COSMETIC

Gender and Nasal Shape: Measures for Rhinoplasty

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Background: Gender-specific nasal shapes are recommended for rhinoplasty. This study was conducted to clarify whether there truly are gender-related differences and to determine optimal nasal shapes in a Caucasian population. **Methods:** The authors created female and male composite photographs of "average" (n = 128 each), "optimal" (n = 16 each), and "most unpleasant" (n = 8 each) noses stratified on the basis of each photographed subject's (n = 1)311) own evaluation of the attractiveness of her or his nose, using a visual analogue scale. These composites were also assessed by 308 independent judges. **Results:** Optimal female noses showed a horizontally and vertically lower nasion and were concave to straight in profile as compared with optimal male noses, which had a vertically and horizontally higher nasion and a straight profile. A supratip break was not found in any of the composites. At least half of the judges rated average and optimal male composite noses as female. A significant majority mistook the composite of the most unpleasant female noses as male (frontal view, 62.0 percent; lateral view, 72.4 percent; p < 0.001). Optimal and average female and male noses were found to be independently significantly more attractive than the most unpleasant ones (p < 0.001, n = 308 judges). Women and men with a straight or concave profile were significantly (p = 0.017 and p = 0.006, respectively) more satisfied with the appearance of their nose than those with nasal humps.

Conclusions: Gender-related differences in nasal shape appear to be subtle, with nasion position being one of the main factors. A nasal hump and a supratip break are not desirable. (*Plast. Reconstr. Surg.* 121: 629, 2008.)

ertain nasal shapes are recommended in textbooks of rhinoplasty and original articles in this field.¹⁻¹² These nasal shapes have been proposed on an empirical basis and/or by the preselection of aesthetically superior nasal shapes by experts in the field of rhinoplasty and are appreciated by a majority of rhinoplasty patients. Among other factors, it was suggested for rhinoplasty that an attractive *male* nose should appear more dominant (i.e., stronger and straight on lateral view), whereas the final aesthetic line of an attractive *female* nose should be concave and the dorsum less prominent.^{1,2,5-7} Looking at the faces

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Copyright ©2008 by the American Society of Plastic Surgeons DOI: 10.1097/01.prs.0000298095.18943.72 of our fellow men and women, we found that the proposed nasal shapes for rhinoplasty are the exception rather than the rule among the great variety of natural nasal shapes.

Composite photographs are averaged images of a number of originals.^{13–16} We thought it crucial to create composite photographs of preferred, average, and unwanted nasal shapes based on each subject's *own* evaluation and to only then crosscheck the results with a group of independent judges. To the best of our knowledge, this is the first published example of such an approach. This study was set up with the aim of clarifying whether there truly are gender-related differences in the nasal shapes of the general population, to determine the most desired nasal shapes in women and men, to analyze measures of these nasal shapes,

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and finally to determine the prevalence of these nasal shapes in a predominantly Caucasian (German) population.

SUBJECTS AND METHODS

Three hundred eleven Caucasian subjects who were 18 to 30 years of age were photographed in a standardized manner with a ruler held at the level of the face. Among other issues, they were asked to rate the following statements using a visual analogue scale, ranging from completely untrue (0) to completely true (100):

- 1. I am satisfied with the look of my nose.
- 2. My nose is too big.

- 3. My nose is too small.
- 4. I like the width of my nose.
- 5. I like the tip of my nose.
- 6. I like the profile of my nose on lateral view.

One hundred twenty-eight women and 128 men of these 311 subjects were randomly selected. Composites of their noses were prepared to achieve frontal and lateral mean shapes of female and male noses and are further on referred to as average noses (Fig. 1). Morphing was performed by making pairs on the first level, resulting in 64 fused photographs in the second level. Again, pairs were fused and the process was continued until only one photograph per group as a com-



Fig. 1. The process of fusing the images is illustrated with the example of the composite of the lateral view of the optimal female nose. Morphing was performed by making pairs in the first level (*L*. 1) resulting in eight fused photographs in the second level (*L*. 2), four fused photographs in the third level (*L*. 3), two fused photographs in the fourth level (*L*. 4), and one photograph in the fifth and final level (*L*. 5). Composites can only be created by an even number of original images, which again results in an even number when divided by four. From 156 women and 155 men, 128 was the highest possible such number. Composites of the rulers were prepared separately for measurements.

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posite of the original 128 photographs remained: every photograph included contributed 0.78 percent to the final result (Fig. 1).

