

## Data about human face asymmetry

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The manifestation of asymmetry in the human face was studied in 130 adult individuals (67 males and 63 females) from the town of Sofia by classic cephalometric methods. The asymmetry was traced in 21 dimensions out of all 28 face dimensions measured bilaterally: 8 of them horizontal, 6 — vertical and 7 — oblique. Once the data were analyzed biostatistically. Mean values of absolute differences and per cent deviations between the dimensions of the left and right face sides were calculated. In 14 dimensions the percentage of the complete symmetry was higher for the males and in other 7 — for the females. The per cent distribution of the dimensions illustrates approximate symmetry ( $0 \pm 1$  mm) following the distribution of the absolute symmetry. Real asymmetry (differences 2 and more in mm) was more frequent in 14 dimensions in women against 7 dimensions — in men.

*Key words:* anthropometry, facial dimensions, asymmetry.

Asymmetry of the human face is a reflection and part of the bilateral asymmetry in man. The asymmetry in limbs and trunk can in to a certain degree be influenced by environmental factors (profession, sport, habits, etc.) while facial symmetry/asymmetry is predominantly due to evolutionary and hereditary factors. Ancient anatomists have observed and recorded with descriptive precision asymmetrical manifestations in the human face. Moreover, sculptors and painters of the different epochs (Hellinistic, Roman epoch and Renaissance) not only have known the display of asymmetry in the human body but have also reproduced it in their works of art. For example, in the head of the famous Venus of Milo the left eyelid slit, the left ear are placed higher and the left facial half is more narrow than the right one [2]. In this case the realistic reproduction of the asymmetry in the face is the "minute" and hard-to-perceive detail that give life to the work.

The aim of the present study is to make an attempt for quantitative characterization of the degree and location of facial asymmetry in the face of the modern Bulgarian. This also stems from the fact that metric data about the asymmetry of the human face are very scanty [5, 7, 8].

The idea for quantitative determination of the degree of asymmetry in the human skull belongs to the late Prof. Kadanov, co-author of many data published earlier [3, 4]. This underlay the grounds for the study of the manifestation and degree of asymmetry in the live human face for the needs of the plastic anthropological reconstruction of the head soft tissues after the skull [9, 10].

## Materials and methods

The investigations were carried out on 130 grown-up individuals — students at the Medical Academy — Sofia aged 20–22 years, 63 women and 67 men. 28 facial dimensions were measured in the investigated individuals (Fig. 1) — 20 out of them — bilaterally: 7 — horizontal, 6 — vertical and 7 — oblique ones. The better part of the dimensions were introduced by us using the classical anthropometric points [1, 6, 10]. A cephalometric set was used.

