

Original Article

Influence of smile and facial angulations on facial attractiveness: Perceptions of laypersons, dentists and orthodontists

ABSTRACT

Objective: To evaluate the facial profile view perceived as most attractive and whether this attractiveness was influenced in a neutral and smiling face.

Methodology: Sixty participants (20 each of laypersons, dentists, and orthodontists) were chosen for the study. Their facial photos were taken along with professional models' with normal occlusion. Participants were asked to rate self and model photos using the Visual Analog Scale (VAS) based on attractiveness; select most attractive face by looking at panels with 0, 30, 45, 60, and 90 rotated facial photos of neutral and smiling for models and self; select most attractive photo from the combination panels of neutral and smiling photos of self and model.

Results: VAS scores by orthodontists for both neutral and smiling faces for both self and model were more or less similar. Dentists and laypersons found smiling photographs more attractive. The 45 angle was perceived most attractive in self and model for both the neutral and smiling categories separately by all three groups. In the combination category, orthodontist perceived the 0 smiling (model) as the most attractive followed by 45 smiling, whereas dentists and laypersons found 45 smiling photographs most attractive.

Conclusion: The 45 profile view was most preferred by all three groups when assessing self as well as models. Smiling photographs of both self and model are considered more attractive than neutral photographs.

Keywords: Attractiveness, facial profile, perception, smile

INTRODUCTION

Attractiveness of the face and its smile attractiveness are apparently strongly related to each other. It is commonly noted that during social interactions, the direction of attention is focused primarily on the eyes followed by the mouth of the speaker.^[1] The mouth present at the center of the face influences the smile and hence plays a crucial role during facial expressions and also appearance of an individual. An ideal esthetic smile displays the teeth fully and partly the gingiva.^[2] There is a positive acceptance and better behaviors toward attractive faces, and this phenomenon is called the "attractiveness halo".^[3] In the current world,

patients are concerned with the esthetics of their smile which is relevant to an orthodontist to pay attention to. Artists, scientists, and doctors have exhaustively studied the face to try and measure or reproduce facial features, especially those related to beauty. However, clinicians commonly diagnose and analyze the facial esthetics based on reliable static anatomic

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features such as balanced facial ratios and symmetry unlike the perception of facial features of laymen.^[4]

A survey done recently by a popular social networking website revealed that the most preferred angle to take selfie photographs is the 45° rotated profile view, and it was considered as the most attractive.^[5] In the first few seconds of seeing a face, it is determined by most people as to how attractive or beautiful a face is according to various parameters. These parameters are perceived differently by individuals, i.e., perception of a good smile and an attractive face may vary at a layman's perspective. Furthermore, this perception can vary among students pursuing their dental career and also among experienced clinicians especially orthodontists who evaluate ideal faces and profiles for the treatment on a daily basis in their practice. A visually attractive or pleasing face also garners a longer attention span when viewed from the various profile views as compared to a neutral face.

Keeping these factors into consideration, the following study aims to evaluate the profile view in which the face is perceived at most attractive and also whether this attractiveness is influenced in a smiling and expressionless neutral face. Furthermore, how this perception varies among laypersons, dental students, and orthodontists.

METHODOLOGY

This study was approved by the Institutional Ethical Committee (MRDC/IEC/2018/03). Sample size estimation was done by using GPower software version 3.0, Heinrich-Heine-University, Dusseldorf, Germany. Sample size was estimated for Mean: Wilcoxon signed-rank test (matched pairs) was chosen. A minimum total sample size of 60 participants (20 in each group, i.e., orthodontists, laypersons, and dentists) was found to be sufficient for an alpha of 0.05, power of 95%, 0.7 as effect size (assessed for difference in Visual Analog Scale (VAS) scores for neutral and smiling face for self and models) from the pilot study. Therefore, sixty participants without visual impairment were chosen for the study (20 laypersons, 20 dental students, 20 orthodontists each of the groups were equally divided into 10 males and 10 females). Participant's informed consent was obtained to use their facial photos for the study. The laypersons were randomly selected from among the teaching staff of various courses at the university not related to dentistry. The dentists were students pursuing their final year or internship of their bachelors of dental surgery degree. The orthodontists group were required to have a professional degree of postgraduation with masters

