

# Beauty And The Eyes Of The Beholder: Comparing The Perception Of Professionals And Non Professionals To Altered Dental Esthetics

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## Abstract

**Introduction:** The smile appearance and final facial profile is often dramatic to individuals perception of the beautiful face and the position of the mandible is the characteristic of the patients inherent underlying bony pattern and is difficult to alter during treatment, so, it may be beneficial to consider the balance between the incisal inclination and different mandibular sagittal positions. The study aims to find out the preferable maxillary incisor inclination in the smile profile of a female subject with respect to altered mandibular positions and to elucidate whether the rater's profession plays a role in assessment of optimally esthetic facial profiles. **Methods:** A smiling profile photograph of a female patient with average facial profile was altered artistically to obtain 3 different mandibular positions in decrements, normal and increments of 4 mm and in each positions the incisors inclinations have been altered to different positive and negative inclinations. A total of 37 evaluators including panel of Professionals and Non-professionals were asked to score each photograph using a Likert-type scale. Mann-Whitney and Kruskal-Wallis tests is done for statistical analysis. **Results:** In retruded mandible normal incisor inclination is favoured by the Professionals and +5° incisor inclination by the Non-professionals. In orthognathic mandible +5° of incisor inclination is favoured by Professionals and +10° by Non-professionals and in protruded mandible normal incisor inclination is favoured by Professionals and +10° by Non-professionals. **Conclusions:** There is a youthful quality of establishing a slight protrusive maxillary denture for a woman in cases of mandibular deficiency or excess.

**Keywords:** Smile, Facial Profile, Maxillary Incisor Inclination

**Introduction:** Esthetic improvement makes a profound contribution to a person's desire to seek orthodontic treatment. In fact 80% of adults undergoing orthodontic treatment are often motivated by a desire to improve appearance regardless of functional considerations.<sup>1</sup>

The mouth is a key feature in facial attractiveness and a smiling profile assessment is an integral part of a complete orthodontic diagnosis and treatment planning.<sup>2</sup>

In orthodontic literature, buccolingual inclination of the maxillary incisors play a major role in the profile smile attractiveness. For improving the perception of most proper position of the maxillary anterior teeth, various profilometric studies have been conducted but with normal mandibular positions.<sup>2,3,4</sup> Moreover the position of the mandible is the characteristic of the patients inherent underlying bony pattern and is difficult to alter during orthodontic treatment, so, it may be beneficial for clinicians to consider the balance between the incisal inclination and different mandibular sagittal positions. The objectives of the present study is to find out the preferable

