SAEF – Smile's Aesthetic Evaluation Form: A Useful Tool to Improve Communication Between Clinicians and Patients During Multidisciplinary Treatment

Nuno Sousa Dias, DDS

Postgraduate student, Department of Orthodontics,

The Maurice and Gabriela Goldschleger School of Dental Medicine,

Tel Aviv University, Israel

Foteini Tsingene, DDS

Postgraduate student, Department of Orthodontics,

The Maurice and Gabriela Goldschleger School of Dental Medicine,

Tel Aviv University, Israel

Correspondence to: Dr Nuno Sousa Dias

Orthodontic Department, Tel Aviv University, Tel Aviv, Israel 69978; fax: + 972 3 6409250; e-mail: sousadias.nuno@gmail.com

Abstract

Today, physical appearance plays a major role in self-esteem and, as a result, also in the overall satisfaction of the person. Facial esthetics plays a crucial role, with the smile being the protagonist. A multidisciplinary approach, including several specialties of dentistry, is usually needed in order to create a pleasing end result.

With the Smile's Aesthetic Evaluation Form (SAEF), the authors propose a new evaluation of the esthetics of the smile. It uses both static (photographs) and dynamic (videos) analysis, followed by several objective and subjective items, thus improving the communication between the different dental specialists and laboratory technicians. The SAEF also provides the patient knowledge of the disharmonies of the smile and increases the patient's comprehension and acceptance of treatment. It is organized in such a way as to provide an understanding of the esthetic parameters of the smile individually, and, simultaneously, evaluate the quality of the smile for the specific case.

This form is designed to detect small dental anomalies when the patient is not content with his/her smile, but is unable to pinpoint the parameters that cause this dissatisfaction.

This esthetic evaluation form can be a useful additional tool to the clinical diagnostic procedure.

In order for the analysis to be fully understood, an example of its use will be presented in a clinical case.

Case report: A 28-year-old female patient, dissatisfied with her smile, presented to the Orthodontic Department of Tel Aviv University. She had undergone orthodontic treatment in the past. She presented a relapse in the mandible. The relapse in the mandibular arch was to be corrected with Invisalign. For the maxillary arch, the SAEF was completed in order to improve the communication between the orthodontist, patient, and cosmetic dentist to correct the incorrect parameters highlighted in the analysis.
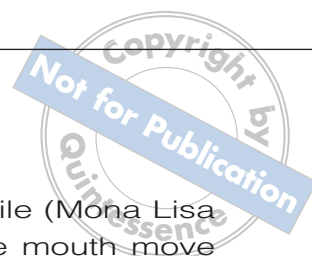
Materials and methods

By using the PubMed database and typing the keywords "esthetic smile," "harmonious smile," "charming smile," "smile morphology," "smile components," "ideal smile," "smile arc," "perfect smile," "smile line," "inter-papillary line," "orofacial harmony," "buccal corridors," "anterior central dominance," "lip line," "golden proportion," "RED proportion," "facial muscles," "facial shape," "tooth shape," "negative space," and "lip posture," 365 abstracts of interest were found (up to 2007).

After reviewing all of them, 48 articles (including chapters of books) were selected as being the most relevant.

Presentation of the diagnostic method

The smile is an integral part of the face, but, most importantly, part of a person as a whole, expressing age, beauty, personality, and youthfulness. It is a way of expressing basic emotions.[1]

Bearing in mind that every smile is unique, the practitioner has the need to easily evaluate its different components in a universal way. Peck et al[2] graded the smile from the rest position to the greatest amplitude.

Rubin[3] developed a classification system of smiles, grouping them into three different types according to the basic design: commissural smile, cuspid smile, and complex smile.[4] The variation of the different smile types depends on the direction of the elevation and depression of the lips and the group of predominant muscles involved in the movement.[5]

In the commissural smile (Mona Lisa smile), the corners of the mouth move upwards due to the contraction of the major zygomatic muscles. In the cuspid smile, the upper lip moves upwards uniformly. In the complex smile, the upper lip moves in the same way as the cuspid smile, but, in addition, the lower lip moves downward in the same manner.[6]

Another classification was introduced by different authors grouping the smile into two different types: posed and spontaneous. The posed smile is forced, static, reproducible, and without emotion. The spontaneous smile is natural and dynamic and in this way not easily reproducible. This smile expresses human emotions.[7]

The posed smile is a voluntary expression used, for example, in the photographic registration. A study showed that only small differences were found in consecutive posed smiles of the same individuals, indicating that this smile can be used as a reference.[8]

Rigsbee et al[9] found that the posed smile can be easily categorized using photographs when compared to a spontaneous smile.[10]

In the Smile's Aesthetic Evaluation Form (SAEF), in order to evaluate the static smile, the posed smile is used during the photographic registration because it is easier to reproduce. During the video registration, the spontaneous smile can be detected. This is important for the dynamic evaluation of the smile and also for the evaluation of some additional parameters of the static analysis.

Fig 1a   Smile's Aesthetic Evaluation Form (SAEF).

The registration of the patient's information in the SAEF is divided into three different parts:

- Part A - Collection of patient's data and diagnostic tools (photographs, videos, and models)
- Part B - Static smile analysis
- Part C - Dynamic smile analysis.

With all the information obtained from part A of the SAEF, the parameters of the smile analysis of parts B and C are investigated.

Presentation of the form

Part A: Collection of patient's data and diagnostic tools (photographs, videos, models)

A.1 Patient's data
In this part, the clinician registers the basic information of the patient (name, gender, race, age, height, and weight). Some esthetic considerations vary due to race, gender, and age. The relationship between height and weight is also helpful to the clinician to gain a better perception of the patient as a whole.

A.2 Reason for the esthetic evaluation
In this group, the SAEF presents two subdivisions: "patient's reasons" and "reference." In the first, the reasons that caused the patient to seek treatment and the reasons for dissatisfaction are mentioned. In the second, the name of the clinician referring the patient is mentioned.

