e-journal of
Social and Legal Studies

Optical Illusions of Digitalism

Merve Yildirim*

Abstract

With the development of the digital evolution of art, software engineering, digital media, modelling, prototypes, simulation, online environments and programs have differentiated the design process. This innovative approach of design processes has influenced many art movements. Op art movement, which coincides with the possibilities of digital technology, is an abbreviated form of the English word "Optical Art". It was developed in the 1960s. Op-Art contains abstract art products that aim to create a depth or three-dimensionality. The illusion of movement, Vasarely, Yaacov Agam and Jesus Raphael Soto, who are the pioneers of the Op art movement, which offers new values in light and optic space, have created an illusion effect on the audience with physical psychological effects with examples of moving art and kinetic art. In the op art movement, artists and scientists produced new virtual images with more complex illusions by processing new virtual images with softwares, information technologies and high-tech printing techniques. What are the development advantages provided by the mathematical components and permutations of the Op Art movement in the axis of the digital world in this study? How and how the basic appearance of optical art changes dimensions will be examined with examples.

Keywords: *Digital, Illusion, Op Art.*

Received: April 27, 2020 ***Accepted:*** May 10, 2020

* Asst. Prof. Dr., Giresun University Görele Faculty of Fine Arts Graphic Design Department, merveyildirim1@hotmail.com, https://orcid.org/0000-0002-7414-6489

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Introduction

Perceptual Abstraction, referred to as 'Retinal Art', which uses visual biceps to powerfully influence the retina and creates a sense of vibration, flashing and movement through optical illusion. For this reason, the examples of Op Art are based on regulations and colour relationships consisting of basic geometric formats. For instance; lines, squares, circles, etc. by destroying scriptable elements (Rona, 1997:1377). Op Art was first used as a term in 1965 for geometric compositions that allow perceptual biceps in an exhibition called "The Responsive Eye" at the Museum of Modern Art (MOMA) in New York City. Op Art is a non-objective art tendency which means the use of correct and curved lines, or geometric shapes, to have a misleading effect (for example, a movement effect) (Ziss, 1984:303).

Op Art is a surface. It is consisting of abstract art products that create vibrations, moire patterns, created exaggerated depth and different visual perception by arranging geometric forms in the illusion of three-dimensionless with the implementation of the rules of perspective and modelling them with colour on geometric forms, applying to methods such as light-shadow, and creating patterns. Op Art strengthens its connection with illusion with the dynamic production of perceptual contrast. Illusion; It means "reproduction" of reality in the art work (Sozen and Tanyeli, 2003:252). Optical illusion is defined as an image that causes the person to misinterpret its meaning (Keser, 2005:241). In illusion, the mind on the basis of previous

experiences uses the viewer's eye-sensing and sensing ability to complete the images for its own benefit (Reichardt 1997:239).

Actually Op Art is focused on examining the second and third dimension based on research on the illusion of the eye. It tends to examine the harmonious eye phenomenon based on the constructivist roots. It aims to create images that affect the physical structure of the brain and eyes and lead the viewer to surprised and deceive. Op Art wanted to create an artistic form that settles on a multidimensional image by highlighting the contrast between psychic influence and physical realities. At this point, it was influenced by the understanding of Post-Impressionist art (Beksac 2000: 138).For instance, to obtain an orange colour, instead of mixing red and yellow colours in the palette, you can point side by side on the picture and detect orange in the eye. So the vibration of the light is tried to focus. Therefore, the colour mixture is provided using the illusion of the eye. Namely Op art is affected by point custom of colour understanding. Op artists who are heavily interested in Seurat and Signac have begun to discover what kind of mobility contrasting and harmonious colours create in the eye, and the contrasts of finely calculated colours and shapes have moved the picture surface. Victor Vasarely noted the contrast of black and white by leading Op artists such as Bridget Riley, as well as the contrasting and incongruous compositions of harmonious and incongruous colours, contrasting colours, colour waists, lines, colour illusions that grow and shrink. The effect, perspective illusion or color tension is due to the effect, perspective illusion or colour tension in Op

Art products obtained by systematic use of formats and colours. It can also cause abstractions such as color, volume, space, area, structure, which have different effects on human devaluation, peace, anxiety (Special, 2007:398) Josef Albers, who promotes Bauhaus Functionality, describes the characters and relationships of colours in his works as follows. Colour is not "an element that accompanies the form", but the main purpose of artistic effort. Unlike Op Art, which is based on the theory called "Interaction of Colours", he argued that color should not be limited to reciprocal interaction but should be able to maintain its own value during the interaction of color (Krausse, 2005:111).Bauhaus, Dada, Constructivism, Orfizm, Futurism and Neo-Impressionism, as well as currents associated with the 20th century artists were also interested in optical perception and illusions (Dempsey, 2010: 230). Op-Art is closely related to currents such as Fluxus, Superrealism and GRAV (Groupe de Recherche d'Art Visuel: Visual Arts Research Group), and especially gestalt theories in psychology and new discoveries in perception psychology and physiology. The inherent illusion or metamorphosis of Op-Art is also an important feature of Kinetic-Art (Gage, 2000:76).

