

## Perception of facial profile attractiveness by a Saudi sample

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أشارت الدراسات الحديثة في مجال تقويم الوجه والفكين إلى مستويات مختلفة من ادراك الجاذبية الجمالية بين الشعوب والمستويات التعليمية. هدفت الدراسة إلى دراسة الجاذبية الجمالية لمختلف مقاطع الوجه الجانبيه عند عينة من المجتمع السعودي. أجريت الدراسة باستخدام صور وجهية رقمية بدرجات متفاوتة من تقدم الفك وتراجعته وذلك لعينة سعودية مكونة من ١٢٠ فرداً. أظهرت النتائج قيمة عالية لاختبار مصداقية تكرار التقييم بين العناصر. وأشارت النتائج لأهمية كل من عاملي الجنس ( $P<0.05$ ) والمستوى التعليمي ( $P<0.001$ ). بالإضافة إلى إجماع جميع الفئات على اختيار المقطع الوجهي الجانبي ذو الأبعاد المتوازنة ليكون الأكثر جاذبية. بينما الوجه ذو الأبعاد الفكاه المتراجع كان الأقل جاذبية.

Previous studies have reported different levels of perception of attractiveness among different ethnicities and among varying education-level groups on facial profile rating. **AIM:** To study the perception of facial profile attractiveness among Saudi dentists and lay-individuals. **MATERIALS AND METHODS:** Digital facial profile images with altered degree of prognathism and retrognathism were presented to a sample of 60 Saudi dentists and 60 lay-persons with equal gender distribution. **RESULTS:** High reliability of repeated assessment of profile images was detected ( $ICC=0.982$ ). Significant difference in perception of facial profile was found between genders ( $P<0.05$ ) and among the groups with different education backgrounds ( $P<0.001$ ). **CONCLUSION:** General agreement was established in both sample groups on average facial profile to be the most attractive and on the most retrognathic profile to be the least attractive.

### INTRODUCTION

The perception of facial esthetics by a society can influence orthodontic treatment decisions and individual's decision to seek orthodontic treatment. This perception is influenced by cultural, education and exposure to visual familiarity with faces within the society. Facial esthetics is a subjective matter and establishing a standard is difficult. However, assessing society's perception of facial esthetics can help clinicians to determine the most acceptable standards of facial esthetics within the community.

Both orthodontic and orthognathic surgical procedures can have a positive impact on facial appearance and esthetics. Nonetheless, these procedures should be based on cultural perception of facial esthetics and not on norms derived from other populations with different racial backgrounds. Previous studies estimated that 80% of adults seeking orthodontic treatment are motivated by a desire to

improve esthetics regardless of structural or functional considerations.<sup>1</sup>

Establishing agreement among individuals seeking orthodontic treatment is not a convenient process since socially-defined beautiful faces are within wide range of cephalometric measurements.<sup>2,3</sup> Beside lack of references and acceptable criteria, another source of vagueness is the semantic confusion between the professional and common definitions of terms like "acceptable" or "attractive". This confusion is reflected when communicating with patients and/or their parents.

Process of perceiving and judging attractiveness is subjective at best and many factors are involved. Considerable controversy exists over the origin of the perception process. Perception is built from sensory information by associative learning or inherent in the organization of the nervous system.<sup>4</sup> Perception is influenced by a variety of physical, physiological and psychological factors.

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In 1921, Rubin's vase illusion related the frequency of object exposure to its recognition and differentiation.<sup>5</sup> At the physiological level, the central nervous system (CNS) integration is obvious when an individual is deprived of food or sex. This individual interprets ambiguous objects as either.<sup>4</sup> A pattern of perception also was related to personality traits, introversion versus extroversion, demonstrated by Witkin<sup>5</sup> in 1972. Psychological factors were shown to have both negative and positive effects. Depressed individuals view themselves more negatively than non-depressed individuals. Despite that, there was no difference in the judgment of the same individuals by others.<sup>6</sup> Social factors also are found to have an influence in forming and modifying perception.<sup>7</sup>

The emergence of many orthodontic treatment indices accompanied increased awareness of the psychosocial significance of physical attractiveness perceived by self and others. For instance, the most inclusive one is the Dental Esthetic Index, which was formulated on the basis of 200 representative occlusal features rated by 500,000 individuals.<sup>8</sup> However, these indices have created controversy and lack of agreement on esthetic improvement. Moreover, Stricker<sup>9</sup> showed that no current index was capable of predicting the psychosocial significance.

