

## TECHNOLOGIES FOR CREATING REALISTIC IMAGES IN PAINTING: A HISTORICAL RETROSPECTIVE

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### ABSTRACT

The author analyzes various technologies for creating realistic images in art. The methodological study base is a combination of several methods: theoretical and conceptual method – in the analysis of the conceptual and terminological research system; comparative-typological – to compare technologies for creating realistic images. It is established that historically the first devices that provided a realistic image were a pinhole camera and a lucida camera. The author has proved that the introduction of innovative technologies has led to a change in the art specifics and the new artistic trend emergence. So, the appearance of photography and cinema contributed to the emergence of pop art, video art and video sculpture, video performance, digital technologies – CG art, WEB-design and VJ.

**Keywords:** Technology, Technique, Painting, Realism, Photography, Digital technology

### 1. INTRODUCTION

The use of technology in art has always been an urgent issue for scientific research, given the rapid development of the technological process and the introduction of technical innovations in all spheres of human life, including culture and art. This is evidenced by an array of relevant publications.

The problems of introducing technologies in the field of culture were raised in the scientific studies of A. Rousseler (2006), P. Daum (2006), P. Drucker (2007), F. Stadman (2010), Yu. Milyutina (2011), V. Zatserkovny and N. Karevina (2014), A. Starovoit (2014). Recently, the scientific paradigm has been characterized by a growing interest in the concepts of content visualization (Simakova, Panyukova & Topchy, 2019: 344) and art virtualization (Erokhin, 2010, Tsukorka, 2015; Bystryakov & Osadchaya and Pilguk, 2017).

Researchers devote considerable attention to the issue for the interpenetration of painting, photography and cinema (Tadbot 1844; Emerson 1889; Robinson 1869; Woodhet 1978; Olechowska & Zambrzycka, 2016; Averyanova, 2018).

However, a significant amount of publication is directed to the study of cultural, not art criticism. A review of the literature on the problem under study suggests that the question of using technologies that would provide a realistic image in painting remains unexplored. The correlation of traditional and innovative in art is an extremely relevant topic. Therefore, it is necessary to trace the introduction of technology in the art of historical cross-section.

### 2. MATERIAL and METHOD

Speaking about technologies in the context of this publication problems, it is obviously worth noting that the art process, like any other form of human activity, has always required the use of a certain technology. Even primitive people used technology in a certain way to create the first cave paintings and aesthetic products.

Technology became innovative when it was a technological innovation and fundamentally changed the conceptual component of art. The advent of paper or print has forever changed the genre-stylistic component of fiction, the invention of photography or digital digitizer – fine arts, sound recording – musical. Moreover, with the advent of new technical devices at the intersection of several traditional art forms, new synthetic trends have emerged – cinema, television, digital video, digital music. Consideration of the known historical facts of the technology introduction into the arts gives grounds to conclude that technologies have become innovative in the period of their introduction and their functional component development. "Any tradition is a former innovation, any innovation is a potentially future tradition" (Bystryakova, Osadcha and Pilchuk 2007, 194).

Turning to the legally fixed definition of the term "technology", we find it in the legislation of Ukraine (2006). In accordance with the Law, technology is understood as "the result of scientific and technical activity, the set of systematic scientific knowledge, technical, organizational and other decisions on the list,

the term, order and sequence of operations, the production process and / or sale and storage of products, and the provision of services". As we see, the concept is interpreted for general use, and not for the cultural and artistic sphere. Therefore, the problem of introducing innovative technology into art is considered in an interdisciplinary and ideological vein at the intersection of the study of several scientific areas, in particular, art history, cultural history, philosophy, social studies, computer science, social psychology, etc.

### 3. RESULTS

Since ancient times, artists have sought to portray reality realistically, paying attention to proportionality and orderliness, the correspondence of the image with the human world. Antique painting and sculpture are based on the teachings of the "classical canon" of the Greek sculptor Poliklet II half of the V century BC, is a set of proportionality rules based on mathematical calculations. The study of the antiquity art theorist is the first attempt to comprehend the laws of realism in painting, subsequently formed the basis of the famous Aristotle's "Poetics". The latter, in his work "Problemata" (about 350 BC), he also investigated the possibilities of image capture, including through a pinhole camera.

