An Experimental Investigation of the Movement Known as Op Art

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AN EXPERIMENTAL INVESTIGATION OF THE MOVEMENT
KNOWN AS OP ART

A Thesis
Presented to
the Graduate Faculty
Central Washington State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Art Education

by
Florence Sterling Taylor
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APPROVED FOR THE GRADUATE FACULTY

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CHAPTER I

INTRODUCTION

Art, whether painting, sculpture, literature or music, is ever-changing. Styles, techniques, media, methods—all fluctuate constantly, and the fact that these changes occur more rapidly today is merely part and parcel of our accelerated society. Art in the past set a slower pace. A school of painting would emerge, develop and, only when it had become firmly established, would it eventually pass out of fashion to make way for a newer school. Due to our technological age, coupled with our emphasis on advertising and selling, schools now, instead of succeeding one another, burgeon upon the scene almost simultaneously. It is almost impossible to distinguish a trend from a full-fledged movement. Some time in the future a perspective will no doubt be gained from looking back at our present art situation to find, perhaps, one school of many facets.

I. THE PROBLEM

Statement of the problem. It was the purpose of this study (1) to explore, analytically and aesthetically, the recent movement in the art world known as Op art; (2) to investigate the principles of perception which are utilized in
such work; and (3) to produce in painting and construction media examples of these optical gymnastics.

**Limitations of the study.** Studies of the psychology and the physics of color, perception, and retinal reactions are being carried on constantly and, although much has been achieved in this area, there is still much to be learned. It is, therefore, impossible for a layman to make a thoroughly scientific approach to these phenomena. An attempt will be made to illustrate the more obvious visual exercises capitalized upon by the Op-artists. After-image, movement, the interaction of colors, and other effects will be produced in the paintings which accompany this thesis.

**II. DEFINITIONS OF TERMS USED**

*Op Art.* "Op" is an abbreviation of the word "optical". Op, then, is art which elicits an immediate visual response in the observer. Op art is not concerned with any expressive content, and the greater the physiological reaction in the viewer, the more "Op" is the art.

*Kinetic Art.* The art of mechanical movement.

*Pop Art.* "Pop" is an abbreviation of the word "popular". Pop art parodies mass production techniques. Comic books, movie frame sequences, and trademarks are often used either singly or in repeats.
Topographical Art. This term derives from the use of the word "topography" in regard to maps which show the physical features of an area. In art it refers to paintings in which the canvas is shaped either irregularly around the perimeter, or within the area as a relief, or both.
CHAPTER II

SURVEY OF RELATED INFORMATION

Related information in the field of Op art must include, of necessity, observation. There is much to be seen in this area other than actual exhibits. The popularity of this manifestation has spread into our homes, our literature, our clothes. It is a perfect example of the old saying about "the tail wagging the dog." Other than seeing Op on every side, one must resort to magazines, newspapers, and search for influences which may have been the forerunners of this art movement.

Review of the literature. The literature relating to the field of Op art is limited. The movement is so relatively new that there is little written on the subject that could be considered of lasting importance. Research must be made largely through the medium of periodicals. Although much has been written on the subjects of color, visual perception, and optical illusions, psychological and associative reactions have been excluded as much as possible from Op works. The greater emphasis is on a physiological effect. Therefore, much of the literature available is not applicable to this study.

In considering the subject of color one is faced with
information on the chemistry of color, the physics of color, and the psychology of color. Many studies have been made in these fields but there is much that remains in the realm of conjecture. Each of these sciences has a bearing on the optical trend in art because it is an outgrowth of our science-oriented society, and without some knowledge of the phenomena that may occur in "seeing", optical art would not have happened.

All painting is, of course, perceptual—it must be seen. But visual perception and its relationship to art has been chosen as the subject of many authors. One noteworthy volume is Rudolf Arnheim's Art and Visual Perception. Mr. Arnheim says:

Every act of seeing is a visual judgment. Judgments are sometimes thought to be a monopoly of the intellect. But visual judgments are not contributions of the intellect, added after the seeing is done. They are immediate and indispensable ingredients of the act of seeing itself (1:2).

In thinking of visual judgment, as applicable to optical painting, the goal of the artist seems to be to confuse the judgment of the viewer.

