to be able to rely on local data.

Conflict of interest

The authors declare that they have no conflict of interest.

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