For the morphing process, only structures directly neighboring the nose were marked with reference points, resulting in a sharply defined nose, upper lip and glabella, and orbital region, but somewhat out-of-focus chin, ear, and upper forehead area (Figs. 2 through 4). Had structures distant to the nose (e.g., ear, chin) been included in the referenced composite, this might have influenced the final composite nose; therefore, this was avoided.

Composites of the noses of the 16 women and 16 men who reported that they were completely satisfied with the appearance of their nose (100 of 100 possible points on a visual analogue scale when being asked question 1) were created and are referred to as optimal noses (Figs. 1, 3, and 4). Composites of the noses of the eight women and eight men who were least satisfied with the appearance of their nose when taking into account all 311 photographed subjects (a maximum of 10 of 100 possible points on a visual analogue scale when being asked question 1) were also produced and are referred to as the most unpleasant noses (Figs. 3 and 4). Nasal measurements were analyzed for all the described composite photographs, with the results listed in Tables 1 through 3.

Three hundred eight independent judges (age range, 18 to 73 years) were used to evaluate whether there were gender-specific differences in nasal shape. For this first task of the survey, eyes, hair, and other facial features were covered or removed to eliminate all other hints suggesting the true gender, with the exception of the nasal shape (Fig. 1). Twelve composite images were presented to the judges separately. These comprised both female and male versions of the following composites: optimal frontal view, optimal lateral view, average frontal view, average lateral view, most unpleasant frontal view, and most unpleasant lateral view. The second task was to assess the attractiveness of the noses of these photographs (Fig. 1) on a visual analogue scale from most unattractive (0) to most attractive (100). In the course of the third task, the 308 judges were shown the complete composite faces and again asked to assess the attractiveness of the noses and to disregard general facial attractiveness. For this task, six photographs were presented, each of which showed both the complete lateral and frontal views of the female and male optimal, average, and most unpleasant composites (Figs. 3 and 4).

Statistical Analysis

Multiple pair-wise comparisons of the ratings given for the different photographs were performed



Fig. 2. Before continuing to read, please cover all but one of the noses shown in this panel and attempt to guess the gender. Proceed in a similar manner with the others. (*Left* and *second from left*) Composite images representing average female noses (n = 128) and (*second from right* and *right*) average male noses (n = 128). A group of 308 independent judges were not able to gauge the gender of these noses. Slight differences are only visible on direct comparison and include a slightly lower nasion and thus shorter appearing nose in the female composite (*left* and *second from left*) as compared with the male composite (*second from right* and *right*).



by Wilcoxon matched pair signed rank test. Twotailed Mann-Whitney *U* tests were used to determine any significant difference in the opinions of the judges, based on age group or education. To assess statistical significance of yes or no questions, chisquare tests were performed. Two weeks after the survey, 31 of the judges were again asked to answer the same questionnaires. We performed Spearman's rank correlation coefficient (ρ) between the main evaluation and the second survey (two-sided). For all tests, the level of significance was set to 5 percent.

Ethics

The study was conducted in accordance with the standards of the Ethics Committee of the University of Kiel (registration number D409/06) and with the Declaration of Helsinki of 1983.

RESULTS

Optimal female noses presented a horizontally and vertically lower nasion and were concave to straight in profile as compared with optimal male noses, which had a relatively higher nasion and a straight profile (Figs. 3 and 4 and Tables 1 through 3). A supratip break was not found in any of the optimal or average female and male composites. Composite images of both the female and male most unpleasant noses contained nasal humps (Figs. 3 and 4). Measurements of optimal, average, and most unpleasant noses are displayed in Tables 1 through 3.

The judges were not able to accurately gauge the gender of the composite average (n = 128men) and optimal (n = 16) male noses when eyes, hair, and other facial features were covered or removed: approximately half or even a signifi-

Fig. 3. Composite photographs of optimal (*above*) (n = 16), average (center) (n = 128), and most unpleasant (below) (n = 8) female noses composed on the basis of each photographed subject's (n =156) own judgment of the attractiveness of their nose. It is important to note that composite photographs are only able to show an average of a group of people. Therefore, composite photographs of the noses of people who were unsatisfied with their nose do not show the individual variations that may have contributed to such a conclusion on their part, but a composite of all the possible variations of noses shared by people who valued their own features in a similar manner. For example, the combination of a very unpleasant nose (because the ala is too large) with another very unpleasant nose (because the ala is too small) may not result in an unpleasant composite nose. Common features associated with dissatisfaction with one's own nasal shape included a dorsal hump, heavy tip cartilage, and a relatively low tip rotation. These features were common to both women and men.