After the introduction of cephalometry, attention has been given to the position of various facial skeletal components and the dentition.<sup>10</sup> However, sporadic attempts were made to include soft tissue elements in profile assessment, such as Ricketts esthetic plane,<sup>11</sup> Holdaway line,<sup>12,13</sup> and Burstone's soft tissue analysis.<sup>14</sup>

Assessment of facial attractiveness can be done utilizing various presentation techniques. The androgynous profile silhouette technique uses shadowed profiles, eliminating other distracting features such as complexion, hair and eyes. In 1993, Czarnicki *et al.*<sup>15</sup> divided lateral

profiles into three main components: chin, lips and nose. Using this technique attractiveness can be exaggerated or accentuated by one component when the others are manipulated. Recently, the digitally manipulated lateral profile photographs are used. It is considered a valid representation of facial attractiveness.<sup>16,17</sup>

Employing digital alteration technique allows investigators to determine facial attractiveness. Differences between orthodontists, maxillofacial surgeons, dentists and lay people in evaluating facial attractiveness have been investigated in different populations.<sup>18-20</sup> Some studies reported agreement on the most attractive profile,<sup>17,20</sup> while other studies showed differences in the perception of facial attractiveness.<sup>21,22</sup>

The aim of this study was to assess the perception of facial profile attractiveness among Saudi dentists and lay-individuals.

## MATERIALS AND METHODS

Sixty dentists and sixty lay individuals were randomly selected to rate computer-manipulated profiles of a male and a female volunteer subjects about their facial profile attractiveness.

Profile images of one male (24 years old) and one female (26 years old) were used. Both volunteers had a pleasant and straight soft tissue profile, with average vertical and horizontal proportions. Standardized cephalographs were collected from both the male and female volunteers. Profile digital photographs were taken using a digital camera (Canon, DiGi PowerShot). The cephalographs were scanned and imported into Dolphin software (Dolphin Imaging and Management, Chatsworth, California).

The profile Images and scanned cephalographs were combined and superimposed. Alterations were made

to simulate different maxillary vertical height and mandibular retrognathic and prognathic relationships. An on-screen gauge was used to track anterior-posterior and superior-inferior movements relative to Frankfort Horizontal reference plane. The positions of the maxilla and the mandible were changed in a 4 mm increment. The 4 mm alteration is based on a previous study showing that orthodontists and lay people are sensitive to changes of 3 mm or more.<sup>17</sup>

Altered profiles, shown in Figure 1 are: maxillary impaction 4 and 8 mm, skeletal open bite 4 and 8mm, mandibular prognathism 4 and 8 mm, mandibular retrognathism 4 and 8 mm. The resulted soft tissue morphology reflected the hard tissue movements calculated according to Dolphin software programmed ratio. Then, areas around the alterations were airbrushed to disguise any signs of alteration or unnatural area especially the lips and cheeks, done by Adobe Photoshop software (Adobe Photoshop CS3, Adobe Systems Incorporated).

The altered profile images were randomly arranged in a Power point presentation (PowerPoint version 2003, Microsoft Office). It included duplicated

18 photographs to test the reliability of the judges. A total of 36 facial profile photographs of the two subjects were shown in a randomized fashion. Each slide had one profile image. Judges were given two pages of a 100 mm visual analogue scale (VAS) shown in Figure 2. VAS represents continuous scoring from 0 to 10 on a blank line without interval marking.



Fig. 2. Showing visual Analogue Scale (VAS) presented to the judges.



F: Female subject, M: Male subject, N: Natural, P: Prognathic, R: Retrognathic, I: Maxillary Impaction, O: Skeletal Openbite

Fig. 3. Bar graph showing the mean score of each profile image when the scores from all the raters were combined.

