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SMILE'S AESTHETIC PERCEPTION ANALYSIS BY DENTAL SURGEONS, DENTISTRY STUDENTS, AND LAY PEOPLE

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ARTICLE INFO	ABSTRACT
	Introduction: The growing search for esthetics, by patients, requires more and more knowledge about many situations and anatomical variations by both dental surgeons and dentistry students. Therefore, this project's goal is to analyze the smile's alteration of its aesthetic perception by dental surgeons, dentistry students, and lay people. **Methods:** That was made by means of a survey composed of six smile changes' frontal images, on which the participant chose what looked more and less attractive. On the images is possible to analyze six items that, frequently, are seen daily on the clinic: medial line deviation; bucket corridor; upper lateral incisors' agenesis; occlusal plan's unevenness; dark gaps on top and smile's arch. It was performed a descriptive statistic analysis to exhibit the results as absolute and relative, through chi-square test and Fisher's exact test, with a significance level of 0.05. **Conclusion:** Dental surgeons, dentistry students, and laypeople presented the same smile's aesthetic perception, in relation to the evaluated dental changes.

INTRODUCTION

Today, society imposes models of beauty that may vary according to different cultures, but aim at the incessant search for perfection. Whether it is in search of the ideal body or the way of seeing the beautiful, there are several parameters that determine the precepts of this evaluation (Câmara, 2006 and 2010). In this context, the smile represents a very important factor to be analyzed and has gained emphasis, being considered as one of the main aspects of greater attention when analyzing the face of a person (Baker *et al.,* 2018). In addition to being the earliest form of human communication, it interferes with facial beauty and plays a role in the quality and virtues of an individual's personality (Nascimento *et al.,* 2012), sometimes influencing even the professional (Pithon *et al.,* 2014). This facial aspect has gained an increasingly concrete aesthetic perception, with certain priorities in most approaches or dental specialties, making the patients look for the most

attractive smile, satisfying it personally and also promoting the constant search for knowledge about such procedures, by Dental Surgeons (CD), as well as Dentistry students (Nascimento *et al.,* 2012; Mondelli, 2003; Marson *et al.,* 2014). The dynamics provided by this development facilitate the identification of aesthetic characteristics, allowing the effective study of different variables (Cotrim *et al.,* 2015). In harmonic smiles, the perspective can be objectively perceived in a frontal view by the proportional relationship between the width of the smile, the anterior tooth segment and the buccal corridor. The symmetry occurs when there is correspondence of shape, color, texture and positioning between the dental elements of the superior hemiarcs. Dominance refers to the fact that the central incisors must be the dominant and most observed teeth (Cosendey *et al.,* 2012). For the constitution of a harmonious and pleasant smile, the presence or absence of an acceptable aesthetic zone is of fundamental importance. And this question can vary among professionals, dentistry students and laypeople (Machado *et al.,* 2013). In this sense, the literature has shown that there is a high search for aesthetics through patients, making dental professionals as well as students adapt to these

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changes, providing better aesthetic and functional results to their patients. In daily life it is observed that the teeth are not normally in perfect balance, affecting the aesthetic appearance of the smile. Currently, there are few studies that have evaluated the anterior aesthetic dentistry (Kokich *et al.,* 1999). In this sense, it is extremely important to emphasize the items under analysis in this study, once the data found can provide both academic and professional dental benefits for subsequent studies, as well as the development of techniques and materials. Thus, the objective of this study is to evaluate, through a questionnaire, the perception of Dental Surgeons, dentistry students and lay people about clinical situations that can be seen in the smile.

MATERIALS AND METHODS

The research began after approval of the Ethics Committee in Research, according to the current resolution for Ethics in Research in Human Beings No. 466/12 of the National Health Council (Ministry of Health, DF) (CAAE: 86606418.3. 0000.5578, no. opinion: 2,653,031). The target groups for participation in the research were Dental Surgeons enrolled in the Federal Council of Dentistry who worked in one or two Private Institutions of Higher Education, selected in the city of Vitória da Conquista - BA (Group 1), undergraduate students of the Course of Dentistry of only one Private Institution of Higher Education (Group 2), and patients / companions in the waiting room of the same institution of the students (Group 3). A total of 150 individuals, equally divided in each group, in which the selection to respond to the questionnaire occurred in a random manner. As a criterion for the inclusion of the research, all the individuals who were willing to read, agree and sign the Informed Consent Term (TCLE) were universalized. However, for each group there were different inclusion and exclusion criteria:

Group 1: Inclusion: Dental surgeons duly registered in the Federal Council of Dentistry and working in one or both of the Private Institutions of Higher Education selected for the research, being active in Dentistry , Endodontics, Surgery; Prosthesis and Orthodontics; Exclusion: Dental surgeons who act exclusively in the public health service and who do not fit the clinical areas mentioned above.