A.3 Study models
The study models are used because they provide an additional 3D view and an exact reproduction of the patient's dentition. They are also helpful as a demonstration tool to explain the problem to the patient. Because esthetics is a subjective issue, visual tools are helpful in assisting the patient to understand his/her individual irregularity.[11]

A.4 Photograph registration
The photograph registration, together with the clinical examination of the face and the smile, provide useful information.[12] This registration should be performed in a place with natural light. The instructions given to the patient should be to hold his/her head in its natural head position.[13] In the SAEF, the photograph registration is composed of 10 different photographs, seven extraoral and three intraoral.

A.5 Video registration
With video registration, the dynamic of the lips during speech and smiling is evaluated for a better understanding of some of the parameters. Some authors have suggested recording and analyzing the spontaneous smile in the dynamic position.[14]

Using the additional information of the visual data, better communication between clinicians of different specialties and between clinician and laboratory can be achieved. Video is also a useful tool to improve communication between patient and clinician. In the video registration, the patient should be relaxed and feel comfortable in order to achieve a natural smile and speech. To standardize the procedure, the patient is asked to recite the alphabet.

Fig 1b   SAEF completed form for patient A.Y.
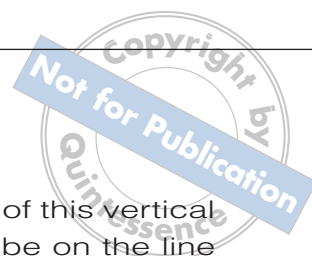
Part B: Static smile analysis

The following is a brief description of all the parameters comprising part B of the SAEF, divided into four groups.

B.1 Buccofacial esthetics

Usually, patients seeking esthetic treatment are not satisfied with their facial appearance. The lack of facial harmony reflects in the smile, either in the form of asymmetries or facial disproportions. The aims of the SAEF are not to quantify the facial anomalies, but the smile, although the smile cannot be isolated from the face. Therefore, the present authors aspire to evaluate the position of the lips in relation to the face in two dimensions: vertical and sagittal.

B.1.1 Lips' vertical position

In the SAEF, there is a tolerance of deviation of ±15% for the lower third in relation to the middle and the upper thirds, according to Burstone.[15] The clinician should grade this aspect as correct when: the value of the lower third of the face, compared to the middle third, is proportional within the 15% tolerance; a correct proportion exists in the lower third of the face when the stomion is located at one-third of the distance between the lower part of the nose and the chin (Fig 2a).[13,16,17]

B.1.2 Lips' sagittal position

Using the natural head position, a true vertical line should be traced passing through the subnasal. Mean values from this line to the lips were proposed in the literature, but for the SAEF the clinician should use a visual evaluation of these values without measuring: the upper lip should be slightly in front of this vertical line; the lower lip should be on the line (Fig 2b).

The clinician should grade this aspect as correct when both of the above parameters are complied with, and incorrect if one or both of them are not in the ideal position.[6,13]

B.2 Gingival esthetics

Observing the esthetics of the gingiva is fundamental when evaluating the smile. Gingival health is necessary as a main component of the health of the oral cavity.[18,19]

B.2.1 Gingival symmetry

In the SAEF, the clinician should use intraoral frontal and lateral photographs to evaluate this parameter (Fig 3b).

The latter should be considered symmetric when, in addition to the symmetry, the gingival margin of the lateral incisor is below a line traced passing from the gingival margins of the centrals and the canines, or when the gingival margins of the centrals, laterals and canines are in the same line. The parameter should be considered asymmetric when even a small asymmetry is present in the gingival contour at the level of the central incisors, or a larger asymmetry is visible in the lateral or canine region.[12,16,20-23]

B.2.2 Interdental papilla

In the SAEF, the clinician should use intraoral frontal and lateral photos to evaluate this parameter (Fig 3c). This parameter should be considered present when the interdental papilla is apparent, and absent when black triangles or a diastema occur between the central incisors.[22,24]

