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Beauty Beyond the Golden Ratio: A Study of Perception Regarding Facial Proportions and Symmetry in the Turkish Population

Altın Oranın Ötesinde Çekicilik: Yüzü Kapsayan Oranlar ve Yüz Asimetrisi Üzerine Çalışma

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ABSTRACT

Objective: The authors examined the effect of previously described facial proportions and facial asymmetry on the perception of beauty and attractiveness. The optimal values of four different facial ratios and the optimal degree of asymmetry were examined.

Methods: In this study, 10 faces were adjusted to reference values and -5%, -2.5%, +2.5%, and +5% deformations were created. Participants were asked to select via online survey the most and least attractive face between 5 photographs of the same person with different facial ratio values. Finally, split-face imaging was used to generate right and left-symmetrical images. These images along with the original images were questioned to determine the most and least attractive.

Results: The most attractive face was closer to the reference ratio, whereas the least attractive face was most distant from the reference. Both left and right symmetrical faces were considered less attractive than natural asymmetrical faces.

Conclusion: Standardized "golden" ratios are effective reference points for the perception of facial attractiveness although deviation from these proportions does not always imply that a face will not be perceived as attractive, as some degree of asymmetry also contributes to facial attractiveness and beauty.

Keywords: Esthetics, face, ratios, facial asymmetry, cosmetic surgery, plastic surgery

ÖZ

Amaç: Yazarlar, daha önce tanımlanan yüz oranlarının ve yüz asimetrisinin güzellik ve çekicilik algısı üzerindeki etkisini incelemektedir. Dört farklı yüz oranının optimal değerleri ve yüzün optimal asimetri derecesi araştırılmaktadır.

Yöntemler: Bu çalışmada 10 yüz referans değerlerine ayarlandı ve -%2,5, -%5, +%2,5 ve +%5 deformasyonlar oluşturuldu. Katılımcılardan, çevrimiçi anket yoluyla aynı kişinin farklı yüz oranı değerlerine sahip 5 fotoğrafı arasından en çekici ve en az çekici yüzü seçmeleri istendi. Son olarak, sağ ve sol simetrik görüntüler oluşturmak için bölünmüş yüz görüntüleme kullanıldı. Bu görseller orijinal görsellerle birlikte katılımcılara en çekici ve en az çekici olanı belirlemek için soruldu.

Bulgular: En çekici yüz referans oranına daha yakındır, en az çekici yüz ise referanstan en uzaktır. Hem sol hem de sağ simetrik yüzlerin, doğal asimetrik yüzlerden daha az çekici olduğu tespit edildi.

Sonuç: Standartlaştırılmış "altın" oranlar, yüz çekiciliğinin algılanması için etkili referans noktalarıdır, ancak bu oranlardan sapma her zaman bir yüzün çekici olarak algılanmayacağı anlamına gelmez, çünkü bir dereceye kadar asimetri de yüzün çekiciliğine ve güzelliğine katkıda bulunur.

Anahtar Sözcükler: Estetik, yüz, oranlar, yüz asimetrisi, estetik cerrahi, plastik cerrahi

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INTRODUCTION

It is accepted that facial proportions with ideal values contributes to facial attractiveness (1-5). The “ideal” values for facial proportions are remarkable when assessing the face during perioperative processes, as well as for patients’ personal satisfaction when looking in the mirror (6). Therefore, defining optimal facial proportions is of significant importance.

The golden ratio is found everywhere in nature, such as in flower petals, the milky way, and the human face (7). Similarly, there are various other reference ratios in the face, which do not strictly conform to the standard golden ratio value yet are still acknowledged as such (8). Various studies also show that faces lacking the golden ratio can still be perceived as attractive (9). In addition, studies comparing individual faces with their artificially created symmetric versions have shown that our eyes have a unique ability to detect the “natural” (8,10). One probable reason for this may be the contribution of natural and unique facial asymmetry on people’s perception of facial beauty. In this study, we investigated the effect of facial asymmetry on the perception of facial attractiveness while studying the potential threshold of asymmetry and facial proportions that can be considered the foundation of facial beauty.