The following quotation from Art and Visual Perception illustrates the interest that those concerned with the visual arts have in this area:

According to gestalt psychologists, the cerebral area contains a field of electrochemical forces. These interact freely, unconstrained by the kind of
compartmental division that is found among the retinal receptors. Stimulation at one point of the field is likely to spread to adjoining areas. As an example of a phenomenon that seems to presuppose such interaction, Wertheimer's experiments on illusory movement may be cited. If two light spots appear successively in a dark room for a split second, the observer often does not report two separate and independent experiences. Instead of seeing one light and then, at some distance, another, the observer sees only one light, which moves from one position to another. This illusory movement is so compelling that it cannot be distinguished from the actual displacement of one light dot. Wertheimer concluded that this effect was the result of "a kind of physiological short-circuit" in the brain center of vision, by which energy shifted from the place of the first stimulation to that of the second. In other words, he suggested that local brain stimulations acted upon each other dynamically (1:6).

It is reasonable to suppose that some of the visual effects achieved by the optical artists is possible because of this "short-circuiting". However, there seems to be disagreement among the scientists as to whether this occurs in the retina or in the brain.

Specific literature on the subject of Op art is limited to periodicals. Many articles have been written on this subject and related subjects such as Pop art. Much of this published material is critical:

Actually Op is not involved with science, but with the pseudo-scientific crafts of display—shop-window designs, textile patterns, eye-catching wrapping-papers—which in turn have salvaged a few techniques from the commercial labs . . .

This is gadgetry, bitten by art, dreaming about science (7:50).

Other articles strive to report what is going on in the art
Current art, equipped with knowledge gleaned from the psychological, photographic and color-chemistry laboratories, creates its effects of movement by operating directly upon the nervous system itself. Painting and sculpture now range from images that exploit the mass-media residue in our consciousness to visual contrivances that seize our eyes and shake them like dice in a box or pull them beneath the picture surface and drown them in a sea of afterimages (16:99).

The trend toward hard-edge abstraction is emphasized here:

From deKooning, Pollock, Kline, Motherwell came the large black-and-white compositions that are a significant contribution of Abstract Expressionism. To compare those sunken and ragged-edged blacks with the hard-surfaced dazzle of the black-and-whites of current Optical art is to grasp in a glance the contrast between the troubled sensibility of the postwar decade and the technological self-assurance of art today (16:102).

Perhaps the best source of information on optical paintings and constructions is the catalogue which accompanied the Op exhibit "The Responsive Eye", which is also the title of the catalogue. This work was done by William C. Seitz, Curator of Painting and Sculpture Exhibitions, The Museum of Modern Art, New York City.

Mr. Seitz seems to be one of the foremost authorities on Op art. In discussing perceptual abstraction Mr. Seitz comments:

Stripped of conceptual association, habits, and references to previous experience, perceptual responses would appear to follow innate laws, limited though our understanding of them may be. The eye responds most directly when nonessentials such as
freely modulated shape and tone, brush gestures and impasto are absent. These means muffle and distort the purely perceptual effect of lines, areas, and colors.

All forms of representation, even ideographs, signs, and symbols, also alter or deflect whatever is innate in vision. The eye needs only the slightest clue to link an abstract shape to some past association with actual objects and space (18:7).

Mr. Seitz has this to say concerning the optical effects elicited:

Carefully controlled static images have the power to elicit subjective responses that range from a quiet demand made on the eyes to distinguish almost invisible color and shape differences to arresting combinations that cause vision to react with spasmodic afterimages. The countless possibilities of these mysterious phenomena are almost as difficult to enumerate as their psychological and physiological causes are to determine (18:9).

A further emphasis on the physiological reaction is evident in the following:

Perceptual abstraction--its existence as an object de-emphasized or nullified by uniform surface treatment, reflective or transparent materials, and a battery of optical devices--exists primarily for its impact on perception rather than for conceptual examination (18:9).

A great deal has been said through the mass media of our time on the new trends in the art world. Op has received its share of this attention. Views on the subject swing from pro to statement of fact to con, but a retrospective look at the situation will, no doubt, be necessary if a true picture is to be drawn.
Review of selected Op artists. Optical art has proved to be a widespread movement. Development of the various forms of this type have occurred nearly simultaneously in various parts of the world. "The Responsive Eye" exhibit alone showed more than one hundred twenty paintings and constructions by ninety-nine artists from fifteen countries.

