

EVALUATION OF COLOR HARMONY ON THE SCALE OF PSYCHOLOGICAL PERCEPTION IN FAMILY LOOK CLOTHES

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Abstract: The fashion trend of Family look clothes is a complicated system of a complex wardrobe. It requires the definition of the laws of compositional construction of the family clothing system on the basis of harmonization of the stylistic unity of the multi-colored composition of products and needs an assessment of the psychological comfort of the consumer in social environment. For this purpose the following tasks are solved: gender and age categories of restriction of color combinations' variants of clothes in Family look style are defined; the algorithm of verification of means of composition in color series of family wardrobe models is developed; communicative methods of control of harmonization means of color compositions are developed. The article considers 5 basic principles of identification of the figurative decision of models of clothes from the point of view of their compositional unity (an image, color, accessories, style). Rules for combining family wardrobe based on the number of family members, their gender, age and style have been developed. It is established that the wardrobe is formed of different types of combinations: parallel, cross, mixed (collage), triangle. Based on the typology of the personality image type by O. Petrova, the typology of the color type of behavior by M. Luscher and the typology of temperaments by G. Eysenk, the categories of color formation of the Family look style are formed. On the example of the portfolio of models selected for the color type "green", image type "prestigious" the method of determining the harmony of color combinations of clothes in the Family look system by the ratio of its filling areas is verified. An algorithm for controlling the process of harmonization of the color composition of the Family look style according to the 7 phases of evaluation of the means of composition is developed, which is displayed by the level control scheme. An algorithm for forming a wardrobe in the style of Family look is developed and its practical application is shown on the example of developing different wardrobe options.

Keywords: Family look style, harmony of color, color types, algorithm, identity, complex wardrobe, collage of models.

1 INTRODUCTION

The trend of Family look does not leave the lists of fashion trends in the clothing industry. This trend shows not only the style for the whole family in clothes and accessories, but also the philosophy of life in family values [1, 2]. The manner of dressing in one style has a peculiar psychological aspect: 1) unites the family and emphasizes the integrity of the relationship between children and parents; 2) emphasizes individuality and allows you to stand out from the crowd; 3) enforces good taste in children; 4) satisfies the child's need to imitate adults; 5) charges with positive emotions [3].

Family look is extremely multifaceted and varied. This is a street-holiday style with a huge number of variations and stylistic solutions [4]. It is because of the peculiarities of capriciousness and insistence of Family look that the laws of this style are so easy to break due to ignorance and turn the whole family into an ordinary clowning of imagery. Subjective perception of the decorative and color theme

of complex wardrobe items in the style of Family look by consumers does not allow us to assess objectively the psychological aspect of comfort due to ignorance of the basics of the composition of this style. Scalability of harmony of color combination of wardrobe items enhances the advertising effect of imagery of a friendly, strong and happy family [5]. The development of methods for quantifying the use of colors requires the use of both instrumental methods of colorimetry and interpretation of the harmony of the collage of models.

2 DISCUSSINS IDEAS

In the history of fashion, it is believed that the homeland of this style is America, during the Great Depression (20s of last century). Women sewed fashionable dresses for themselves, and from the remnants - clothes for children [6]. The popularity of the trend grew and later the family look began to appear on the covers of magazines, on greeting cards [7].

Nowadays, Madonna singer returned to the Family look style for the first time, ordering copies of her own clothes for her daughter Lourdes [8, 9]. The next standards of Family look were Angelina Jolie and Brad Pitt, the Beckham couple, recognized fashionistas Gwen Stefani, Jennifer Lopez and Cindy Crawford [9]. After such advertising, the fashion for a Family look spread around the world.

Designers from Chanel, Lanvin, Cavalli, Dolce & Gabbana began to create actively separate collections in the style of Family look for different tastes [5, 9, 11, 12]. More affordable brands such as Benetton, Mango, Gap, ZARA, Old Navy, H&M, Hanna Anderson and Children's Place are now successfully selling the same clothing for the whole family in their online stores [11, 12]. However, you can create it yourself by buying the same style things from different brands and trademarks. If desired, original things and accessories can be sewn to order or made by yourself. In this case, the style will be individual and unique, and will save a lot of money [12-14].

The motivational choice of the consumer depends on how attractive his image is in competition with similar social status [15]. The psychological effect of color on a person is actively used in medicine. In order to justify the choice of color solution for clothing, marketing research has been conducted, which is based on the theory of harmonious combination of colors called Ittena [16]. There are a number of studies on the effect of color on the psychological and physical state of a person through the use of test questionnaires [17]. This allows you to make recommendations for choosing the main and additional colors of clothing. The informational aspect of the psychological classification of people has a scientific basis for research done by E. Kretschmer, C. Jung, M. Lüscher and H. Eysenck [18].

The psychological comfort of the "clothing-appearance" relationship is assessed through the leading type of perception using the questionnaire by O. Petrova [19]. Segmentation of psychological personality types for the color formation of the wardrobe in the style of Family look is relevant, because the standard features of modern forms of clothing is obvious.