Consideration of the historical fine art development gives reason to argue that throughout the entire period of the painting formation, artists tried to give the image realism and credibility through the techniques and technologies available at that time. In the works of Michelangelo Caravaggio (XVI century) and Diego Velazquez of the Baroque era (XVII century) realism is achieved due to the contrast of light and shadow and carefully selected messages of colors that are close to real (depicted). Gustave Kubra, an artist of the Romantic era, neglects the traditional technique of applying paints for a more realistic object depiction; he describes the ideas of realism in painting in the famous "Manifesto of Realism" (1855). The works of the Impressionists Eduard Manet, Alfred Sisley (XIX century) and the Post-Impressionist Vincent Willem van Gogh (early period of its formation) also have a tendency to realistic images: artists use natural color shades and simplify the compositional construction of paintings.

In the XX century under the totalitarian regime formation, social realism is emerging as a realistic trend of art in Europe, in particular in the Soviet Union. Theorist of contemporary art Jose Ortega y Gasset points out that in the painting of the middle of the XX century socialist realism prevails, which depreciates the aesthetic artist tastes of that period, but depicts reality realistically (Ortega y Gasset 2007).

In the historical context of the past, realism was an effective means of cognition and studying the laws of building the world, as well as part of a powerful educational movement. Throughout their life, artists inspired by the idea of realism have sought techniques that help realistically portray reality.

#### 3.1. The Use Of Techniques For Fixing Images And The Search For New Technologies In Painting

In the theory of art, it is generally accepted that it was with the advent of photography that it became possible to capture images. However, it is not so.

The first device for projecting images, as well as a simple device for obtaining an optical image of objects, is a camera obscura (from the Latin "Camera obscura" – "darkroom"). It is a lightproof box with a hole in one of the walls and a screen (with frosted glass or tissue paper) on the opposite wall. Rays of light passing through 0.5–5 mm hole create an inverted image on the screen. The operating principle of the pinhole camera was first considered by Aristotle (384–322 BC) in the work "Problemata physica" in the study of solar eclipse, and then by the Arab physicist and mathematician of the 10th century Ibn Al-Khaysamom (Alkhazen) from Basra (Zatserkovny, 2004: 13).

Artists used a pinhole camera to create realistic images. Italian artist and architect Leonardo da Vinci (XV century) used this device for sketching from nature, Italian artist of the Classicism era (XVII century) Giovanni Canaletto – to create landscapes of London, Venice. The Dutch artist of the Baroque era (XVII century) Jan Vermeer created extremely realistic paintings using a pinhole camera.

The British artist D. Hockney, exploring the work of Renaissance and Renaissance artists, in particular Jan Van Eyck and Jean Auguste Dominique Ingres, indicates that the artists used not only the aforementioned cameras, but also convex mirrors and lenses for projection to create a realistic image. Let us consider some aspects of his research that are hypothetical in nature. Using the painting "Portrait of Arnolfini's Couple" (1434) by the Flemish painter of the early Renaissance, Jan Van Eyck, as the example, researcher conducts his own experiment: he produces a metal chandelier, similar to the one shown on the canvas, and explores the possibilities of fixing glare and light rays reflected in the image mirror and a chandelier. As a study

result, the artist suggests that Jan Van Eyck used a concave lens to capture an accurate image and accordingly create a realistic image (Hockney, 2001).

In the art history we find another interesting device, technologically similar to a pinhole camera. We are talking about a camera lucida (from the Latin “Camera lūcida” – “well-lit room”) – an optical device with a prism, which serves as an aid in transferring existing motifs to paper. It was invented in 1807 by the English physicist Uvilliam Wollaston. This technical tool was used to create portrait and pictorial canvases: unlike an alternative pinhole camera, it provided the opportunity to create a straight-line (not inverted) image and better reproduce black and white drawings. With the camera lucida, the artist could get the correct construction of perspective and similarity with the existing motive.

These two technical devices provided artists with the opportunity to capture the image and reproduce it realistically, taking into account the relevant details and proportions on the canvas.

However, the use of technical equipment dictates the artist certain requirements for the use of tools, as well as compliance with the technology for creating a picture. Firstly, the image obtained from the pinhole camera lens is mirrored, and therefore right-handed objects become left-handed, especially “right-handed” people – “left-handed people” and others. The problem is solved if you install a mirror near the lens that will reflect an inverted image. Secondly, the lens is able to focus on individual objects. To avoid blurring the image, you need to change the position of the canvas under the projection rays. But in this case, a change in the proportion and foreshortening of the image is possible. Such errors can be seen on the canvases of Antey by Francesco Parmigianino (1537), where there is no proportionality of shoulders, Lady Genovese with the head of the Flemish artist Antonis Van Dyck (1626) too small, Peasant with the very long legs of the French master Georges de Latour.