in orthodontics and dentofacial orthopaedics. In addition, professional models with no malocclusion voluntarily agreed to provide their facial photos as model photos. The inclusion criteria included all patients above the age of 18 years with no adverse skeletal malocclusions and no history of previous dental treatments or facial surgeries. The exclusion criteria included patients with syndromes, debilitating malocclusions, congenital disorders (cleft lip and palate), previous history of facial trauma/illness, or with history of orthodontic/orthognathic treatment.

Standardized photographs of the face of the participants and professional models without any facial makeup (two males and two females) were taken against a white or light background free of shadows and distractions. Quality lighting revealing facial contours. Horizontally rotated facial angles of 0° (frontal), 30°, 45°, 60°, and 90° (lateral profile). Photographs were taken using a Digital Camera (Canon™ PowerShot SX540HS 20.3), with shutter speed 1/125, Aperture of f4.0 and ISO 3200, 50 mm focal length. The camera was set on a tripod positioned 1 m away and at the level of the participant's head parallel to the floor. The images were standardized using PhotoEditor™ (Google®), and panels are developed for the study.

For the first task, the participant's photographs of their neutral face and smiling facial views at angles from 0° to 90° were arranged randomly and presented in a circular format, and the same is done with the model photographs.^[6] Participants were then asked to rate the overall neutral and smiling panels of self and models using a VAS [Figure 1a]. For the second task, both the neutral and smiling facial views comprising the participant's photographs along with the model photos were made. The neutral and smiling face is individually labelled 1–5 and is arranged in a linear manner. The participants were asked to choose the one most attractive photograph of their self-panel as well as model photographs [Figure 1b]. For the third task, a combined panel with a mix of neutral and smiling faces of both the self and model photographs separately. The participant was asked to choose the single most attractive face out of the panels of self and model photos [Figure 1c].

Statistical analysis

Data were analyzed using the Statistical Package for the SPSS software version 21, IBM, Bangalore, India. Categorical variables were summarized as frequency. VAS scores were summarized as means and standard deviation inferential statistics were done by using Kruskal Wallis, Mann–Whitney U, and Wilcoxon test. The level of statistical significance was set at 0.05.