Fig 2 Buccofacial esthetics. **(a)** Lips' vertical position: this parameter is correct in this case. **(b)** Lips' sagittal position: this parameter is correct in this case.
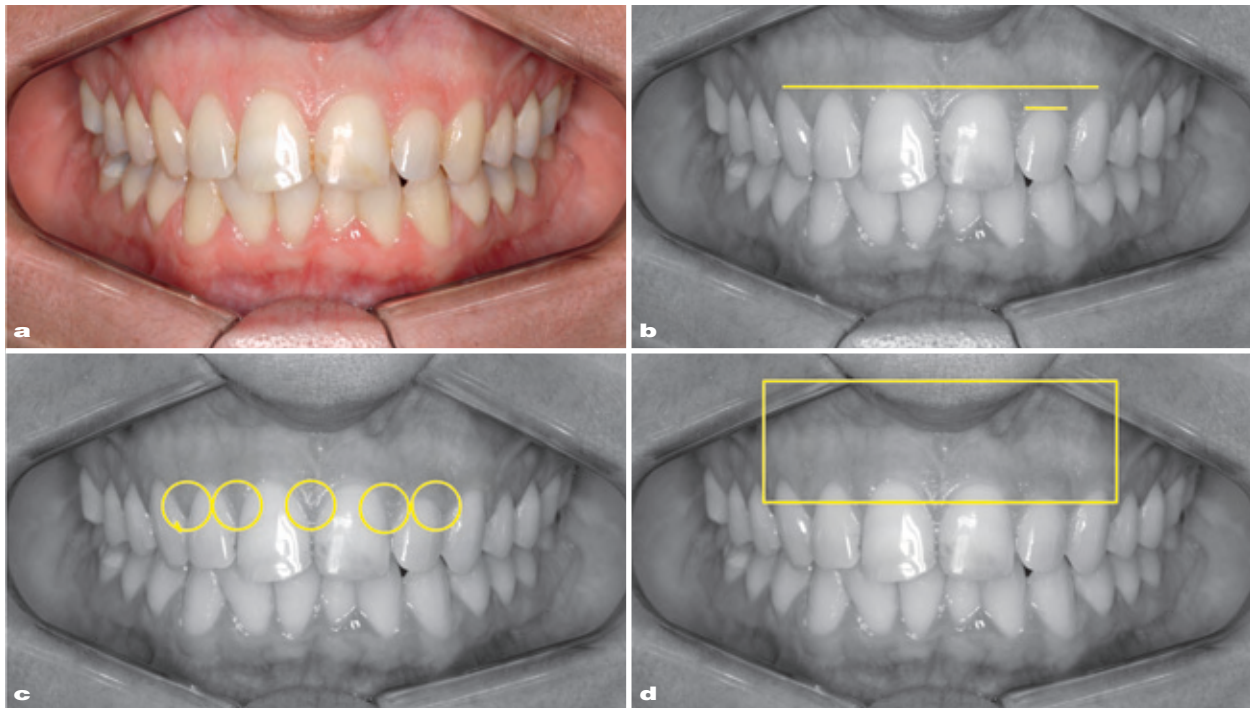
Fig 3 Gingival esthetics. **(a)** Frontal photograph used of the patient while biting. **(b)** Gingival symmetry: asymmetric in this case because of the gingival contour of the lateral incisors. **(c)** Interdental papilla: this parameter is correct in this case. **(d)** Gingival pigmentation: this parameter is correct in this case because there is no pigmentation.
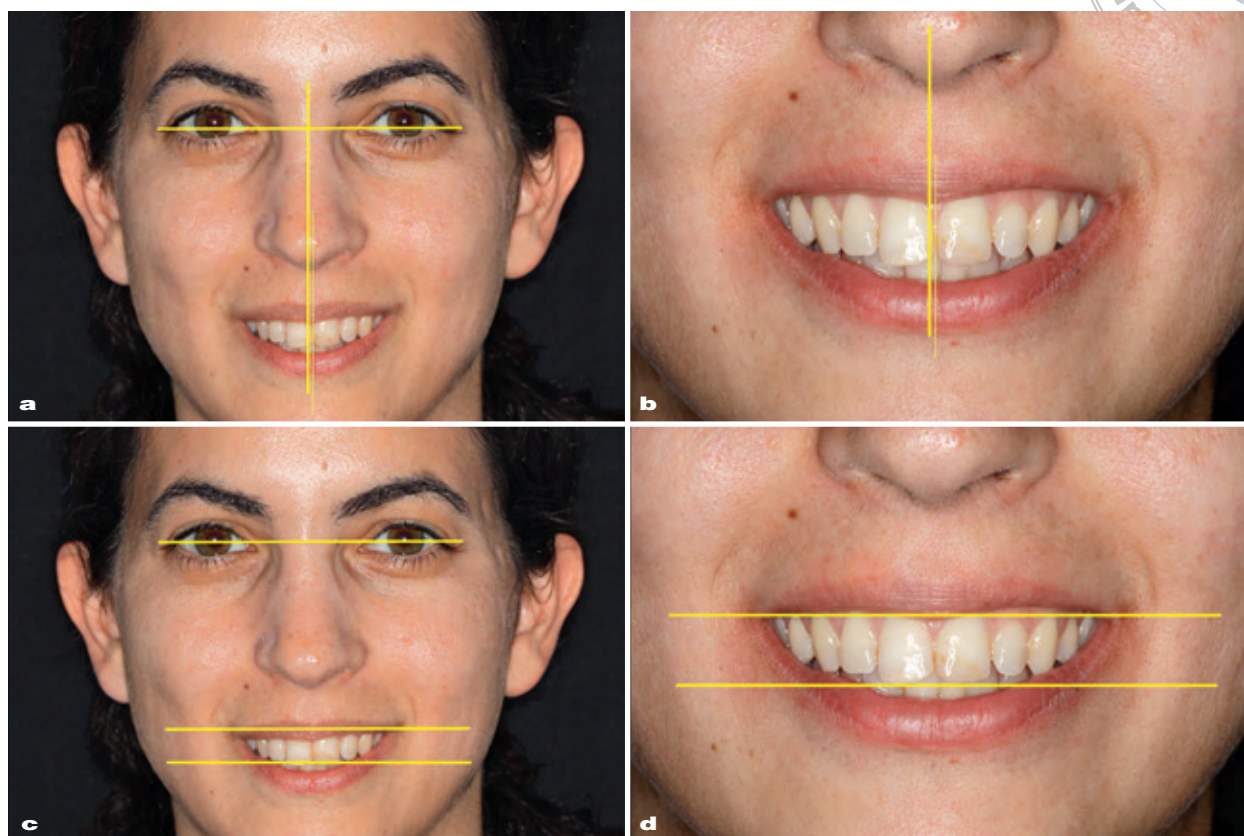
Fig 4 Macroesthetics (part 1). **(a)** Position of the medium lines on the patient's face while smiling. **(b)** Position of the medium lines: this parameter is incorrect in this case. Notice that the facial midline is parallel to the dental midline but they do not coincide. The distance between them is 1 mm. **(c)** Smile's horizontal parallelism on the patient's face while smiling. **(d)** Smile's horizontal parallelism: this parameter is correct in this case.

B.2.3 Gingival pigmentation

In the SAEF, the clinician should use intraoral frontal and lateral photographs to evaluate this parameter (Fig 3d).

This aspect should be graded absent when there is no pigmentation; this parameter should be graded present-normal, when, in a subjective evaluation, the clinician considers the pigmentation minimal and that it does not interfere with the esthetics of the smile. For example, when the patient has dark pigmented skin, this parameter should be graded present-normal.

The parameter should be graded as present-exaggerated when, in a subjective evaluation, the clinician considers it unesthetic.[25]

B.3 Macroesthetics

Macroesthetics represents a parameter that is applied when a group of teeth is compared to the soft tissues and the facial characteristics of the patient.[26]