Josef Albers and Victor de Vasareley have been called the fathers of today's Op. It has been said, however, that to call Albers the father of Op is an unjust label. His "delicately balanced paintings are not based on obvious optical rules nor are they trying to shock by illusive tricks. He builds a world of luminous purity, a mysterious world that exists only through the magic of color relationships" (10:29).

Optical painting--that is painting which depends on visual phenomena--has been experimented with for some time. Josef Albers, American, born in 1888, has been making color studies for twenty years. His color squares are well known, and he need depend on no sudden optical trend to win recognition.

Victor de Vasareley, French, born in 1908, is another artist who has been working with emphasis on visual effects and is considered to be an initiator of this recent movement.
Vasareley had six works included in "The Responsive Eye" exhibit, more than any other artist with the exception of Albers who exhibited eight works. Vasareley's collage "Orion MC" attracted a great deal of attention at this show.

Larry Poons, American, born 1937, is noted for the ellipses he uses on a brilliant background. He uses complements which cause the ellipses to seem totally disengaged from the background area. His painting in "The Responsive Eye" exhibit was done in red with blue and green spots. Just recently a mammoth exhibit of contemporary paintings has been held simultaneously in ten New York galleries exhibiting three hundred seventy-one works. *Time* magazine says of Poons's painting in this exhibition, "Larry Poons's placement of blue spots on a field of gold produces a Mexican jumping bean effect of after-image dots" (21:70).

Another Op color painter is Richard Anuszkiewicz. Anuszkiewicz does not rely on a repeated pattern as do Poons and Davis but produces varied works composed of dots or lines authoritatively done. Harold Ronsenberg has this to say about Anuszkiewicz: "Richard Anuszkiewicz's hard, cool Op art derives from the softer and more personal work of his teacher, Josef Albers, whose experiments in color and perception developed during his years at the Bauhaus and Yale" (16:104).
Bridget Riley, British, born 1931, is one of the most interesting of the black and white Op artists. Her works may make the observer sway, become dizzy, see colors where there are none, and possibly become queasy. *Art International* published a detailed article on the involved planning which Miss Riley must endure in order to prepare her work for the person who will execute it. This comment is made on the completed work:

It is idiomatic to speak of our eyes "devouring" something. Here the reverse happens, our eyes are attacked and "devoured" by the paintings. We are faced with a subtle inexorable variation of linear units. So smooth is the transition that it does not allow our eyes to organize the units into stable larger entities that could serve as focusing points (2:21).

Gene Davis, American, born 1920, is a color painter known for his stripe painting. Davis says of his painting, "There is no simpler way to divide up a canvas than with straight lines at equal intervals. This enables the viewer, more than in most paintings, to forget the structure and see the color for itself... The very monotony of the stripes operates in favor of the color" (12:47). He uses acrylic stained into unsized canvas. The creativity in this type of painting is in the arrangement of the color which is random and intuitive.

Moire images are the forte of Gerald Oster, American, born 1918, who was a professor of chemistry at Polytechnic
Institute of Brooklyn. This is a case of a scientist branching out into the field of art and achieving one-man shows in New York. The trick in the moire construction is to leave an inch or more gap between the overlying patterns which causes it to shift and shimmer as the observer moves.

There are many artists operating within the largely unidentified margins of Op. The fact that all art is perceptual and the fact that optical painting encompasses both color exercises and geometrics make the field very wide indeed. "The Responsive Eye" exhibit was the first large gathering-together of so-called optical works. The resulting tour and accompanying ballyhoo focused a great deal of attention on this new manifestation in the art world. Upon retrospection, however, one is amazed at the conglomeration of materials, techniques, approaches, and work exhibited in one all-encompassing extravaganza.
CHAPTER III

DEVELOPMENT OF THE STUDY

The mechanics of Op art are calmly and carefully calculated and contrived. It is necessary to examine some of the devices used in order to understand the effect achieved in optical painting. The deliberate use of intense and "clashing" color to jangle the nerves of the viewer, the use of perspective to create the illusion of depth, and the use of motion, both implied and contrived, are the stock in trade of the Op artists. A definite, physical reaction is sought in the viewer, and a great deal of planning must be done in order to attain the maximum retinal sensation.