MATERIALS AND METHODS

The study protocol was approved by the Ethics Committee of Koç University (approval number: 086.IRB3.047, date: 2021). Informed written consent was obtained from each participant prior to the study. As asymmetry was a key factor to consider in the study methodology, ratios in which facial asymmetry was expected to be prominent were selected. The chosen ratios covered the vertical and horizontal aspects of the span of the whole face as well as important structures such as the lips, chin, cheek, nose, eyes, and temples. The reference values of the four proportions were based on previously conducted comprehensive facial ratio studies (Figure 1) (2,3,8). An online survey was created using Qualtrics (Qualtrics XM, USA). The 53-question survey consisted of questions regarding proportions, symmetry, and personal demographic information, such as age and gender. The survey link was sent to Koç University medical students and faculty via scholar email groups and online chat platforms and was also shared with lay people via social media.

Five healthy female and five healthy male adults from the Turkish population without significant facial marks or deformities were

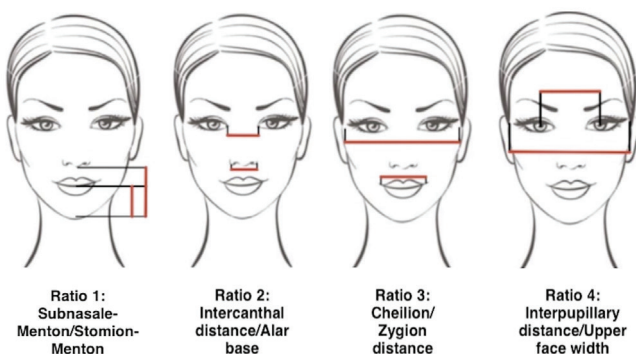


Figure 1. Facial proportions used in the study

selected to create a ratio database for analysis. First, each volunteer was scanned with a computerized facial visual scanner (VECTRA XT, Canfield Scientific, USA) for standardized imaging. The faces were then adjusted according to the reference values for each ratio, and then deformed images with +2.5%, +5%, -2.5% and -5% percentile changes were created. A total of 60 images (six images per participant) were generated consisting of one original image, one with respect to reference values of ratios, and four with +2.5%, +5%, -2.5% and -5% percentile changes (Figure 2). The original face was placed in order with the other images according to the value of the examined proportions. Participants were asked to choose the most and the least attractive images.

For the second part of the study, left and right mirror images were created using the same software. Participants were asked to compare the original image with modified left and right symmetric images for each face and provide their ranking on attractiveness (Figure 3).

Statistical Analysis

The software SPSS 21.0 (IBM, USA) was used, and the confidence interval was set to 95%. For total and gender-related analyses, frequencies and percentage distributions of the most attractive and least attractive choices were inquired. Correlations between the most and least attractive faces according to participant age and gender were calculated using the chi-squared test. Statistical significance was considered for p values less than 0.05.

RESULTS

A total of 72 participants completed the survey (48 female, 24 male). The mean age of the participants was 30.29 years (18-65 years). In the first part of the survey, participants selected the most attractive face among the six variations for ten different faces, individually adjusted for the four ratios (Chart 1). Overall, a moderately shorter chin (+2.5%) was chosen as most attractive for the proportion of chin height, while the majority chose the tallest chin (-5%) as least attractive. Although relatively close between ratios, the relatively narrow nose image (+2.5%) was the most attractive ratio for nose width, while the widest nose (-5%) was the least attractive. The moderately narrow lip (-2.5%) was attributed to the most attractive lip width; and the widest one (+5%) as the least. Regarding the temporal width, majority of participants selected the original face as the most attractive face, while the largest temporal width (-5%) was selected as the least attractive (Figure 4). When the gender of the images was considered, no significant difference was found for chin and lip size. For alar base width, the most attractive choices were the narrowest nose (+5%) for females and both the original nose size and the moderately large nose size (20.8% each) for males. Conversely, the least attractive alar base width for both genders was the widest. For temporal width, the most attractive choice was the reference image for females and the original image for males, while the least attractive were the face with the largest temporal width for females and the face with the narrowest temporal width for males. In the second part of the study, questions comparing the original image versus left and right symmetric mirror images revealed an overall distribution of 36.1% in favor of the original image, 40.1% for the right, and 23.8% for the left symmetric image. However, only 12.9% chose the original image, while 60% chose the left symmetric image, and 27.1% chose the right symmetric image as the least attractive