B.3.1 Position of the medium lines

In the SAEF, the clinician should use frontal photographs of both the face smiling
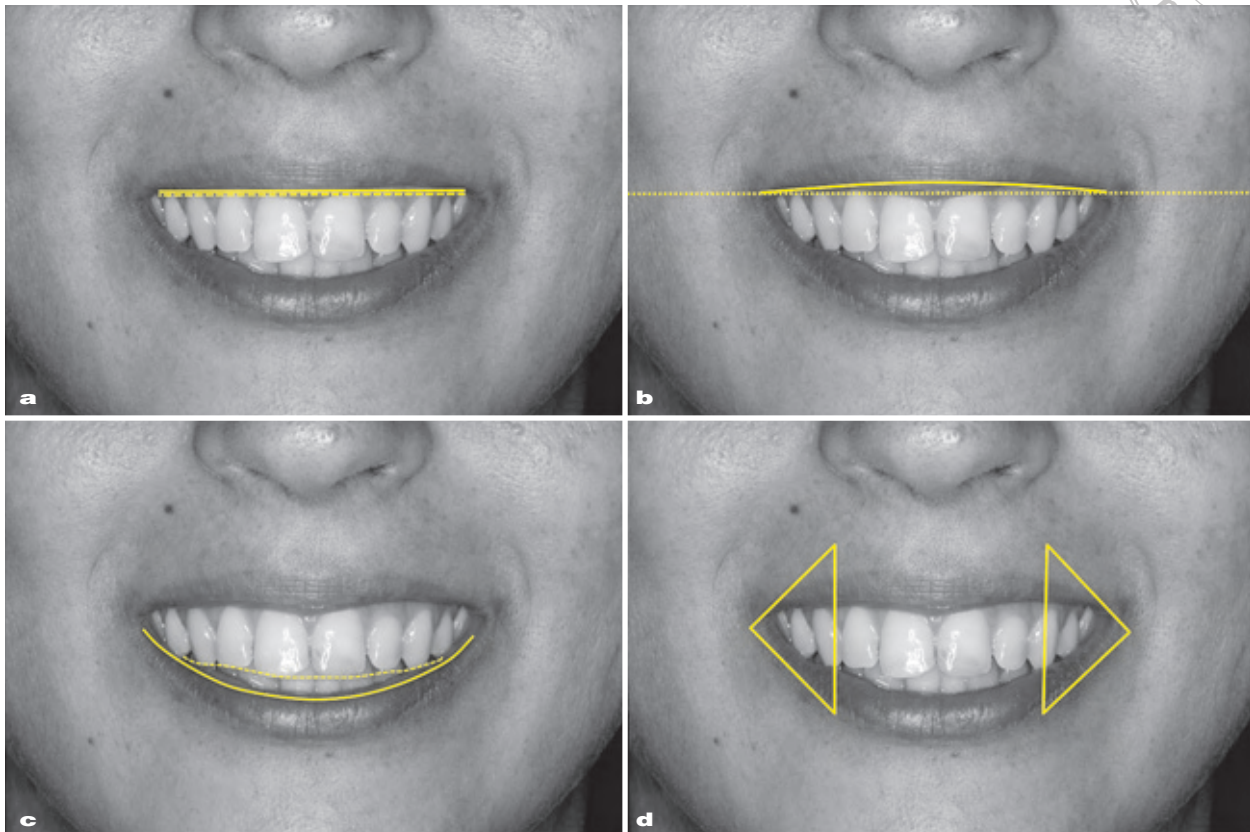
Fig 5 Macroesthetics (part 2). **(a)** Lip line: this parameter is correct in this case. **(b)** Upper lip's curvature: this parameter is incorrect in this case. Notice that the upper lip presents a slight lower concavity. **(c)** Smile arc: this parameter is incorrect. The smile arc in this case is non-consonant due to the irregularity of the incisal edges of the maxillary anterior teeth. **(d)** Negative space: this parameter is correct in this case.

as well as of the lower third while smiling (Figs 4a and 4b).

Using this parameter, the clinician compares the midline of the face with the maxillary midline of the teeth. This parameter should be considered as ideal when these lines coincide; it should be considered as parallel lines when these lines do not coincide, but are parallel to each other within a distance of 2 mm; and it should be considered as non-parallel when the lines are not parallel to each other or when the distance between them is more than 2 mm.

The relationship between the maxillary and the mandibular dental midlines is not taken into consideration in SAEF.[16,18,23,27-30]

B.3.2 Smile's horizontal parallelism
In the SAEF, the clinician should use frontal photographs of the face smiling as well as of the lower third while smiling (Figs 4c and 4d).

Using this parameter, the clinician compares three different horizontal lines: incisal line, intercommissural line, and bipupillary line.
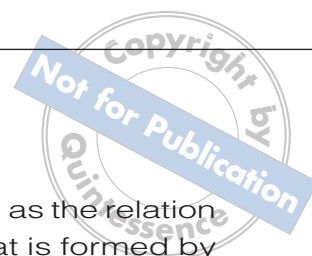
This parameter is graded as ideal when there is parallelism of all the lines, and as non-parallel lines when even one of the lines is not parallel to the other two.[18]

B.3.3 Lip line

In the SAEF, to evaluate this parameter, the clinician should use the photograph of the frontal lower third while smiling and the video registration (Fig 5a).

The image of the greater amplitude of the smile is used to grade the position of the lip line.

The clinician should grade this parameter as ideal when both central incisors as well as the interproximal gingiva are visible.

As mentioned by several authors, a slight gingival exposure in women during smiling should be considered esthetic. In the SAEF, there is a 2 mm tolerance of the position of the lip line. In women, the tolerance is towards the gingival part and, in men, towards the incisal part of the maxillary incisors.[2,7,16,22,23,31-34]

B.3.4 Upper lip's curvature

In the SAEF, to evaluate this parameter, the clinician should use the photograph of the frontal lower third while smiling (Fig 5b).

The clinician should consider this parameter ideal when there is an upper concavity of the lip, as acceptable when it is flat, and as unesthetic when there is a lower concavity of the lip.[18,35]

B.3.5 Smile arc

In the SAEF, to evaluate this parameter, the clinician should use the photographs of the frontal lower third while smiling and oblique to the left and to the right while smiling (Fig 5c).

The smile arc is defined as the relation between the curvature that is formed by the incisal edges of the maxillary incisors and canines and the curvature of the lower lip during a posed smile.

The smile arc should be considered ideal when it is consonant with the line, it should be considered acceptable when it is straight, and it should be considered unesthetic when it is not consonant.[5,7,8,23]

B.3.6 Negative space

In the SAEF, to evaluate this parameter, the clinician should use the photograph of the frontal lower third while smiling and during the video registration (Fig 5d).

This is a subjective and non-metric evaluation. The clinician should grade the negative space as decreased, normal or increased, according to his/her esthetic perception.

The video registration is extremely relevant for the evaluation of this parameter because using only the picture can be deceiving, due to the luminosity of the room or the ring flash of the camera.[5,7,18,23,35-40]

B.3.7 Teeth proportions

In the SAEF, to evaluate this parameter, the clinician should use the frontal while-biting photograph (Fig 6a).