It has been the purpose of this study to produce some examples of optical painting which illustrate some of the effects used in Op. The approach to this type of painting is mechanical and notable for its lack of emotion--both in regard to its creation and in its subsequent viewing.

I. SELECTED CONCEPTS OF VISUAL PERCEPTION

Everyone is familiar with the term "optical illusion". This immediately brings to mind the geometrical drawings which are often seen in books or puzzles that create a
now-you-see-it-now-you-don't effect. However, the optical illusion is carried a great deal further in optical painting and must be considered to include other forms of perceptual phenomena.

**Perspective.** The problem of perspective is inherent to most painting. To some artists it might be significant just to the extent that one plane advances more than another but to the Op artist who deals with the more geometric type of work it may be all important. The fact that a great deal of depth may be depicted on a two-dimensional surface may be capitalized upon as it is in many Op works. One of the more notable of this type is Jeffrey Steele's "Baroque Experiment" which was exhibited in "The Responsive Eye" exhibit.

There are many ways of achieving an illusion of depth but perhaps the most common one is the decrease in size of figures in the visual field which makes the figures seem to be more distant. In fact the most common interpretation of perspective is "distance". We see this phenomenon as distance. If we are viewing a real scene we are correct in seeing the distance. For example: if one is viewing a fence obliquely the fence posts will seem to be smaller in ratio to the distance from the viewer. One is perceiving distance. However, in a reproduction of this scene, one is subject to an illusion because the further fencepost will be smaller on the repro-
duction but yet it is no further from the eye than the near fencepost. The Op artist makes good use of this illusionary device by seeming to lead the viewer deep into the painting.

After-image. After-image in regard to color will be considered under the color section of this chapter. After-image is important to the end result sought in many Op works, black and white or color. Tests have proved that when the eye is fixed on a certain point it will wander off center either slowly or by swift jerky movements. The image on the retina will fade if the eye remains fixed on one spot. The picture has to be shifted to keep the image alive. The eye of a person looking at a picture will jump from place to place rather than move smoothly across the area. At each jump a small part of the picture is focused on the back of the eyeball where light receptors are located for detailed seeing. As the eye jumps along a straight line the successive images fall on the same row of receptors but if it jumps across a step in the line, different sets of receptors are stimulated. An after-image remains impressed on the retina for a few seconds, usually. The nature of the movements of the eye may leave a series of distinct pictures as after-images. "Our sense organs and nervous system tend to organize or modify our perceptions into simple patterns or objects . . .

Even when we try very hard, it is difficult to overcome such
organizing tendencies in perception" (4:12-13).

Motion. Motion must be considered in two aspects when dealing with Op art. Implied motion such as is shown in Bridget Riley's "Current" is achieved with line, contrast, and after-image. This type of painting (or, possibly, collage) is most effective and may leave the viewer queasy. Actual motion must be included when one considers the constructions exhibited with "The Responsive Eye" exhibit. Many constructions depend on actually moving parts for a visual effect. Some works may include objects to be manipulated by the spectator, others may move with such external stimulus as air currents. Some works are three-dimensional so an illusion of movement is given when the gallery-goer walks by. A study of kinetic art would include a more specific survey of moveable and moving art. It is mentioned here because some of this art, such as those included in recent Op art exhibits, are as much concerned with visual effect as with the fact that they do actually move.

Other visual effects. Many and varied are the tricks played by the Op artists. The fact that overlapping planes cause the obscured plane to seem to be behind the obscuring plane (a type of perspective) was first capitalized upon by the Cubists and may now be used in Op. The fact that everyone expects light to come from above may be taken into con-
sideration to create an illusion. Concentric circles may actually seem to spiral if appropriate diagonals are used in the background.

A familiar technique is the ambiguous figure which causes perception to oscillate between two possibilities. A figure close to another figure which nearly encloses it is usually seen as larger than when the two shapes are separated. Closely spaced lines at an angle to a straight line distort that line. The eye tends to clot the angles when two lines cross sharply. This is the phenomenon relied upon in creating a moire, where two pieces (or more) of glass or transparent plastic are suspended in a sandwich-like form causing a third pattern to appear in between if the material has been lined properly.