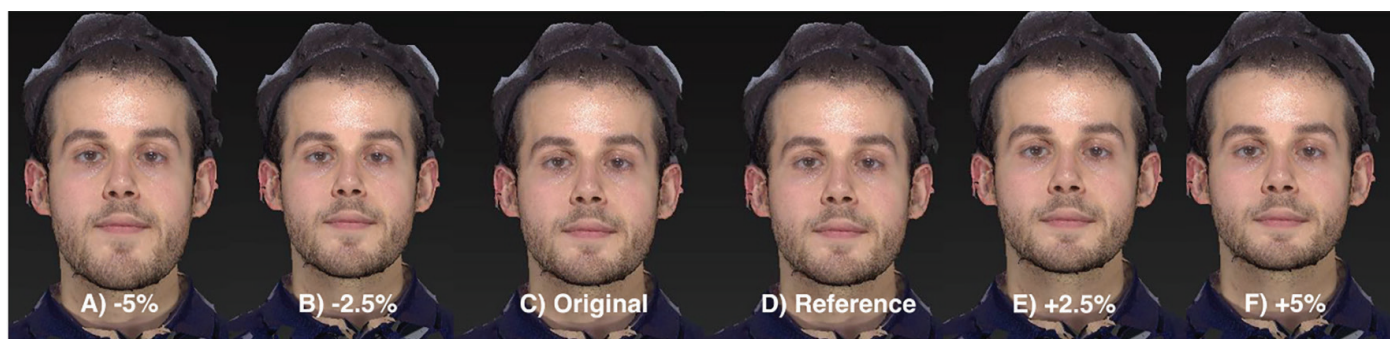


Figure 2. Example questionnaire strip with changes in chin height



Figure 3. Example questionnaire strip with original (A), left (B), and right (C) symmetric images

(Figure 5). Furthermore, a formula for an “asymmetry score” was generated for each of the 10 original faces to assess the level of asymmetry in each one. The formula was adapted from Tamir et al. (9) c-value formula. There were two asymmetry scores for each face: one for the right symmetrical face and one for the left symmetrical face. To calculate the asymmetry score of the right half, the difference between the values of a proportion of the original face and the right symmetrical face was divided by the ratio of the original face. The same calculation was applied to determine the asymmetry score of the left half. As a result, each original face had two asymmetry scores, indicating the amount of variation from the original face. The correlation between selections and their asymmetry scores was examined, and a relationship was identified. With asymmetry scores below 0.7, the results showed that there was a significant tendency to like the original image the most, and the closest mirror image was the second. However, with asymmetry scores greater than 0.7, participants didn’t gravitate toward these images. These findings suggest that minimal asymmetry contributes to beauty.

DISCUSSION

There are a variety of beauty standards for each culture and nationality. Results of this study show that the beauty standards of the Turkish population are in correlation with the generally accepted terms of beauty in terms of the studied ratios. Considering chin height, participants chose an “average” size, which is consistent with other studies in the literature (3,9). However, younger participants had a wider distribution of choices for the size of an ideal chin size, whereas older people had a narrower distribution. Therefore, age is an important factor in the perception of beauty. In addition, it is known that some facial structures get smaller with aging, such

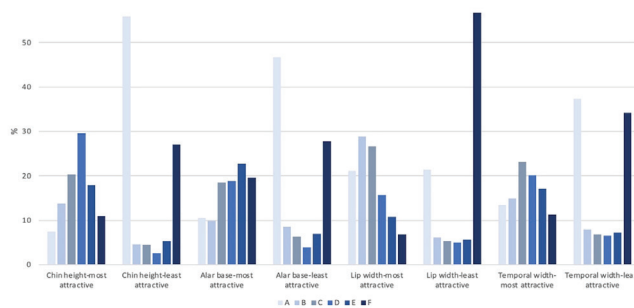


Figure 4. Results for facial ratios (%)