There are three different methods that can be used to evaluate the proportional harmony between the maxillary anterior teeth, because these teeth are the most important for esthetics. These methods are golden proportion, RED (recurring esthetic dental) proportion, and golden percentage.

A study carried out by Ali Fayyad et al,[41] compared the results of the three
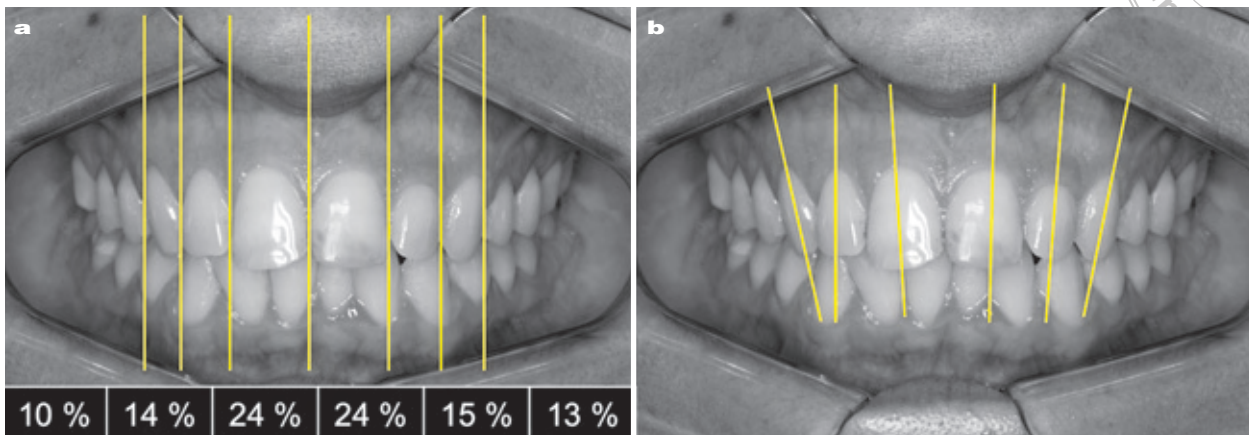
Fig 6 Macroesthetics (part 3). **(a)** Teeth proportions: this parameter is acceptable because the deviation from the golden percentage is within the 3% tolerance. **(b)** Axial axis of teeth: this parameter is incorrect in this case because on the right side the teeth present unesthetic axial inclination.

methods and concluded that only the golden percentage presented constant results relative to the width of the teeth. This method considers the following percentage of the teeth in relation to the inter-canine distance ideal: 25% for the central incisor, 15% for the lateral incisor, and 10% for the canine. The results of the same study presented some deviations, maybe due to ethnic differences (23%, 15%, and 12%, respectively).

In the SAEF, the clinician should use the golden percentage with a tolerance of 3% due to possible ethnic differences in the evaluation of the proportion of the maxillary anterior teeth.

The clinician should grade this aspect as proportional when it is between the ranges. The clinician should grade this aspect as acceptable when the measurements are between the tolerance limits, and as disproportional if the measurements do not respect the proportions, or if the measurements are asymmetric.[12,18,39,41-43]

B.3.8 Axial axis of teeth

In the SAEF, to evaluate this parameter the clinician should use the frontal while-biting photograph (Fig 6b).

The clinician should consider the axial inclination of the maxillary anterior teeth as aligned when the inclination of the apexes of the teeth are more pronounced moving distally in the arch. When this inclination is incorrect, the clinician should consider this parameter as non-aligned.[18,22]

B.3.9 Embrasures

In the SAEF, to evaluate this parameter, the clinician should use the frontal while-biting photograph (Fig 7b). The definition of embrasures is the triangular incisal space located inferior to the contact point.

The clinician should consider this parameter as correct when a progressive increase of the dimensions of the embrasures exists in a posterior direction when moving away from the midline.[22,44,45]
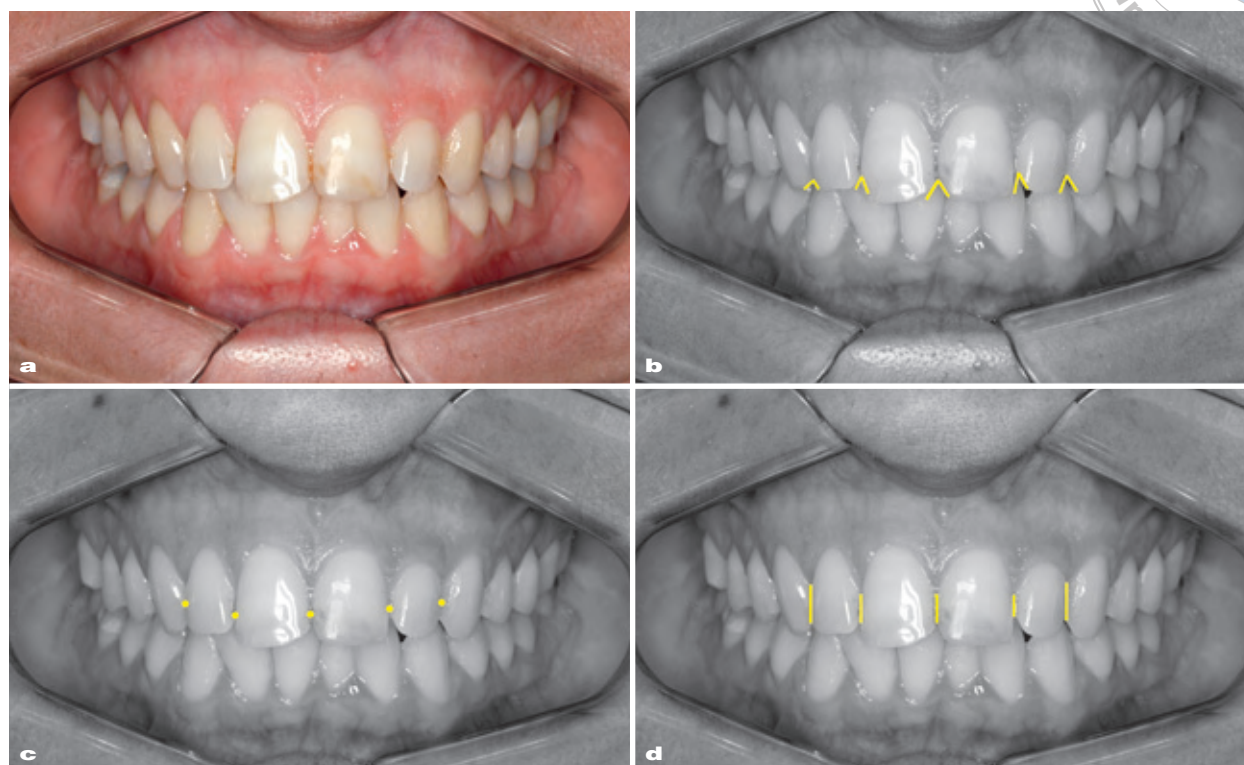
Fig 7 Macroesthetics (part 4). **(a)** Frontal while-biting photograph. **(b)** Embrasures: this parameter is incorrect in this case. Note the irregularity and the lack of symmetry of the embrasures due to the shape of the edges of the anterior teeth. **(c)** Contact points: this parameter is incorrect in this case. Note the asymmetrical position of the contact points. **(d)** Connectors: this parameter is incorrect in this case. Note the irregularity of the connectors due to the shape of the anterior teeth.