1. Optic Illusions

Mathematically edited lines and dots coloral elements in graphic studies, movement-specific light, electromagnetic effects, even some kinds of optical join conditioning which disrupts the development of dynamic events. These events play an active role in the emergence of

optical illusion works because of stimulation of the retina layer in the eye, when the aim is to awaken the visual reaction in the audience for physiological sense.

Op Art studies attracted the attention of art theorists and also scientists, especially specializing in mathematics scientists, and physiology and psychology science. Optical Art is seen as a mathematically themed form of abstract art with mathematical calculations and geometric and the intersecting points of aesthetics. Geometry and mathematics are using eye illusion that can gain optical motion to the two-dimensional picture by mathematically growing and shrinking the forms that make up the texture structure, changing, collecting, dispersing or rotating at certain points. Optical Art has four-dimensional by adding depth and movement to the painting (Zanker, 2004, p.75). With multi-focus compositions that force the eye to new perceptions which is never seen, op art's visual turmoil reflects the impression of movement and depth, and also it is valid for art and aesthetic impulse in motion (Ruhrberg, 2005:347). Simple mathematical arrangement of successive curves can be a starting point for creating complex artistic patterns. Op Art is a repeated repetition of a form, colour or composition throughout the length of the canvas for thinking mathematically. Our eye is not only observing these repetitions, but also helps Op Art to create itself and bring out new works (Ozel, 2007:399). Josef Albers, Yaacov Agam and Victor Vasarely are considered as pioneers of Op Art. They work on colour and tone, color and movement relationship. In 1965, an exhibition called "Responsive Eye" was held at the New York Museum

of Modern Art (MOMA) on the illusions of perception. Op Sanat was used for the first time as a term for the works in this exhibition. Bridget Riley, Victor Vasarely and Josef Albers are on display. They are pioneer of this movement. The exhibition fascinated its audience, but also heavily criticised by some critics for using visual tricks, although it has quickly become popular in many areas such as fashion and advertising, with its suitability for industrial production.



Figure 1. Jesùs Rafael Soto (1959)

Jesus Rafael Soto is seen as a defining figure of both Op Art movement and kinetic sculpture. He used the dynamics between the background and the foreground, where he adapts industrial and synthetic materials such as nylon and steel and optical effects through colour manipulation

to produce commercial sculpture reliefs. In this Penetrables series study, he hung thousands of strands or PVC and steel construction from the ceiling. His work is included the audience in the work of art and allowed them to be in-depth. Understanding the reactions of viewers, it allowed an audience to experience a wide range of different perspectives over time when they moved in the field. Thus, the viewer became an integral part of the work by tapping or moving the picture, or simply passing through it. Some works were very clear, while others were flat. It has like a repetition. In other Penetrables, he used painted elements that can be noticed from a far. From afar, these works reflect an intense mass illusion when the viewer came into contact, it was a completely different aesthetic experience than the inner self. Victor Vasarely is one of the most important representatives of contemporary art and founder of the Op Art movement. His works are focused on painting movement in static forms by expanding the principles of kinetic art.

The theoretical basis of the Op Art movement was revealed with the most effective way in Vasarely's Manifesto Jaune. In 1955, he explained that "Tomorrow's art will either be everyone's common treasure or it will never be." He invented an encrypted visual art that created a plastic alphabet and would use it as the cornerstone of future generations.