Consideration of clothing in the style of Family look on the basis of harmonization of stylistic unity of the multi-colored composition of products requires an assessment of psychological comfort in the social environment. For this purpose it is necessary to solve the following tasks: to define gender and age categories of restriction of variants of color combinations in style of Family look clothes; to develop an algorithm for verifying the means of composition in the color series of family wardrobe

models; to develop communicative methods of control of harmonization means of color compositions.

3 METHODS

The complexity and diversity of the Family look is regulated by the system of identifying the features of a single style for the whole family at the stage of selecting models from Internet resources. A huge number of variations and stylistic solutions for creation a family image require the use of knowledge of the basics of composition as a method of artistic design at the initial stage. Functional, constructive and aesthetic value of the utilitarian justified form of models in the style of Family look is estimated by exact coincidence and harmony of color and accent details [20].

Achieving integrity and unity in the combination of complex wardrobe items provide the principles of style identification (Table 1).

Models presented in electronic resources, as a rule, have functional and constructive value. The control of aesthetic value is provided by the theory of composition. The objectivity of the assessment of color combinations is provided by expert and instrumental control methods of means of harmonization on the basis of observance of the basic rules of color harmony:

Rule 1: The colors yellow, red, green, blue are called the main, pure, without shades of others, adjacent to them in the color spectrum.

Rule 2: There are three groups of colors in combination - related (R), related-contrast (R-C) and contrast (C).

Rule 3: Related circles have at least one common (main) color in their composition. There are four groups of related colors - yellow-red, red-blue, blue-green and green-yellow.

Rule 4: Related-contrasting colors are located in two adjacent quarters of the color wheel and have one main color, the other two - mutually complementary to the main color. There are four groups of related contrasting colors - yellow-red and red-blue, red-blue and blue-green, blue-green and green-yellow, green-yellow and yellow-red.

Rule 5: Contrasting colors are located in opposite quarters of the color wheel; they are yellow-red and blue-green, yellow-green and blue-red.

The rules of formation of signs of stylistic identity are influenced by such laws of composition as dominants, integrity, balance, standardization, contrasts.

The law of dominance in the color composition, due to the image type of the consumer, determines the main color tone as a functional element of the color type of behavior.

Table 1 Principles of identification of the figurative solution of clothing models in the style of Family look

Characteristic feature	Principle	Method	Family size			
			2	3	4	5-6
A complete match of the image	The identity is the same	Dimensional copying of the mirror image of the assortment				
The identity of colors in different cuts	Identity is related	Color dominant in the gradation of rhythm metrics				
Identity of accessories	Frequency	Support with the same accessories				
Stylistic identity	Grouping	Stylistic balance of items combinations				

The law of integrity ensures the harmonious interaction of color zones according to the rules of subordination.

The unity of style implements the laws of standardization through the means of harmonization of art form: nuance, identity, and rhythm.

The law of contrasts explains polyvariety by such means as shape, tone, color, proportions, quantity from the standpoint of the unity of opposites.

The three-component theory of color vision adopted in colorimetry allows to quantitatively link the chromaticity coordinates of chromatic colors with the areas of their spots using the criterion of harmony of color composition of objects in the style of Family look [21].

The typology of Max Luscher's personality is based on the desires that determine life choices and characterizes the main type of color behavior: the blue type is the desire for harmony; the green type is a desire for prestige; red type - the desire to succeed; yellow type - the desire for change [16].

Characteristics of psychological types of temperament and attitudes to clothing are directly correlated with the degree of psychological comfort of the color type of behavior.

The sequence of work on the quantitative determination of the color type of the overall composition of the Family look models is as follows:

1. Formation of a card index of appearance of models according to the principles of identification and introduction in a grid of frontal projections on a body.
2. Determining the coordinates of color spots that form the color composition of Family look models.
3. Determining the proportions of color areas in the image type of consumers, taking into account the color type of behavior.
4. Choosing how to combine the components of the wardrobe for family members.

4 EXPERIMENTAL

The formation of models' system in the style of Family look is performed according to the general rules of selection of clothes for one person [13]. The basis of selection is to determine the number of family members, their gender and age.

Depending on the number of family members, this system can be 2, 3, 4, 5, 6-component. According to gender and age, as a rule, this system should include parents and children.