B.3.10 Contact points

In the SAEF, to evaluate this parameter, the clinician should use the frontal while-biting photograph (Fig 7c). The contact point is defined as being the exact point where two teeth of the same arch touch each other. The most important function of contact points is to avoid the accumulation of food but also to play a fundamental role in the evaluation of the smile.

The clinician should consider this parameter as correct when the contact points are positioned progressively more apical when moving distally from the midline in a symmetric manner.[18,22,44]

B.3.11 Connectors

In the SAEF, to evaluate this parameter, the clinician should use the frontal while-biting photograph (Fig 7d). The area between two adjacent teeth that seem to touch in a frontal view is called "connector."

In the SAEF, the clinician should use the rule of "50-40-30" to define the esthetic relationship between the anterior teeth. This rule defines the size of the contact area between the anterior maxillary teeth. The contact between the central incisors should present an ideal area of 50% of the length of the central inci-
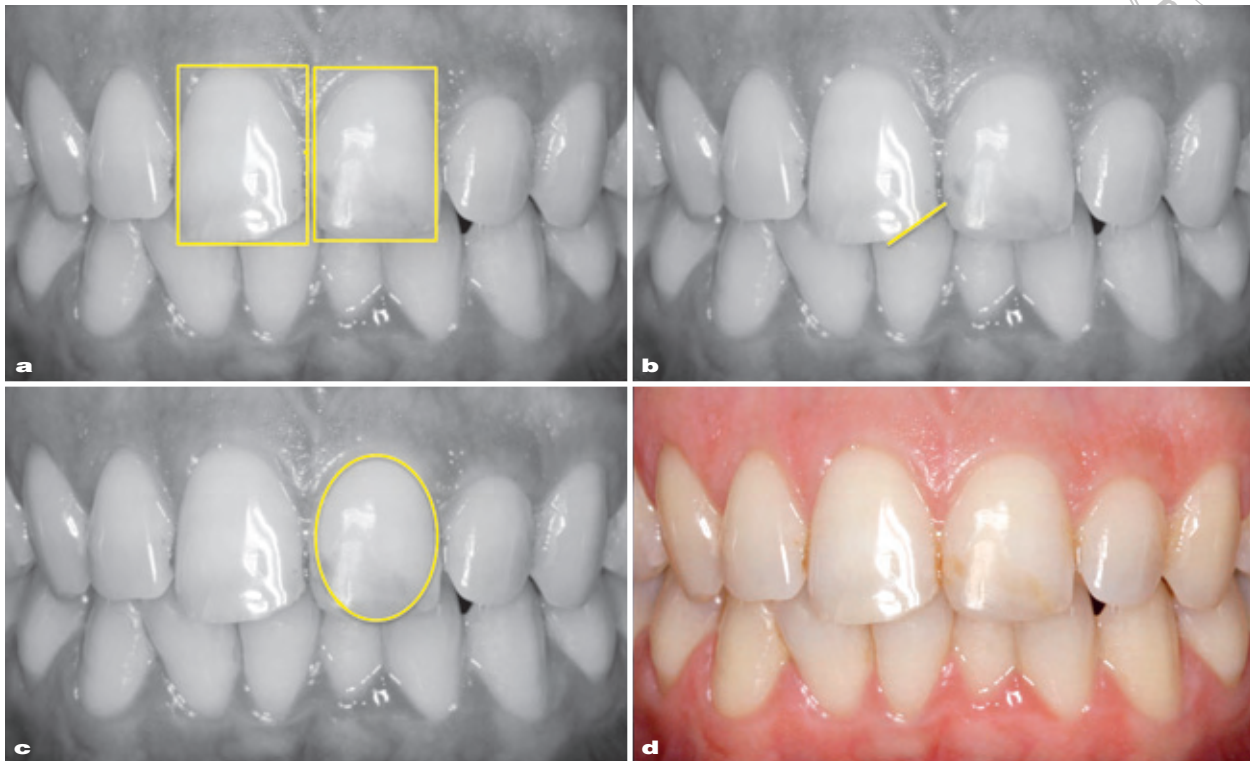
Fig 8 Microesthetics. **(a)** Central incisor's proportion: this parameter is incorrect in this case. Note that the maxillary central incisors are proportional but not in a symmetrical way. **(b)** Structure anomaly: this parameter is incorrect in this case. The maxillary central incisors present an unesthetic composite restoration. **(c)** Central incisors' shape: note that the central incisors are egg-shaped. This does not interfere with the items' quantification. **(d)** Color: this parameter is incorrect in this case. Note the color disharmony caused by the old unesthetic composite restorations.

sor, the contact between the central and the lateral should be 40% of the length of the central incisor, while the contact between the lateral and the canine should be 30% of the length of the central incisor.

The clinician should consider this parameter as correct when the rule is followed symmetrically.[26,44]

B.4 Microesthetics
The elements that make a tooth's anatomy as similar as possible to that of a natural tooth are considered microesthetics.