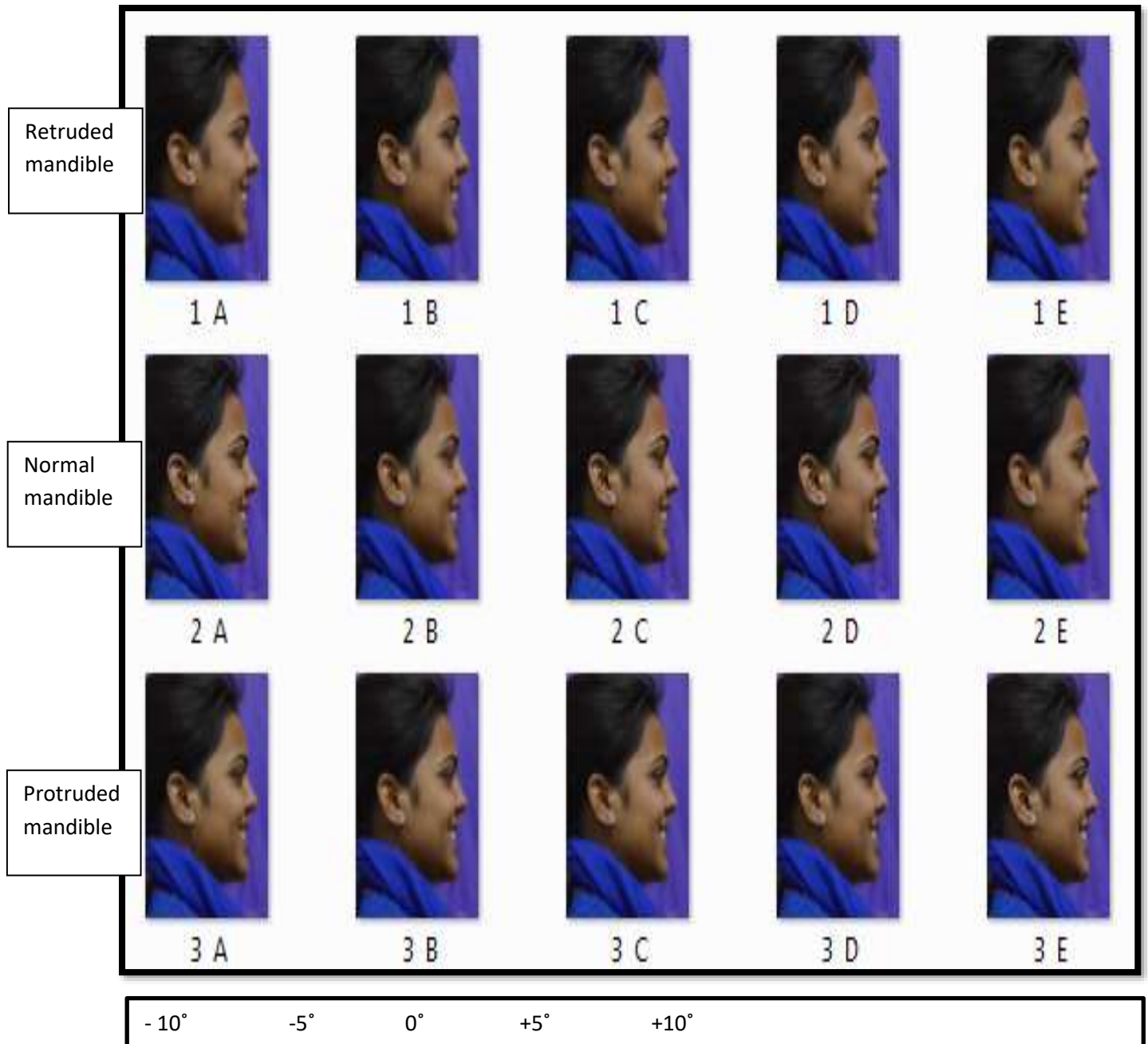
maxillary incisor inclination in the smile profile of a female subject with respect to altered mandibular positions and to elucidate whether the raters profession plays a role in assessment of optimally esthetic facial profiles.

**Material and Methods:** A treated female orthodontic patient of age 21 years was chosen from the patients treated in the department of orthodontics at MMCD SR, Mullana based on the following cephalometric and clinical criteria. 1) Class 1 occlusion with adequate overjet and overbite. 2) well positioned maxillary incisors according to cephalometric standards. 3) soft tissue cephalometric analysis ( Merrifield's z - angle and Rickett's E-line) within normal range, and 5) Facial angle and H-angle as described by Holdaway and nasolabial angle and maxillary lip angle as described by Arnett and Bergman within normal range. Informed consent was taken from the patient for her participation in the study and the results of the study was kept blind from the patient.

A right lateral profile photograph of the patient in natural head position and with a blue background was taken at a distance of 1.5 m from the camera (Nikon DSLR) under standard conditions. Two images was captured of the subject with one in a neutral facial expression and another with the subject in a posed smile. A 100-mm ruler was fixed above her head as a guide for computer aided alterations. The use of alterations of 1 subject has been shown to be successful in studying variations in dental appearance.<sup>4,5</sup>

A commercially available image editing software program (Adobe Photoshop CS version 8.0) was used to alter the anteroposterior position of the mandible. The mandibular prominence of the patient was altered in decrements and increments of 4 mm to represent retrusion and protrusion. 3 profiles of the patient (retruded, normal, and protruded) were created keeping the vertical height of the constructed face constant. These were named as group 1, 2, and 3 respectively.

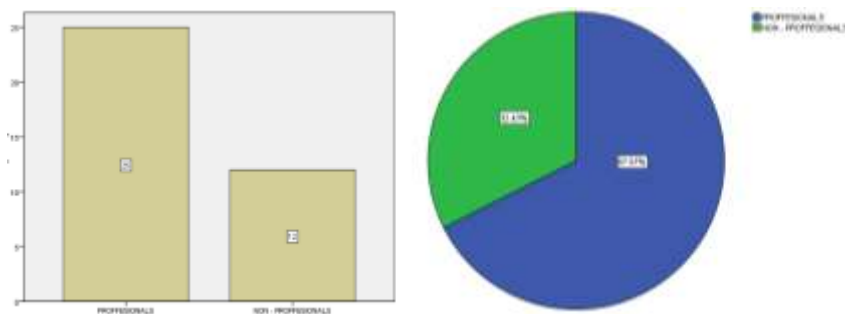
In the next step, each of the three above groups were subdivided into 5 subgroups by altering the inclination of the maxillary incisors in 5 degrees decrements and increments, and 2 modifications were produced to represent retroclined and 2 to represent proclined incisors to obtain five photographs. Artistic editing was done in each altered photographs to maintain natural appearance.



