

Differences and degree of identity between certain face dimensions

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By means of classical anthropometry 108 grown-up individuals of the male sex and 112 — of the female one aged 18-32 years, students, have been investigated. The following facial dimensions were taken: interpupillary distance, nose width, distance between the apexes of the maxillar canines, height of the ear, width of the left eye-lid slit, the height between Glabella-Subnasale and the height between Gnathion-Labrale superius. The results obtained are statistically processed. After the analysis of the identity and the differences between the mean values of the analyzed sizes and the distribution of the differences according to the prevalence of the given dimension, the authors draw the conclusion that the identity and the differences among these facial dimensions can be used as an objective guide in the solution of certain practical tasks of anthropology.

Key words: anthropometry, facial dimensions, identity.

The interrelationship between definite constant anatomical sizes in the facial part of the skull (human face respectively) is known for quite a long time now [1, 3, 6]. It can be traced beginning from the canons of the old masters of fine art. Michelangelo Buonaroti was the first in 1493-1494 to take as a module the physiognomical height of the face which he divided into three equal parts with parallel to the horizontal plain lines [3]. This was accepted also by other famous authors from the Middle Ages such as Leonardo da Vinchi, Albrecht Dürer etc.

The purpose of the present study is to look for the degree of identity and the differences between some of the face dimensions in grown-up individuals with regard to application in anthropology — the method of plastic anthropological reconstruction of the head by the skull [4, 5, 9].

Material and methods

108 individuals of the male sex and 112 of the female one aged 18-32 years have been investigated by the classical anthropological method (9). The following dimensions limited by the points have been taken (Fig. 1):

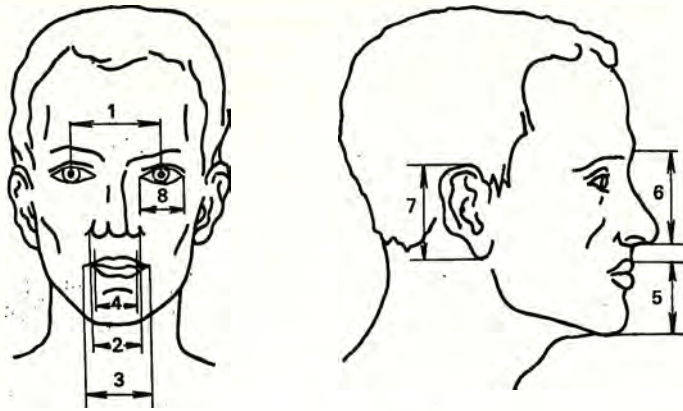


Fig. 1. Anthropometrical points and dimensions

1. Centrum pupillae dex. – centrum pupillae sin. (interpupillary distance),
2. Alare – Alare (width of nose),
3. Cheilion – Cheilion (width of mauth slit),
4. Distance between the apexes of the upper canines,
5. Labrale superius – Gnathion,
6. Glabella – Subnasale,
7. Supraaurale – Subaurale (height of the ear),
8. Ektokanthion sin. – Entokanthion sin. (width of the left eye-lid slit).

Identity as well as differences were sought between the eight dimensions as follows:

1. Interpupillary distance – Cheilion – Cheilion,
2. Cheilion – Cheilion – Labrale superius – Gnathion,
3. Interpupillary distance – Labrale superius – Gnathion,
4. Alare – Alare – Apexes of 3|3,
5. Alare – Alare – width of the left eye lid slit,
6. Glabella – Subnasale – height of the ear.

For each dimension the medium value with the basic parameters (Table 1) has been calculated. The recorded differences are distributed into three groups: with absolute identity (difference=0); with the first dimension greater

Table 1. Statistical characteristics of 8 facial dimensions in grownups of both sexes ($\sigma n = 108$; $\varphi n = 112$)

Dimensions	Females			Males		
	x	σ	m	x	σ	m
1. Interpupillary distance	54,4	3,6	0,3	57,9	4,0	0,4
2. Alare-Alare	32,2	2,3	0,2	36,2	2,8	0,3
3. Cheilion-Cheilion	49,9	2,7	0,3	53,9	3,2	0,3
4. Apexes 3 3	33,7	2,0	0,2	35,0	2,4	0,2
5. Labrale sup.-Gnathion	52,9	3,8	0,4	57,4	4,8	0,5
6. Glabella-Subnasale	65,6	3,8	0,4	69,8	4,6	0,4
7. Height of the ear	60,5	3,3	0,3	65,2	3,9	0,4
8. Width of the eye-lid slit	32,2	2,6	0,4	34,1	2,3	0,3

(difference +) greater second dimension (difference -). The groups are differentiated separately for both sexes. The differences are presented for each group by an ordinary arithmetic mean in mm and their frequency and distribution - in an absolute number and in percent.