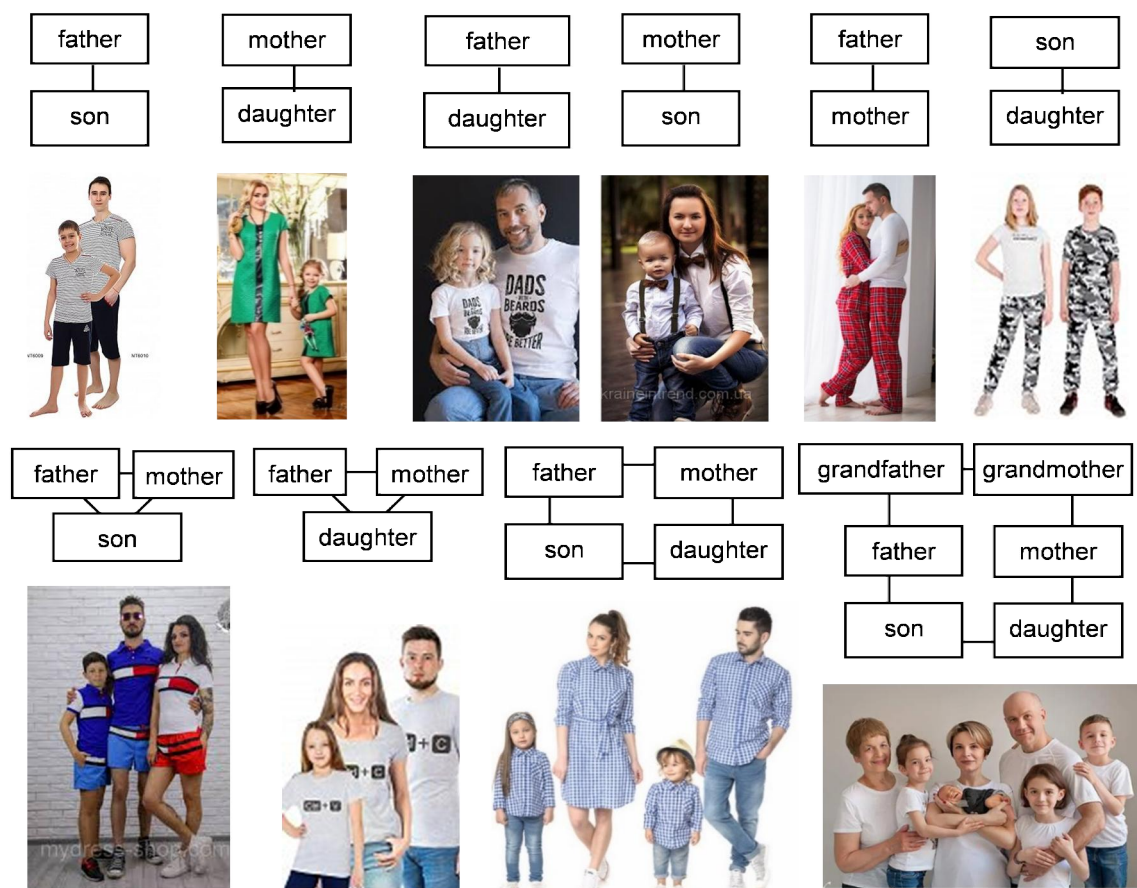


Figure 1 Ways of combining family members in the Family look system

However, sometimes it can be only parents, only children, or parents + children + grandparents, or grandchildren with grandparents. The basic options for possible combinations of family members in the Family look system are shown in Figure 1.

However, these concepts can be somewhat expanded. For example, the combination father + son also involves the combination grandfather + grandson or father + grandfather + son, and the combination mother and daughter - involves the combination grandmother + granddaughter or mother + grandmother + granddaughter. In addition, the number of children in this system can vary from 1 to 4-5. For example, the combination father + son also implies a father + 2 sons, the combination mother + daughter - provides a combination of mother + 3 daughters, and the system father + son + daughter provides, for example, a combination of father + 2 sons + 1 daughter or father + son + 2 daughters. A formalized description of the combinations of family members in the Family look system is represented by the equation (1):

$$FL = f + m + s_i + d_j + gf + gm \quad (1)$$

where: FL is the number of family members in the Family look system; f is the father; m is the mother; s is the son;

d is the daughter; gf is the grandfather; gm is the grandmother; i is the number of sons; j is the number of daughters.

This factor is very important, especially when determining the rules of combining the wardrobe of family members. The frequency of occurrence of different component variants of the family is presented in Figures 2 and 3.

When designing clothes in the style of Family look, the most common is a traditional family of 4 people, which allows you to describe the probable options for combining wardrobe and color in this system. The choice of products that will be included in the wardrobe primarily depends on the style and age of family members. The warm period of the year has been chosen for research, for the purpose - festive clothes and for rest; for accessories - complementary items from the main fabric or the companion fabric. The color composition is usually based on a limited number of color combinations. Such a restriction is clearly represented by sets of special purpose clothing (uniform, office, industrial). The gender and age category of consumers in a complex wardrobe has secondary intonations of accessories or variations of the main color scheme in the combination group.

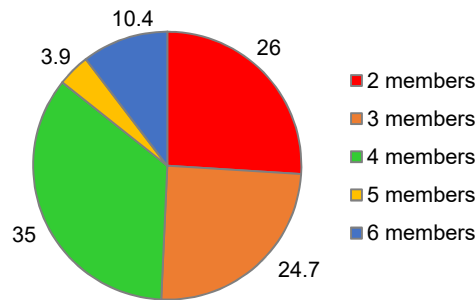


Figure 2 Frequency of occurrence of family members' number



Figure 3 Frequency of occurrence a combinations of family members by gender

When combining colors between family members in the Family look system, the same rules are followed as when combining wardrobe units. The color may be the same for the same range of clothing or with different color accents and different filling areas, the color may be the same or different in different sex groups with different assortment; the color of clothes of one assortment can be different

in opposite sex groups; color and ornament may be the same in certain types of clothing, regardless of gender and range; color and ornament may be different with different range of clothing and gender of family members [22]. The frequency of occurrence of different color combinations and clothing range between family members is shown in Figures 4 and 5.