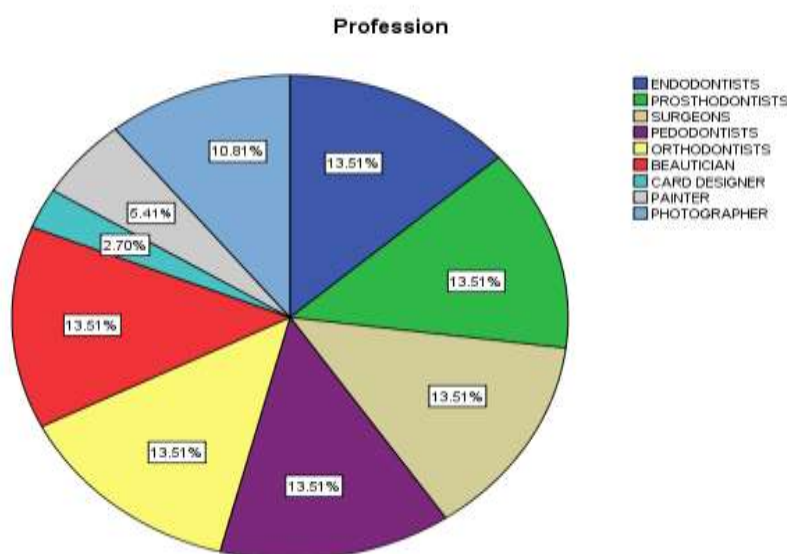
**Fig 1: Three sets of modified images of same patient with different mandibular positions and different incisor inclinations**

Each of the sets of the images were printed on a glossy paper (Digital plus) with a Photo Smart printer (Epson) in a 15 X 20 cm size format and was randomly arranged in a binder.

The rating panel comprised of two groups of 37 raters (25 Professionals and 12 Non Professionals). The Professional panel (25) consisted of 5 Endodontists, 5 Prosthodontists, 5 Maxillofacial Surgeons, 5 Pedodontists, 5 Orthodontists (all of whom worked in the college of dental sciences in Mullana). The selection criteria for Non-professionals (12) consisted of Photographers, Beauticians, Painters and Card Designer.



## PANEL GROUPS AND PROFESSION



Each of the judges were asked to be seated in the same lighting conditions and received the profile photographs in 3 sets (Retruded, Normal and Protruded mandible).

All the judges were instructed about the rating scale and images were not shown to them at the beginning. A Likert-type scale was used for rating the photographs because it is largely accepted in the psychology literature as the most useful rating method.<sup>6,7,8</sup> No information was shared with the panel about the images they were about to see, except that the subject was female. The judges viewed all the photographs at first and then began to rate the photographs. They were not allowed to return to previously rated photograph as they progressed through the binder. Each member of the panel was asked to rate the photograph on their perception of attractiveness. Photographs in each set were randomized according to a random number table and a questionnaire was prepared for rating the profile images based on the Likert – type scale.<sup>6</sup> All the panel members were asked to evaluate the photograph in each set at the same session and assign a score from 1 to 5: 1, very attractive; 2, attractive; 3, neither attractive nor unattractive; 4, unattractive; and 5 for the most unattractive profile. The raters were asked to assign each score to only one profile in each set and separately for different positions of the mandible.

**Statistical analysis:** The Standard deviation (sd) and mean for each photograph were calculated based on the scores given by each rater. Additionally, the standard deviation and mean of each photograph were calculated independently based on professional group as described in fig 2,3 and4 for Group 1 (retruded mandible), Group 2 (normal mandible) and Group 3 (protruded mandible) respectively.

The Mann-Whitney test was used to compare the rankings of images between the Professional and Non-professional groups. The Kruskal- Wallis test was used to compare the rankings of images between the individual Professional groups.

