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Designing of children`s stage costume using the bionic objects

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Abstract

The article is devoted to the actual problem of design-projecting of the costumes for children`s choreographic team based on bionics, using a bionic creative source. The method of analysis is used to identify the scope of the use of vegetables as a creative source during the creation of fashion collections. It has been found that designers use vegetables as the materials for making clothes; as the materials for sketching the models of the clothes; as the source of inspiration for the form, decoration, and color decision.

A figurative and stylistic analysis of the bionic creative source and the transformation of the plant images into the fashion designs of the stage costumes for children`s choreographic team have been carried out.

As a result of the analysis and the transformation of the creative source ‘Vegetables’, the models of the stage costumes for children`s choreographic team have been designed. The following principles have been used in the design of the costume, namely: imitation of bioform in separate elements of the costume; analogousness of silhouette solutions and general form of the costume to the natural bioforms; bionic design-projection with the identification of functionality and figurative and associative expressiveness of the costume. In the process of designing the collection of the children`s stage costumes, the scenario of the performance, as well as the requirements to the children`s clothes and the creative source, have been considered.

Keywords: designing, bionics, fashion collection, stage costume, children`s clothes, projection, production, creative source

Introduction

The creation of the stage costumes is an important direction of design-projecting. In such a case the costume for the performance should not only be compositionally perfect, reflect the director`s creative idea and correspond to the stage design, but also should be convenient when actors perform choreographic movements. Design-projecting of the costumes for the creation of the stage images of inanimate creatures, in particular plants, is a matter of particular interest.

The forms of wildlife take a special place in the design-projecting of the costume. When working with this source, the main thing is the emotional contact with biological and plant forms, which results in a creative impulse that leads to the creation of a new artistically constructed form of the clothes. Professional designers of the clothes often use bioforms in their products, for example, a skirt-tulip, banana trousers, ‘flittermouse’ cut of the sleeves, imitation fur, imitation leather or “like a leather” decoration of the fabric. Such decorations as artificial flowers, berries, vegetables, etc. are widely used as well. Creative ideas for the creation of the clothes based on bionics can be directed towards the search for color, texture, form, decoration, that have novelty and originality. Bionics is a science and an art, an analysis and a synthesis, the search for an original, new in the artistic design of the costume at the same time.

Bionics is a science of using knowledge about the construction and form, principles, and technological processes of wildlife in engineering, architecture, and design. As defined in (Mikhailenko and Kashchenko, 2011), the basis of the bionics is the studies on the simulation of

living systems. The study of the forms of wildlife awakens the designer's imagination, provides an opportunity to solve the problem of the harmony of functionality and aesthetics, enriching the formal means of harmonization during the search for the most expressive proportions, rhythm, symmetry, and dynamism (Malynska, Pashkevich, Smirnova, and Kolosnichenko, 2018).

The problem of the use of *bionic in fashion design* is at the focus of scientists and designers.

In the paper (Liu, 2017), the author proposes a bionic increment model of the fashion industry value chain (FIVC), based on a multicellular network structure.

The designing of the folk costume in the context of 'green' philosophy or bionics is considered in the article (Karamova, Mukhametshin, Makhmutova, and Usmanov, 2019).

As noted in (Belko, 2018), the bionic trend in the artistic design of the costume is based on the establishment of the structural and functional unity of methods of the shaping of natural and artificial systems.

In the research (Zhao, 2011), it is stated that the artistry of bionics to a great extent reflects the modeling, fabric, color, texture of the clothes, etc.

A detailed description of the use of fruit prints in the fashion design, starting from the XVIII century and until now, is presented in the paper (Yotka, 2018).

The researchers (Abraamyan, Garakyan, and Nikolaeva, 2015) define seven types of transformation of the natural form in the design of the clothes: 1. The use of natural elements. 2. Copying of natural forms. 3. The use of bioforms in ornamentation and stylization. 4. The construction of the costume forms as the analogs to the natural bioforms. 5. The associative creative stylization of bioforms. 6. The use of functions, tectonic construction, or structure of bioforms. 7. The bionic designing, using the ergonomic consistencies of bio analog construction.