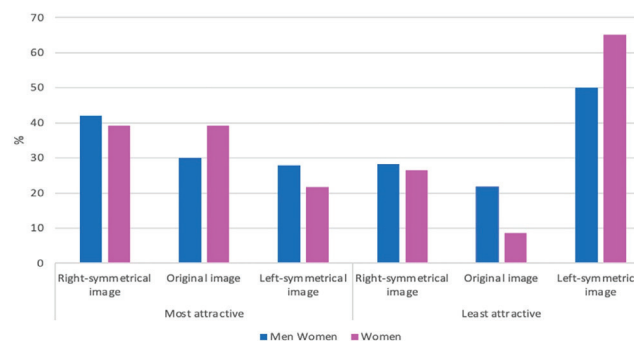


Figure 5. Results for the symmetrical derivations of the face (%)

as the temporalis muscle, maxillary bony prominences, become smaller with aging. Hence why dermal fillers in these anatomical regions serve as the foundation for reconstituting volume loss. When comparing preferences regarding alar base size, the survey participants preferred a wider alar base for men and a narrower one for women. This difference seems to be reasonable because we have the knowledge that wider and more prominent structures on the facial midline contribute to a more “masculine” image, while thinner and smaller facial attributes contribute more to a “feminine” appearance (11). This trend is reflected in the increasing popularity of rhinoplasty procedures with many women undergoing surgery to reduce their nose size. The least attractive face regarding the temporal width was selected as the face with the narrowest bitemporal distance. As confirmed through the results of the study, sunken and narrow temples can contribute to an older and less attractive look. Hence the reason that treating the temple region with dermal fillers is a sought-after procedure for facial rejuvenation.

Regarding the results of the asymmetry study, the original face was least likely to be chosen as the least attractive option. Our results were consistent with the literature, which stated that some degree of asymmetry contributes to facial attractiveness and our perception of beauty (8,9). In this study, we aimed to further analyze the impact of asymmetry on beauty by investigating the perception of attractiveness through facial ratios in combination with asymmetry. Through this, we were able to determine the optimal range of asymmetry that can contribute to attractiveness, which is the main contribution of our study to the existing literature. A number of studies have investigated the effects of gold ratios on the perception of beauty. However, these studies did not consider the influence of asymmetry. When examining the horizontal distances and ratios of the face, the effect of asymmetry should be considered. One side of the face may contribute more, while the other side contributes less, and this difference may be what creates a unique sense of beauty. As the main contribution of the existing literature, our study investigated this topic in combination with facial ratios. Apart from analyzing the combined asymmetry results, a separate analysis for each face was also conducted. When participants chose the least attractive face, they never chose the original face as least attractive, except for two people's faces. Out of the ten faces, eight were found to be most attractive, so additional calculations were conducted for the two odd results for which one of them had values of the four proportions very close to the reference values. Thus, one of these odd results can be clearly explained by this fact, proving that both ratios and asymmetry contribute to attractiveness. In contrast, apart from conforming to the "golden ratio", a slight amount of asymmetry definitely contributes to attractiveness by providing a natural touch and making the faces of 8 billion uniquely different.

CONCLUSION

Countless studies have been conducted in the search to find a "geometrical formula of beauty". The gold standard has been the tool of choice in most of these studies. However, do all beautiful faces have perfect ratios? It is generally acknowledged that symmetry contributes to beauty, but this is not always the case when it comes to our perception of beauty. In addition, there are many contributors to beauty that we overlook, such as minor flaws, personal and cultural preferences, and national differences. Thus, regarding our study based on the Turkish population, the golden ratio contributes to facial attractiveness, but some amount of asymmetry is clearly a cofactor, as some faces lacking the golden ratio but with a certain degree of asymmetry can still be perceived as attractive. When planning any surgical beautification procedure, an approach that combines geometry and symmetry should lead to better results. Nevertheless, informing patients about the individuality that asymmetry provides to facial features and its contributory effect to beauty can be an important part of the consultation. In a society where beauty is defined through filters, a reminder that a certain degree of asymmetry and minor flaws can enhance beauty is refreshing.

Ethics

Ethics Committee Approval: The study protocol was approved by the Ethics Committee of Koç University (approval number: 086. IRB3.047, date: 2021)

Informed Consent: Informed written consent was obtained from each participant prior to the study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Ö.Ö., L.C.M., B.S.K., Concept: Ö.Ö., L.C.M., B.S.K., Design: Ö.Ö., L.C.M., B.S.K., Data Collection or Processing: Ö.Ö., L.C.M., B.S.K., Analysis or Interpretation: Ö.Ö., L.C.M., B.S.K., Literature Search: Ö.Ö., L.C.M., B.S.K., Writing: Ö.Ö., L.C.M., B.S.K.

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