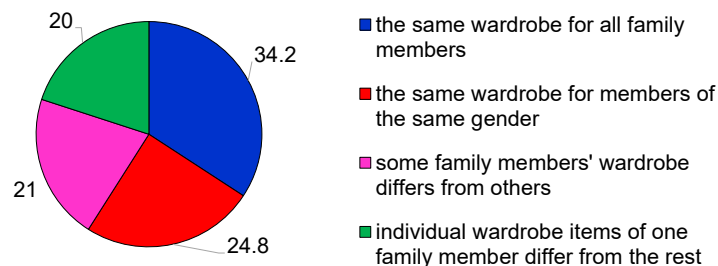


Figure 4 Frequency of combinations of wardrobe items between family members

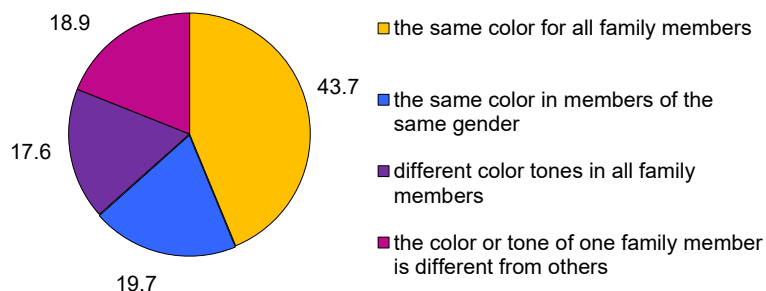


Figure 5 Frequency of color combinations between family members

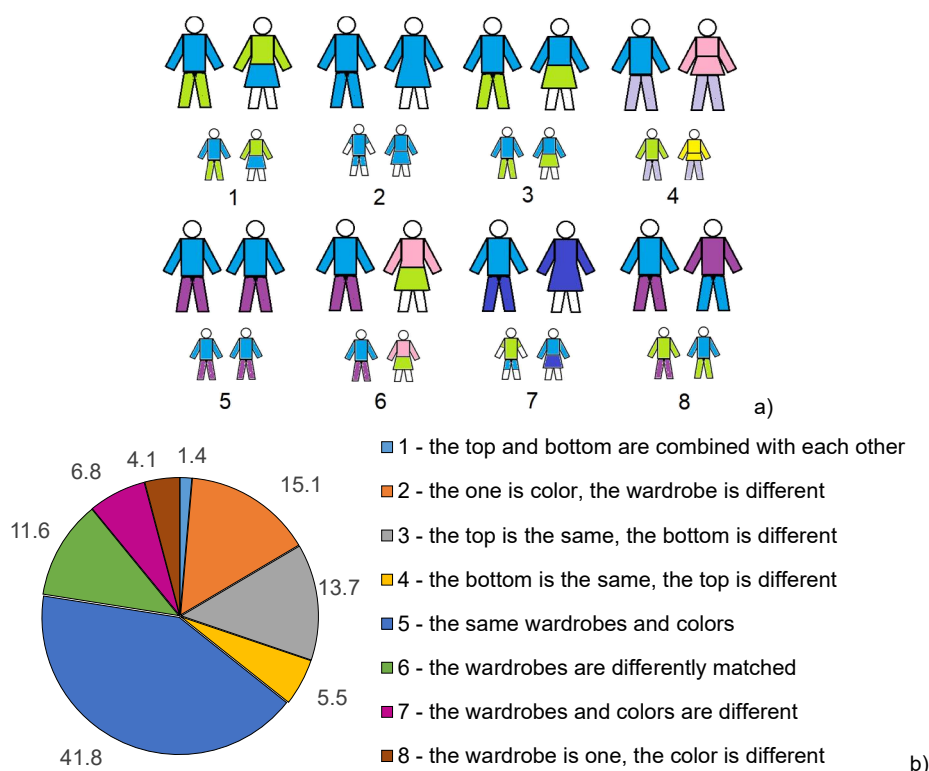


Figure 6 Options for combining colors in a wardrobe collage: a) pictogram; b) frequency of occurrence

The obtained values indicate that one of the key positions of consumer demand for Family look clothing is the predominant identification of the image solution of clothing models on the principle of "identity is the same" in the range and color. This confirms the psychological desire of family members to visually emphasize their unity.

The study of the rules of mutual combination of color and wardrobe units allowed us to determine the probable options for their combination (Figure 6).

Options of combinations (2, 3, 5, 6) with a frequency of 11.6-41.8% should be used as a base in the development of Family look clothing to provide the widest range of consumers.

Preliminary studies of the subjective color preferences of the youth group of women on the basis of a short test by M. Luscher characterizes the respondents as stylish ones, following fashion trends: first place - blue; second place - blue-green; third and fourth place belongs to yellow-red color. These colors are included in the color palette of the spring-summer season constantly. They characterize the modern woman as independent and purposeful, who keeps up with

the times. This is a generalized personality – "one who constructs herself." The consistency of the respondents' opinions is characterized by the concordance coefficient $W = 0.71$ and Pearson's criterion $\chi^2_p = 71.4 > \chi^2_{tabl} = 18.5$.