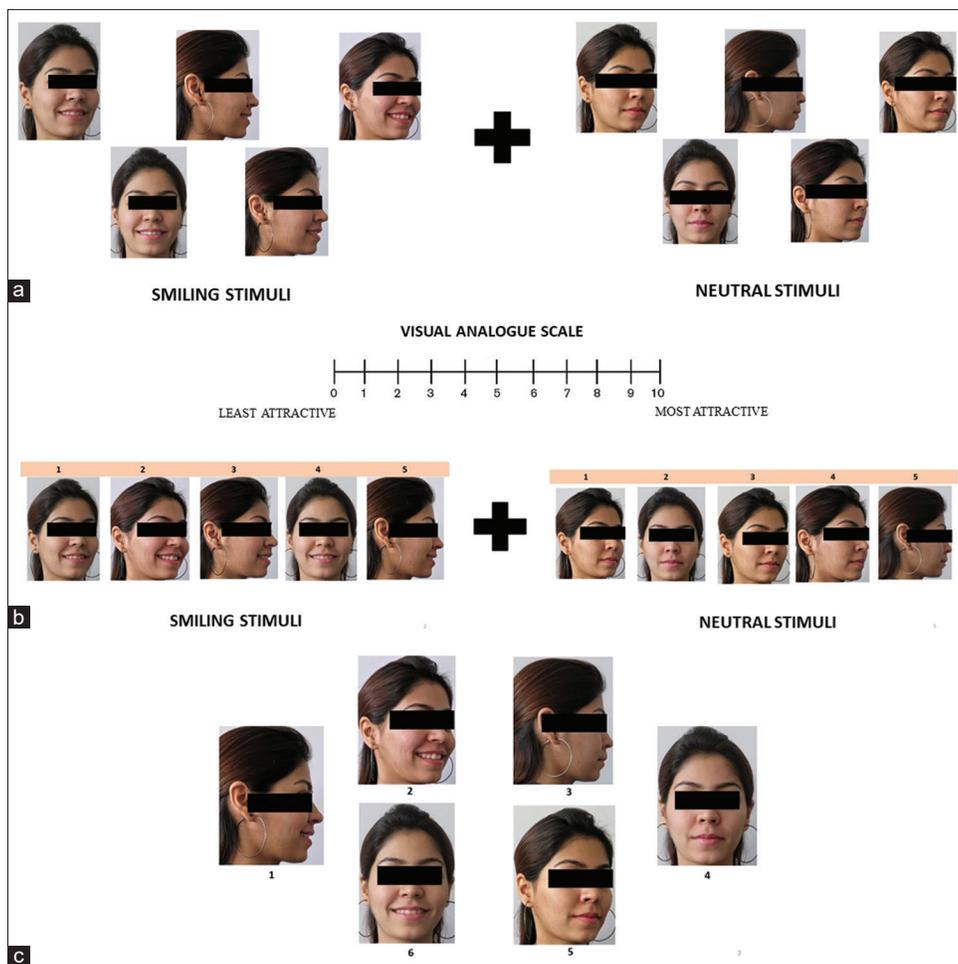


Figure 1: (a) Task 1: Overall panel arranged in the random order for Visual Analog Scale measurement (b) Task 2: Panel arranged in the linear order for choosing one most attractive photograph (c) Task 3: Panel arranged in combination of neutral and smiling photographs in the random order for choosing one most attractive photograph

RESULTS

Ratings of overall facial attractiveness by all three groups (Task 1).

When self and model VAS scores were rated by dentists and laypersons and compared for neutral and smiling faces, ratings were found to be significantly high for smiling faces in both cases ($P < 0.0001$), whereas for orthodontists, the results were not statistically significant [Figure 2].

Ratings of most attractive profile view of neutral and smiling photographs of self and model by all three groups (Task 2).

When orthodontists assessed their self-neutral and smiling photographs, the 45° profile view was selected to be the most attractive in both the cases ($P < 0.0001$ for both neutral and smiling). Similar assessment by dentists ($P = 0.092$ for neutral and <0.0001 for smiling) and laypersons ($P = 0.158$ for neutral and <0.0001 for smiling) both selected the 45°

profile view photograph to be most attractive in their neutral and smiling photos [Figure 3a].

While assessing the models, the orthodontists found the 45° profile view to be most attractive in both the neutral and smiling photographs ($P = 0.037$ for neutral and <0.0001 for smiling); dentists found 0 the degree neutral ($P = 0.158$) and 45° smiling ($P = 0.002$) attractive and laypersons found the 45° profile view most attractive in both neutral and smiling photographs ($P = 0.11$ for neutral and <0.0001 for smiling) [Figure 3b].

Ratings of most attractive profile view of combination of neutral and smiling photographs of self and model by all three groups (Task 3).

The dentist perceived the 45° smiling (self) as the most attractive followed by 0° smiling and 90° smiling in the decreasing order. These differences were found to be statistically significant ($P = 0.027$) [Table 1a]. However, orthodontist