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cant majority considered these noses as female (frontal view, average nose, 65.9 percent, p < 0.001; frontal view, optimal nose, 45.5 percent, p = 0.111; lateral view, average nose, 53.6 percent, p = 0.210; lateral view, optimal nose, 57.8 percent, p = 0.006). In contrast, a significant majority of the judges mistook the composites of the most unpleasant female noses as male (frontal view, 62.0 percent; lateral view, 72.4 percent, all p < 0.001; n = 308 judges).

The features found in female and male optimal composites as described above were only present in 15.4 percent of women and 43.2 percent of men involved, when examining each of the noses of our cohort, separately. We found a nasal hump in 41.0 percent, a straight profile in 42.9 percent, and a concave profile in only 11.8 percent of all women (n = 156; 4.3 percent did not clearly fit any category). We found a nasal hump in 36.4 percent, a straight profile in 43.2 percent, and a concave profile in 15.4 percent of all men (n =155; 4.9 percent did not clearly fit any category).

There was no significant difference in the rates of satisfaction with the appearance of individuals' own noses in women *and* men with straight nasal profiles as compared with those with concave nasal profiles (questions 1 through 6 of the photographed subjects). Women and men with straight or concave profile were significantly more satisfied with the overall appearance of their nose (question 1: women, p = 0.017; men, p = 0.006), with the size of their nose (question 2: women, p = 0.004; men, p < 0.001) and with the profile of their nose (question 6: women, p = 0.013; men, p < 0.001) as compared with women and men with a nasal hump.

Dissatisfaction with one's own nose correlated highly with dissatisfaction with one's nasal profile (women, $\rho = 0.659$, p < 0.001, n = 156; men, $\rho =$ 0.727, p < 0.001, n = 155). There was a moderate negative and statistically significant correlation between the answers to question 1 (satisfaction with

Fig. 4. Composite photographs of optimal (*above*) (n = 16), average (*center*) (n = 128), and most unpleasant (*below*) (n = 8) male noses composed on the basis of each photographed subject's (n = 156) own judgment of the attractiveness of their nose. As stated in the legend of Figure 3, these composite photographs do not reveal individual variations. Common features associated with dissatisfaction with one's own nasal shape included a dorsal hump, heavy tip cartilage, and a relatively low tip rotation. These features were common to both women and men. A feature shared only by men who were unsatisfied with their nose was increased columella show (see also Fig. 3).

	Nasion-Corneal Plane	Nasion-Glabella Plane	Nasion Vertical Position	Nasofrontal Angle	Nasofacial Angle	Tip Projection	Tip Rotation
	(mm)	(mm)	(mm)	(degrees)	(degrees)	(mm)	(degrees)
Female							
Optimal	12.8	1.92	Just above pupil level	144.5	30	28.8	113
Average $(n = 128)$	12.8	2.4	Between pupil and lash line	137	32	29.6	106
Most unpleasant	12	4.8	Upper lid crease	134	35	28	104
Male							
Optimal	13.6	3.52	Upper lid crease	129	36	30.4	114
Average $(n = 128)$	14.4	4.8	Upper lid crease	130	34	32	109
Most unpleasant	16	1.76	Upper lid crease	133	35	32	108

 Table 1. Measures of Optimal Female and Male Noses Composed on the Basis of Each Photographed Subject's

 Own Judgment of the Attractiveness of His or Her Nose*

*It is important to note that composite photographs are only able to show an average of a group of people. Therefore, composite photographs of noses of people who were unhappy with their nose do not show the specific features of the potentially least attractive nose or all their possible unattractive variations but essentially only features shared by people who were not satisfied with their nose.

Table 2. Measures of Average (n = 128) Female and Male Noses Composed on the Basis of Each Photographed Subject's Own Judgment of the Attractiveness of His or Her Nose*

	Final Aesthetic Line below Nasion on Lateral View	Nasolabial Angle (Columellar Labial Angle) (degrees)	Nasal Length (Nasion-Tip- Defining Point) (mm)	Length of Upper Lip (mm)	Interphiltral Distance (mm)	Width of Dorsal Lines (mm)	Approximate Width of Tip-Defining Points (mm)
Female							
Optimal	Concave	116	36	12.8	12.8	8	11.2
Average $(n = 128)$	Straight	106	37.6	13.6	12.8	8.8	12
Most unpleasant	Convex (hump)	106	39.2	14.4	12.8	10.4	12.8
Male	× 1 ′						
Optimal	Straight	115	42.4	16	14.4	9.6	12
Average $(n = 128)$	Straight	114	40	15.2	12.8	9.6	12
Most unpleasant	Convex (hump)	104	44.8	15.2	14.4	11.2	14.4