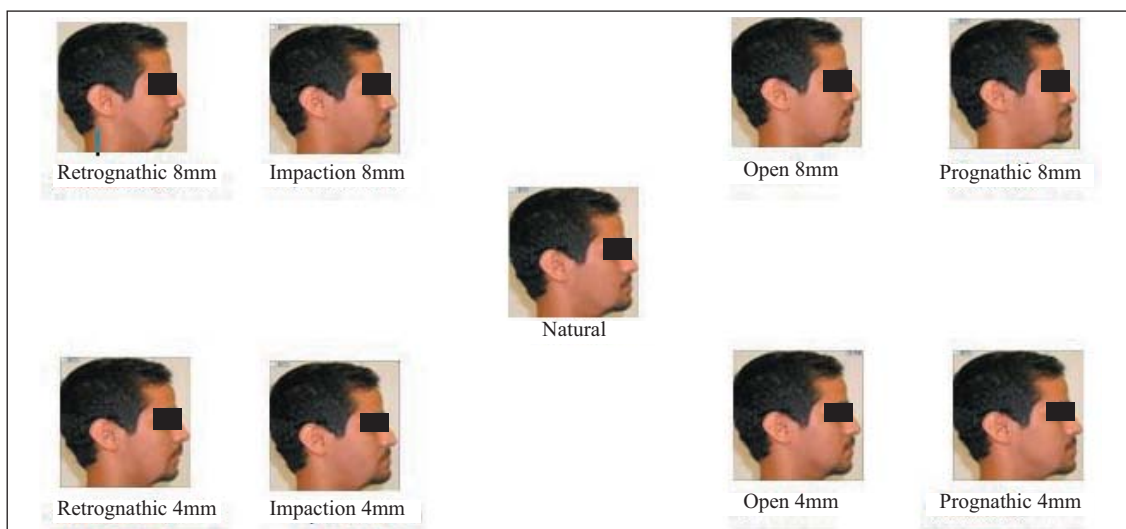


Fig. 1. Original facial profile image and altered profile images of the male subject.

Sample selection of judges was random and stratified into two categories: lay people (30 females, 30 males) and dentists (30 males, 30 females). The dental group was selected to exclude surgeons and orthodontists. The judges were given a short presentation before they proceeded to rate the photographs, emphasizing in the picture rating that there were no correct or wrong answers. Judges were asked to rate each photograph independently and not to return to the previous slide. The raters had no time limit to finish the presentation.

Reliability was tested by using intra-class correlation coefficient (ICC) with 95% confidence interval statistics, two-way mixed, where raters were random and pictures were fixed. Facial attractiveness findings were analyzed by repeated measures analysis of variance (ANOVA). The factors were facial profile, rater gender and education. Age was not considered because the sample age differences purposefully minimal.

## RESULTS

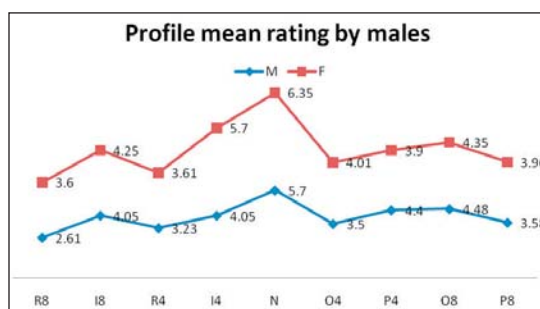
The intra-rater reliability in this study was very high with an ICC of 0.922. Variation in reliability among different groups was tested using Pairwise comparisons. Negligible difference was found (Table 1). Testing different variables affecting the raters perception such as profile of the subjects, gender and education of the raters was tested using ANOVA. There was a significant difference in perception when considering different profiles, gender and education of the raters (Table 2). The average overall rating of different profiles showed that the average unaltered profile was the most attractive (Fig. 3). There was a general agreement of all sample groups on the average facial profile to be the most attractive and on the most retrognathic profile to be the least attractive (Figs. 4, 5, 6,7).

**Table 1.** Reliability of repeated assessment of different groups using intra-class correlation coefficient (ICC).

Group	N	ICC
Overall	120	0.9283
Dental	60	0.9196
Lay person	60	0.9263
Male	60	0.9393
Female	60	0.9133

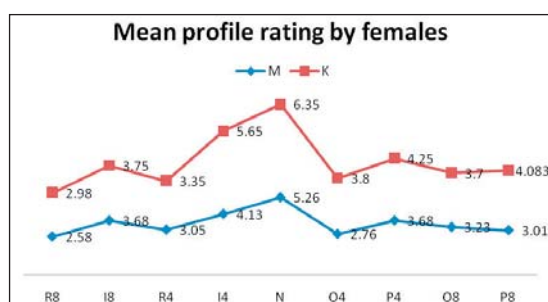
**Table 2.** Summary of Repeated Measures ANOVA

Effect	Degree of freedom	F value	P value
Profile	17	24.908	P<0.001
Profile*Gender	18	2.265	P<0.05
Profile*Education	18	4.317	P<0.001



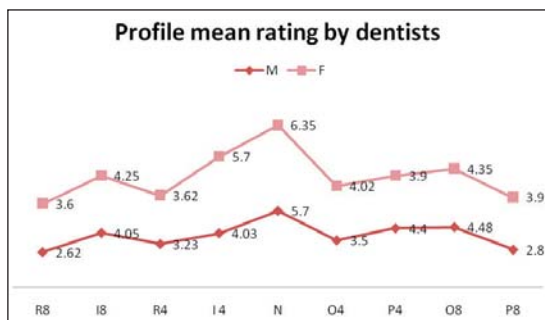
N: Natural, P: Prognathic, R: Retrognathic, I: Maxillary Impaction, O: Skeletal Openbite