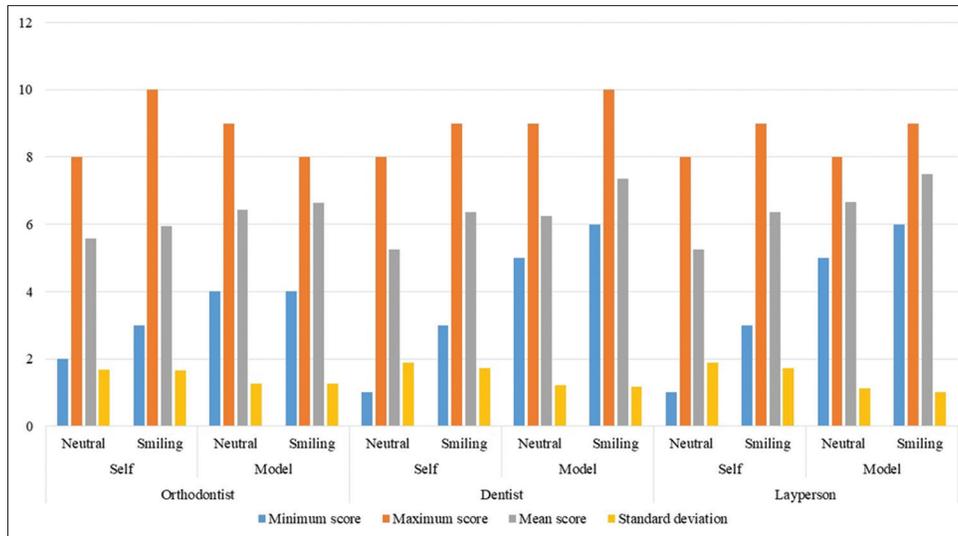


Figure 2: Task 1: Visual Analog Scale scores by three groups for self and model (neutral and smiling)

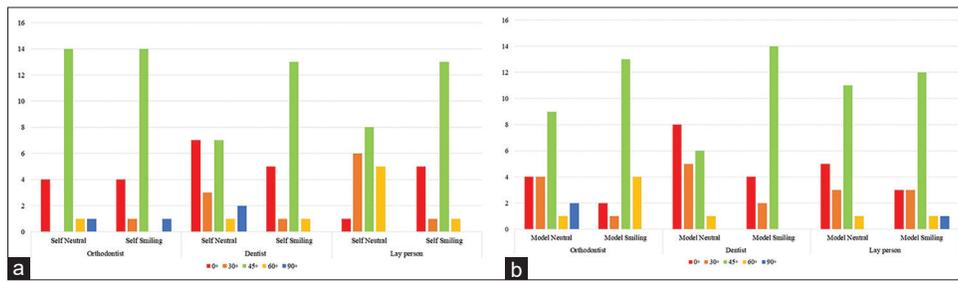


Figure 3: (a) Task 2: Most attractive angulation of self-neutral and smiling photographs by the three groups (b) Task 2: Most attractive angulation of model neutral and smiling photographs by the three groups

perceived the 0° smiling (model) as the most attractive followed by 45° smiling and 0° neutral in the decreasing order. Furthermore, layperson perceived the 45° smiling (Model) as the most attractive followed by 0° smiling and 90° smiling in decreasing order. These differences were found to be statistically significant ($P = 0.016$ and 0.004 , respectively) [Table 1b].

DISCUSSION

Various articles have been published evaluating facial attractiveness on the basis of photographic views and smile. However, not many of these have documented literature on how perception of this attractiveness can vary with smiling and neutral faces and among laypersons, dentists, and orthodontists. Therefore, the present study was planned with the aim of evaluating the facial attractiveness in neutral and smiling faces in different profile views and the difference in perception among laypersons, dentists, and orthodontists.

Peck and Peck^[6] explained in their study on facial esthetics that sociology and psychological studies have helped in asserting that most esthetic judgements are now transitioning from just a visual feeling to a more detailed visual perception of

individuals. Also while studying features of the face, more significant than the esthetic stimulus is the esthetic response to the stimulus seen in the perspective of the observer. While perception is defined by psychologists as “a single, unified awareness derived from sensory processes when a stimulus is presented,” esthetic attitudes vary among different individuals due to “selective conditioning,” i.e., people often are judgmental presumptively when assessing faces.^[6] The VAS was used to understand the viewpoints of all the three groups and compare their views on an attractive face when asked to rate photographs of self and that of professional models.