The study of temperament types in the control group of clothing consumers of Family look, namely, women of younger age group was performed by G. Eysenk's test.

Choleric (35%) corresponds to the red type of behavior. It is a desire for success and victory. Sanguine (17%) corresponds to the green type of behavior. It is a desire for prestige, the search for reliability and comfort. Phlegmatic (10%) corresponds to the yellow type of behavior. It is a desire for change that is full of hope. Melancholic (27%) corresponds to the blue type of behavior. It is a desire for harmony based on unity with the world around us.

To determine the image attitude to style, a questionnaire by O. Petrova was used [19]. The relationships of the categories of the color composition of the Family look style are shown in Table 2.

Table 2 Categories of color formation of the Family look style

Consumer group	Color type of behavior	Temperament type	Image attitude to style
avantgarde	red	choleric	obsessed, aesthetic, distinctive
prestigious	green	sanguine	prestigious, harmonious
moderate	yellow	phlegmatic	standard, aesthetic, rational
practical	blue	melancholic	neat, harmonious

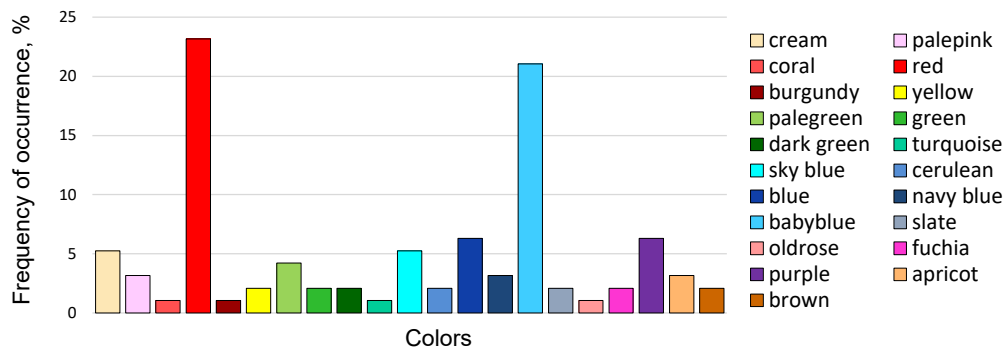


Figure 7 Diagram of the distribution of the occurrence of chromatic colors in the collage Family look

The central figure in the Family look collage is usually a mother. A two-year period of psychological perception of color was used to select mobile signs ahead of the development of shape signs. The key trends of spring-summer collections of women's light clothing of 2018-2020 years are the use of bright, often contrasting colors and pastel shades, an original combination of textures and prints, especially floral ornaments. The controlling function of color combination is illustrated by Figure 7.

The characteristic of the chromatic colors in the Family look collage corresponds to the color type of behavior and temperament type.

The verification of the portfolio of models in the style of Family look according to the scenario of determining consumers' preferences is based on the method [23]. The tectonic integrity of the three-dimensional shape of clothing models for different gender and age groups is characterized by a coefficient of proportionality on the principle of scaling [24, 25].

To study the color composition of the portfolio of Family look models in the group of "prestigious" consumers, the method of determining the ratio of areas in the grid of product dimensions was used [26]. Since the type of sanguine temperament clearly coincides with the color type of behavior "green", the portfolio of five models is composed on the principle of identity of the range and decoration in different combinations of parents with children (Figure 8).

The coefficient of proportionality of the ratios of the areas of color spots is calculated by the equation (2):

$$C_{pr} = \frac{S_i}{S_j} \quad (2)$$

where: S_i is the area of the color spot of the clothes of the central figure and S_j is the area of the color spot of the clothes of another family member.

Verification of the ratios of the areas of color spots of the portfolio models are given in Table 3.

In the Family look collage the central figure is usually mother. The location of the models in the portfolio is estimated by approaching the harmony of the "golden section" (1.6 for women). The collage of models №4 (Figure 8) characterizes a high degree of coincidence with the harmonious proportionality of body measurements of the four-component group of the family and clearly defines the purpose of the range. The collage of models №1 shows a mirror image of the type of assortment by gender, but does not extend to the social aspect of the family. Collages of models №2 and №3 emphasize the metric rhythm of color tonality. However, the collage №3 corresponds better to the laws of composition in ensuring unity and integrity. Collage №5 identifies the color group of the central figure, but disturbs the balance due to the small area of the color spot of the boy's clothing accessories. Due to the inconsistency of the factors assessing the integrity of the composition, the collage №5 was excluded from further analysis.