The facts of using optics do not detract from the talent of artists – after all, technology is a means of conveying the artist’s intention. And vice versa, the fact that reality is reflected in these paintings only adds weight to them – after all, that is how people of that time, things, premises, cities looked. These are real artifacts, art documents.

The camera obscura and the camera lucida are the forerunners of the modern camera, however, it was they who rendered the work of the classics of the painting a realistic effect.

### **3.2. The Evolution Of A Fixed Image: From Photogram To Photo**

The chemical image fixation became possible only at the beginning of the 19th century, when scientists T. Wedgwood and G. Davy received the first photograms using silver salts (1802), but they still did not know how to fix the image. The first practical success on the way to the photography appearance was heliography.

Image capture technologies were organized even without a camera. Photogram is an image obtained by the photo chemical method, without the use of a camera. A specific feature of the photo gramis that the object is placed on photo paper or film, and illuminated with a lamp so that its shadow falls onto the photo material. As a result of these manipulations, opaque objects are reflected in the photogram in the form of silhouettes (Sidorenko 2008, 34).

Throughout the 19th century, searches for ways to preserve the photographic image continued. The introduced inventions of the heliography by N. Niepce, the daguerreotype of the French artist L. Daguerre and the calotype of the English scientist V. Talbot were the first steps in the photography development as a new means of image fixation. “How wonderful it would be if you could make these natural images print and stay on paper for a long time,” Talbot wrote in his research texts (Daniel 2004).

At the same time, experiments continued on the use of these technologies in the visual arts. Famous avant-garde artists ManRay, Mohoy Nagy and EilLissitzky having interested in the new technology of photography began to experiment with shooting equipment in the process of creating paintings. So, in the 1920s, the photogram under consideration appears in the practice of fine art (or the derived name “reiogram” – on behalf of its founder, artist M. Ray).

The photogram provided artists with the opportunity to move from literal realism to imagery, from a familiar perspective to a deep, multifaceted one. Subsequently, artists practice receiving photograms using x-rays.

The technology for creating photograms shows that artists looked not only for fixing methods, but also for the artistic transformation of fixed images. Along with the Photogram, solarization is also used. That is a technology that allows you to give the desired black-and-white effect to an image by illuminating a partially

detected emulsion. With further development, the emulsion areas that are not exposed to exposure to light become black, and a light outline forms around the already detected ones due to lateral diffusion of the developer oxidation products (Woodhead 1978, 59). Thus, these image capture technologies provide the desired visual effect, while maintaining the image plausibility and proportionality.

I emphasize that artists (not photographers) often created photograms. Man Ray never perceived himself as a photographer, although he owns several technical discoveries. At first, he became interested in photography only for photographing his finished canvases, and later he created photography without a camera, known as reioigraphy, and a special print from negatives – solarization, which became his hallmark.

### **3.3. Technological Capabilities Of Photography: Photopressionism, Photorealism, Hyperrealism**

Artists are actively exploring photographic opportunities. The world famous impressionist E. Degas takes photographs of ballet dancers, from which he then paints his famous paintings. It is thanks to this technology that his work is extremely realistic and accurate.

In painting with the help of photography, it becomes possible not only to fix the image, but also to create imaginative solutions and allegories. The artistic direction of photoimpressionism is emerging, the concept of pictorialism appears, which is used to determine the similarity of photography with painting (Daum, 2006). Artistic photographs in the genre of impressionism are created by A. Stiglitz, A. Coburn, R. Demashi, P. Ventosa. Photographers use special techniques of shooting and photo printing: soft-focusing lenses, filters, processing of positive dichromate, silver salts in order to create optical illusions, a picturesque pattern, a blurred silhouette. Photos of B. Cole from Toronto are very similar to the paintings of the Impressionists. The blurriness of the image and the imitation of paint smears is achieved due to the fact that the depicted objects are in water. This creates a certain symbolism and emotional background, characteristic of impressionism.

In the world practice, the transformation of painting continues under the relentless photography penetration. Photorealism appears, that is a modern genre of painting, which, in contrast to photoimpressionism, depicts reality in a more realistic and detailed way. The term was first used by the American writer and artist L. Meisel to define the artistic movement in the United States during the late 1960s and late 1970s (Monte, 1970).

However, photorealism could not be realized as an artistic direction in the territory of the former USSR. The distribution of photography as a way of capturing a real image was not supported by the authorities in a totalitarian country, because it could only reflect the realities of life, and not create the necessary illusion images in accordance with idealistic aspirations.