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Figure 2. Vasarely, Carden**,** Silkscreen 54/240, 1980

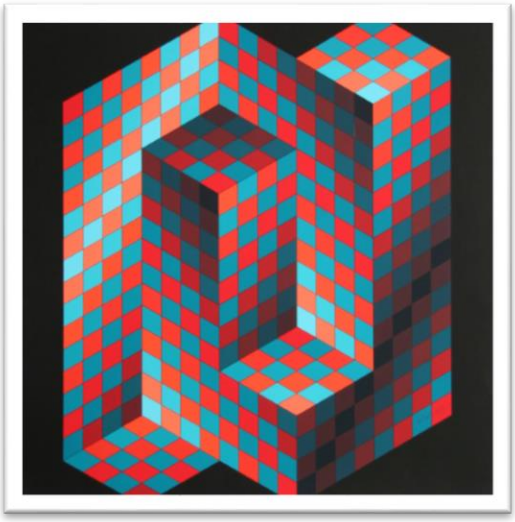


Figure 3. Vasarely *Oslop, acrylic on canvas1988*

Op Art products based on geometry evoke mental situations such as pleasure, like, happiness on the viewer with colour, line and formal arrangements whereas, with the perception and illusion of the eye, it pushes the brain to a different viewing tendency besides getting used to it, which are disturbing emotions and awaken emotions. These feelings often trigger the effects of dizziness and dizziness on humans. His paintings include artists whose paintings are optically uncomfortable and produce uncertainties, particularly the work of Bridget Riley. Except for him American Julian Stanczak is also thought (Yılmaz 2019:38).

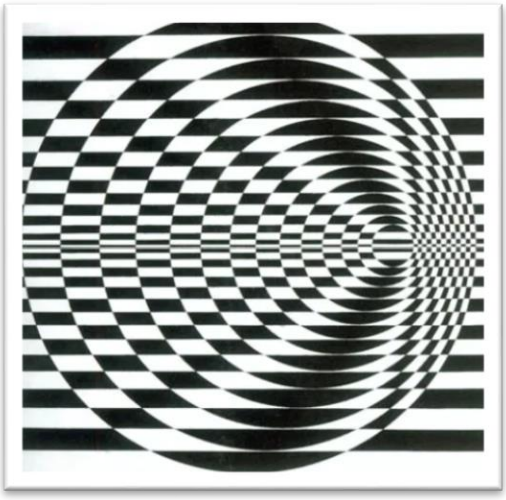


Figure 4. Bridget Riley

2. Op art of Digitalism

Digital art is a process of reshapes, repurposes, and associates with new content instead of producing something. The artist aims to

resolve the default problem in the most economical way possible as a result of a series of selected transactions. Therefore the solution of a result is reached instead of producing a finished object as a result of the service (Yıldırım, 2019:321).

Optical effects produced in a computer with digital technologies: Light, colour and formal mobility illusions and the use of 3D technology have enabled faster resolution of the result by providing many conveniences such as reproduction of prints. For op works, it can be said that the experience of perspective, colour and form is adapted into an abstract-geometric image language. Op artists take advantage of the imperfections of the eye compared to the depiction artists when designing their work, and today they use the world of digital technology based very widely (Yilmaz 2006: 197-198).When we look at op art works, we see that there are graphic designs which generally benefit from eye sensing defects. In the 1960s, John Sharp developed a mathematical art analytical think system with his computer in 1979, based on optical and visual psychology on graphic surfaces in which he worked on op and geometric art. After the 1990s, Op Art stood out from the inadequacy claimed by the practitioners of the '80s, in fact, as an unfinished project. For this purpose, the "Op at Op" exhibition organized by Tom Moody in New York in May 1998 by Up&Co consists of Op Art works by David Clarkson, Mark Dagley, Tom Moody, Ray Rapp and Alicia Wirt with different approaches and techniques (Moody, 1998:1). In this exhibition, op paintings, sculptures, video shows, light and colour arrangements, computer animations, etc. are drawn to the attention of the works prepared by

technological tools. Among these artists, Ray Rapp and Tom Moody are among the artists who use the computer as a tool, resisting the value system for aerodynamic excellence. Ray Rapp, an artist who has produced video placement, sculpture and digital printing, tried to open new horizons to Op Art with its digitally animated version, particularly by costing himself the "Galloping Horse/Gallive Horse" photo of Muybridge, which he downloaded from the internet.



Figure 5. From Rapp, Strobing Muybridge video, muyStrRB / Gallop

Rapp creates a similar relationship to Hollywood sci-fi film scenes by shrinking and enlarged video frames, stopping the audience with flickering mini-video shows, and then running it away as if nothing happened. Subjects in Ray Rapp's work are removed from a rather docile familiarity context and present images as if they were in quarantine for intro section and further detection, as if they were beamed into cramped areas of video portals. They seem limited and isolated as hieroglyphics that are not exploited for their flexibility and

disputes but seized and digitized for graphic qualities, thus creating a conscious tension cry in their works.

