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METHODS AND MEANS OF CREATING FOUR-DIMENSIONAL SPACETIME IN LANDSCAPES BY VICTOR BILYK

Abstract. *The purpose of the article is to identify the means used by the Ukrainian painter Viktor Kyrylovych Bilyk (also known as Victor Belik; 1937–1992) to create the illusion of four-dimensionality on two-dimensional plane. **Research methods.** The author utilises general research methods of deduction (the use of theoretical studies to determine practical tools) and induction (for the generalization of individual results), as well as the formal analysis method to examine the artworks.*

Results. *The illusion of movement and time is one of the features that characterize V. Bilyk's style and manner, and the artist put great importance on this. However, none of the researchers of his work focused on this aspect. We explored various methods for creating such an illusion in landscapes, which enabled the artist to convey the four-dimensionality of space and thus reproduce the world of nature as a holistic, vibrant and being in motion. In the study, we investigated two levels of creation of four-dimensional space in V. Bilyk's landscapes: formal and contextual.*

Conclusions. *On the formal level, the artist creates optical illusions of motion using means of composition, such as golden proportion and diagonals, special rhythmical organization of space, color scheme, texture of brushstrokes. Also, the illusion of time duration is based on the trajectory of eye's movement of while the viewer is staring at the artwork, which creates an inner movement into the depth of the picture. For this purpose, perspective and construction of a golden spiral are used.*

The contextual level is created using objects located at different points of space or historical time. Understanding possible space coordinates of each object in one case or historical time coordinates – in the other case – creates an interval between them that is perceived by the viewer's brain as the flow of time. The effect of this method, though, is possible only under condition of viewer's awareness of these objects properties and their time coordinates.

The results can be used as a complement to the history of Ukrainian art of the twentieth century, as well as illustrative material for studying formal analysis of paintings.

Key words: *Viktor Bilyk, Victor Belik, Ukrainian art, landscape, painting, four-dimensional spacetime, space-time continuum, time category, time dimension, composition, illusion of time and motion.*

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ЗАСОБИ ВІДТВОРЕННЯ ЧОТИРИВИМІРНОГО ПРОСТОРУ-ЧАСУ У ПЕЙЗАЖАХ ВІКТОРА БІЛИКА

Анотація. Метою дослідження статті є виявлення засобів, якими послуговувався український художник-живописець Віктор Кирилович Білик (1937–1992) для створення ілюзії чотиривимірності на двовірному матеріалі. **Методи дослідження.** Авторкою використані такі загальнонаукові методи дослідження, як дедукції (використання теоретичних розробок для визначення практичних засобів) та індукції (для узагальнення окремих результатів), а також формальний мистецтвознавчий метод для аналізу творів. **Результати.** Ілюзія руху та часу є однією з рис, що характеризують творчу манеру В. Білика; художник надавав цьому великого значення. Проте жоден з дослідників його творчості не акцентував уваги на такому аспекті. Нами розглянуто різноманітні засоби творення такої ілюзії в пейзажах, завдяки чому митець мав змогу передати чотиривимірність простору, відтворюючи світ природи як цілісний, живий і рухливий.

У дослідженні автором розглянуті два рівні створення чотиривимірного простору у пейзажах В. Білика: формальний і сюжетний. **Висновки.** На формальному рівні, з одного боку, застосовуються оптичні ілюзії, для чого використані властивості золоті пропорції, діагоналі, ритму, кольору, світлотіні, характеру і напрямку мазка. З іншого – ілюзія тривалості, яка базується на траєкторії руху очей глядача під час споглядання твору, що створює внутрішній рух у глибину картини. Для цього використано перспективу і побудову за золоту спіралю.

На сюжетному рівні використовуються об'єкти, що перебувають, або можуть перебувати в різних точках простору або історичного часу. Використання такого методу можливе, якщо глядач знає ці предмети, їхні властивості та часові координати.

Результати досліджень можуть бути використані як важливе доповнення до історії українського мистецтва ХХ століття, а також як ілюстративний матеріал під час вивчення формального аналізу живописних творів.

Ключові слова: Віктор Білик, українське мистецтво, пейзаж, живопис, чотиривимірний простір-час, просторово-часовий континуум, категорія часу, часовий вимір, композиція, ілюзія часу та руху.

Formulation of the problem. Since ancient times, and especially since the Renaissance, one of the main tasks of painting has been the depiction of three-dimensional space on a two-dimensional plane, which is technically just a fragment of a canvas with coloured spots. This was facilitated by the discovery of the laws of perspective and understanding of the characteristics of colour transmission to create depth in a flat image. However, artists have always sought to make their works look not only voluminous, but also moving.