B.4.1 Central incisors' proportion
In the SAEF, to evaluate this parameter the clinician should use the frontal while-biting photograph (Fig 8a).

The clinician should evaluate only the central incisors for this parameter.

This parameter should be evaluated as correct when the width of the central incisors are smaller than their height, in a proportion of 66% and 80%, respectively. In addition, the two central incisors' size should be the same.[22,28,44]

B.4.2 Structure anomaly

In the SAEF, to evaluate this parameter, the clinician should use the intraoral frontal and lateral photographs (Fig 8b).

The clinician should consider this parameter as present if some structural anomaly of any of the maxillary frontal teeth is present (ie, enamel imperfections, crown fractures, abrasions, abfraction, unesthetic restorations).

In this parameter, the absence of any of the maxillary teeth should also be registered.[46,47]

B.4.3 Central incisors' shape

In the SAEF, to evaluate this parameter, the clinician should use the frontal while-biting photograph (Fig 8c). The clinician should consider the dental morphology as an individual characteristic and with no relation to the shape of the face or the gender. This information will not interfere with the quantification of all the parameters but plays an important role in esthetics.

The clinician should categorize the shape of the maxillary central incisors as quadrangular, egg-shaped, or triangular.[22,48,49]

B.4.4 Color

In the SAEF, to evaluate this parameter, the clinician should use the intraoral frontal and lateral photographs (Fig 8d).

The clinician should consider harmony when a balanced relation of the color of the teeth exists and should consider disharmony when one or more teeth with coloring break the visual balance of the smile.

In this parameter, the teeth in harmony can be bright or even dark. This is a subjective evaluation that depends on the perception of the patient and is also related to age.[50,51]

Part C: Dynamic smile's analysis

C.1 Smile's personality features

Videographic registration allows, in certain cases, the perception of esthetics in smiles with crowded teeth, diastemas, or rotated teeth. In these cases, the presence of any asymmetry or imperfection must be kept and not corrected, as long as it does not interfere with the harmony of the dentofacial unit.

C.2 Hereditary features to maintain

Registration of small deviations in the smile (crowding, diastemas, or teeth rotations) that are also present in the family must be corrected if they interfere with the harmony of the dentofacial unit. The patient's opinion is important.

C.3 Other aspects to consider

Registration of any important aspects in the patient's smile that were not mentioned in previous parameters is done in this section. This parameter can be used for the registration of the morphopsychology of the smile, as well as for the registration of wrinkles that can be important for plastic surgery.

On the first page of the SAEF, the "items quantification" section is where the clinician registers the values between the green, red or yellow colors, each one representing the sum of the correct or incorrect parameters.

After reviewing all of the above-mentioned parameters, the items quantification of the SAEF should be done to quickly show the relationship between

the correct and incorrect parameters of the smile before and after treatment.

This evaluation should be performed by the same clinician.

Advantages of the SAEF
- easy to complete
- good presentation and easy storage of large amount of information
- comparison of initial and final results
- improvement of the patient's comprehension of his/her disharmonies
- easy case presentation to an audience
- easy communication with the patient
- easy communication with the lab
- easy case discussion among professionals.

Disadvantages of the SAEF
- standardization of the photographic registration
- difficulty in the acceptance of the video registration by some patients
- some parameters are subjective.

Conclusion

Nowadays, there is a need for multidisciplinary treatment in many cases. Often, in order to reach an optimal result, irreversible procedures with dentofacial esthetic changes are planned. These procedures should only be carried out if significant and adequate information of the case is obtained. Therefore, the SAEF plays a very important role, providing a significant amount of important information on the individual case.

The present article's goal is to provide information about the use of this tool to as many professionals as possible, from private surgeries to universities, improving the quality of patient care.

References

1. Freitas-Magalhães A, Psicologia do Sorriso. Porto: Editora Universidade Fernando Pessoa, 2006.
2. Peck S, Peck L, Kataja M. The gingival smile line. Angle Orthod 1992;62:91–100.
3. Rubin LR. The anatomy of a smile: its importance in the treatment of facial paralysis. Plast Reconstr Surg 1974;53:384-387.
4. Philips E. The classification of smile patterns. J Can Dent Assoc 1999;65:252–254.
5. Ackerman MB, Ackerman JL. Smile analysis and design in the digital era. J Clin Orthod 2002;36:221–236.
6. Sarver DM, Ackerman MB. Dynamic smile visualization and quantification: part 1. Evolution of the concept and dynamic records for smile capture. Am J Orthod Dentofacial Orthop 2003;124:4–12.
7. Sarver DM. The importance of incisor positioning in the esthetic smile: the smile arc. Am J Orthod Dentofacial Orthop 2001;120:98–111.
8. Sarver DM, Ackerman MB. Dynamic smile visualization and quantification: part 2. Smile analysis and treatment strategies. Am J Orthod Dentofacial Orthop 2003;124:116–127.
9. Rigsbee OH 3rd, Sperry TP, BeGole EA. The influence of facial animation on smile characteristics. Int J Adult Orthodon Orthognath Surg 1988;3:233-239.
10. Ackerman MB, Brensinger C, Landis JR. An evaluation of dynamic lip-tooth characteristics during speech and smile in adolescents. Angle Orthod 2004;74:43–50.
11. Van Zyl I, Geissberger M. Simulated shape design. Helping patients decide their esthetic ideal. J Am Dent Assoc 2001;132:1105–1109.
12. Ritter DE, Gandini LGJr, Pinto Ados S, Ravelli DB, Locks A. Analysis of the smile photograph. World J Orthod 2006;7:279–285.
13. Silva C. Análise Geométrica. Manual da técnica e método de traçado. 2005 Porto, Facies.
14. Tarantili VV, Halazonetis DJ, Spyropoulos MN. The spontaneous smile in dynamic motion. Am J Orthod Dentofacial Orthop 2005; 128:8–15.
15. Burstone CJ, Marcotte MR. Problem Solving in Orthodontics. Chicago: Quintessence Publishing Co Inc, 2000.
16. Sarver DM. Videoimaging: the pros and cons. Angle Orthod 1993;63:167–170.
17. Perenack J. Treatment options to optimize display of anterior dental esthetics in the patient with the aged lip. J Oral Maxillofac Surg 2005; 63:1634–641.
18. Rufenacht CR. Fundamentos de estética. In: Rufenacht CR (ed). Fundamentos de Estética. São Paulo: Quintessence Editora, 1998:9–127.
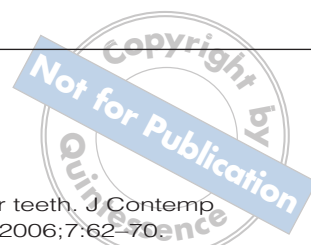
19. Vandana KL, Savitha B. Thickness of gingiva in association with age, gender and dental arch location. J Clin Periodontol 2005;32:828–830.