The paper (Cao, 2017) determines the problem, which at the current stage exists in the bionic design of the clothes for children and analyzes some types of bionic design.

The researcher T. Nikolaeva (Nikolaeva, 2010) defines the reference to the bionic analogs as a very relevant step in the research for the optimal and aesthetic indicators of the children's clothes since the development of the child's body fully corresponds to the main stages of the evolutionary development of most living natural objects.

In the article (Nikolaeva, Protsyk, and Nazarchuk, 2011) the process of transformation of bio analog into the ready-made models of children's jackets using the principles of morphological transformation is considered.

As defined in the guidance (Kozlova and Belko, 2007), at the current stage designers use not only external forms but also the properties and characteristics, which express the functions of one or another organism, analogous to the functional and utilitarian requirements to the product.

So, the researchers of the modern design of the clothes tend to believe that the use of bionic direction and the principles of transformation of bioforms during the creation of sewing products promotes the discovery of new color solutions, forms, methods of processing, functions of the clothes, etc.

Many studies are devoted to the development of the principles of designing the *stage costumes*.

Stage costume can be attributed to the spectacular type of the clothes, which must meet a lot of requirements, namely: the nature of the performance, the role and image of the performer, consider the combination of executed movements on the stage, have a vivid imaginative solution, take into account the lighting, color scheme of the scene, etc. The main function of the costume is a symbolic one, that is why stage costume is an expressive image, which plays an important role in the transfer of the information, complements and emphasizes the character of the dance, of the performance and the actor's role. The paper (Moloney, 2014) is devoted to the interaction between 'fashion design and costume design'.

Stage costume is a mean of artistic influence on the viewer through the external signs and characteristics of the impersonated character, which help the actor to personate.

The main purpose of the stage costume is the creation of an artistic image to reveal the

content of the spectacle. The article by Fensham (2019) discusses the dance costumes of the choreographer Gertrud Bodenwieser, which are considered as resistance to totalitarianism. As it is grounded in the research (Yezhova, Abramova, Kutsenko and Hrinenko, 2018), the production of the stage costumes requires the organic artistic unity of stage costumes, decorations, the lighting of the stage, production of the show, the character of the role, the complex of movements during the performance, etc. from the designer. The principles of creation of stage costume sketches are disclosed in a practical guide (Rowe, 2012).

In the research (Rubanka, Sinianska, Rubanka, and Ostapenko, 2018), the requirements for the clothes for girls with the predicted ergonomic characteristics for ballroom and sport dances are developed. The article, prepared by Potter (1990), identifies the main features of Bakst's dance costumes: boldness and wearability.

In the article (Fensham, 2015), a combination of artistic expressiveness of the costumes and the choreography in the cultural history of Manchester is noted. A combination of color, shape, costume ornamentation and kinesthetic of the dance movements in the designer's vision is specified as well. The article (Barbieri and Crawley, 2019) reveals the importance of materials in the expressive function of stage costume, based on an analysis of the opera chorus costumes. The article (Brayshaw, 2020) is devoted to the use of knitwear in the design of the stage images of actors.

The research (Bouffard and de la Gorce, 2016) presents an overview of the drawings of French stage costumes of the XVII-XVIII centuries, which are included in the Edmond de Rothschild collection in the Louvre. In the study (Jablon-Roberts and Sanders, 2019), the definition of a historically accurate theatrical costume based on Robert Hillestad's taxonomy is formulated.

The authors of the article (Kim, Cho, and Lee, 2015) analyze the common and distinctive features of the costumes for Buddhist dances. It is determined that in both Mongolia and Korea, the symbolism of the costume for this ritual dance is related to the traditional culture.

The aim of the article is to develop the methodology of design-projecting of the collection of stage costumes for children's choreographic team for the dancing show based on bionic creative source.