**Fig. 4.** Line graph showing the mean rating of profile images by male judges (N=60)



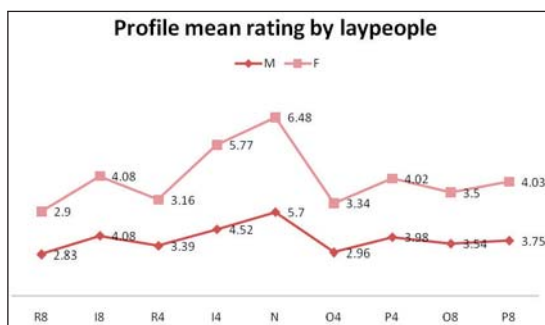
N: Natural, P: Prognathic, R: Retrognathic, I: Maxillary Impaction, O: Skeletal Openbite

**Fig. 5.** Line graph showing the mean rating of profile images by female judges (N=60).



N: Natural, P: Prognathic, R: Retrognathic, I: Maxillary Impaction, O: Skeletal Openbite

Fig. 6. Line graph showing the mean rating of profile images by dental professionals (N=60).



N: Natural, P: Prognathic, R: Retrognathic, I: Maxillary Impaction, O: Skeletal Openbite

Fig. 7. Line graph showing the mean of profile images rating by laypeople (N=60).

## DISCUSSION

### Validity and Reliability

Concerns about validity and reliability of measuring subjective interaction through an objective tool continues to remain unresolved. Personal variations, semantic variations and misinterpretation cannot be eliminated.

Studies showed that using a pool of judges, colored picture slides and VAS provides a valid, reproducible and representative method of rating both dental and facial esthetic.<sup>16</sup> Moreover, VAS allows more freedom in the analysis to be used. VAS allows greater sensitivity and can avoid bias toward preferred values as found with numerical or equal appearing interval scale.<sup>16,23</sup> This study showed

high intra-rater reliability of average measurement (ICC= 0.922). Variation in reliability in different groups was shown in Pairwise comparisons. Negligible difference was found.

### Rating of Facial Profiles

Unaltered female facial profile with average vertical and horizontal proportions ranked first by all groups. This finding agrees with previous studies that found preference for average proportion profiles.<sup>14,24,25</sup> All groups came to agree on the worst profile, which was the 8 mm of mandibular retrognathism in the male subject.

Findings in this study agree with previous studies that Class II is perceived to be unpleasant by different comparison groups.<sup>26-28</sup> Czarnicki *et al.*<sup>15</sup> showed that 62% of their sample judges rated retruded profile to be the least attractive. Moreover, facial profiles with increased facial height were less attractive than those profiles with decreased facial height.<sup>27</sup>

Analysis of variance of the data gathered showed significant difference when different profiles were rated ( $P < 0.001$ ), i.e., different profiles perceived differently. Statistically significant difference in rating of profile images was found between different gender groups ( $P < 0.05$ ) and among groups with different educational background ( $P < 0.001$ ). Education effect in this study was limited to dental training since all sample individuals were bachelor degree holders. In general, professionals gave higher rating when compared to lay people in relation to their pattern. The best perceived profile by dentists scored higher than that of the lay people. They both agreed on the most and least attractive profiles. Agreement between dental professionals and lay people on judgment of facial profile attractiveness has been reported in previous studies.<sup>14,17,27,29</sup>

Many factors might contribute significantly to facial esthetics other than profile outline shape. However, facial profile was found to be the most relevant motivating factor in seeking orthodontic treatment.<sup>30</sup> Attractiveness is the end result of many factors, many of which are not related to profile, such as hairstyle, color and shape of the eyes, color and texture of complexion.<sup>31</sup> Photographs would influence perception of profiles by the presence or absence of these features, which may affect it in either a positive or a negative way. However, photographs allow obtaining a true life judgment of profiles. Also, using single male and single female subjects would minimize variation and act as a control for them.

Individuality can affect picture judgment. Age in this study registered but was not considered. Previous studies found it to alter attractiveness judgment. It has been found that older individuals did not rate youthful faces as attractive.<sup>32</sup> Judges from low socioeconomic status tend to judge profile images less favorably than those from higher status.<sup>16</sup>

## CONCLUSION

This study showed that Visual Analogue Scale is a valid, reliable tool in the assessment of facial attractiveness.

All sample groups judged the average facial profile to be the most attractive and the most retrognathic profile to be the least attractive. Favoring average proportions agrees with previous cross-cultural studies, which found characteristics of average proportions to be attractive.

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