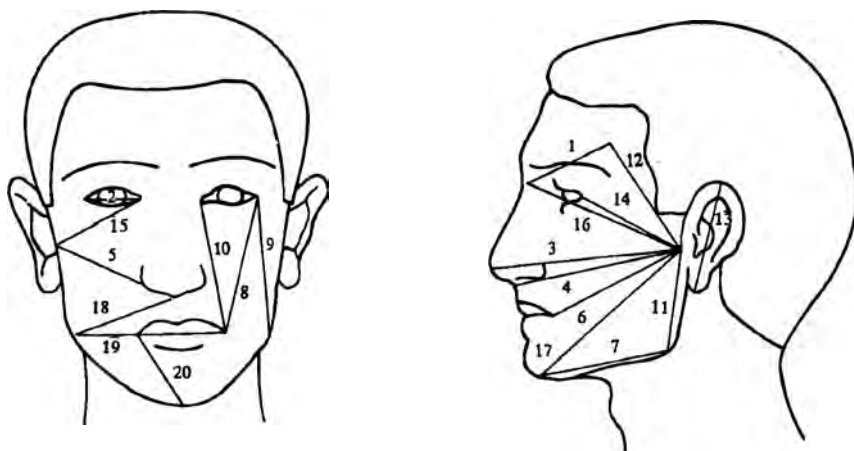


Fig. 1. Anthropometrical points and dimensions

The data relating to the degree of asymmetry were biostatistically processed after the method of Kadanov — Yordanov: full symmetry (0 mm difference), approximate symmetry (difference  $\pm 1$  mm), overall symmetry (+1,0, -1) and asymmetry (difference 2, 3, 4 and more mm). The asymmetry with prevalence to the right is designated with “+” and the one to the left with “-”. The values of the absolute differences and the per cent deviation between the values to the left and the ones to the right have been calculated (Table 1 and 2).

Table 1. Per cent distribution of the differences in mm between the facial dimensions,  $n=63$ , ♀

Dimensions	0	+1 mm	-1mm	-1, +1 mm	-1, 0 +1 mm	2, 3, 4 ... mm
<b>Horizontal</b>						
1. Frontotemporale — Nasion	11,11	9,52	7,94	17,46	28,57	71,43
2. Entokanthion — Ektokanthion	65,08	11,11	17,46	28,57	93,65	6,35
3. Tragion — Pronasale	9,53	15,87	11,11	26,98	36,51	63,49
4. Tragion — Subnasale	14,29	14,29	6,35	20,63	34,92	65,08
5. Tragion — Alare	12,70	7,94	4,76	12,70	25,40	74,70
6. Tragion — Cheilion	11,11	6,35	11,11	17,46	28,57	71,43
7. Gonion — Gnathion	6,35	9,52	9,52	19,05	25,40	74,60
<b>Vertical</b>						
8. Ektokanthion — Cheilion	12,70	7,94	11,11	19,05	31,75	68,25
9. Ektokanthion — Gonion	12,70	9,52	6,35	15,87	28,57	71,43
10. Entokanthion — Cheilion	22,22	7,94	7,94	15,87	38,10	61,90
11. Tragion — Gonion	6,35	7,94	14,29	22,22	28,57	71,43
12. Tragion — Frontotemporale	11,11	12,70	7,94	20,63	31,75	68,25
13. Superaurale — Subaurale	22,22	4,76	19,05	23,81	46,03	53,97

Oblique						
14. Tragion — Ektokanthion	7,94	19,05	23,81	42,86	50,79	49,21
15. Tragion — Entokanthion	19,05	9,52	19,05	28,57	47,62	52,38
16. Tragion — Nasion	15,87	20,63	15,87	36,51	52,38	43,62
17. Tragion — Gnathion	7,94	9,52	6,35	15,87	23,81	76,19
18. Gonion — Subnasale	20,63	11,11	14,29	25,40	46,03	53,97
19. Gonion — Cheilion	11,11	14,29	11,11	25,40	36,51	63,49
20. Gnathion — Cheilion	17,46	14,29	22,22	36,51	53,97	46,03

T a b l e 2. Per cent distribution of the differences in mm between the facial dimensions,  $n=67$ ,  $\sigma$