Group 2: Inclusion: Students duly enrolled in the undergraduate course of Dentistry of a Private Institution of Higher Education in the city of Vitória da Conquista - BA; Exclusion: Those who had previous experience with Dentistry (for example: dental technicians, Oral Health Assistant - ASB, etc.).

Group 3: Inclusion: Patients attended at the Dental Studies Center of a Private Institution of Higher Education in the city of Vitória da Conquista - BA; Exclusion: Those who had previous experience with Dentistry (for example: dental technician, Oral Health Assistant - ASB, etc.).

For the accomplishment of this study a questionnaire was used (Appendix A), adapted from the work of the authors Kokich *et al.* (1999, 2006), divided in two parts, the first referring to the identification of the participant and the second, which dealt directly with the research. A catalog was also used consisting of 6 photographs of a frontal smile, randomly grouped, which were modified by ADOBE PHOTOSHOP ™ (Adobe Systems

Software CC 2018 19.0.1.29687). These being: middle line deviation; buccal corridor; upper lateral incisor agenesis; unevenness of the occlusal plane; black spaces or *black space* in the upper arch and smile arch. Each photo was analyzed individually and subjectively by the participant and, in the end, elected the most and least attractive according to their aesthetic perception of the modified smile, in order to classify the condition of more or less aesthetic. The researcher personally performed the delivery of the document, explaining the research, and the same was answered by the participant. It is important to note that there was no interference by the researcher or other research participant during the completion of the questionnaire and the evaluation of the images by the participant. To conclude, a statistical analysis was performed, in which descriptive statistics procedures were used to express the results as absolute and relative frequencies. The frequencies of the responses in relation to the aesthetic perception of the smile were compared by means of the chi-square test. On the other hand, the associations between the aesthetic perception of the smile and the characteristics of the study participants (group, sex, age group, training time, dental specialty, course semester and schooling) were verified using Fisher's exact test. The level of significance was 5% (α = 0.05). The data were tabulated and analyzed in IBM SPSS Statistics for Windows (IBM SPSS, 21.0, 2012, Armonk, NY: IBM Corp.).

RESULTS

150 individuals participated in the study, divided into three groups: 50 Dental Surgeons, 50 dentistry students and 50 lay people. The main characteristics of the participants, according to the group, are described in Table 1.

Aesthetic perception of the smile by Dental Surgeons

Figure 1 shows the distribution of Dental Surgeons according to aesthetic perceptions. There was a significant difference in the frequency distribution for the more aesthetic image (Figure 1A) and for the less esthetic image (Figure 1B). According to the Dental Surgeons, the changes that presented less preference were the unevenness of the occlusal plane (0%), black hole (2%) and inverted smile arch (2%) (Figure 1A). The alteration that had the greatest rejection was the inverted smile arc (76%), followed by black hole (14%) (Figure 1B). Associations of the aesthetic perceptions (aesthetic image and less aesthetic image) of the Dental Surgeons with sex, age group, time of formation and specialty were tested. The results of the analyzes indicated that none of these factors was associated (p $\geq$ 0.05) with the aesthetic perception of the Dental Surgeons.

