DETERMINATION OF ANTHROPOMORPHOLOGICAL HOMOGENEITY OF GIRLS' BODIES OF PRESCHOOL AGE GROUP

Irina TUTUNARU, Stela BALAN, Marcela IROVAN and Tatiana NAUMENCO
Technical University of Moldova, Chisinau, Rep. of Moldova

Abstract: Designing products for children, compliant with the modern requirements of education process must comply with the modern anthropometric standardization, psychophysiological development of children and improved design techniques.
The particularities of children's silhouettes are determined, first of all, by differences in the proportions of main elements. It is known that namely the proportions of silhouette represent the biggest age-related variability and affect the perception of silhouette in general.
The study considered the proportions of common type silhouettes of girls determined by a series of anthropomorphological indicators of projections. As an object of research was chosen a preschool age group, as the children aged 3 … 6,5 years have specific particularities of silhouette that must be taken into account when elaborating new models of products.

Keywords: type body, anthropometric indicators, girls, age group 3 … 6,5 years.

INTRODUCTION

The group of preschool age children as one with the highest degree of silhouette changeability and specific functioning of organism compared to the organism of an adult person complicates the task of designing adequate clothing.

Comfort is of special importance for the child, but fashionable clothing is not always comfortable. Clothing must not impede the physical development of children and must be convenient both from the ergonomic and utility point of view. Therefore, when designing clothing for children one should take into consideration the mutual location of functional elements (joints and constructive-decorative elements) in accordance with the particularities of body structure and silhouettes of children.

PARTICULARITIES OF PHYSICAL DEVELOPMENT OF PRESCHOOL AGE CHILDREN

In order to study the physical development of man a series of usual quantifiable important indicators is used: body height, circumference of chest, body weight, determining the structural-mechanical properties of organism. Physical development goes through a series of successive periods and depends on the age of person [1].

During the first neutral childhood (3…7 years) boys and girls have a few differences in the external body shape and many physiological and biochemical parameters. From the first year of life and until the age of 4…5 years the body growth rate decreases. All body dimensions increase at relatively stable rates. The speed of growth processes increases on the sixth year of life.

During the first period of childhood (4…7 years) an intensive growth of skeleton bones and body height is noticed (especially in the age of 5 to 7 years). In this period the dimensions and shapes of bodies of boys and girls have almost no differences. Their movements in this age are characterized by diversity, higher complexity and coordination.

The body proportions change. Changes occur mostly due to the reduction of relative dimensions of head and body and growing relative length of extremities. The height of head attains 1/6 of body length. The growth speed of upper part of body decreases uniformly, while the length of arms (shoulders and fingers) and body diameters increases. The proportions of different body parts in the process of growth change unevenly.

With time the children's posture changes due to the displacement of weight center downwards.

