



ANALYSIS ON COLORS OF FOLK COSTUME AND THEIR APPLICATION IN CONTEMPORARY TEXTILE DESIGN

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Abstract: *The traditional colors and motifs of folk costumes will always be extremely inspirational and always viable for fashion design. Reinterpreted and stylized in unprecedented contexts, they are highly appreciated due to the authentic and fresh air they emit.*

*In this paper, the authors present a study about the possibility of using the colors and traditional motifs of folk costumes in contemporary textile designs. The primary and secondary colors of the folk costumes from the Strandja region, Bulgaria, were analyzed. Folk costumes were vectorized in the Inkscape program. 4 basic elements have been selected from folk costumes, saved as bitmap images in *.BMP file format and stylized. The colors of each element of folk costumes were extracted in the RGB model and were combined with modern colors presented by Pantone for Spring/Summer 2019 at New York Fashion Week. Two textile designs for each element were made in 3 variants of colors. After that, we conducted through a developed Google Forms tool, a survey regarding the consumer's opinion in order to evaluate the designs already created. A total of 80 respondents from Romania, Bulgaria, Serbia and Macedonia were interviewed. They were randomly selected regardless of education, employment and gender. The results obtained were processed by the ABC analysis method.*

Key words: *Folk elements, textile patterns, ABC analysis, colour similarity*

1. INTRODUCTION

Traditional clothing plays an important role not only in highlighting the community's own identity, but also in other communities in the same region, reflecting a range of beliefs and rich functionality and application in everyday life and holidays. [1].

The motifs and their elements of traditional clothing can be used in the design of modern clothing [2, 3]. Each motif and element on which it is applied has its origin, meaning and variety in form, color and manner of representation.

The design of modern textile fabrics related to weaving, embroidery, dyeing, printing uses well-known motifs and elements of culture, religion, the environment and the history of textiles. In order to achieve the final decision - which elements of folklore to use when creating modern textiles, a number of steps are required, such as studying fashion trends, finding appropriate elements and motifs that have not been used so far.

Women's folk costume has regional and even local varieties in Bulgaria and Romania. It



consists of a suckman, a tunic-shaped cut with a deep cut out, an apron decorated with many decorative elements - geometric, natural, stylized, abstract.

The colors of the folk costume are supposed to be associated with emotions, human qualities, seasons, festivals and by this society interprets the location of the person wearing it. Using the colors of folk costumes in modern textiles and combining this colors with contemporary color trends, requires research and analysis of designers' opinions as well as consumer interest in them, [4, 5, 6].

By analyzing the possibility of applying elements and colors of folk costume it can be summarized that: there are few publications related to the use of traditional costume colors in modern textiles due to their specific application reflecting symbolism rather than combinations suitable for textile design; it is necessary to analyze the opinion of experts and to study the consumer interest in the use of traditional costumes in combination with the contemporary color trends; due to the constantly changing tendencies in the colors, it is necessary to summarize a methodology for analyzing the consumer demand.

2.MATERIAL AND METHODS

Folk costumes from the region of Strandja, Bulgaria, were used for the purposes of the study. This costume belongs to the suckman type. It consists of: a shirt; suckman, a woolen dark garment with closed tunic; a front apron and a woolen belt with a red, orange, dark-wine color. The skirts and bosoms of the suckman are decorated with a velcro, sewn with colored sutures. The decoration is intertwined with colorful walks, braids, laces. The apron is colored, standing on the black background of the suckman, combining colors like red, green, yellow, white. There are embroidery in the wearing varieties.

Folk costumes are vectorized in the Inkscape program (Inkscape, GPLv2 +, <https://inkscape.org>). Vectorization module developed by Selinger [7] that uses a polygon trace algorithm, included in Inkscape program is used. Elements of used costumes are selected and separated. The elements are saved as bitmap images in *.BMP file format. In the GNU Octave [8] program environment, their colors are extracted in the RGB model as shown in position 4.

The contemporary colors include those presented by Pantone (Pantone LLC) for Spring/Summer 2019 NYFW (New York Fashion Week) and neutral colors. In table 1 are presented the colors used (numbered 1 to 16), their Pantone catalog numbers, general appearance, RGB color values and L *a*b* values representing the specific colors. The color components of the RGB color model (RGB [0 255]) were converted to Lab (L [0 100], a [-86.18 98.23], b [-107.86 94.47]).