Figure 2 shows the distribution of Dentistry students according to aesthetic perceptions. There was a significant difference in the frequency distribution for the more aesthetic image (Figure 2A) and for the less aesthetic image (Figure 2B). According to Dentistry students, the alterations that presented the least preference were the inverted smile (0%), black hole (2%) and occlusal plane (2%), (Figure 2A). The alteration with the highest rejection was the inverted smile (76%), followed by black hole (26%) and occlusion plane (14%) (Figure 2B). Associations of aesthetic perceptions (aesthetic image and less esthetic image) of the students of Dentistry with sex, age group and semester of the course were tested.
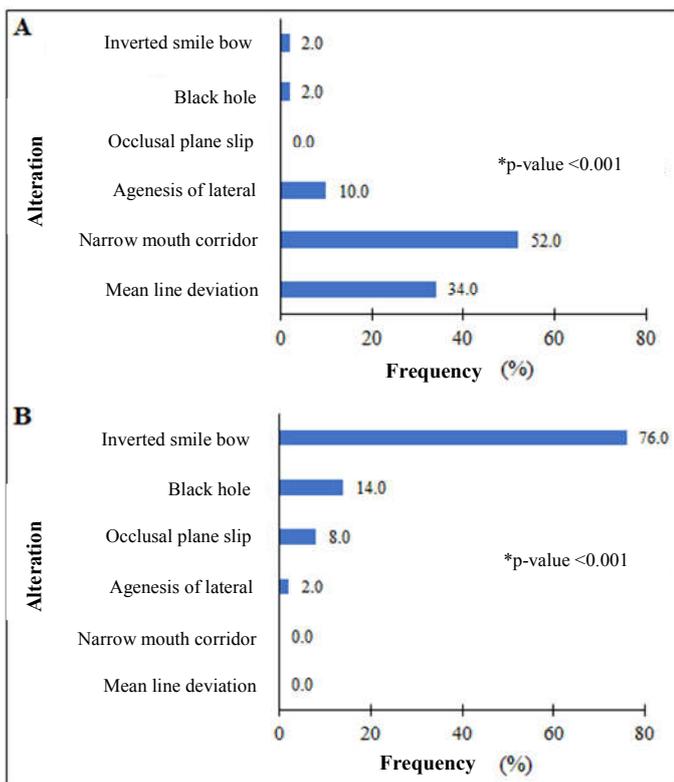
Figure 1. Aesthetic perception of the smile by dental surgeons. A, more aesthetic image; B, less aesthetic image. * Chi-square test.
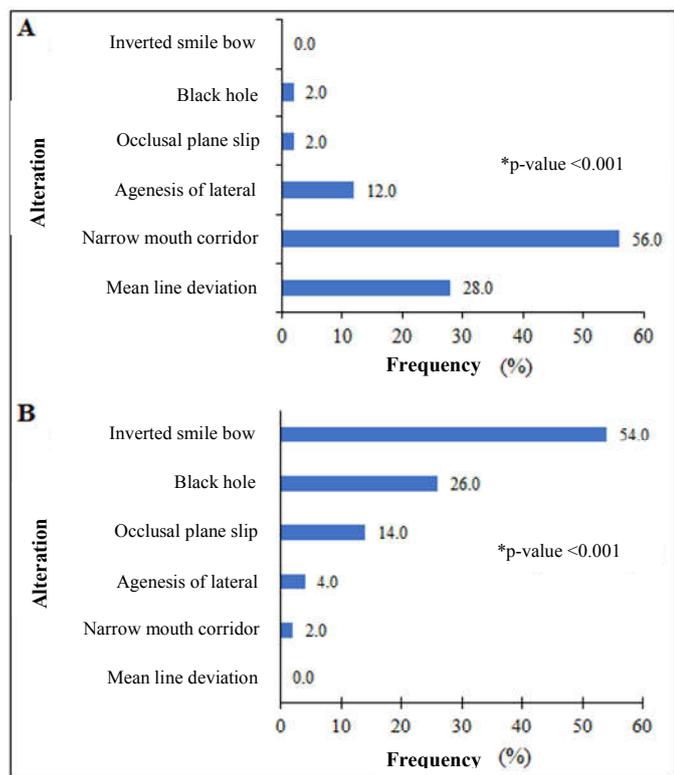

Figure 2. Aesthetic perception of the smile by dentistry students. A, more aesthetic image; B, less aesthetic image. * Chi-square test.

Figure 3. Aesthetic perception of the smile by lay people. A, more aesthetic image; B, less aesthetic image. * Chi-square test.