Results and discussion

The mean values of the face dimensions (Table 1) are greater in the individuals from the male sex, which a regular consequence of sexual dimorphism. In the following three groups of sizes a degree of identity can be sought; interpupillary distance, width of the mouth slit; height Gnathion-Labrale superius; width of the nose; apexes of 3|3, width of the eye-lid slit; height of the auricle, height Glabella-Subnasale.

For the first group of dimensions (No 1, 3, 5) the interpupillary distance is with greatest value and with the lowest one is the width of the mouth slit (Fig. 2). The height between Gnathion and Labrale superius takes the intermediate position between them. The difference for the individuals of the male sex is 0,2 mm between the size No 1 and No 5, i. e. a practical identity exists. In the individuals from the female sex the difference is 1,5 mm for these dimensions. The width of the mouth slit is closer in value to the height Gnathion-Labrale superius. The differences between these dimensions are 3,5 mm for the males and 3,0 mm for the females respectively. The mean values from this group show a similarity the

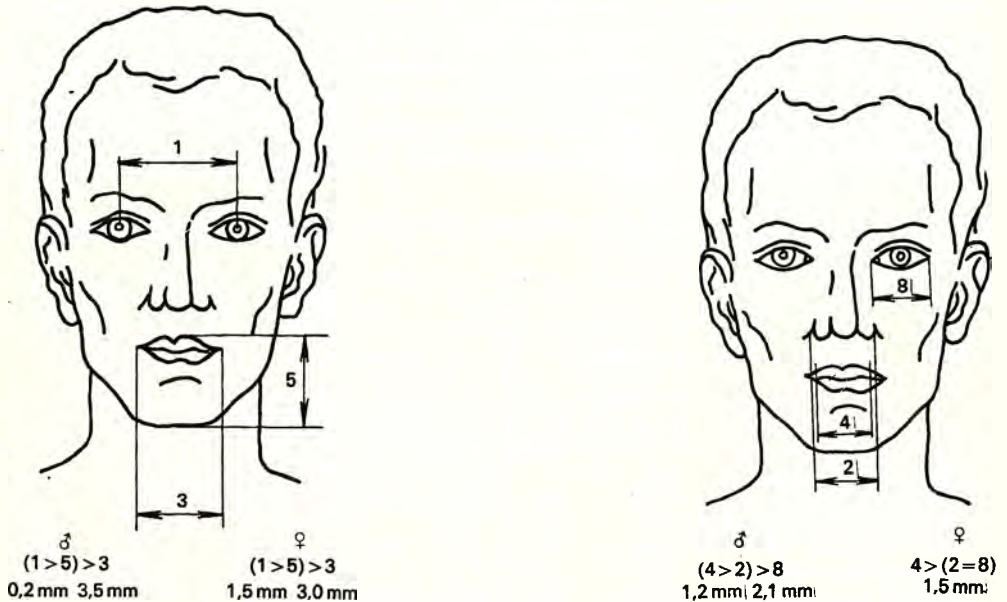


Fig. 2. Differences between the dimensions: interpupillary distance, Gnathion-Labrale superius, and width of the mouth slit

Fig. 3. Differences between the dimensions - width of nose, width of the eye-lid slit and distance between the maxillary canines apexes

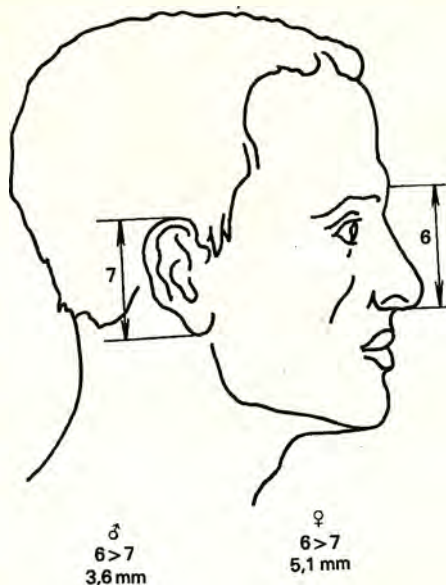


Fig. 4. Distances between the dimensions Glabella-Subnasale, height of the ear

differences between them being insignificant. This shows that they can be used in practice without possessing the qualities of canons or absolute dependencies.