**Results:** Thirty seven raters (25 Professionals and 12 Non-professionals) participated in the study. No significant differences between Professional and Non-professional panel for Group1 (retruded mandible) and Group2 (normal mandible). The statistical analysis showed that in Group3 (protruded mandible) a significant difference was found for the ranking of image 3B (-5° of incisor inclination).

In Group1 (retruded mandible), the normal incisors (image 1C) is preferred as the most attractive by the panel group Professionals and +5° of incisal inclination (image 1D) is preferred by the panel group Non-professionals. (fig5)

In Group2 (orthognathic mandible), the +5° of incisal inclination (image 2D) is preferred as the most attractive by the panel group Professionals and +10° of incisal inclination (image 2E) is preferred by the panel group Non-professionals.(fig6)

In Group3 (protruded mandible), the normal incisal inclination (image 3C) is preferred as the most attractive bythe panel group Professionals and +10° of incisal inclination (image 3E) is preferred by the panel group Non-professionals. (fig7)

The Kruskal Wallis test comparison suggests that the most proclined incisors are preferred over the retroclined incisors for the Surgeons, and least for the Endodontists and Pedodontists in all three altered mandibular positions. (Fig 8)

Group 1- Retruded mandible

**Group Statistics**

	PANEL GROUP	N	Mean	Std. Deviation	P VALUE
A	PROFESSIONALS	25	3.04	1.399	.428
	NON PROFESSIONALS	12	2.67	1.155	
B	PROFESSIONALS	25	2.68	1.345	.539
	NON PROFESSIONALS	12	3.00	1.706	
C	PROFESSIONALS	25	3.00	1.500	.373
	NON PROFESSIONALS	12	2.50	1.732	
D	PROFESSIONALS	25	2.72	1.275	.229
	NON PROFESSIONALS	12	3.25	1.138	
E	PROFESSIONALS	25	3.56	1.502	.963
	NON PROFESSIONALS	12	3.58	1.240	

Fig 2 (mean and standard deviation for retruded mandible Group1)

Group 2 – Normal mandible

**Group Statistics**

PANEL GROUP	N	Mean	Std. Deviation	P value
A PROFESSIONALS	25	3.12	1.236	.328
NON –PROFESSIONALS	12	2.67	1.435	
B PROFESSIONALS	25	2.20	1.258	.396
NON –PROFESSIONALS	12	1.83	1.115	
C PROFESSIONALS	25	3.88	1.130	.612
NON –PROFESSIONALS	12	3.67	1.303	
D PROFESSIONALS	25	3.04	1.428	.929
NON –PROFESSIONALS	12	3.08	1.240	
E PROFESSIONALS	25	2.76	1.562	.065
NON –PROFESSIONALS	12	3.75	1.288	

Fig 3 (mean and standard deviation for normal mandible Group2)

Group3 – Protruded mandible

### Group Statistics

PANEL GROUP	N	Mean	Std. Deviation	P value
A PROFESSIONALS	25	2.60	1.225	.674
NON – PROFESSIONALS	12	2.42	1.240	
B PROFESSIONALS	25	3.16	1.248	.006
NON – PROFESSIONALS	12	2.00	.853	
C PROFESSIONALS	25	2.84	1.434	.055
NON - PROFESSIONALS	12	3.75	.965	
D PROFESSIONALS	25	3.24	1.535	.782
NON - PROFESSIONALS	12	3.08	1.730	
E PROFESSIONALS	25	3.16	1.625	.290
NON - PROFESSIONALS	12	3.75	1.422	

Fig 4 (mean and standard deviation for protruded mandible Group 3)

Mann-Whitney test

**Group = Group 1 (retruded mandible)**

## Ranks

	PANEL GROUP	N	Mean Rank	Sum of Ranks
A	PROFFESIONALS	25	19.80	495.00
	NON - PROFFESIONALS	12	17.33	208.00
	Total	37		
B	PROFFESIONALS	25	18.24	456.00
	NON - PROFFESIONALS	12	20.58	247.00
	Total	37		
C	PROFFESIONALS	25	20.12	503.00
	NON - PROFFESIONALS	12	16.67	200.00
	Total	37		
D	PROFFESIONALS	25	17.58	439.50
	NON - PROFFESIONALS	12	21.96	263.50
	Total	37		
E	PROFFESIONALS	25	19.14	478.50
	NON - PROFFESIONALS	12	18.71	224.50
	Total	37		

Fig 5 (sum of ranks for Group1 retruded mandible)