The methods of research. The method of analysis is used to determine the sphere of application of vegetables as a creative source during the creation of collections of fashionable clothes. The models of the clothes, made from the vegetables by designers Sung Yeon Ju, Daniel Feld and Wesley Nault, as well as the models, designed by People for the Ethical Treatment of Animals (PETA), are selected as the objects for analysis. For the analysis of the models with vegetable prints and embroidery, the dresses of Dolce & Gabbana's Spring 2012 & 2018 ready-to-wear fashion show, and the women's collection of designer Bertrand Guyon, presented at the Schiaparelli show in Paris in 2016, are selected. Also, the casual vegetable-printed clothes, presented on the international commercial Internet sites, as well as the models, where the vegetables are used as the analog of shape and color, are analyzed. The use of plants as a means of the image during the creation of fashion illustrations by the designers Edgar Artis and Meredith Wing is analyzed too.

A figurative and stylistic analysis of the creative source 'vegetables', and the transformation of vegetable images into the fashion sketches of stage costumes for children's choreographic team are carried out. At the stage of designing the sketches of the collection of stage costumes, the method of system and structural and morphological analysis of the basic object of the research with its further synthesis based on the obtained data is used. The main principles, used in the design of the costume, are as follows: imitation of bioform in the separate elements of the costume; analogousness of silhouette decisions and the general form of the costume to natural bioforms; bionic design-projecting with the identification of functionality and figurative and associative expressiveness of the costume. As a result of the research, a collection of stage costumes for the dancing show 'Veseli Ovochi (Funny Vegetables)' of the Ukrainian folk song 'A Pumpkin Walks in the Garden' was developed. The dancing show was performed

by actors of the children's choreographic art studio 'Aelita' (Kropyvnytskyi, Ukraine).

Results. Designers widely use vegetables as a source of inspiration to create the models of the clothes for both podiums and everyday use.

Edible plants, in particular vegetables, are used by the designers as the materials for making clothes; as the materials for sketching the models of the clothes; as the source of inspiration for shape, decoration, and color decision.

Recently graduated Korean artist Sung Yeon Ju created a collection of dresses, made from vegetables: eggplants, carrots, onions, cabbage, radish, etc. (Foiret, 2010).

The dress, made from artichoke and red cabbage, was created by the designers Daniel Feld and Wesley Nault within the Hunger Pains project, headed by Ami Goodheart of SOTO Productions in 2009 (Anon, 2010).

People for the Ethical Treatment of Animals (PETA) organization, which advocates for the ethical attitude to the animals, uses dresses, made from vegetables, in its advertising projects, for example 'Let vegetarianism grow on you'. The designers of PETA prefer different breeds of cabbage when they create fashionable images (Tian, 2011).

Domenico Dolce and Stefano Gabbana actively use fruit and vegetable prints in their designs. For example, in Dolce & Gabbana ready-to-wear collections Spring 2012 (Phelps, 2011) and Spring 2018 (Phelps, 2017) the fabrics with realistic images of eggplants, tomato, courgette, cucumber, onion, and pepper were used. The dress with pineapple print became one of the favorites of the Gucci Fall 2017 ready-to-wear collection (Mower, 2017). At the Schiaparelli 2016 show in Paris the models of the clothes with the use of vegetable prints and embroidery, designed by the creative designer Bertrand Guyon, were presented. In the fashion collection realistic and stylized images of tomatoes, onions, beets, carrots, beans, peas, different breeds of cabbage, etc. were used (Menkes, 2016). Fruit-faced portraits, presented by Arcimboldo, became an adornment of Comme des Garçons's Spring 2018 show (Mower, 2017).

Vegetable-printed clothes are presented on commercial Internet sites, in particular, it is possible to buy men's and women's sweatshirts, ties, T-shirts, and shorts with images of vegetables. In this case, realistic prints (Fig. 1, a), prints of 'food and its components' type (Fig. 1, b), stylized images (Fig. 1, c), as well as anthropomorphic images of vegetables with the accessories like glasses (Fig. 1, d) are used.