Table 1. Characteristics of study participants, according to the group

Variable	Group		
	Dental Surgeons	Students of Dentistry	Laymen
Gender			
Female	29 (58.0%)	35 (70.0%)	33 (66.0%)
Male	21 (42.0%)	15 (30.0%)	17 (34 (0%)
Age Group			
≤ 24 years	1 (2.2%)	34 (70.8%)	15 (30.0%)
25 to 35 years	25 (54.3%)	13 (27.1%)	12 24%)
> 35 years	20 (43.5%)	1 (2.1%)	23 (46.0%)
Time of formation			
≤ 8 years	16 (33.3%)	-	-
9 to 16 years	17 35.4%)	-	->
16 years	15 (31.3%)	-	-
Specialty dental			
Surgery	12 (24.0%)	-	-
Orthodontics	14 (28.0%)	-	-
Endodontics	13 (26.0%)	-	-
Other *	11 (22.0%)	-	-
Semester of course			
≤ 7º	-	26 (40,0%)	-
8º and 9º	-	16 (32,0%)	-
10º	-	14 (28,0%)	-
Education†			
Low	-	-	7 (15.2%)
Average	-	-	24 (52.2%)
High	-	-	15 (32.6%)

* Includes dental and prosthesis; †low = up to elementary school; average = incomplete or complete secondary education; high = incomplete or complete upper; -, a characteristic not investigated in the group.

Aesthetic perception of the smile by laypeople

Figure 3 shows the distribution of lay people according to aesthetic perceptions. There was a significant difference in the frequency distribution for the more aesthetic image (Figure 3A) and for the less aesthetic image (Figure 3B). According to the laymen, the changes that presented the least preference were the inverted smile (0%), occlusal plane (2%) and black hole (4%) (Figure 3A). In contrast, the alteration with the highest rejection was the inverted smile (64%), followed by the occlusion (18%) and black hole (14%) (Figure 3B). Associations of the aesthetic perceptions (aesthetic image and less esthetic image) of the laity with sex, age group and schooling were tested.

The results of the analyzes indicated that there was only association between the less aesthetic image and the semester of the course, and students from the earliest semesters (up to the seventh) presented greater rejection due to changes in the occlusal plane and black hole, compared to the students of the higher semesters (from the eighth); On the other hand, the students of the most advanced semesters presented a greater rejection due to the inverted smile arc change, compared to the students of the earlier semesters (Table 2).
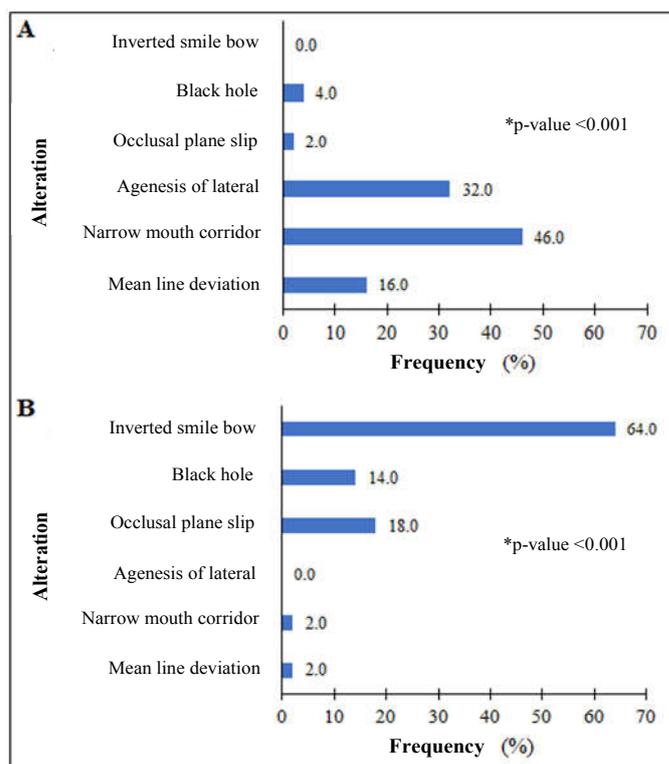
Table 2. Association between the perception of dentistry students regarding the less aesthetic image and the semester of the course

Course Semester	Alteration						p-value *
	DLM	CBE	Agenesis of lateral	DPO	Black hole	ASI	
≤ 7º	0 (0,0%)	0 (0,0%)	1 (5,0%)	7 (35,0%)	7 (35,0%)	5 (25,0%)	0,003
8º e 9º	0 (0,0%)	1 (6,3%)	1 (6,3%)	0 (0,0%)	3 (18,8%)	11 (68,8%)	
10º	0 (0,0%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	3 (21,4%)	11 (78,6%)	

DLM, middle line deviation; CBE, Narrow mouth corridor; DPO, difference in occlusal plane; ASI, Inverted smile bow. * Fisher exact test.