## Mann-Whitney Test

Group = Group2 (normal mandible)

## Ranks

PANEL GROUP	PROFFESIONALS	N	Mean Rank	Sum of Ranks
A	PROFFESIONALS	25	20.32	308.00
	NON - PROFFESIONALS	12	16.25	195.00
	Total	37		
B	PROFFESIONALS	25	19.96	549.00
	NON - PROFFESIONALS	12	17.00	204.00
	Total	37		
C	PROFFESIONALS	25	19.54	472.50
	NON - PROFFESIONALS	12	17.88	214.50
	Total	37		
D	PROFFESIONALS	25	18.90	638.50
	NON - PROFFESIONALS	12	19.21	230.50
	Total	37		
E	PROFFESIONALS	25	16.78	419.50
	NON - PROFFESIONALS	12	23.63	283.50
	Total	37		

Fig 6 (sum of ranks for Group2 normal mandible)

## Mann-Whitney Test

Group = Group3 (protruded mandible)

## Ranks

PANEL GROUP	PROFFESIONALS	N	Mean Rank	Sum of Ranks
A	PROFFESIONALS	25	19.54	419.50
	NON - PROFFESIONALS	12	17.88	214.50
	Total	37		
B	PROFFESIONALS	25	22.12	488.00
	NON - PROFFESIONALS	12	12.50	150.00
	Total	37		
C	PROFFESIONALS	25	16.78	553.50
	NON - PROFFESIONALS	12	23.63	258.50
	Total	37		
D	PROFFESIONALS	25	19.20	480.00
	NON - PROFFESIONALS	12	18.58	223.00
	Total	37		
E	PROFFESIONALS	25	17.78	444.50
	NON - PROFFESIONALS	12	21.54	283.50
	Total	37		

Fig 7 (sum of ranks for Group3 protruded mandible)

	Profession	N	Mean Rank
A	ENDODONTISTS	5	13.60
	PROSTHODONTISTS	5	15.90
	SURGEONS	5	9.80
	PEDODONTISTS	5	15.10
	ORTHODONTISTS	5	10.60
	Total	25	
B	ENDODONTISTS	5	12.40
	PROSTHODONTISTS	5	10.00
	SURGEONS	5	12.40
	PEDODONTISTS	5	17.20
	ORTHODONTISTS	5	12.00
	Total	25	
C	ENDODONTISTS	5	12.10
	PROSTHODONTISTS	5	11.90
	SURGEONS	5	15.00
	PEDODONTISTS	5	14.30
	ORTHODONTISTS	5	18.70
	Total	25	
D	ENDODONTISTS	5	11.10
	PROSTHODONTISTS	5	8.80
	SURGEONS	5	14.90
	PEDODONTISTS	5	11.90
	ORTHODONTISTS	5	18.30
	Total	25	
E	ENDODONTISTS	5	10.90
	PROSTHODONTISTS	5	13.20
	SURGEONS	5	15.40
	PEDODONTISTS	5	10.90
	ORTHODONTISTS	5	14.60
	Total	25	

Fig (8)Kruskal-Wallis test for panel group Professionals.

**Discussion:** Esthetically pleasing faces generally have good proportions, facial balance, and harmony, and yet differences often emerge in the interpretation of these concepts.<sup>9</sup>It is a prime concern of an orthodontist to enhance the smile attractiveness which can be easily achieved by proper positioning of the maxillary incisors. By maintaining a favourable balance between the incisor inclination and the bodily position of the teeth maximum facial harmony can be obtained.

In the present study a series of facial profile photographs based on the original ideal profile of the finished orthodontic female patient was evaluated by different groups of evaluators of dental professionals and non-professionals. By altering the mandibular position and the maxillary incisor inclination in the smile profile of the female patient it has been tried to obtain the most favourable and least desirable combinations as a whole and to

elucidate whether the mandibular positions and rater's profession are key factors in ranking the preferred incisor inclination. Also the smile profile of 1 subject was altered to eliminate the effect of background facial attractiveness. This has also been shown as a useful method in studying altered dental appearance by Wagner et al.<sup>10</sup> In this present study color photographs of the smile photographs have been used since they convey more realistic view than silhouettes and profile drawings. However while using photographs several factors such as eye color, hair color, makeup, skin complexion, nose size, etc can bias the observers perception of facial attractiveness<sup>11</sup>.