Painting, unlike music, cinema, and choreography, is a static form of art, and such characteristics as movement and time are not its features, from a physical point of view. Both the third and fourth dimensions in the picture are nothing more than a set of optical illusions. It is the illusion of several time coordinates in a work of art that makes a viewer feel time. The means of creating such illusions became the object of search for artists and art theorists in the 20th century.

Analysis of recent research and publications. Art theorists involved in the development of formal

analysis, in particular H. Welflin, were the first to draw attention to the phenomenon of movement in fine art [1].

For futurists, the concept of movement and speed was fundamental. Thus, in 1914, O. Bohomazov, a Ukrainian futurist painter, published his theoretical work *Painting and Elements*, in which he presented his vision of an artwork as elements connected by rhythm, dynamics and movement, which he considered the most important components of any work [2]. A recent research by Y. Maistrenko-Vakulenko on Ukrainian theatrical drawings of Avant-Guard era explores the evolution of space-time continuum representation [3].

V. Favorsky considered the category of time in the context of the representing movement. He also stated that a person perceives time as a vector directed from left to right, due to which we see the centre of composition as the present, while the past stands behind and around [3]. The nature and universality of such perception has been an object of scientific discussion [4, 5].

Ukrainian artist and art theorist, Kyiv Art Institute professor, M. Pysanko, described some

tools for creating time through the illusion of movement in his book *Motion, Space and Time in Fine Art* [5].

Viktor Bilyk's artworks have been studied by some art critics (such as O. Kuzyants [6], I. Petrov [7], V. Pidgora, O. Zinkevych [8]). However, the categories of time and movement, which the artist put fundamental importance to, still remain unresearched [9; 10; 7; 5].

The aim of the article is to study formal and narrative elements and principles of reproducing the passage of time in the works of the Ukrainian artist Viktor Bilyk. Therefore, the object of research is such an aspect of the concept of time as an interval between time coordinates and its reflection in the painting of the artist.

Using the theoretical art studies, we can conclude that the illusion of time in a painting was achieved on two levels: formal (utilizing the principles of composition, rhythm, colour, chiaroscuro, texture) and contextual (visual story of a picture).

Presenting main material. Viktor Kyrylovych Bilyk (also known as Victor Kirillovitch Belik [11]; 1937–1992) was a Ukrainian painter, who, after graduation from Kyiv State Art Institute (now NAFAA), worked in various genres and techniques.

As a monumental artist, he created numerous mosaics, murals, and embossing in public institutions located in various parts of the Soviet Union. These artworks include mosaics and embossing at the Main Post Office in Simferopol, mosaics at the Azotmash Palace of Culture in Cherkasy, copper embossing on the facade of the Institute of Urology and painting of the Main Post Office in Kyiv, etc.

Viktor Bilyk devoted all his free time to easel painting. His heritage includes portraits of famous personalities of Ukrainian culture and science, landscapes and still lives painted in a recognizable individual manner.

Landscapes make up a significant part of Viktor Bilyk's heritage. In total, he painted about 500 landscapes during his lifetime. When traveling, he always had a sketchbook with him, so many sketches painted in different parts of the world have survived. In addition to Crimea, where he was born, it is the Caucasus, Samarkand and Bukhara, Germany, Bulgaria, Hungary, and of course, many cities of Ukraine.

Viktor Bilyk's style and manner were formed under the influence of socialist realism on the one hand, and under the influence of his personal preferences on the other. The influence of social

realism in his landscapes is expressed mainly formally, and is manifested in cheerful colours, realistic construction of objects, a tendency towards dynamics borrowed from the futurists. The artist's fascination with impressionism and post-impressionism contributed to colour experiments, which later resulted in an individual style, recognizable due to the colour scheme, dominated by bright and warm colours, and rhythmic large textured brush strokes, which always emphasize the form of objects. Illusion of time is another distinguishing feature of V. Bilyk's landscapes. It is usually impossible to recreate the concept of time in a landscape with the help of figures in motion. Therefore, other means that convey the feeling of four-dimensionality were utilized.

The category of time appears in the artist's works on the formal and contextual levels.

At the formal level, the methods of creating the illusion of time are based on the properties of composition, perspective, direction and pace of the lines, texture and rhythm of painting planes, the nature of the brushstroke, colour and contrasts, etc [5]. V. Bilyk skilfully used these tools, and in various artworks we can see utilizing several of them at once, which makes it possible to feel the passage of time simultaneously on several levels.