It is known that the presence of malocclusion affects psychologically and may influence self-perception of facial attractiveness and/or facial esthetics. Hence, to further validate an ideal diagnosis in esthetic treatments, the objective morphological features of the face should be viewed from different photographic views and the subjective perceptions should be made according to the malocclusion of the individual.^[7] As orthodontists we must always ask ourselves if the finishing of cases is done with absolute facial harmony or only a stable occlusion of the patient.

Table 1a: Task 3: Most attractive angulation in the combination panel of smiling and neutral photographs of self

	Self-frequency (%)		
	Orthodontist	Dentist	Lay person
0° neutral	1 (5.3)	0	0
0° smiling	4 (21.1)	6 (30.0)	6 (30.0)
30° smiling	0	3 (15.0)	3 (15.0)
45° neutral	4 (15.8)	0	0
45° smiling	8 (42.1)	10 (50.0)	8 (40.0)
60° smiling	1 (5.3)	0	3 (15.0)
90° smiling	2 (10.5)	1 (5.0)	0
Total	20 (100.0)	20 (100.0)	20 (100.0)
P	0.051 (NS)	0.027 (S)	0.308 (NS)

S: Significant, NS: Not significant

Table 1b: Mask 3: Most attractive angulation in the combination panel of smiling and neutral photographs of model

	Model frequency (%)		
	Orthodontist	Dentist	Lay person
0° neutral	2 (10.5)	0	0
0° smiling	12 (63.2)	6 (30.0)	8 (40.0)
30° smiling	0	4 (20.0)	1 (5.0)
45° neutral	0	0	0
45° smiling	6 (26.3)	10 (50.0)	10 (50.0)
60° smiling	0	0	0
90° smiling	0	0	1 (5.0)
Total	20 (100.0)	20 (100.0)	20 (100.0)
P	0.016 (S)	0.247 (NS)	0.004 (S)

S: Significant, NS: Not significant

In the first task, it was observed that all three groups rated themselves lower when compared to the models photograph on the VAS. The low scores could be due to the participants' desire to improve their dental or facial appearance with orthodontic treatment which many of them expressed after the tasks were completed by them. All three groups also scored the smiling photographs higher than the neutral ones. According to van der Geld,^[8] the perception of one's own attractiveness, especially when smiling there is a slight difference between the parts of the whole picture.

The perception of one's own photograph is influenced psychologically since the area of the mouth, lips, and teeth have an important role in one's emotional perception, especially in adults. Van der Geld further explains that psychologically speaking, there are two important dimensions to explore in the self-perception of smile. The first dimension explains that the perception of one's own smile will be influenced to an extent by the opinions of the subjects' peers as well as what is considered to be socially acceptable. The dimension of social psychology is related to the long history of one's culture. With the constant change in cultures and beliefs, what is termed or perceived as attractive will also be in transience.^[8]

Second, the dimension of personal satisfaction with one's appearance will play a major role in the perception of attractiveness. This perception arises internally from an individual which is born out of their own experiences or the personality psychology. Some theories related to attractiveness also assume that they can be influential when judging or assessing other people. A persons own behavioral traits may also be influenced by another's level of attractiveness as perceived by them.

For the second task, it was seen that for both the neutral and smiling photos of self, the most commonly selected profile view for attractiveness was the 45° profile view followed by the 0° profile. Kim *et al.*^[9] in their eye tracking study for photographic views and perception of attractiveness discussed that when faces are presented in different angles and with a smile, the fixation of time for these photographs is increased when evaluating faces other than self. They also noticed that the visual attention was more for the slightly rotated photographs, i.e., the 30°–45° angles. This may have an indication that morphologically, features of a slightly rotated face may be detrimental to ideal esthetics of an individual.