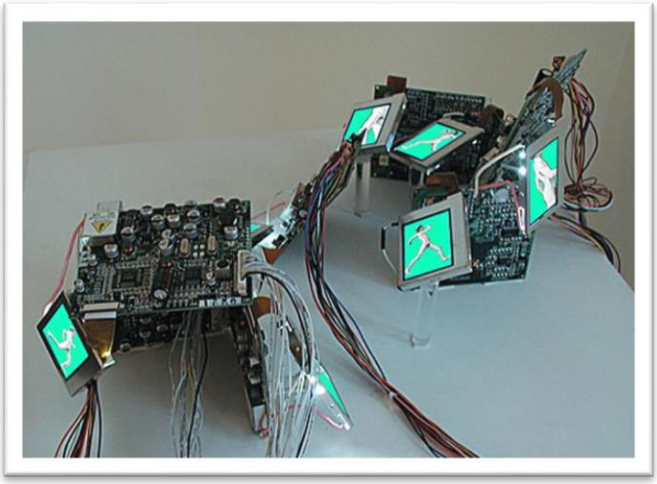


Figure 6. Rapp, rapidly human walking, 2005

Ray Rapp leverages video frames in his computer-based work and prints digital prints of computer-manipulated images in Adobe Photoshop. Some images were downloaded online before being modified, as in the Muybridge series, or scanned from books, magazines, etc. His works are High Voltage, Truzkz, Feedback, Serial TVs etc. Moody produces works closer to the traditional style, paints cubes. He creates on the computer with mouse, prints computers, cut apart the pieces, and reassembles with linen strips in a giant mosaic (Ozel, 2007: 403).



Figure 7. Yoshiyuki Abe 1991 Fuji photographic C print 22x28inc.

In the work of Yoshiyuki Abe, who is a digital art artist and photo engineer, "Geometric/Geometric"and "Stochastica/ Stokastic", op art effects are seen. By combining geometric shapes, the surfaces of hyperbolic paraloid, the artist's formal structures, which form algorithmic visual surfaces, also disrupt images and give depth to optic surfaces

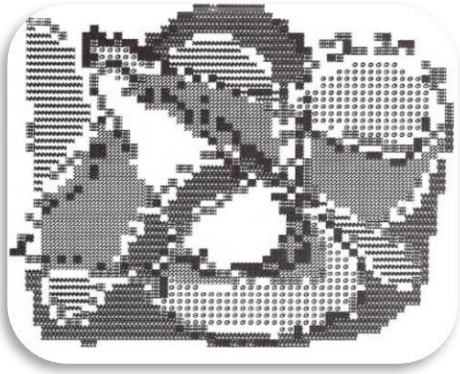


Figure 8. Ruth Leavitt

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Some of Ruth Leavitt's works, which produce digital art, can be evaluated in op art. From the sources of digital arts to the fractal image or sounds set up through the most complex mathematical functions from a simple Paint-Shop or Photoshop painting, the existence of a wide range of possibilities has also deeply affected op art. Akiyoshi Kitaoka, a Professor of Psychology at Ritsuimeikan University in Japan, began his work as a scientist who studied the science of visual illusion and began to produce visual designs to serve his scientific work since the late 1990s. His work, which relies on the illusions of movement that nudges the viewer's head, nauseating and disturbing, has been found interesting and beautiful in some sections, cause to recognition by preventing his scientific purpose. Kitaoka, which produces its work using graphic design software such as Corel-DRAW, Adobe Illustrator, did not produce visual illusions for artistic purposes, but initially drew attention as a reflection of the scientists who helped develop Op Art in the 2000s (Ozel, 2007:404).

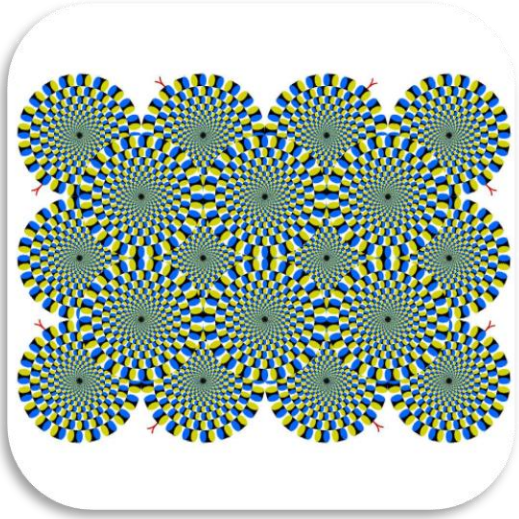


Figure 9. Kitaoka, the Rotating Snake, 2003

Kitaoka's "The Rotating Snake" has been watched by many and spread online. In this image, it is seen as if they were going inside or side-by-side circles, when the viewer focuses on the image, the illusion of movement begins (Yilmaz, 2019:48).