Composition provides numerous opportunities for creating dynamics, and therefore the illusion of time. Dynamics is achieved taking into account the specifics of psychology of perception, namely due to the fact that everything perceived by the eye is only one link in the chain of information circulating in the nervous system [12]. The compositional principles that enable to create the illusion of time are presented in Viktor Bilyk's landscapes by placing the image diagonally, using the golden section and golden spiral, guiding lines, perspective, etc.

Perspective. It should be noted that the very perception of the third dimension – depth – in the picture is accompanied by an internal movement that occurs along the trajectory of the viewer's gaze. The duration of time in this case is not determined by the optical illusion of movement, but by the time required to view the work [5]. V. Bilyk paid special attention to this aspect. Internal movement – movement into the depth of the picture – is conveyed by various means. Firstly, this is the perspective that introduces the glance inside the picture; secondly, it is adding contextually insignificant, but compositionally imported figures. They do not necessarily move, they look more like silhouettes and do not affect

the content in any way, but the viewer's gaze is inevitably drawn to them [12].

In the sketch *Berlin. Bridge over the river Spree* (il. 1), at first glance, no action is taking place. Passers-by, whose silhouettes are barely legible, do not create movement. There is only an internal movement into the depth of the picture. Internal movement is created by guiding lines (roofs of buildings, bridge chains) and perspective (diminished silhouettes in the arch of the bridge, whose actions can be solely guessed and interpreted by a viewer). All these techniques make the process of viewing the picture long and thus bring a temporal dimension to the work.

A similar method is found in the sketch *Potsdam Center*. The Gothic cathedral, placed on the vertical line of the golden ratio, is the first thing to attract a viewer's eye. The opening in the arch draws attention inside the picture. Movement is supported by guiding lines. The figures of people perceived as moving down the street are painted

schematically, but they are another factor in the inner movement.

Another compositional tool used by Bilyk is **diagonals**. Since it is in human nature to perceive the flow of time from left to right in two-dimensional plane [13; 5], the artist arranges objects along the diagonal, which provokes the sense of movement up or down. Arranging objects diagonally from the upper left to the lower right conveys downward movement, while a diagonal from the lower left to upper right conveys upward movement.

Thus, in the painting *Along the Streets of Balaklava* (il. 2) the sense of movement is conveyed, first of all, by the use of diagonals. The cart going down the street is supported by guiding lines that almost coincide with the diagonal drawn from the lower left corner to the upper right. The other two lines (top left to bottom right and top right to bottom left) are supported by the roofs of buildings. The intersection of these lines seems to be the point where the cart is headed.



Il. 1. V. Bilyk. «Berlin. Bridge over the river Spree». Oil, board. 40x45. 1980-s. [Image by author]



Il. 2. V. Bilyk. «Along the Streets of Balaklava». Oil, board. 30x50. 1980-s. [Image by author]

The next method is utilizing the properties of the **golden ratio**. The placement of the main figure on the line of the golden ratio seems harmonious and "correct" to the viewer. If the main object of the image is placed on the golden ratio, it will appear as still. If the main object is displaced from the line of the golden ratio, the viewer subconsciously tries to move this object "to the correct place", which creates illusion of movement in the direction of this line [14].

In the picture *Along the Streets of Balaklava* we can see how this method works. The cart, which is the main object here, is to the left of the golden section line, which forces the viewer to look for a more harmonious location to place it and imaginarily move it to the right. Thus, in the viewer's mind, the cart is located at two points in space, which is interpreted by the brain as two time coordinates. The point of intersection of the guide lines, which is exactly on the vertical line of the golden section, helps to find the point to which the cart seems to be headed. In this way, the illusion is created that the cart is going up the street.

In addition to the golden section, it is worth paying attention to the same proportion in the form of a spiral – **the Fibonacci spiral** or the golden spiral [14].

The study *Columns in Sanssouci* illustrates the principle of movement along the golden spiral. The viewer's gaze begins to move from above – from the eaves of the column. The arc-shaped direction of the brushstrokes with which the

clouds are written sets the movement that continues the green of the tree, and then the edge of the shore, and brings us to the bases of the columns. The last detail that the viewer notices is the tilted fragment of the column that completes the spiral. After that, the gaze is fixed again on the columns going uphill. This is another example of internal movement based on the trajectory of the eye movement while looking at a picture.

The composition of the painting *View of the Genoese fortress in Sudak* (il.3) is also built according to the golden spiral. At first, our gaze slides over the ruins of the fortress, goes around it, descends to the withered quince-tree, which no longer bears fruit. Finally, the gaze is fixed on an old boat that was once used for fishing.