“One of the demonstrations of how photography was assimilated in the world of art is the success of photorealistic painting in the late 1960s and late 1970s. It is also called superrealism or hyperrealism. Artists such as Richard Estes, Denis Peterson, Audrey Flack and Chuck Close often created paintings that looked like photographs” (Thompson, 2007, 77). Hyperrealistic paintings or sculptures are not interpretations of photographs or literal illustrations of a particular scene or object. The goal of creating hyperrealistic canvases is to create a reality illusion, which actually either does not exist or is not visible to the human eye.

Nowadays, the artistic directions of photorealism and hyperrealism show that artistic works can be really very realistic due to the shooting and digital techniques.

### **3.4. Technological Experiments In Painting Of The XX–XXI Centuries**

With the cinema advent, the interest of artists in screen art is growing. Painters, inspired by the idea of dynamic image and movement in the frame, resort to their own technological experiments. The avant-garde trend in art dictates the need for new creative experiments, a combination of various techniques, materials and the search for new ideas to artists, while the artistic content is simplified. Artists are actively using the latest digital technology in the process of creating their images.

A Ukrainian artist and sculptor, Alexander Arkhipenko, became interested in cinema, moved to Hollywood in 1923 and invented the unique technology of “moving painting” (“Peinture changeante” – indicated in the patent), later called “archipenturo”. The invention was an electric mechanism by which they move ribbons create certain images on the plane. Subsequently, this principle was started to be used for commercial purposes for billboards (Sidorenko, 2008, 31).

In the mid 1950's a new direction in the visual arts, combined painting is born. Artists use various materials to create their work: photographic images, clothing, newspaper pages, and even three-dimensional objects. Silk Screen Printing by R. Rauschenberg is an excellent illustration of how not only paper fragments are attached to the canvas, but also household items: watches, bags for vegetables, and the like. In their installations, J. Jones uses coffee cans, J. Chamberlain – crumpled car debris, E. Parampolini – metal structures. American pop art is emerging. Artists James Rosenquist, Ed Rushcha. Roy Lichtenstein and Andy Warhol work in this direction, using animations and advertising in their work.

With the advent of digital technology in art, the phenomenon of “digital art” is emerging, the main types of which are digital computer painting, computer graphics and digital computers culture. The digitizer, a graphic tablet for entering information created by hand directly into a computer, is used to create digital drawings, computer graphics.

With the advent of digital printing, it has become possible to produce reproductions of paintings by artists and print photographic images on canvas. Moreover, the technique of applying oil paints to printed reproductions is currently being used, as a result of which it is sometimes difficult to distinguish printing from real paintings. Modern digital photographic equipment and digital processing can simulate the manufacturing process of the mentioned photogram. To do this, you need a point source of light, objects on a transparent surface and paper onto which the shadow image will be projected.

In the XX–XXI centuries the synthesis of art and science led to the formation of such new forms of artistic creativity as painting in the style of CG-art, video performance, video sculpture, WEB-design and VJ (Zukorka 2015, 112–113).

#### 4. CONCLUSION

As the study result, it was found that the trend of realism in painting was achieved due to technical devices and innovative technologies. Historically, the first such devices were a pinhole camera and a lucid camera. Optical fixation technologies, and later digital technologies, have provide dun limited possibilities for creating realistic images of reality. With the photography advent, it became possible not only to capture the image of reality, but also to turn it into a unique pictorial photorealistic work.

A generalization of scientific, theoretical and methodological approaches to solving the issue of technology in art has allowed the formation of theoretical and methodological research foundations, which are based on an understanding of the technology concept as the result of scientific and technical activity.

A historiographical review showed that innovative technology became when it was a certain technological innovation and fundamentally changed the conceptual art component. As a result of the technology introduction in painting, new artistic trends appeared. So, the appearance of photography and cinema contributed to the emergence of pop art, video art and video sculpture, video performance, IT technology – CG art, WEB-design and VJ. It is proved that as a result of the new technologies introduction, the synthesis of various techniques and materials, the artistic content of the art work is simplified.

Given the continuous development and technological progress in society, the prospects for further research on the issue of technology in art, in our opinion, may be numerous. Given the very wide range of issues in this area that have not yet undergone comprehensive scientific study, we believe that the further analysis for the introduction of modern digital technologies in art, as well as the study of artistic styles and trends that arise as a result of updating the technological art component and follow postmodern.

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