Changes in the adipose tissues and musculature result in changes of other components: shape of thorax and abdomen, trunk and back [2].
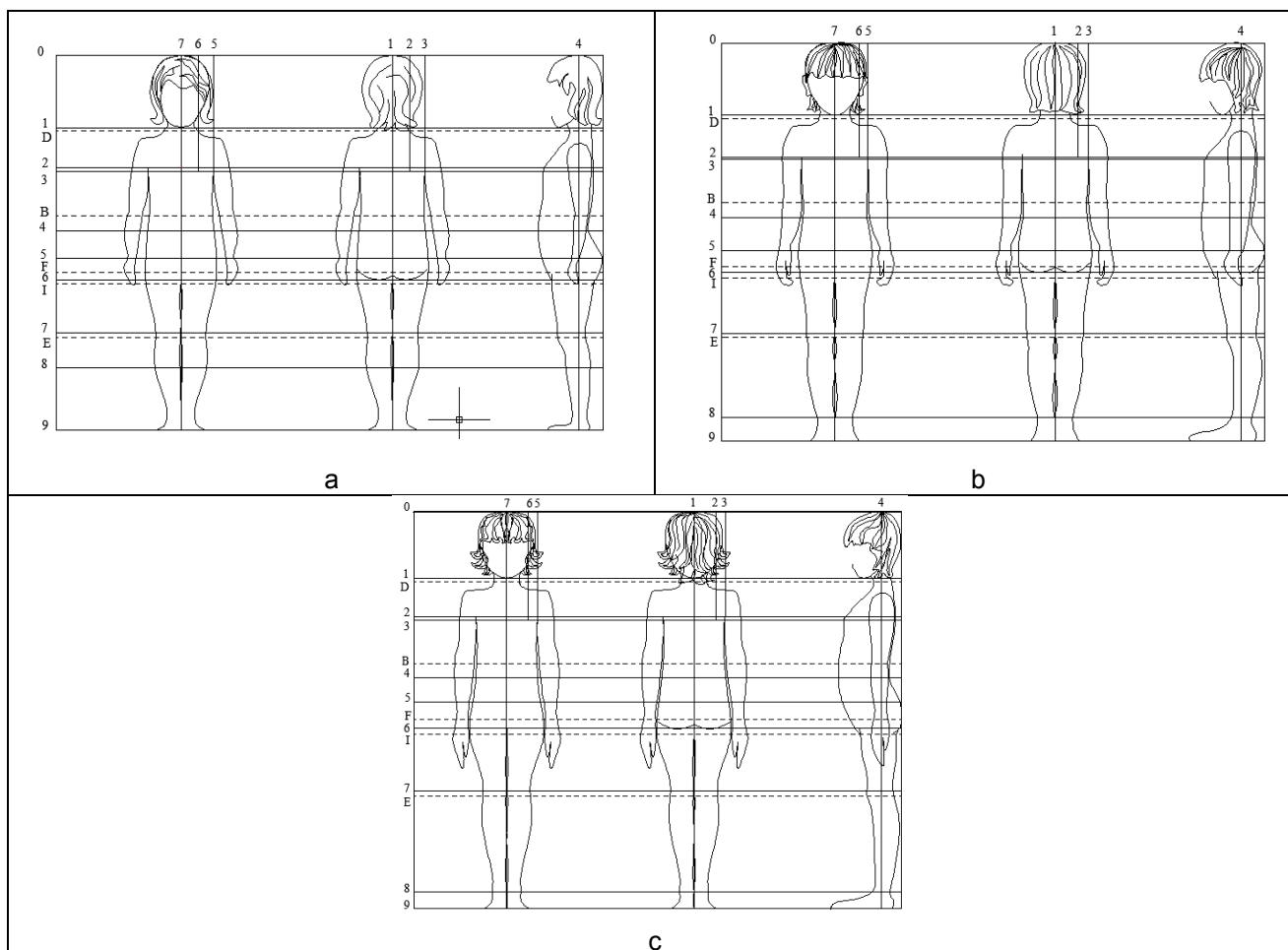
COMPARATIVE ANALYSIS OF COMMON-TYPE BODIES OF GIRLS, AGE GROUP 3…6,5 YEARS

In order to analyze the external shape and morphological particularities of body structures of girls of preschool age group the dimensional projection signs provided in the GOST 17916-86 were used (Common-type silhouettes of girls. Dimension signs 98-56-51, 110-56-51, 122-56-51) that is applicable on the territory of the Republic of Moldova. In this document the common-type silhouettes of girls are provided in two corpulence groups with heights of 98…122 cm and dimensions of 56…64 cm.

Since GOST 17916-86 offers a quite large variety of common-type silhouettes in the examined age group, a decision was made to produce a comparative characteristic of three common-type silhouettes by choosing one with the minimum values of main dimensional signs, the second intermediary and the third with maximum values of main dimensional characteristics, all three silhouettes being included into one corpulence group. Based on the projection dimensional signs the guide images of common type silhouettes 98-56-51, 110-56-51 and 122-56-51 have been produced.

The scheme shows the external contour of child's silhouette in three projections – backside view, profile, front view – with application of major constructive levels in the form of horizontals: neck and shoulder, scapular, thoracic-axillary, waistline, hips, subfemoral fold, knees and support surface, as well as the verticals: mid rear, neck basis in side view, armholes on back, armholes on front, chest center, средней front midline. The main anthropometric levels are marked in accordance with the UMCD CMEA methodology [3].

The graphic models of corresponding common-type silhouettes have been elaborated using the proportional-modular method, the posterior and anterior dimensions and silhouette width values.

For a more complete analysis of external silhouette shapes of girls of preschool age the comparative anthropometric analysis of graphic models of common-type silhouettes has been performed based on the constructive levels. For this scope the deviations of projection-dimensional signs in each pair of common-type silhouettes have been calculated– with height 98 and 110 and accordingly, 110 and 122 cm.

a

b

c

Figure 1: Schemes of constructive levels of children's bodies, preschool age:
a – common-type body 98-56-51;
b - common-type body 110-56-51;
c - common-type body 122-56-51.