Thus, placing the elements of composition in direction of the golden spiral subconsciously makes the eye move, and we perceive this as dynamics.

Rhythm is an important component of V. Bilyk's painting, which consists in alternation of larger and smaller objects. The rhythm can be set by alternations of lines, light and shade or colored spots, strokes of different sizes, and usually creates the illusion of movement [9; 15; 5]. The sky, sea, and tree leaves in most of the painter's Crimean landscapes seem to be moving precisely because these objects (rendered quite schematically) are rhythmically organized.

Sky painting technique in the artist's landscapes and its role in dynamics deserves a separate exploration. The sky in his works rarely appears as



Il. 3. V. Bilyk. «View of the Genoese fortress in Sudak». Oil, canvas. 70x90. 1985. [Image by author]

blue and serene. The structure of colored shapes is always controlled by a certain rhythm. To create peace and quietness, less contrasting and more rounded shapes are used. Brushstrokes with sharp angles, contrasting in color, are used to convey tension.

In the sketch *Berlin. TV Tower* (il. 4) uses the most dynamic type of rhythm – progressive, when the sequence of elements of the rhythmic pattern increases up and to the left. This makes the clouds appear to be moving towards the upper left corner.

In the *Siveromorsk Routine* painting, the landscape plays a crucial role due to the use of rhythm in the sky and the sea. A progressive, radially directed rhythm of light and cadmium strokes creates the movement of the sun's rays from top to bottom. This creates a feeling of sunlight breaking through dark clouds, which is perceived as a symbol of North Sea people's harsh and stressful life. Rhythm can also be found in the waves. The alternation of contrasting light and dark strokes conveys their movement, and also leads the eye into the depth of the picture, to the crest of a wave rising above the ship.

Colour in Viktor Bilyk's works deserves a separate article. We will limit our research only to those colour choices that work within the concept

of time duration. V. Kandinsky developed a theory of colour dynamics, in which he works out several types of movement that can be conveyed using different colours. This theory has not gained universal support, but at least one of the statements has some basis. Thus, he believed that warm colours and white create movement towards the viewer, while cold colours and black create movement in depth [15]. Indeed, objects placed in the background seem colder to us, and objects in the foreground appear warmer. Conversely, the use of warm colours creates the illusion of their approach to the viewer.

When examining the landscapes of V. Bilyk, one can observe the dominance of warm, mostly orange, hues, including in the objects in the background. This colour often appears in the image of the sky. Illuminated by tinted cadmium, the clouds in *the Crimean sketch with the ruins* of the fortress appear to be approaching the viewer.

Another feature of V. Bilyk's painting is the use of colours from an additional palette to depict water and the sky, which, depending on the size of the stroke and the nature of the rhythm, creates a directed movement or flickering [9, 5]. In particular, the shimmering effect in the image of the sky in the already mentioned



Ил. 4. В. Билик. «Berlin. TV Tower». Oil, board. 70x50. 1980-s. [Image by author]

Berlin. The bridge over the river Spree and water in various works is created by using additional blue and orange colours next to each other. The shimmer is the result of placing chromium oxide next to red cadmium, yellow cadmium next to cobalt blue.

Dynamic, rapid movement is achieved by placing dark colder and warm light (mostly with the addition of orange cadmium) spots next to each other. Dark colours cause the illusion of movement into the depths, while orange colours, on the contrary, create the illusion of approaching the viewer.

Crimean landscape with longboats, depicting the state of nature before the onset of a storm, seems extremely dynamic, despite the absence of any activity. The peculiarity of this landscape is that time illusion is conveyed in it by almost all possible means at once. Boats are depicted lit by sunlight while the sky is dark. The use of strokes contrasting in value and colour, the movement of the former in depth, and the latter – outward – creates the conflict between the current sunny state and the approaching thunderstorm, which

conveys tension. The direction of strokes at an angle and their rhythm enhance the dynamics. Dark shapes seem to approach the ground, and light ones seem to push them away.

Thus, with the help of solely formal means of dynamics, the mood of the picture is created and the philosophy of perceiving nature as a powerful and invincible substance is conveyed.

At the contextual level, four-dimensionality is created by the choice of the theme of the picture. This can be achieved in various ways, the essence of which is that the viewer himself draws the frames, turning a scene into an episode. This happens due to the fact that a person perceives visual images with their eyes, but the processing of the image takes place in the brain, which corrects what is seen based on the previous experience of the viewer [12]. Thus, hagiography icons showed the most significant episodes from a saint's life, which made it possible to see not a scene, but a whole story that lasts for years. G. Klimt and F. Krychevsky, to convey the passage of time, depicted three generations of women. K. Petrov-Vodkin depicted the shadows of fallen soldiers behind the survivors in the painting *After the Battle*. Artists also used allusions to create a sense of time passing by depicting famous people from different eras side by side, like Raphael in *The School of Athens*.