Bruce *et al.*^[10] published in the journal of applied cognitive psychology way back in 1987 about what was the basis of the 3/4th view in the recognition of face. They concluded that faces which are rotated laterally had better chances of recognition and are generally also more preferred. They felt that the 45° face had two advantages, i.e., they give information of two dimensional features of the front face as well as three dimensional features of the laterally seen profile. In Kim's study,^[9] they found that during evaluation, the attention was initially drawn to the 0° front face but when assessing objectively, subconsciously subjects preferred the laterally rotated face. This could also explain why some dentists in our study found the 0° profile as being attractive for the model.

We observed in our study certain orthodontists rating the 90° faces of self and model attractive. In Kim's study, although the 90° face received minimal visual attention during eye tracking, they explain that orthodontists and oral surgeons are the ones who most commonly use lateral cephalograms and 90° profile photographs for the diagnosis and treatment planning of various malocclusions. These are the gold standards in determining ideal face esthetics, especially in cases which require some form of functional treatment or even, orthognathic surgery. This could be the reason why the 90° was selected as attractive by a few. Even then, orthodontists utilize the 45° smiling face photograph for esthetic evaluations commonly; hence, one can say that a diagnosis which is based only on the lateral profile may not

be accurate for the ideal treatment planning and assessing overall what would be the best suited plan for the patient.

For the third task, participants were asked to choose the single most attractive face from a combination panel of 0°, 45°, and 90° photos with a mixture of neutral and smiling faces of both the self and model photographs. Overall rating of self (both smiling and neutral) by orthodontist and layperson was not found to be significantly different among different profile views of smiling and neutral photographs, although the 45° smiling photograph seemed to be highly preferred by all three groups. This puts one into question whether laypersons in general share the same disagreement with orthodontists when it comes to esthetic preferences of the face? Wendell Wyle^[11] had stated that the opinion of laypersons to facial esthetics and profile is as good or better than that of orthodontists since they are not conditioned by the norms and ideals of orthodontic literature. Studies in sociology support this statement saying that the general population is remarkable in judging facial esthetics of oneself.

Fagan^[12] had suggested that 3/4th or 45° profiles reveal more clearly the features useful for recognition and memory when compared to full-face views or profile photographs. Since the 3/4 view shows maximum number of the facial features, it is hence more likely to be better remembered than faces which are presented in similar or slightly different views.

Laypeople generally tend to observe dynamically the appearance of others in everyday, and smile is one of the most dynamic motions used for facial expressions.^[13] The ratings for smiling faces were generally found to be higher than the neutral ones when evaluating facial attractiveness. The subjective responses for 0° smiling face were noticed to be highest for the model faces. This implies that a dentally attractive face when smiling maybe influential in the perception of facial attractiveness.

Limitations

- The perception of attractiveness was to be evaluated using only photographs at various profile views. When using dynamic photographs emotional features can be better evaluated and the facial attractiveness can be judged in a better manner
- Dynamic photographs are not commonly used in practice and facial attractiveness studies from other studies using videos showed to be more or less same to static images^[14]
- In addition, the facial views which are presented may influence how the different parts of the face contribute to the overall facial characteristics.^[15]

CONCLUSION

- Orthodontists VAS scores for both neutral and smiling faces and for both self and models were more or less similar. The 45° profile view was perceived most attractive in self and model for both the neutral and smiling categories separately. In the combination category, orthodontist perceived the 0° smiling (Model) as the most attractive followed by 45° smiling
- Dentist VAS scores for both neutral and smiling faces for both self and model found that smiling faces were rated higher in both the categories. The 45° profile view was perceived most attractive in self and model for both the neutral and smiling categories separately. In the combination category, dentist perceived the 45° smiling (Self) as the most attractive
- Layperson VAS scores for both neutral and smiling faces for both self and model found that smiling faces were rated higher in both the categories. The 45° profile view was perceived most attractive in self and model for both the neutral and smiling categories separately. In the combination category, dentist perceived the 45° smiling (Model) as the most attractive
- One must always keep in mind the esthetic preferences of both the patients and their parents/guardians before we go into treatment planning instead of working around the stereotypical norms or ideals we have in our minds.

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Conflicts of interest

There are no conflicts of interest.

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