Fig. 1. Vegetable-printed models of casual clothes: a - broccoli (Funny 3D Broccoli Printed Long Sleeve Crewneck Green Pullover, 2019), b - vegetables (Delicious Vegetables And Pizza Vector, 2019), c - fruits & vegetables (Interestprint Men's Hoodies Pullover Fruits Vegetable Fashion, 2019), d – carrot (Love my Life Eat Your Carrots Vegetable Fun T-shirt, 2019)

As reported in (Fantozzi, 2014), during the New York City Fashion Week in 2014, a contest of dresses was held at the Subway event, where the participants had the task to design a runway dress, inspired by one of Subway's sandwich-topping vegetables. Veritee Hill won that competition with her dress, inspired by red onion.

Edgar Artis, the fashion illustrator from Armenia, creates sketches of women's dresses using the flower petals, berries, fruits, and vegetables (Edgar Artis, 2015-2019). Painter Meredith

Wing actively uses plants and their fragments in fashion illustrations (Fig. 2).

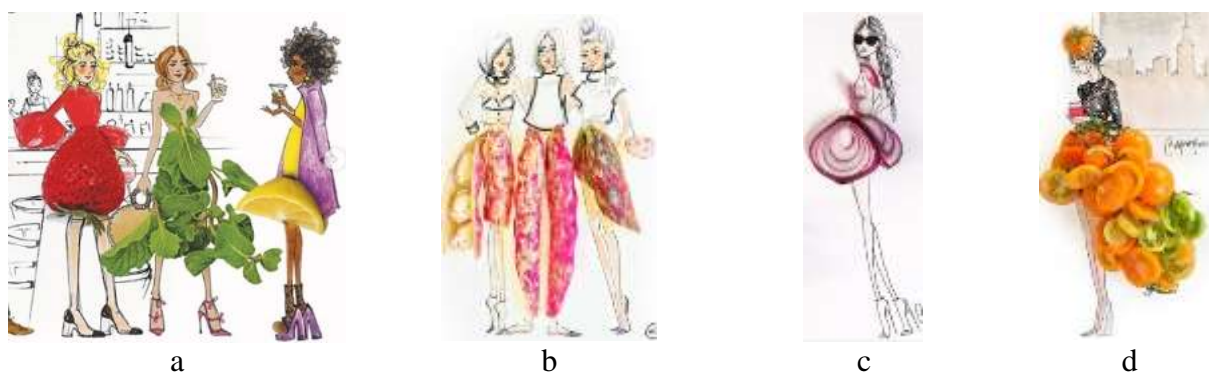


Fig. 2. Fashion illustrations with the use of plant fragments: a – berries, leaves, fruits; b – beans; c, d – vegetables (Meredith Wing, 2015-2019)

As a result, the analysis shows that fruits and vegetables are used: a) to create the clothes; b) to create sketches of the clothes; c) as a creative source for the creation of the models of clothes; d) as a source for designing the images of fabrics. Fruits and vegetables are a creative source for designers and fashion illustrators and are widely presented in podium collections and in fashion illustrations, as well as in casual clothing.

When using bionic objects as a creative source for the development of modern models of the clothes, either the direct transfer of colors, shapes, sizes, or associated elements are used: only colors, approximate shape, details, etc. In the second case, the motives of nature are not copied, but transformed in accordance with the associative images, which they cause in the artist's mind; the image is interpreted abstractly, however, in sketches, created in accordance with associations, the connection to the original source should be visible.

The designer performs the transformation of the natural source into the new form of the costume in stages, distinguishing such characteristic features and peculiarities: plastic organization of natural form; rhythmic organization of divisions and form lines of wildlife; elements of the form and its small details, which provide it with originality; characteristic ornamentation of the source; the surface texture of the source form; color gamma of the source, etc. The study of bioforms reveals the character of functions, movements, correspondence of masses and silhouettes in the tectonics of the construction of natural object, vitality, and beauty of forms and lines. Artistic and compositional features of bioforms can suggest an idea of a silhouette form of the future costume, a line of the form of its part, which dominates over other forms and accentuates the entire composition.