In the present study, image of an adult female patient has been used to remove any confounding factors to eliminate the potential bias of growth related changes<sup>12</sup>. Study done by Ghaleb et al,<sup>4</sup> concluded that Dentists, Orthodontists and lay persons, preferred an increase of +5° of incisor inclination in labial direction which agrees with the ratings of the Professionals and Non-professionals in our study. On the other hand, photographs with 10° of lingual incisor inclination had the lowest score which supports the results of the panel of this present study. According to Ghaleb et al,<sup>4</sup>the smile is negatively affected by the lingual inclination of 10° and also produces an “old” appearance because of loss of proper root torque. A significant difference between the ratings of photographs among different dental professionals except for the profiles with moderate inclinations (-5°, normal and +5°). The difference between the results of their study and this present study may be related to the ethnic background of the subject and the different populations of the evaluators of the panel.

The study done by Cao et al<sup>2</sup>, Orthodontists practicing in China rated the smiling profile with a 5° of lingual inclination as the most attractive. This is different from the results of Ghaleb et al<sup>4</sup> and this present study and may be due to different methods of image alterations or geographic conditions affecting local culture and influence on public's esthetic concept.<sup>13,14</sup>

Although the assessment in this study is done on different mandibular positions with different incisor inclinations, the fact that these results have been produced from 1 photograph is to be taken into account.

**Conclusions:** The present study concludes that normal incisor inclination is favoured by Professionals and a proclined incisor inclinations by Non-professionals in cases of retruded or protruded mandible whereas in orthognathic mandible, more amount of incisor proclination is favoured by Non-professionals. There is more acceptance of maintaining or increasing maxillary denture protrusiveness for optimizing the facial esthetics.

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## References

1. Baldwin DC. Appearance and Aesthetics in oral health. *Community Dent Oral Epidemiol*, 1980;9:244-56
2. Gago AB, Maroto MR, Crego A. The perception of facial aesthetics in a young Spanish population. *Eur J Orthod* 2012;34:335-9.
3. Schlosser JB, Preston CB, Lampasso J. The effects of computer-aidedanteroposterior maxillary incisor movement on ratings of facial attractiveness. *Am J OrthodDentofacialOrthop* 2005;127:17-24.
4. Ghaleb N, Bouserhal J, Bassil-Nassif N. Aesthetic evaluation of profile incisor inclination. *Eur J Orthod* 2011;33:228-35.
5. Wagner IV, Carlsson GE, Ekstrand K, Odman P, Schneider NA. Comparitive study of assessment of dental appearance by dentists, dental technicians, and laymen using computer-aided image manipulation. *J Esthet Dent* 1996;8:199-205.
6. NZ Hooman, Oshagh M, KH Mohammad, T Sepideh. Esthetic evaluation of incisor inclination in smiling profiles with respect to mandibular position. *Am J OrthodDentofacialOrthop* 2015;148:387-95
7. RC Atiken. Measurement of feelings using visual analogue scales. *Proc R Soc Med*. 1969 Oct;62(10):989-93.
8. Langlois JH, Kalakanis L, Rubenstein AJ, Larson A, Hallam M, Smoot M, Maxims or myths of beauty? A meta-analytic and theoretical review. *Psychol Bull* 2000;126:390-423
9. Orsini MG, Huang GJ, Kiyak HA, Ramsay DS, Bollen AM, Anderson NK, et al. Methods to evaluate profile preferences for the anteroposterior position of the mandible. *Am J OrthodDentofacialOrthop* 2006;130:283-91.
10. Maple JR, Vig KW, Beck FM, Larsen PE, Shanker S. A comparison of providers' and consumers' perceptions of facial-profile attractiveness. *Am J OrthodDentofacialOrthop* 2005;128:690-6.
11. Cochrane SM, Cunningham SJ, Hunt NP. A comparison of the perception of facial profile by the general public and 3 groups of clinicians. *Int J Adult OrthodonOrthognathSurg* 1999;14:291-5.
12. de Almeida MD, Rodrigues Farias AC, Vieira Bittencourt MA. Influence of mandibular sagittal position on facial esthetics. *Dent Press J Orthod* 2010;15:87-96.

13. Turkkahraman H, Gokalp H. Facial profile preferences among various layers of Turkish population. *Angle Orthod* 2004;74:640-7.
14. Oshagh M, Zarif NH, Bahramnia F. Evaluation of the effect of buccal corridor size on smile attractiveness. *Eur J Esthet Dent* 2010;5:370-80.