Table 1: Colors of Pantone Spring / Summer 2019, NYFW color palette and neutral

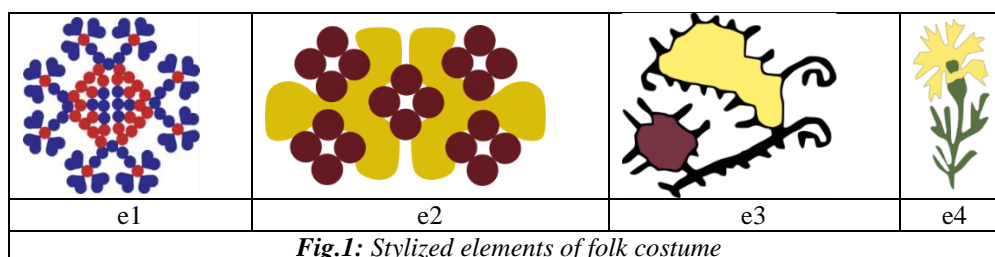
Color Number	Pantone Number	General View	R	G	B	L	a	b
1	PANTONE 17-1564 Fiesta		221	77	67	53,05	55,53	36,64
2	PANTONE 19-1862 Jester Red		157	55	68	38,41	43,35	15,25
3	PANTONE 15-1264 Turmeric		254	132	42	67,83	41,05	64,93
4	PANTONE 16-1546 Living Coral		252	118	106	65,51	50,19	31,31
5	PANTONE 18-2045 Pink Peacock		200	62	115	48,22	58,41	0,99
6	PANTONE 17-0542 Pepper Stem		145	150	73	60,17	-13,24	39,57
7	PANTONE 13-0850 Aspen Gold		251	199	72	82,82	6,23	67,48
8	PANTONE 19-4150 Princess Blue		45	92	158	39,04	7,02	-40,56
9	PANTONE 18-1031 Toffee		117	87	65	39,55	9,29	17,59
10	PANTONE 15-0960 Mango Mojito		217	159	60	69,38	12,30	57,68



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11	PANTONE 18-0416 Terrarium Moss		104	105	67	43,44	-6,94	21,28
12	PANTONE 14-2808 Sweet Lilac		231	182	207	79,01	21,62	-5,80
13	PANTONE 13-0919 Soybean		215	196	157	79,82	0,72	22,05
14	PANTONE 19-3810 Eclipse		59	58	80	25,37	6,05	-13,18
15	PANTONE 11-0106 Sweet Corn		242	237	215	93,60	-1,99	11,26
16	PANTONE 19-0805 Brown Granite		86	64	62	29,40	9,22	4,93

Figure 1 shows the stylized elements used of folk costume. The elements are stylized and in this process they conform to their original appearance on folk costumes. There are 4 basic elements with combinations of 2 colors, in 3 combinations, according to their coloring on the costumes. When choosing a number of colors for an element, it is necessary to take into consideration the possibilities of the weaving, embroidery, jacquard machine, on which the textile pattern with the elements used will be made.



In Table 2 the values of RGB color components are presented. The primary color is the color of most of the elements and the secondary color, it is the one that the small details on it are colored.

Table 2: Values of RGB color components of folk costume elements

e1_1	R	G	B	e1_2	R	G	B	e1_3	R	G	B
Primary	255	255	245	Primary	46	44	140	Primary	240	104	184
secondary	255	98	200	secondary	191	44	44	secondary	97	184	139
e2_1	R	G	B	e2_2	R	G	B	e2_3	R	G	B
Primary	40	46	129	Primary	218	189	11	Primary	29	45	35
secondary	255	255	254	secondary	100	26	33	secondary	21	85	62
e3_1	R	G	B	e3_2	R	G	B	e3_3	R	G	B
Primary	33	113	38	Primary	255	239	112	Primary	118	51	65
secondary	179	55	88	secondary	118	51	65	secondary	33	113	38
e4_1	R	G	B	e4_2	R	G	B	e4_3	R	G	B
Primary	160	65	64	Primary	252	233	114	Primary	43	31	140
secondary	252	233	114	secondary	87	114	64	secondary	252	233	114