*It is important to note that composite photographs are only able to show an average of a group of people. Therefore, composite photographs of noses of people who were unhappy with their nose do not show the specific features of the potentially least attractive nose or all their possible unattractive variations but essentially only features shared by people who were not satisfied with their nose.

one's nose) and question 2 (size of one's nose: women, $\rho = -0.594$, p < 0.001, n = 156; men, $\rho = -0.640$, p < 0.001, n = 160) and a moderate positive correlation between satisfaction with the tip of one's nose (question 5) and satisfaction with the profile of one's own nose (question 6: women, $\rho = 0.601$, p < 0.001, n = 156; men, $\rho = 0.677$, p < 0.001, n = 155).

When showing both the frontal and lateral views at the same time (third task; Fig. 3), optimal female noses were found to be independently significantly more attractive than composites of either the average or most unpleasant noses, the latter two being equally significantly different in attractiveness (p < 0.001 for all; n = 308 judges). When showing both the frontal and lateral views at the same time, average male noses (Fig. 4) were found to be significantly more attractive than op-

timal male noses (p < 0.001; n = 308 judges). Again, optimal and average male noses were found to be independently significantly more attractive than composites of the most unpleasant male noses (p < 0.001; n = 308 judges) (Figs. 3 through 5). The results obtained in the course of the second task (assessing nasal attractiveness with eyes, hair, and other facial features with the exception of the noses covered or removed) were equivalent to those obtained in the third task (complete composite faces shown).

When presenting photographs of the noses for the assessment of attractiveness, the results were found to be reproducible with a second survey, with the results of both surveys correlating highly ($\rho = 0.778, p < 0.001$). When assessing consistency in the estimation of gender, there was no corre-

				Columellar	Distance Highest Point Alar Rim and Tip-Defining	Distance from the Long	Distance from
I	30ny Base Width (mm)	Alar Base Width (mm)	Intercanthal Width (mm)	Show on Lateral View (mm)	Points-to-Distance Highest Point Alar Rim and Columellar-Lobular Angle Ratio	Axis of the Nostril to Alar Rim	the Long Axis of the Nostril to Columella
Female							
Optimal	20.8	35.2	31.2	5.6	1.8:1	1.6	1.6
Average $(n = 128)$	20.8	34.4	31.2	5.6	2.0.1	1.6	1.6
Most unpleasant	20.8	36.8	33.6	5.6	1.7:1	1.9	1.9
Male							
Optimal	20.8	36.8	32	4.8	1.7:1	1.9	1.9
Average $(n = 128)$	22.4	38.4	32	4.8	1.6:1	1.9	1.9
Most unpleasant	24	38.4	32.8	5.6	2.0:1	2.4	2.4



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the attractiveness of composite noses on a visual analogue scale when showing both the frontal and lateral views at the same time. Each box shows the median, quartiles, and extreme values. Optimal female noses were found to be independently significantly more attractive than composites of the average and most unpleasant noses (p = 0.001 for all; n = 308 judges). Average male noses were found to be significantly more attractive than optimal noses, with the latter group again significantly more attractive than most unpleasant male noses (p = 0.001 for all; n =308 judges). Pink plots represent female judges; blue plots represent male judges.

p<0.001

^{optimal}

average]

p<0.001

lation between the first and second surveys, indicating once more that nasal shape alone is not indicative of the gender of an individual. Neither age nor education level were found to influence the opinion of the judges in the study.

DISCUSSION

The radix area and the position of the nasion and ideal nasion are the basis of preoperative analysis and planning of rhinoplasty.2,17-20 An ideal vertical nasion position between lash and crease line of the upper eyelid is recommended.^{1,2} This level can be altered from the lash line upward to the crease line in those desiring a stronger nose or lowered to the midpupil level in those requesting a softer nose.^{2,3} We found a vertical nasion position just above pupil level optimal for women and a vertical position at the upper lid crease level optimal for men. Vertical nasion position appeared

to be the most obvious gender-specific difference for both the optimal and average composites.

In the literature, it has been suggested that aesthetically the tip must be both the highest point on the nasal profile and a definite entity that terminates nasal length, with the dorsum lying parallel and approximately 2 mm posterior to a straight line drawn from just above the nasofrontal angle to the tip-defining points in women.^{1,5} In contrast, it has been suggested that men have a higher dorsal bridge.^{1,5} Some authors consider the final aesthetic dorsal line best to be concave for women and straight for men,^{2,6,7} whereas other authors generally tend to favor a more concave than straight profile irrespective of the gender of the patient.⁸ In the present study, a straight mid dorsum was optimal in both women and men, whereas in women the final aesthetic line appeared slightly concave. A supratip break was not seen in optimal composites of either gender. The tip was not the highest point in profile but rather on the same level as the dorsum in both the average and optimal composites of women and men.