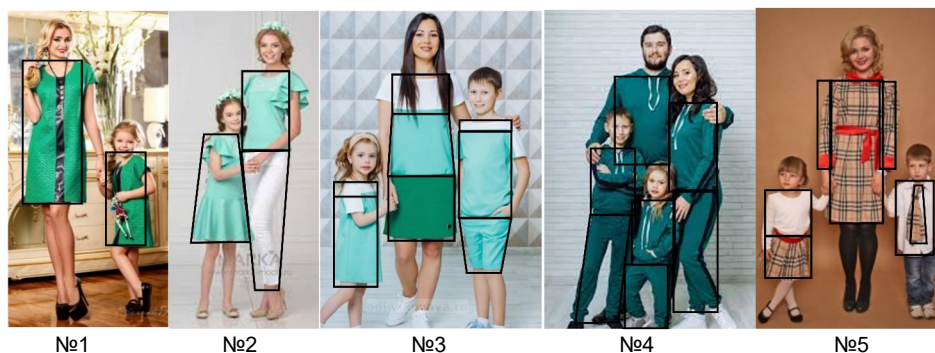


Figure 8 Portfolio of color composition of Family look models of «prestigious» type

Table 3 Verification database for determining the harmony of color combinations

Model collage number	A sign of imagery	Method of color groups identification	Area of color spots			Coefficient of proportionality		
			<i>Si</i>	<i>Sj</i>	<i>Cpr1</i>	<i>Cpr2</i>	<i>Cpr3</i>	<i>Cpr, average</i>
1	Complete matching of clothes m, d	Mirror coincidence of assortment	398 (m)	166 (d)	2.4 (m/d)	-	-	2.4
2	Affinity of the top m, d	Gradation of color rhythm metrics	167 (d)	123 (m)	1.33 (d/m)	-	-	1.33
3	Stylistic identity m, d, s	Equilibrium of color combinations in metric rhythm	413 (m)	236 (d) 305 (s)	1.75 (m/d)	1.35 (m/s)	1.29 (s/d)	1.46
4	Complete matching of clothes of parents and children f, m, d, s	Dimensional copying by gender	570 (f) 476 (m)	340 (s) 216 (d)	1.68 (f/s)	2.2 (m/d)	1.19 (f/m)	1.69
5	Identity of accessories m, d, s	Support of the color tone of the central figure with accessories	327 (m)	64 (d) 4.8 (s)	6.04 (m/d)	-	13.3 (d/s)	9.67

Table 4 Gradation of the quality of interpretation of the harmony of the collage of models for the conformity factors to the fashion trends

Interpretation of the quality of factor expression	Numerical value	Factors, models		
		<i>f₁</i>	<i>f₂</i>	<i>f₃</i>
most strongly expressed	+3	№4	№3	№3
less expressed	+2	№3	№4	№1
a little noticeable	+1	№2	№2	№4
neutral position	0	№1	№1	№2

To estimate the possible emotional feelings of potential consumers, the portfolio of color compositions of Family look models in accordance with Figure 8 the method of bipolar seven-point scale was used to assess the concept of factors of color psychological perception [27]. The initial data for assessing the harmony of color perception in the portfolio of Family look models for the image type "prestigious" are given in Table 4.

The positive correlation of the assessment of the harmony of color perception in the scale of interpretation of divisions from +3 to 0 for three factors (*f₁* - assessment factor; *f₂* - force factor; *f₃* - activity factor) is determined by the equation:

$$r_s = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}, \quad (3)$$

where: *d* is the difference between the ranks of the characteristic on the two correlated features and *n* is the volume of the population.

The difference between the ranks *d_i* on the correlating features of models №3 and №4 is 1. The number of models is 4, then:

$$r_s = 1 - \frac{6 \cdot (1^2 + 1^2)}{4 \cdot (4^2 - 1)} = 1 - \frac{6 \cdot 2}{4 \cdot 15} = 1 - \frac{12}{60} = 1 - 0,2 = 0,8$$

r_s - corresponds to a high level of correlation: 0.8 > 0.79.

The algorithm of level control of the process of harmonization of color composition is based on

the hierarchy of features of recognition of the image identity of the object [28]. The hierarchy of stages is organized in the order of increasing natural numbers by extended groups from the zero cell by 5 phases of evaluation of the means of composition in the Family Look models. The zero phase for the characteristics of the wardrobe contains the position 1 - style Family look. The first phase contains positions of properties: 2 - unity; 3 - integrity. The second phase (series 4, 5, 6) is the principles of identification: 4 - uniformity; 5 - recurrence; 6 - grouping. The third phase (series 7, 8, 9, 10) - basic colors of behavior: 7 - red; 8 - green; 9 - blue; 10 - yellow. The fourth phase (series 11, 12, 13, 14, 15) - the laws of composition: 11 - dominant; 12 - integrity; 13 - equilibrium; 14 - standardization; 15 - contrast. The fifth phase (series 16, 17, 18, 19, 20, 21) - components of a combination of groups: 16 - women-men; 17 - adults-children; 18 - assortment; 19 - color; 20 - accent print; 21 - accessories. The sixth phase (series 22, 23, 24, 25, 26, 27, 28) - 22 - the number of families; 23 - completeness; 24 - two-color; 25 - tricolor; 26 - related; 27 - related-contrast; 28 - contrast. The grid of horizontal and vertical rows forms a scheme of level control of the color composition of the Family look models (Figure 9a). An example of the formation of the color harmonization route of the central model of the collage №3 (Figure 9b) is shown in Figure 9c.