Table 3. Aesthetic perception of the smile, according to the groups participating in the research

Perception / alteration	Group			* p-value
	Dental Surgeons Dental	students	Lay people	
More esthetic image				
Mean line deviation	17 (34.0%)	14 (28.0%)	8 (16.0%)	0.058
Narrow mouth corridor	26 (52 (0, 0%)	28 (56.0%)	23 (46.0%)	
Lateral agenesis	5 (10.0%)	6 (12.0%)	16 (32.0%)	
Occlusal plane gradient	0 (0, 0%)	1 (2.0%)	1 (2.0%)	
Black hole	1 (2.0%)	1 (2.0%)	2 (4.0%)	
Inverted smile arch	1 (2.0%)	0 (0.0%)	0 (0.0%)	
less aesthetic image				
midline deviation	0 (0.0%)	0 (0.0%)	1 (2.0%)	0.236
narrow buccal corridor	0 (0 (0%)	1 (2.0%)	1 (2.0%)	
Lateral agenesis	1 (2.0%)	2 (4.0%)	0 (0.0%)	
Detachment of the occlusal plane	4 (8, 0%)	7 (14.0%)	9 (18.0%)	
Black hole	7 (14.0%)	13 (26.0%)	7 (14.0%)	
Inverted smile bow	38 (76.0%)	27 (54.0%)	32 (64.0%)	

* Fisher's exact test.

The results of the analyzes indicated that none of these factors was associated (p ≥ 0.05) with the aesthetic perception of lay people. In Table 3 the aesthetic perception of the smile (aesthetic image and less aesthetic image) is presented, according to the groups participating in the research. No significant differences were observed in the aesthetic perception between the groups for both evaluations (more aesthetic image and less aesthetic image).

DISCUSSION

Smile analysis has been discussed in the literature for some time. As a methodology to achieve this goal, scholars use frontal images of the smile. Although this situation has been discussed in the literature, it is always necessary to investigate anterior aesthetic perception, given the wide diffusion and alteration of aesthetic perceptions over time (Kokich *et al.,* 2006'; Lopes *et al.,* 2006). Thus, using the methodology adapted from the works of Kokich *et al.* (1999; 2006), this study analyzed the previous aesthetic perception through frontal images of the smile, since, according to Flores-Mir *et al.* (2004), this position favors the analysis of an image of the complete face. Corroborating with this choice, Baker (2018) emphasizes that the smile has gained significant prominence when analyzing the face, thus becoming the point with the greatest focus of attention. The analysis groups were dentistry professionals, students of the area and lay people, totaling an amount of 150 individuals. Regarding the analysis between CD and student of Dentistry, it was possible to observe that there is a greater similarity between the answers for those students who were in more advanced periods of the course, because they have greater clinical contact with aesthetic dentistry. Similarly, in his work, Ayyildiz *et al.* (2017) observed that there is similarity between students of the first periods and laymen, because the beginning semesters do not present much contact with disciplines responsible for the aesthetics of the smile. Kokich; Kiayk; Shapiro (1999) and Machado *et al.* (2013), in their articles on the aesthetic analysis of the smile, evidenced that there are differences in the perception of the different alterations used in previous teeth for