A color similarity method has been applied in the analysis of the consumer's opinion on the textile designs created here. The color similarity n is defined by the mathematical dependencies presented in [9]. The greater value of the coefficient n means closer color vectors; the lower values of n show a lesser similarity; when $|C_2|$ is equal to $|C_1|$, the coefficient n has a maximum value of 1:

$$n = 1 - \frac{||c_2| - |c_1||}{|c_1|} \quad (1)$$

$$|C_1| = \sqrt{R_1^2 + G_1^2 + B_1^2} \quad (2)$$



$$|C_2| = \sqrt{R_2^2 + G_2^2 + B_2^2} \quad (3)$$

In the present work, a survey of consumer opinion was conducted in order to evaluate the designs already created, combining colors of elements used in folk costumes with modern ones. A total of 80 respondents from Romania, Bulgaria, Serbia and Macedonia were interviewed. They were randomly selected regardless their education level, employment status and gender. All respondents were informed regarding the purpose of the survey and the purpose of using the received data. The survey was conducted through a developed Google Forms tool, because it is a free Google application used to create an online form or test that can be completed online from a mobile device or a desktop computer. The obtained results are in real time on-line. All the patterns were created by Digital Fabrics online tool [10].

The obtained results were analysed with the ABC analysis method [11]. The ABC analysis was put in application in the following order: The sum of all the respondents' answers was determined and then the obtained data was sorted in descending order; A share in the total value was calculated as the ratio between the amount for a given pattern and the sum of all amounts.

The fraction of the total was determined by a cumulative sum of the share in the total value - the values were obtained as the sum of the two previous ones; The data was divided into three categories A, B and C. Category A comprised 0-75% of the data, 75-95% category B and 95-100% category C. The patterns corresponding to category A were selected.

This data was processed at a level of significance $\alpha=0,05$

3. RESULTS AND DISCUSSION

The selected color combinations are represented in the Table 3. There are 4 basic elements with two combinations. The color similarity with the background is shown: between the primary color and the background (CDP), and between the secondary color and background (CDS).

Table 3: Color combinations and difference between Pantone's and element colors

e1_1				e1_2				e1_3			
PC	4	12	13	PC	6	7	13	PC	5	12	8
CDP	0,32	0,18	0,24	CDP	0,49	0,25	0,24	CDP	0,45	0,18	0,57
CDS	0,12	0,06	0,02	CDS	0,35	0,03	0,02	CDS	0,29	0,06	0,44
e2_1				e2_2				e2_3			
PC	1	7	13	PC	3	6	8	PC	5	7	8
CDP	0,44	0,25	0,24	CDP	0,34	0,49	0,57	CDP	0,45	0,25	0,57
CDS	0,28	0,03	0,02	CDS	0,15	0,35	0,44	CDS	0,29	0,03	0,44
e3_1				e3_2				e3_3			
PC	7	8	13	PC	6	8	13	PC	3	7	13
CDP	0,25	0,57	0,24	CDP	0,49	0,57	0,24	CDP	0,34	0,25	0,24
CDS	0,03	0,44	0,02	CDS	0,35	0,44	0,02	CDS	0,15	0,03	0,02
e4_1				e4_2				e4_3			
PC	3	6	8	PC	1	3	4	PC	1	3	5
CDP	0,34	0,49	0,57	CDP	0,44	0,34	0,32	CDP	0,44	0,34	0,45
CDS	0,15	0,35	0,44	CDS	0,28	0,15	0,12	CDS	0,28	0,15	0,29
CDP – primary color similarity; CDS – secondary color similarity; PC – Pantone color; e - element											

The survey data showed that 42% of respondents chose patterns with Drop repeat and 58% half drop, resulting that the selected color of the patterns should be analyzed individually.

The figure 2 presents the results of the ABC analysis of the two data sets for patterns with Drop and Half drop repeats.

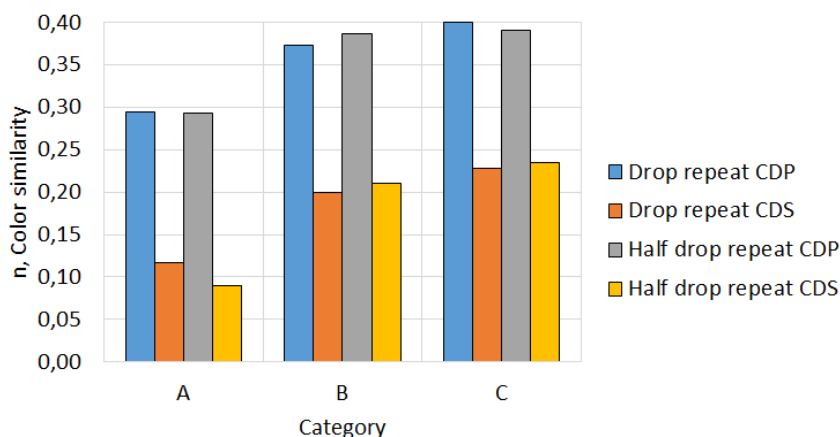
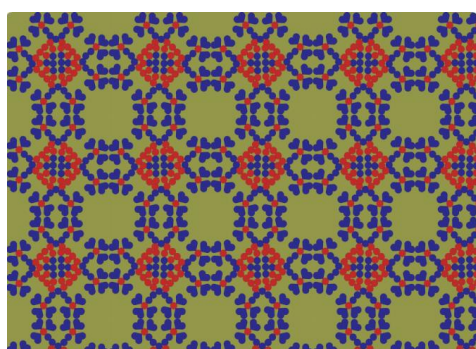