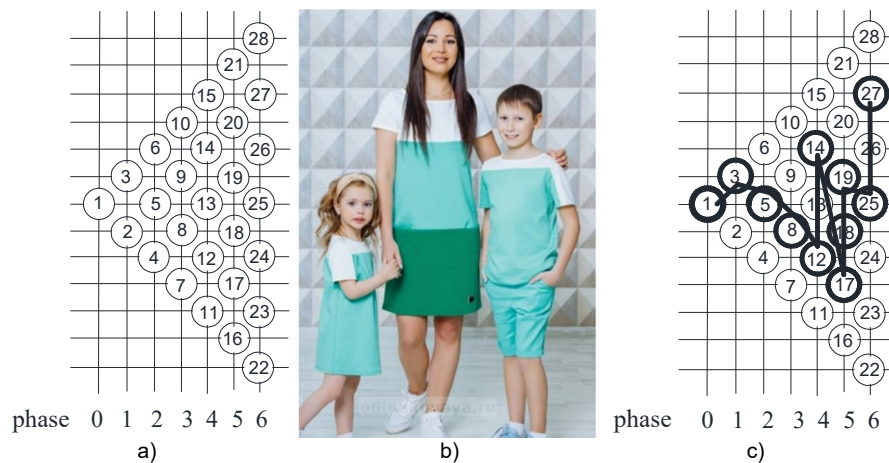


Figure 9 Scheme of level control of color harmonization of Family look models

Checking the route of color harmonization control model №3 (Figure 9), made in a related-contrast collage (27), confirms the triad combination of adults and children (17), assortment (18), color scheme (19) in a positive correlation ($r_s=0.8$) tricolor composition (25).

5 RESULTS

According to the results of reviewing 150 combinations of clothing models in the style of Family look in accordance with the recommendations [4, 5, 9, 10, 14] 4 rows of models have been formed on the basis of color

type of behavior of 7 units each, which provides a closed color wheel (Table 1). By combining standard rules for matching wardrobe items and colors, the Family look model line has been created for 4 color types of behavior (Figure 10).

The basic model range of color type of behavior (Figure 11) illustrates the algorithm for forming a family wardrobe in the style of Family look.

The stages of formation of the family wardrobe are illustrated in Figure 12.

To assess possible emotional sensations taking into account color types used the method of correlation analysis.

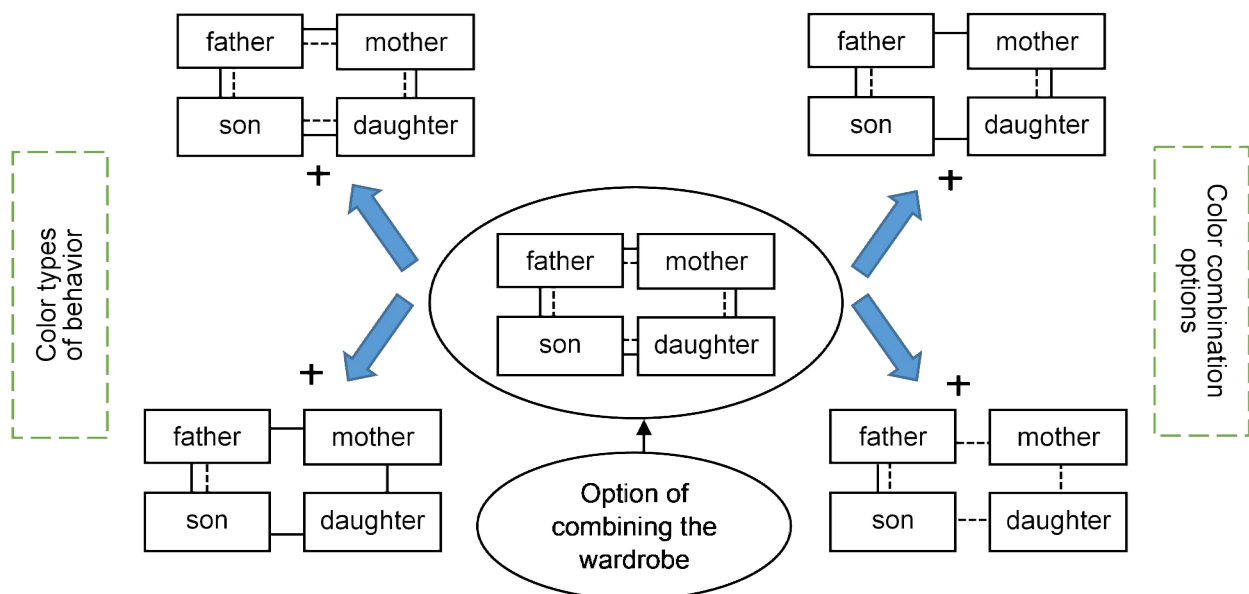


Figure 10 Variations of color and range combinations



Figure 11 Model range of basic color types of behavior: a) red, b) blue, c) green and d) yellowish