The contextual method of conveying time, in contrast to the formal method, which affects only the subconscious, also depends on the previous experience and awareness of the viewer: he must be aware of the context of the depicted scenes and conscious of their temporal location.

The landscape does not have as many possibilities of context as the listed works. However, V. Bilyk applies this method in the landscape as well.

Firstly, the signs of passing time in his landscapes are objects in a non-static position: bent trees, stones in the air, a bell hanging at an angle. The viewer's brain creates variable points of the position of such objects, because it knows about the initial position of these objects [12].

Secondly, this is depiction of states of nature, the consequences of which can be predicted. In the above mentioned *Crimean Landscape with Longboats*, the illusion of time is conveyed not only at the formal level. It is also based on our knowledge of the fact that dark clouds bring bad weather, and light ones are so because of illumination by the sun's rays. That is, the conflict is created not only with the help of contrast, but also with the help of context.

Thirdly, it is the use of recognizable objects that are symbols of certain eras next to each other, that is, the placement of two or more coordinates of historical time in the same plane. Understanding the distance of these coordinates from each other leads to the perception of the time interval between events, although the events themselves are not depicted.

In *View of the Genoese fortress in Sudak*, mentioned above, the formal methods of depicting time are emphasized by more complex plot means. As it was already mentioned, the spiral construction forces the viewer's gaze to slide from the ruins of the fortress, through the dried quince-tree to the old longboat, that means that the objects are placed in chronological order by the last time they were used. The fortress was destroyed hundreds of years ago, the quince-tree dried up not so long ago. Longboats such as the one depicted in the picture have hardly been used for their original purpose at the time of painting, so they are seen as something that will soon completely fall out of use. Thus, the main

objects depicted in the picture have different time coordinates and are perceived as symbols of antiquity, the recent past and the border between the past and the future. There are no people in the street, although you can see the houses and the crooked old fence, another symbol of the past. Thus, in this case, the passage of time at the level of the context is conveyed with the help of symbols. At the same time, on the formal level, we see the rhythm of the clouds, which allows us to feel the somewhat chaotic, but directed into the depth air movement. The sky continues to live and move above the crumbling fortress, the withered quince-tree and the abandoned longboat.

Along the Streets of Balaklava, mentioned above, uses the same principle of placing two time coordinates on the same plane. Thus, the movement of time, conveyed at the formal level, is also emphasized contextually. In the foreground and middle plans are small houses. In the background – on the hill – the ruins of the Genoese fortress can be seen, like a giant ghost of the past.



II. 5. V. Bilyk. «The Bell in Khersones». Oil, board. 50x50. 1986. [Image by author]

The Bell in Chersonesus (il.5) is another example of combination of formal and contextual methods of conveying time. The bell displaced sideways from its equilibrium position, which everyone aware of its work would read as movement just before or after a strike. The next thing the viewer sees is the St. Volodymyr Cathedral, damaged during the bombings, from which the history of the bell actually began. All this creates a context and sets time coordinates, the combination of which creates a line of time movement.

The rhythmic strokes for the sky, the light that slides over the buildings and colours them with orange and red cadmium – all this creates the illusion of movement on the formal level.

Conclusions. Summing up, we note that the reproduction of four-dimensional space in landscapes was a conscious and important task for Viktor Bilyk. He managed to depict the category of time on two levels: formal and contextual, and in many works – on both. The artist's style is characterized by a variety of means at both levels.

At the formal level, on the one hand, optical illusions are used, for which the properties of the golden ratio, diagonal, rhythm, colour, chiaroscuro, character and direction of the stroke are used. On the other hand, the illusion of duration is based on the trajectory of the viewer's eyes while viewing the work, which creates an internal movement into the depth of the picture. For this, perspective and arrangement of objects according to the golden spiral are used.

At the contextual level, objects from different points in space or historical time are used. This method works only if the viewer is aware of these objects, their qualities and their time coordinates. These can be objects in a non-static position or natural phenomena, as well as objects related to the past, which can act as symbols of certain historical coordinates.

Viktor Bilyk's use of these methods in his landscapes enables him to convey the four-dimensionality of space and thus reproduce the world of nature as holistic, vibrant and moving.

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