Nasal measurements could be discussed in this context, but doing so may exceed the scope of this article. Differences between the measurements shown in this article (Tables 1 through 3) and the invaluable work of other authors might be explained by different ways of selecting candidates for attractive noses or slight differences in the determination of reference points.^{1,2,5,7,9-12,21-23} Optimal measures will vary depending on the size and proportions of other facial structures (i.e., a nose that appears pleasant on one face can appear very unpleasant on another face).²¹ The obvious example of this is a small nose on a 6-foot man versus a large nose on a 5-foot woman. We suggest considering the measures given in the present article for optimal nasal shapes as average values of people with average configurations and sizes. Another issue not dealt with in the present article is the deviated nose, which represents a great aesthetic problem.^{13,14,24,25}

Only through the direct comparison of noses of highly satisfied individuals do gender-related differences become more obvious in women; however, such differences do not appear to be immediately apparent, as evidenced by approximately 50 percent of the independent judges who considered optimal and average male noses to be female. Other authors have shown that people prefer feminized to average shapes of a female face and feminized to average or masculinized shapes of a male face.¹⁵ We confirm these findings for nasal shapes, when composites of subsets are based on each individual subject's evaluation of their *own* nose. Through cross-checking these results by the assessment of 308 independent judges it was confirmed that optimal female noses were indeed the most attractive, with all differences being significant. However, average male noses were found to be independently significantly more attractive than the optimal noses by the independent judges. This indicates a discrepancy between selfassessment and assessment by others (i.e., men may tend to prefer an even more feminized shape of their own nose, which may not always be appreciated by others).

We show that the frequency of the presence of a nasal hump is almost identical in both women and men in a Caucasian population (approximately 50 percent). Nasal humps, a lower than average tip rotation, and a boxy tip are also seen in both the female and male most unpleasant composites and are unwanted by either women or men. These features are not objectively gender-specific but were here shown to be primarily subjectively associated with the male gender, as a significant majority of the judges considered both the male and female most unpleasant composites as male. A potential fallibility of composite images is that individual features may be masked. For example, it may be that the combination of a very unpleasant nose (because the ala is too large) with another very unpleasant nose (because the ala is too small) does not produce an unpleasant composite nose. To completely clarify which nasal shapes appear unpleasant it would be necessary to further subclassify a larger cohort of people who are unhappy with their nose and to then rearrange composites addressing different aspects that contribute to a nasal shape being unpleasant in appearance.

Composite photographs were used in this study in an attempt to develop images that would allow the determination of a standard impression of optimal nasal shape. This was performed by fusing the images of faces of subjects who were completely satisfied with the appearance of their own nose. Extrapolating this standard optimal nasal shape to the assessment of attractive natural noses in living individuals proves difficult. The averageness hypothesis describes the phenomenon that the mean shape of a set of faces (a composite) is judged as more attractive by a majority of observers than is each individual face that contributed to the set.¹⁴ Composite photographs also teach us that the mean shape of a set of attractive faces is preferred to the mean shape of the sample from which the faces were selected.¹³⁻¹⁶ Enhancing the explicit sexual dimorphic features of human faces should theoretically improve attractiveness by enhancing sex hormone-related cues to

youth and fertility in women and, within certain limits, to dominance and immunocompetence in men.¹⁵ Elements of facial structure that reflect enhanced sexual dimorphism may include those features of the optimal noses we have described in the present study that showed a softer appearance in women and a stronger appearance in men.^{2,3}

In the Asian population, composite noses might tend to show a more concave dorsum on lateral view.^{8,26} Requesting a more dominant nasal dorsum may well be as common in Asia as is the request to remove nasal humps in other parts of the world. It has been shown that features of an individual face that deem it attractive to others are thought to be largely consistent between observers independent of age, sex, or ethnic or cultural background.^{13,27}

CONCLUSIONS

There may in fact be gender-related differences in nasal shape; however, they would appear to be subtle. The term "optimal attractive" as suggested by Perret et al.¹³ may be applicable when the average and already beautiful nasal shape is combined with what we here refer to as genderassociated features: a lower nasion giving the nose a virtually shorter appearance and a slightly concave profile in women and a straight but somewhat feminized nose in men. A supratip break is desirable in neither women nor men.

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