Dimensions	0	+1 mm	-1 mm	-1, +1 mm	-1, 0, +1 mm	2, 3, 4... mm
<b>Horizontal</b>						
1. Frontotemporale — Nasion	25,34	19,40	19,40	38,81	64,18	35,82
2. Entokanthion — Ektokanthion	58,21	19,40	10,45	29,85	88,06	11,94
3. Tragion — Pronasale	16,42	8,96	7,46	16,42	32,84	67,16
4. Tragion — Subnasale	7,46	7,46	13,43	20,90	28,36	71,64
5. Tragion — Alare	20,90	8,96	16,42	25,37	46,27	53,73
6. Tragion — Cheilion	23,88	10,45	10,45	20,90	44,78	55,22
7. Gonion — Gnathion	17,91	7,46	14,93	22,39	40,30	59,70
<b>Vertical</b>						
8. Ektokanthion — Cheilion	17,91	16,42	4,48	20,90	38,81	61,19
9. Ektokanthion — Gonion	10,45	19,40	8,96	28,36	38,81	61,19
10. Entokanthion — Cheilion	26,87	13,43	10,45	23,88	50,75	49,25
11. Tragion — Gonion	8,96	7,46	19,40	26,87	35,82	49,25
12. Tragion — Frontotemporale	14,93	8,96	14,93	23,88	38,81	61,19
13. Superaurale — Subaurale	31,34	16,42	17,91	34,33	65,67	34,33
<b>Oblique</b>						
14. Tragion — Ektokanthion	7,46	7,46	8,96	16,42	23,88	76,12
15. Tragion — Entokanthion	16,42	8,96	17,91	26,87	43,28	56,72
16. Tragion — Nasion	16,42	11,94	14,93	26,87	43,28	56,72
17. Tragion — Gnathion	14,93	13,43	16,42	29,85	44,78	55,22
18. Gonion — Subnasale	8,96	17,91	16,42	34,33	43,28	56,72
19. Gonion — Cheilion	7,46	7,46	22,39	29,85	37,31	62,69
20. Gnathion — Cheilion	20,90	11,94	14,93	26,87	47,76	52,24

## Results and discussion

The horizontal dimensions in women show the highest degree of symmetry 93,65 per cent in the width of the eyelid slit and lowest 25,40 per cent for the distance from tragion to alare and gonion-gnathion. In four of dimensions (with a difference of 1 mm), the asymmetry is prevalent to the right, in two — it is to the left and in 1 there is total identity. According to the vertical dimensions the auricle is most symmetrical (46,03 per cent) and the lowest degree of symmetry is observed in the Ektokanthion — Gonion and Tragion — Gonion (28,57 per cent) distances. In three of the dimensions (differing 1 mm) the asymmetry is prevailing to the left, in two — it is to the right and in 1 identity is observed.

According to the oblique dimensions the highest symmetry is recorded in Gnathion — Cheilion (53—97 per cent) with close values for Tragion — Nasion and Tragion — Ektokanthion.

In four of the dimensions the differences of 1 mm are in the trend to the left and in three — to the right.

The tendencies for asymmetrical manifestations in the males are similar to the ones in the females although in another per cent distribution.

The comparison of the per cent distribution of the differences between men and women shows that in four of the horizontal dimensions the symmetry in the representatives of the male sex is greater. Males are more symmetrical in all six vertical dimensions. In the oblique dimensions however, five out of the seven are marked by more symmetrical in the female sex.

The per cent distribution of the absolute differences shows that in the different dimensions full symmetry (difference = 0) is recorded in 6,4 per cent to 65 per cent of the cases. In fourteen dimensions the per cent of full symmetry is higher in men and in other seven — it is higher in women. The per cent distribution of the values shows a statistically significant symmetry ( $0 \pm 1$  mm) to the some degree and in the same dimensions as in the absolute symmetry. In women the vertical dimensions are most symmetrical followed by the oblique and horizontal ones. In the males the symmetry in the horizontal dimensions is better pronounced followed by the ones of the vertical and oblique dimensions. A genuine asymmetry (differences of 2 and more mm) can be found more frequently in women (in 14 of the dimensions) than in males (in 7 of the dimensions).

## Conclusion

The summarized survey of the data for the genuine asymmetry (differences of 2, 3, 4 and more mm) direct our attention to the lower segment of the lateral part of the face — the space between Tragion—Gonion—Gnathion and to the one of Ektokanthion — Gonion — Cheilion. The findings of the higher localization of the left auricle and left eyelid slit are in full accord with the established higher localization of the left meatus acusticus externus and left orbit in precious craniological studies of ours [4]. Moreover the identity of the dimension Tragion — Gonion on the right and on the left and of Gonion — Gnathion is the lowest of all studied dimensions in women and Tragion — Subnasale, Tragion — Ektokanthion and Gonion — Cheilion is lowest in men.

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