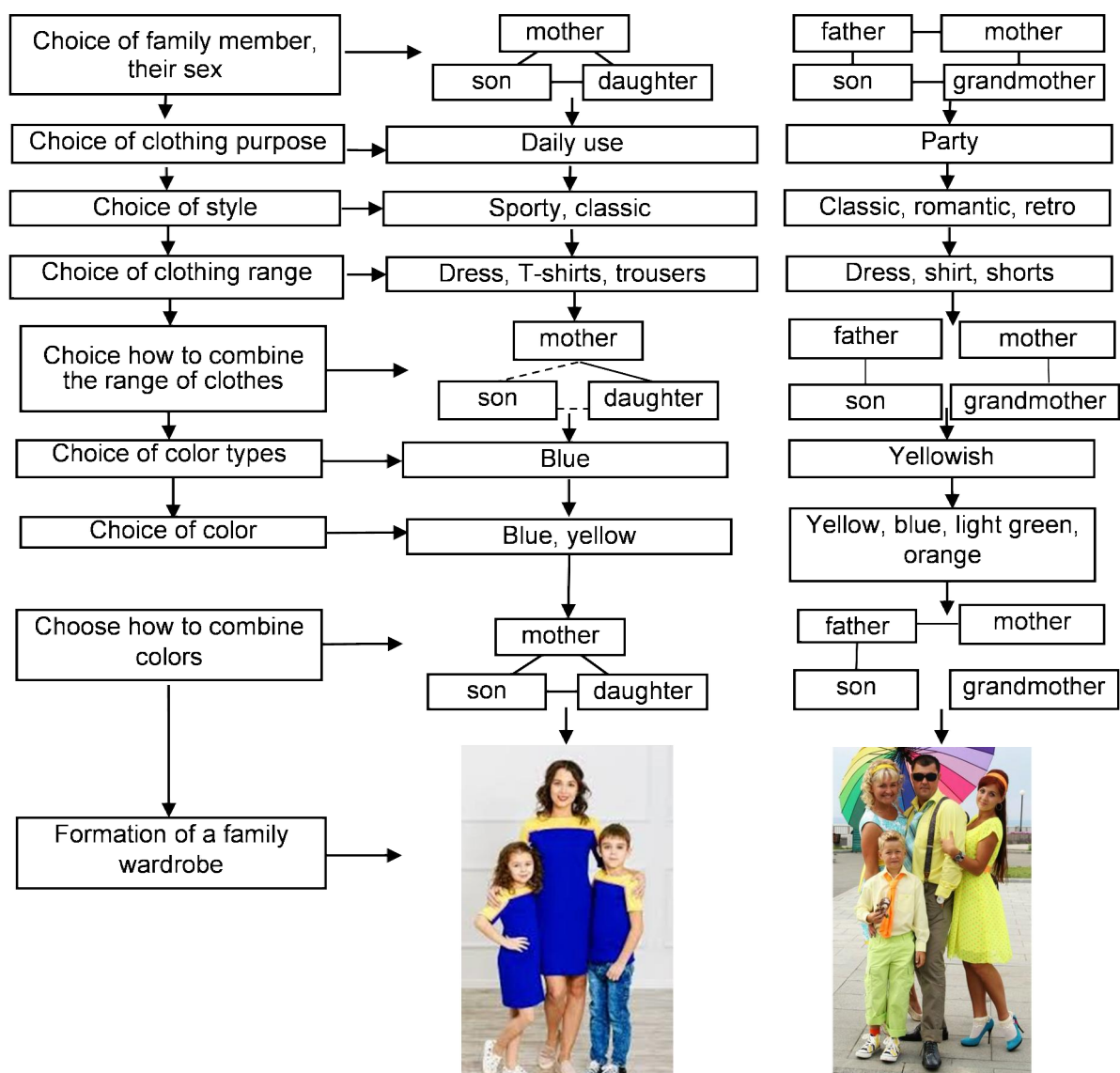


Figure 12 Algorithm of forming a family wardrobe in the style of Family look

6 CONCLUSIONS

Wardrobe in the style of Family look is formed according to the rules of combining gender and age characteristics of the family in the range, color and purpose of clothing with different types of combinations: parallel, cross, mixed (collage), triangle, which is confirmed by Figures 10 and 11.

To implement an algorithmic method of controlling the harmony of color of clothing in the style of Family look, the categories of color formation of style are analyzed (Table 2) from the standpoint of achieving integrity and unity in the combination of objects.

The application of the identification principles of the figurative solution of clothing models in the Family look style allows us to state the following:

- the main regulator of the selection of models in the style of Family look is not so much the composition of the family and purpose, as the psychological aspect of family values;
- to analyze the color composition of the family wardrobe, it is advisable to use the method of verification of color types of behavior, it allows to determine the harmony of color combinations by areas of color spots, which is important for recognizing signs of model imagery;
- the proposed method of quality gradation control of color harmony expression in the scale of psychological perception allows you to apply the bulkhead color control algorithm of any model in 7 phases of level control (Figure 9).

The suggested rules can be applied when designing clothes in one style for a group of people who do not form a family. For example, when developing branded (uniform) clothing for a particular company, school; in the development of stage clothing; clothes of members of a sports team; for themed youth parties, etc. The results can be useful for stylists, designers, marketers and university students learning to design clothes.

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