The dimensions of the second group (No 2, 4, 8) have little differences among themselves (Fig. 3). For the individuals of the female sex a complete coincidence is recorded between the nose width and the width of the eye-lid slit. This value is by 1,5 mm lower than the distance between the apexes of the maxillar canines. In the individuals from the male sex the nose width is of greatest value of all three

Table 2. Distribution in percent of the differences between eight facial dimensions in grownups of both sexes (♂ $n = 108$, ♀ $n = 112$)

Dimension	Females								
	difference 0		difference +			difference -			
	n	%	n	%	\bar{x}	n	%	\bar{x}	
1. Interpupillary distance Cheilion-Cheilion	9	8,1	89	79,5	+6,0	14	12,5	-2,3	
2. Cheilion-Cheilion - Labrale sup. - Gnathion	8	9,1	23	20,5	+3,5	81	72,3	-5,7	
3. Interpupillary distance Labrale sup.-Gnathion	9	8,1	61	55,0	+5,0	41	36,9	-5,1	
4. Alare-Alare - apexes of <u>313</u>	12	10,7	21	18,8	+2,8	79	70,5	-3,4	
5. Alare-Alare - width of the left eye-lid slit	5	9,1	20	36,4	+3,0	30	54,5	-3,3	
6. Glabella-Subnasale - height of the ear	8	7,2	90	81,1	+6,7	13	11,7	-2,8	

dimensions. The distance between the apexes of the canines is by 1,2 mm smaller and so is the width of the eye-lid slit by 2,1 mm. Practically the distance between the apexes of the maxillar canines, can serve as an objective guide in the determination of the nose width and the width of the eye-lid slit and vice-versa.

The third group is related to the height of the ear and the height between Glabella and Subnasale (Fig. 4). This relationship has been manifold investigated [7, 8]. In our results the ear height is smaller than the other distance by 3,6 mm for the males and by 5,1 mm for the women. This confirms the standpoint about the comparatively smaller auricle in female individuals.

The brief analysis of the data in Table 1 shows the proximity and the differences between the mean values of the dimensions and outlines the global tendency for identity or difference. The gathering in groups of the differences according to the prevalence of one or the other dimension (Table 2) underlines the individual picture. In the males there is an absolute identity of some of the dimensions (difference = 0) from 1,9% to 15,7% and in women this is in the limits of 7,2%–10,7%, i.e. the cases of identity of the dimensions are more frequent in male individuals. This, however, contradicts the common view that the woman's face is more regularly and more symmetrically shaped.

From the distribution of the differences in the first group of dimensions (the first 3 in Table 2) it is seen that they are in limits from 2,3 to 6,0 mm.

The interpupillary distance is greater than the width of the mouth slit in 79,5% of the females and in 73,1% for the males and is greater than the height between Gnathion and Labrale superius in 55,0% and 48,6% respectively. This determines also the reverse frequency of the differences between the width of the mouth slit and the height between Gnathion and Labrale superius – 72,3% for the females and 75,9% for the males.

In the second group (4 and 5 in Table 2) is seen that the width of the nose is greater than the distance between the apexes of the maxillar canines in 18,8% for the females and in 57,4% for the males, and is also bigger than the eye-lid slit width in 36,4% and 65,4% respectively. This distribution emphasizes once again the already noted greater nose width in the individuals of the male sex.

Males								
difference 0		difference +			difference -			
n	%	n	%	\bar{x}	n	%	\bar{x}	
16	14,8	79	73,1	+6,0	13	12,0	-3,0	
2	1,9	24	22,2	+4,6	82	75,9	-5,9	
10	9,8	52	48,6	+5,8	45	42,1	-6,0	
17	15,7	62	57,4	+3,4	29	26,9	-2,6	
6	10,9	36	65,4	+3,7	13	23,7	-3,2	
11	10,2	85	78,7	+6,6	12	11,1	-4,1	

The height of auricle is smaller than the Glabella-Subnasale distance in 81,1% for the female and in 78,7% for the males. The differences are of comparatively great value of 6,6–6,7 mm. This can be partly explained with the difficulty in the precise determination of the Glabella point in the region between the eye-brows in the living individual.

Summing up the analysis of the results obtained a conclusion can be drawn that the degree of identity established and the differences between some of the basic facial dimensions can successfully be used as an objective guide in solving some practical tasks of anthropology.

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