Fig. 3 shows the sketches of dresses based on a creative source 'vegetables' in the collage technique.

To emphasize realism when designing stage costumes, direct transfer of the elements of creative source into the costume forms is usually used.

The next stage in the creation of the collection of stage costumes 'Funny Vegetables' for children's choreographic team was the analysis of choreographic performance, in particular the actors' movements in the costumes.

In this article, in the process of designing the collection of children's stage costumes, the scenario of performance, as well as the requirements for the children's clothes and the creative source are considered. In this case, the classification of children's movements, presented by T. Nikolaeva, is considered, according to which young actors can be attributed to moving bio objects considering the dynamics of performance.



Fig. 3. Fashion collage 'Vegetables' (Olena Vasylieva, 2020)

In the ballroom choreography, there are clear rules for the dance costumes, which depend on age categories of participants, where the main requirements concern the restriction of openness of the costume and the safety of the participants. The most stringent requirements are set up for the costumes of the youngest participants of the competition. At the same time, there are no such stringent requirements to the stage costumes as to the costumes for ballroom dances; it all depends on the performance of the actor, the singer, the dancer, therefore, the idea of the costume is built on the scenario of the performance. In the dance 'Funny Vegetables', the following elementary training movements, technically complicated dance movements and dance steps are used: turns and rotations (*Grand battement, Pa shane*), jumps (*Pas emboite, Pas jete*), splits, "flag", shifts forward and so on. Elementary training movements are elementary movements of the legs and arms, changes in the body positions, which ensure the learning of the elements of all parts of the classical dance lesson (near the supporting area, in the middle and allegro). Technically complicated dance movements are movements, complicated in the technique of moving, as well as changes in the body positions, which require additional professional skills and certain efforts of the dancer. Connecting and helping movements or dance steps are the displacement and change in the body position, through which the transition from one to the next movement occurs. They provide a connection between the elements in the combination (Rekhlitska and Bilousenko, 2014).

Having studied the children's movements during the dance, a conditionally-graphical scheme of dynamic positions of the parts of the body provided in Fig. 4 is prepared.

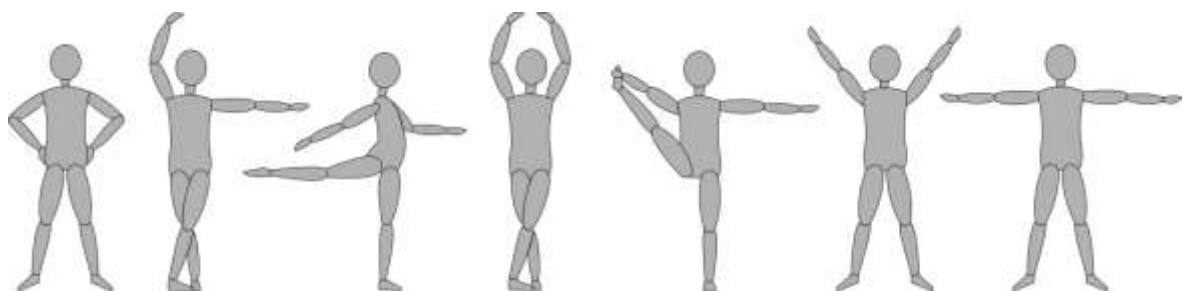


Fig. 4. Conditionally-graphical scheme of dynamic positions of the parts of the child's body in a dance costume (Olena Vasylieva, 2020)

Dynamic indicators characterize the possibility of human execution of given movements in maximum extreme positions at the slightest pressure of the clothes on the surface of the body, minimal deformations of the materials and limited movement of the separate parts of the product in respect to the surface of the body (Kolosnichenko and Pashkevich, 2018).

As a result of the analysis of the performers' movements during the dance, and considering the requirements for the children's costume for ballroom dances, the designs of the

costume of semi-adjoining, free and very free silhouettes of straight, oval and globular shapes are chosen.