20. Lindhe J, Karring T, Araújo M. Anatomy of the periodontium. In: Lindhe J (ed). Clinical Periodontology and Implant Dentistry. Slovenia: Blackwell Munksgaard, 2003: 3–48.

21. Castro MV, Santos NC, Ricardo LH. Assessment of the "golden proportion" in agreeable smiles. Quintessence Int 2006;37:597–604.

22. Kina S. Fundamentos de estética. In: Kina S (ed). Invisível. Restaurações Estéticas Cerâmicas. Maringá: Dental Press Editora, 2007: 31–78.

23. Sabri R. The eight components of a balanced smile. J Clin Orthod 2005;39:155–167.

24. Tarnow DP, Magner AW, Fletcher P. The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. J Periodontol 1992;63:995–996.

25. Deepak P, Sunil S, Mishra R et al. Treatment of gingival pigmentation: a case series. Indian J Dent Res 2005;16:171–176.

26. Morley J, Eubank J. Macroesthetic elements of smile design. J Am Dent Assoc 2001;132:39–45.

27. Miller TE. Orthodontic therapy for the restorative patient. Part II: The esthetic aspects. J Prosthet Dent 1989;61:402–411.

28. Kokich VO. Esthetics and anterior tooth position: an orthodontic perspective. Part I: Crown length. J Esthet Dent 1993;5:19–23.

29. Johnston CD, Burden DJ, Stevenson MR. The influence of dental to facial midline discrepancies on dental attractiveness ratings. Eur J Orthod 1999;21:517–522.

30. Thomas JL, Hayes C, Zawaideh S. The effect of axial midline angulation on dental esthetics. Angle Orthod 2003;73:359–364.

31. Peck S, Peck L, Kataja M. Some vertical lineaments of lip position. Am J Orthod Dentofacial Orthop 1992a;101:519–524.

32. Kapagiannidis D, Kontonasaki E, Bikos P, Koidis P. Teeth and gingival display in the premolar area during smiling in relation to gender and age. J Oral Rehabil 2005;32:830–837.

33. Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. J Esthet Dent 1999;11:311–324.

34. Alexander RG. Considerações na criação de um sorriso bonito. In: Romano R (ed). A Arte do Sorriso. São Paulo: Quintessence Editora, 2006: 187–210.

35. Dong JK, Jin TH, Cho HW, Oh SC. The esthetics of the smile: a review of some recent studies. Int J Prosthodont 1999;12:9–19.

36. Parekh SM, Fields HW, Beck FM, Rosenstiel SF. The acceptability of variations in smile arc and buccal corridor space. Orthod Craniofac Res 2007;10:15–21.

37. Moore T, Southard KA, Casko JS, Qian F, Southard TE. Buccal corridors and smile esthetics. Am J Orthod Dentofacial Orthop 2005;127:208–213.

38. Roden-Johnson D, Gallerano R, English J. The effects of buccal corridor spaces and arch form on smile esthetics. Am J Orthod Dentofacial Orthop 2005;127:343–350.

39. Ritter DE, Gandini LG, Pinto Ados S, Locks A. Esthetic influence of negative space in the buccal corridor during smiling. Angle Orthod 2006;76:198–203.

40. Parekh SM, Fields HW, Beck FM, Rosenstiel SF. Attractiveness of variations in the smile arc and buccal corridor space as judged by orthodontists and laymen. Angle Orthod 2006;76:557–563.

41. Ali Fayyad M, Jamani KD, Agrabawi J. Geometric and mathematical proportions and their relations to maxillary anterior teeth. J Contemp Dent Pract 2006;7:62–70.

42. Wolfart S, Thormann H, Freitag S, Kern M. Assessment of dental appearance following changes in incisor proportions. Eur J Oral Sci 2005;113:159–165.

43. Ward DH. Proportional smile design using the recurring esthetic dental (red) proportion. Dent Clin North Am 2001;45:143–154.

44. Sarver DM. Principles of cosmetic dentistry in orthodontics: Part 1. Shape and proportionality of anterior teeth. Am J Orthod Dentofacial Orthop 2004;126:749–753.

45. Morley J. The role of cosmetic dentistry in restoring a youthful appearance. J Am Dent Assoc 1999;130:1166–1172.

46. Langlais RP, Miller CS. Anomalias por localização anatómica. In: Langlais RP, Miller CS (eds). Atlas Colorido de Doenças Comuns da Boca. Rio de Janeiro: Guanabara Koogan, 2002: 25–79.

47. Felino E. Ensaio Clínico Aleatorizado Para a Avaliação da Eficácia e Poder Erosivo de Dois Estimulantes Não Farmacológicos Da Secreção Salivar. Monografia para obtenção de grau de Licenciatura, Universidade Fernando Pessoa, Porto 2007:6.

48. Wolfart S, Menzel H, Kern M. Inability to relate tooth forms to face shape and gender. Eur J Oral Sci 2004;112:471–476.

49. Anderson KM, Behrents RG, Mckinney T, Buschang PH. Tooth shape preferences in an esthetic smile. Am J Orthod Dentofacial Orthop 2005;128:458–465.

50. Kina S, Bruguera A, Celestrino M, Kano P. Luz e cor. In: Kina S (ed). Invisível. Restaurações Estéticas Cerâmicas. Maringá: Dental Press Editora, 2007: 79–124.

51. Pietrobon N, Paul S, Pack N. Novas tecnologias para a padronização da escolha da cor. In: Romano R (ed). A Arte do Sorriso. São Paulo: Quintessence Editora, 2006: 367–384.