CDs, dentistry students and lay people. However, for the present day, in which there is an imposition of an aesthetic pattern, it was observed with this work that there is a similarity between these groups (Machado *et al.,* 2013; Kokich *et al.,* 1999; Andrade *et al.,* 2016; Alves and Aras, 2014). Considering the analysis of the alterations presented in this study, the narrow buccal corridor was classified as more esthetic for the 3 groups verified. For Nascimento *et al.* (2012), this is due to the fact that this clinical situation does not directly contribute to the attractiveness of the smile by individuals (Figures 1A, 2A and 3A). However, it interferes with the oral rehabilitation process (Ferreira *et al.,* 2016). When asked about the less attractive aesthetic perception, there was more emphasis on the inverted smile arch (Figures 1B, 2B and 3B). This situation is known as a discrepancy between the incisal edges of the upper incisor canines and the upper edge of the lower lip. Câmara (2010) affirms that these asymmetries of the dental elements, as well as of the lips, interfere in this question, providing some variations, that become perceptible and less esthetic. It is known that the middle line of the face is one of the important points in the morphological analysis of the smile. These, when coincident with the facial midline, are important aesthetic and functional components of an occlusion. This contributes, to a certain extent, in the dental and facial harmony. However, some deviation from it may cause an aesthetic impairment in the individual's smile (Francischone *et al.,* 2007; Normando *et al.,* 2009).

Kokich; Kiayk; Shapiro (1999) affirm that a 4mm maxillary midline deviation is enough for CDs to classify significantly less aesthetics than the others, being smaller values imperceptible for this group. This placement corroborates with the present study, since the CDs questioned in this study did not perceive the line deviation as a negative point, since the image presented in the questionnaire had a smaller deviation than the value found by the researchers. It is important to emphasize that in this study the objective was exclusively to analyze the smile, which may have influenced the evaluation, since a full face analysis could alter this result. This change may not have been a highlight for laymen, as Feu *et al.* (2007), when this

occurs in a discreet way may not seriously compromise the aesthetics of the smile, not being noticed by this group. Kokich; Kiayk; Shapiro (1999) also consider that laymen are unable to detect a midline deviation of at least 4 mm. Already when it comes to the second most aesthetic selection for the laity, Ferreira *et al.* (2016) considers that lack of a dental element in the arcade, especially in the anterior region, is an important item for analyzing the smile of an individual, for the CD and probably for the student of Dentistry. With the result found it is inferred that it does not happen for lay people. Andrade *et al.* (2014) and Follak *et al.* (2009) consider that the *black space* or black hole can cause besides aesthetic alterations, phonetic difficulties and food impaction. Faced with current standards, where beauty imposes itself in the face of difficulties, this would be a more noticeable change in the area. As for the change chosen by the laity, Janson (2011) states that this situation must be one of the main relevant aspects during a dental treatment. This situation provides an occlusal disharmony, promoting a loss in the aesthetics of the smile (Janson, 2011; Vicentin, 2015). It is worth mentioning, as Davis (2007) points out, that the most beautiful and natural smiles are not necessarily symmetrical and uniform, or perfect in scientific standards. In this way, this work was able to show that even with perceptible clinical alterations a smile can be considered attractive. The aesthetic analysis of this work, made it known that there is a similarity, by the areas of performance of the Dental Surgeons, as to the judgment of the more and less aesthetic of the clinical situations presented. Therefore, it was necessary to group all the performances for a meaningful analysis.

The results found in this study may have undergone alterations when compared to literature, since this group had a group of interviewees with a more select group compared to other studies. But this fact is due to the attempt to standardize the number of individuals for each group analyzed, compared to the number of Dental Surgeons, Dentistry students and lay people of the Institutions selected for the research. Another point to be analyzed was the limitation in the application of a questionnaire to the laymen only in an Institution, these being present for dental treatment. This already emits a different aesthetic perception regarding the applicability of the questionnaires to lay people outside of this circumstance. However, this choice was due to ethical facilities, for submission of this work to the Committee of Ethics in Research with Human Beings. From this perspective, it is worth mentioning that the participant's point of view may vary based on his / her culture. Thus, individuals from different places would have different opinions, based on their culture. Thus, it is understood that the results are restricted to a culture of a municipality in the interior of Bahia.

Conclusion

Based on the results it is possible to conclude that:Dental surgeons, dentistry students and laymen presented similar aesthetic smile perceptions regarding the odontological alterations evaluated; In general, the odontological alterations that seem to most negatively impact the aesthetics of the smile are the inverted smile arch, the occlusal plane gap and the black hole, the first being the change with the greatest rejection among the interviewees; The aesthetic perception of the smile by students of Dentistry was influenced by the semester of the course, with students from the earliest semesters presenting lower tolerance for the unevenness of the occlusal plane and black hole, while the students of the earlier semesters presented lower tolerance for the arch of the smile inverted.

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