The main principles, used in the design of the costume, are as follows: imitation of bioform in separate elements of the costume; analogousness of silhouette solutions and general form of the costume to the natural bioforms; bionic design-projection with the identification of functionality and figurative and associative expressiveness of the costume. At the stage of bioforms transformation, the proportions, silhouette, form, color of the creative source 'vegetables' have been analyzed in the research, and the transformation of object forms into the silhouette forms, which are close to human proportions, has been implemented. The next stage in the development of the artistic design of stage costume was the switch to the identification of shape-forming means of costume organization and artistic image; the sketch of the costume-image turned into the sketch of a real costume. Stages of the transformation of the creative source image into the sketch of stage costume are presented in Fig. 5.



Fig. 5. Stages of sketching of stage costumes 'Funny Vegetables' on the basis of bionics (Oksana Abramova, 2018):

a – melon; b – pumpkin; c – cucumber; d – bean; e – potato; f – beet; g – carrot

The collection of models of clothes for children is designed in different tectonic systems, according to the classification, provided in the article (Pashkevich, Kolosnichenko, Yezhova, Kolosnichenko, and Ostapenko, 2018). The proposed models of children`s costumes mainly can be included in the second and the third tectonic systems. Thus, the models c, d, g, which are presented in Figure 5, belong to the second tectonic system; such products are characterized by small and medium-sized volumetric shapes, semi-adjusted silhouette. The clothes of such tectonic systems freely interact with a human figure, and mainly are held in place on the constructive cinctures of the figure. The models a, b, e, f (Fig. 5) of the collection belong to the tectonic system of the third type; these are products, the shape of which remains almost unchanged in dynamics and does not obey to a human figure. Such products are characterized as more static and rigid products, which have one supported area; they are characterized by a large

volumetric shape and rectangular, oval or trapezoidal silhouette.

Discussion of the results. As a result of the research, the collection of stage costumes 'Funny Vegetables' for children's choreographic team is designed (Fig. 6). The collection of models consists of three dresses, set for girl (blouse and shorts), set for girl (short dress and leggings), and two sets for boys (shirt and trousers). All models are complemented with head wears – berets and hats. Polyester dress fabrics are used to make dresses, shirts, and trousers. The knitted fabric of the 'beeflex' type, composed of polyester and elastane, is used to make fit shorts and leggings. To get the volume to separate elements (for example, beans), the filling mass (synthetic downy fiber or holofiber) is used. The developed models of costumes-characters reflect the different stages of plant development. For example, the costume 'melon' in the form of dress and beret corresponds to the geometry of the melon fruit, but beret is decorated with the melon flower. Also, the costumes of 'pumpkin', 'cucumber', 'bean' and 'potato' are supplemented with flowers. This technique allows enriching the composition of the costume and providing it with an additional decorative effect. An important indicator of the artistic value of the costumes is a positive attitude of young actors to their outfits, as well as the unchanging success of the choreographic performance among the spectators of all ages.





Fig. 6. Collection of the stage costumes 'Funny Vegetables':
a – pumpkin; b – cucumber; c – bean; d – potato; e – beet; f – carrot

Conclusions. The review of scientific publications shows that the use of bionic direction and the principles of bioforms transformations during the creation of sewing products promotes the discovery of new color solutions, forms, methods of processing, functions of the clothes, etc. It is determined that the designers widely use bionic objects as a source of inspiration to create the models of the clothes for both podiums and everyday use. Edible plants, in particular vegetables, are used by the designers as the materials for making clothes; as the materials for sketching the models of the clothes; as the source of inspiration for shape, decoration, and color decision. As a result of the analysis and transformation of the creative source 'vegetables', the models of the stage costumes for children`s choreographic team are designed. In the process of designing a collection of the children`s stage costumes, the scenario of the performance, as well as the requirements to the children`s clothes and the creative source, have been considered. In particular, the movements of actors during the dance 'Funny Vegetables' have been analyzed.

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