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Figure 10. 3D Joe and Max, Lavobo holes

Max Lowry (1976-2010) and Joe Hill 3D are among the most important figures of art. Artists who specialize in creating giant optical illusions rise from the ground to unexpected walls, walkways, ceilings, mythical creatures that suddenly emerge from the pits. Artists have undertaken very creative work. After Max Lowry's death, Joe Hill continued to pursue a common legacy at '3D Joe and Max'. The two artists conducted a 1,160 m² study with Reebok CrossFit to break the Guinness World Record in 2011. This work has been made in history as the largest and longest anamorphic work in the world (Yilmaz, 2019:48).



Figure 11. 3D Joe ve Max, Reebok CrossFit

With anamorphic 3D designs, artists who are presenting the extraordinary images that push the retina of the eye on the streets and amaze people have made a new breakthrough. They opened the doors of new virtual worlds, in versed in the mess of the streets or the ordinary order. They take advantage of eye defects and practice people with a dimensional sense of image. Cyberspace, computer engineering use Artistic productions with digital technology have created a dynamism and fictional structure in Op Art and has brought a remarkable ingenious dimension.

Although op-Art movement representatives were amazed by their work at first, they managed to reach a large fan base in the later period. Since 1950, the language of visual use in the works developed by them has increasingly been featured in the lives of ordinary people in different countries, squares, streets, buildings have been decorated with their

works (https://turkinfo.hu/kultur/unlu-macarlar-ve-hungarikumlar/unlu-macarlar-victor-%20vasarely). The city remains a meeting place for many people despite all this mechanical, synthetic lifestyle, mediocrity. Especially population growth in cities increases the negative effects of the urban environment, along with the boredom and alienation seen throughout society, creating psychological situations such as alienation. The sense of freedom and individuality created by the urban space in the individual also leads to a difficult effort, such as the individual's self-creation (Tulum, 2012:48).

Kurt Wenner, a world-renowned artist and painter, is considered a pioneer of 3D street art for his three-dimensional work with pastel paints, which began in the 1980s. Wenner, who left his job at NASA in 1982, began working on classical works and created his own style in anamorphic or delusional street painting. Giving his paintings the air of rising or coming down, the artist who produced his works using geometry and visual illusion techniques of European master painters combined classical art techniques with street art (Yilmaz, 2019:49).



Figure 12. Disaster, Kurt Wenner (Londra, England)

3D computer art or computer graphics are almost captivated by the new visual illusions of the virtual realm, with motionless images and digitalized optical arts produced with the help of advanced artistic software modelled with the help of various geometric shapes.

Conclusion

Today's industry has given a new model to the op art concept of the digital world as well as in many areas with its anti-value-added competition. Art is the focus of technology today and in the future. In the new world order, nothing will ever be the same. In the shadow of

the technological possibilities of the electronic cyber age, the uninhibited dimensions of the optic textures of digital images woven between the reality and surrealism of the virtual realm of art continue to be reshaped and infinitely.

In the op art, it aims for three dimensions by creating eye illusions with colors and lines. Op art, which is based on geometry and physics, has become an almost integral part of science with this feature and has become a completely scientifically indexed structure in the process.

Initially it is abstract and black and white, and black and white colours are the best choices that can be used to create a perception of incompatibility in the eye. Because the human eye is not designed to adapt to the opposite light tones at the same time, and it will take time for black and white to adapt to this situation in the face of the presentation of a geometric order. This is to cause a different reaction in the eyes that examine op-art works. The main purpose of the artists of the movement is these different reactions and disturbances. Op-art works produced results that went beyond the usual in human perception. They provided movement with eye illusions (Yıldırım, 2020: 190). Op art is a motion image based on calculations and measurements.

Scientific colour circles, colour sequences based on suitcases, as if they were researched and found for op art current. The most common feature of Op art is that geometry and moving formats are combined within a link. In this case, op art using the resources of digital arts is perceived

and reinterpreted in a wide range, from a simple paint-shop or Photoshop painting to a fractal image or sounds based on highly complex mathematical functions The dimensions of the possibilities offered by digital have become inevitable for op art and fascinated viewers with new visual illusions of the virtual realm. Digital art applications create a virtual sense of "now and here" as it completely destroys the distance between art work and the viewer. Digital art, immersion, incarnation (embodiment) and interaction (interactivity) features affect all the participants' senses and cognitives while the viewer moves to a different world, a virtual reality. The unlimited reproduction of works of art in digital art has provided mathematical convenience in op art. Op art rebuilt the existing work with different perspectives.

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