Fig.2: Results from ABC analysis

It can be seen that in category A, the most commonly selected patterns are those with up to $n=0,3$ similarity to the color for the primary color and to $n=0,12$ for the secondary. The same trend is preserved when selecting colors for Half drop repeat. In the rest of the groups, the results are identical to group A. Patterns with a higher similarity between the primary color and the background and a lower similarity between the background and the secondary color are selected. Category A comes with combinations with less similarity to those in the rest of the categories.

Most selected patterns according to the survey with drop and half drop repeat are presented in figure 3. As it can be seen, regardless of the repeat, the resulting trend primary element is similar to the background color, and secondary to be more contrasting.



e1_2 Drop repeat, with Pantone color 6



e4_1 Half drop repeat with Pantone color 3

Fig.3: Two of most selected patterns from the survey

4. CONCLUSION

The brands adopt a color strategy in order to transmit their values to consumers but the commercial success in fashion production is often related to consumers' perception and not always to the quality of the design. By the analysis of the available literature and the results obtained in this



paper, the authors consider that:

1. The use of the colors similarity is a suitable tool for evaluating consumer opinion when analyzing colors for modern textile design.

2. The presented analysis method can be used when designing contemporary textile patterns using folk elements.

3. The study demonstrates the intricacy in investigating and clarifying the patterns and it might be utilized to create inventive approaches by designers, marketers, instructors etc.

REFERENCES

[1] V., Yankova, *Images of the past Tatars in Lithuania and Poland*, Dialogue with time – Intellectual history review, vol. 47, pp.189-204, 2014 (in Russian)

[2] A., Mocenco, S., Olaru, G., Popescu, C., Ghituleasa, *Romanian folklore motifs in fashion design*, Annals of the University of Oradea, Fascicle of Textiles, Leatherwork, Vol XV, no. 1, 2014, pp.63-68

[3] M., D., Şuteu, L. Doble, A. Albu, E. Toth, *Romanian traditional motif element of modernity in clothing*, Annals of the University of Oradea fascicle of textiles, Leatherwork, Vol XVIII, no. 1, pp.109-112, 2017

[4] S., Baycheva, *Application of devices of measurement of color in analysis of food products*. Innovation and entrepreneurship – Applied scientific journal, Vol.4, No.4, pp.43-59, 2016

[5] L., Indrie, Z. Kazlacheva, J. Ilieva, S. Gherghel, *Embroidery - from digital designing to fine art*, Industria Textila, vol. 68, pp.366-369, 2017

[6] Z., Kazlacheva, P. Dineva, *An investigation of pattern making of twisted draperies*, Applied Researches in Technics, Technologies and Education, Vol. 5, No.2, pp.85-93, 2017

[7] P., Selinger, *Potrace: a polygon-based tracing algorithm*, [Online]. Available: <http://potrace.sourceforge.net/>, Accessed on 10.02.2019

[8] J., Eaton, D., Bateman, S., Hauberg, R., *Wehbring GNU Octave version 4.4.1 manual: a high-level interactive language for numerical computations*, 2016, [Online]. Available: <http://www.gnu.org/software/octave/doc/interpreter/> Accessed on 10.02.2019

[9] E., Elnashar P., Boneva, *Transfer of colors and forms from Egyptian carpets for contemporary textile*, Innovation and entrepreneurship – Applied scientific journal, vol.4, No.4, pp.3-1, 2016

[10] *Digital Fabrics*, [Online]. Available: https://www.digitalfabrics.com.au/custom-fabric/?fbclid=IwAR1P30w-mcumHZLtT4uj_L6xj7Zu1I6KTM-UuRpqOe9K6Me3xpdcCtX2Dck# Accessed on 08.02.2019

[11] D., Ch., Bose, *Inventory management*, ISBN-81-203-2853-1, New Delhi, 2006