Table 1: Anthropometric analysis of graphic models of common-type silhouettes of girls based on constructive levels

Dimension sign, as per GOST 17916-86	Value, см for common-type silhouettes			Deviations, cm	
	98-56-51	110-56-51	122-56-51	98-110	110-122
1	2	3	4	5	6
Frontal projection					
1	98	110	122	6	12
4	78,9	90,0	101,6	11,1	11,6
6	67,5	77,8	89,6	10,3	11,8
11	68,2	78,3	88,8	10,1	10,5
7	56,6	65,7	78,1	9,1	12,4
86	44,9	52,7	61,3	7,8	8,6
12	39,2	46,6	55,5	7,4	8,9
9	25,4	29,6	36,3	4,2	6,7
56	19,4	20,4	21,3	1,0	0,9
116	13,8	13,9	14,6	0,1	0,7
117	6,6	7,0	6,9	0,4	-0,1
Profile projection					
82	3,2	3,2	3,2	0	0
81	0,7	1,1	1,9	0,4	0,8
80	0,3	0,4	0,4	0,1	0
112	3,4	3,7	6,8	0,3	3,1
84	3,8	4,0	6,2	0,2	2,2
110	7,4	7,5	6,9	0,1	-0,6
95	13,7	13,8	13,9	0,1	0,1
111	16,6	17,1	18,2	0,5	1,1
67	16,1	17,8	19,2	1,7	1,4
115	16,6	16,8	16,9	0,2	0,1
116	13,8	13,9	14,6	0,1	0,7

The analysis of guide images of girls in frontal and profile projections allowed us to establish the main differences between the studied common-type silhouettes:

In the first subgroup the difference in dimension sign 4 amounts to 11,1 cm and in the second subgroup – 11,6 cm, this implies a fast growth of the child, especially after the age of 4,5…5 years;

The difference in the height of waistline constitutes 9,1 cm and 12,4 cm accordingly, this points to the changes in the main proportions of silhouette, these changes are uneven, they are slow in the beginning and gradually accelerate with process;

The deviations identified for the height of subfemoral fold - 7,8 cm and 8,6 cm accordingly, point to the elongation of lower extremities, this elongation being attributed to the elongation of angle, as the knee height changes first by 4,2 cm and then by 6,7 cm;

The shoulder height changes uniformly, first by 0,4 cm and then by 0,3 cm more, accordingly the shoulder inclination increases;

The hip width practically does not change, as the transversal hip diameter changes accounted to 1,0 cm in the first case and 0,9 cm in the second, i.e. the silhouette becomes more elongated;

Interesting changes occur to the foot width, it augments first by 0,4 cm and then decreases by 0,1 cm;

By analyzing the profile projection one may make a judgment on the child's posture. The back became rounder, the spine depth attained 0,4 cm, the waist depth increased (in average by 0,3 cm)

The body position also almost did not change, as the difference between the examined silhouettes constituted 0 cm.

The abdomen remains prominent, this is confirmed by small deviation values – 0,1 cm for the anterior and posterior waist diameter;

The thorax becomes wider, the anterior-posterior chest diameter changed first by 0,3 cm, and then quickly by 1,1 cm, however, the thorax relatively elongated upwards appears flatter;

The hip width changes uniformly, the difference accounting to 1,0 and 0,9 cm accordingly, the relatively small deviation values for the anterior-posterior waist diameter make the abdomen to seem more prominent;

Rapid changes occur to the neck width, since the anterior-posterior neck diameter practically does not change in the beginning – the difference for dimension sign 110 is 0,1 cm and then it is quickly reduced by 0,6 cm, making the neck thinner.

CONCLUSIONS

The data provided above allows to affirm that in the result of anthropometric measurement studies of girls of preschool age group significant differences have been determined between the chosen common-type silhouettes, affecting the visual perception of silhouettes in the context of elaborating harmonic models of products. For this purpose the authors propose to divide the preschool age group into **two subgroups** in order to elaborate products of different models, in accordance with the anthropomorphological structure of silhouettes in each subgroup. Thus, the common-type silhouettes with heights of 98 cm to 110 cm will constitute the first subgroup and the silhouettes with heights of 110 cm to 122 cm will constitute the second subgroup. The children with height of 110 cm will appear well in the models of both subgroups.

REFERENCES

[1] Дунаевская, Г.Н., Коблякова, Е.Б., Ивлева, Г.С. *Размерная типология населения с основами анатомии и морфологии.* / Под редакцией Е.Б. Кобляковой. М.: Мастерство, Издательский центр «Академия», 2001. – 288 с.
[2] Куренова, С.В., Бескоровайная, Г.П. Выбор мест расположения линий членения основных деталей детской одежды // Сб.науч. тр. ДГАС. - Шахты, 1997. - Вып. 1.-С.24-28.
[3] ГОСТ 17916-86. *Фигуры девочек типовые. Размерные признаки для проектирования одежды.* - Вед.01.01.87г.

Corresponding author:

Irina TUTUNARU
Faculty Light Industry
Technical University of Moldova
Address of Institution: 168, Stefan cel Mare Blvd.
Postal code, city: MD-2004, Chisinau.
Country: Republic of Moldova
E-mail: itutunaru@gmail.com