It would seem that there is no end to the perceptual problems and retinal reactions that the Op artist may turn to their own advantage in creating their material. Although they have been accused of plagiarizing one another, it is true that there are many similarities between artists of any given school or painting.

II. EFFECTS OF COLOR IN THIS STUDY

Although the color Op and black and white Op do have a common ground in that the color proponents also use simple
geometric shapes, hard-edge to a great extent, and an emphasis on visual impact, there is a world of difference between these two manifestations of Up art. The action of the intense colors on one another takes one into a whole new area. The same principles must also be considered but each in a different way.

**Perspective.** To the Up artist perspective is not as important to the color paintings as it is to the geometric advocates. However, perspective should be mentioned with regard to the use of color because some colors seem to advance and others to recede. This is, of course, illusionary as is depth perspective on a two-dimensional surface. The Up artist may emphasize the above mentioned action of the colors by surrounding an advancing color with a receding color area which tends to make the first color advance even more aggressively.

**After-image.** The most familiar of the color after-image is the complementary after-image which occurs when one views a color and upon looking away is conscious of seeing the color which is complementary to the original color. Most people in everyday life do not seem to notice after-images although they occur constantly. This pushes into the realm of psychology and is a process of adaptation wherein we see what we expect to see. The study of color is involved and much is yet to be discovered on this interesting subject.
The Committee on Colorimetry of the Optical Society of America has this to say concerning after-image:

Many after-images consist of noticed consequences of visual adaptation; the external stimulus induces a state of local adaptation of the retina which temporarily produces contrasting responses to contrast-free stimuli. Other after-images depend on localized excitation in the retina, or elsewhere in the visual system, which persists and produces a sensation pattern that resembles the original stimulus pattern.

In general, the colors and the spatial and temporal patterns of both the initiating stimulus and the subsequent viewing situation are factors determining the hues and saturations as well as the spatial and temporal patterns of the observed after-image. Thus after-images are complex resultants which vary in hue, saturation, brightness, size, shape, pattern, texture, focus, latency, duration, and developmental sequence. They are characteristically transient, changing, filmy, or veil-like; drift and move with the eyes; and in general are much less objective and compelling than the original perception (13:115-116).

The painter of a color up work may calculate that the observer will "see" a different color within the one he is actually perceiving due to after-image.

**Color enhancement.** Color enhancement relates to that which has already been written concerning color perspective, but it goes further than viewing color from the basis of depth perception. Color enhancement includes the interaction of two or more colors, one upon another. For instance, complementary colors seem more intense when placed side by side than when separated. When a chromatic and an achromatic color
are juxtaposed, the achromatic color seems to take on a complementary hue. Enhancement is then seen to be a matter of contrast. As Up strives to enhance everything to the ultimate, one finds a great deal of contrast of color, hence color enhancement, used by the artists.

Motion. Motion in color results from the action of the colors on one another and is related to after-image and color enhancement. The rivalry of two strong fields of color causes confusion in the eye and sets up a vibration or motion. A border may be made to jump between two colors, or spots may appear where actually there are none. A further explanation of these phenomena follows:

The eye sees color with three different light-sensitive receptors having peak sensitivities, respectively, for deep blue-violet, green, and yellow. Each kind of receptor contains molecules of a different light-sensitive pigment. Light breaks the molecules in two, starting an electrochemical impulse on the way to the brain. One of the two pieces is a substance that inhibits the breakdown of their pigment molecules. Wherever the substance remains, the retina will be less sensitive to light. Thus light, projected on the retina leaves behind a duplicate pattern of inhibiting chemical. When the retina is then illuminated uniformly by looking at a white surface, all the receptors are stimulated except where the chemical is.

White light contains all the visible colors, but inhibited receptors will respond only to those not present in the previous image. Where there was red, you will see green; where there was blue, you will see yellow (4:12-13).

Studies of color are hampered by so many variables that
it is difficult to get a complete picture of any aspect. Even the most cursory examination of books on the psychology of color or the science of color shows contradictions and varying theories. But all seem agreed that what makes a study of color so difficult is the individual. Everyone has a reaction to any given color and that reaction may be entirely different than the reaction of the next person to that color. Red may symbolize courage, blood, strength, war, or as many different associations as the number of people interviewed on the subject. Color may also be used in a disturbing way. Ittelson (8:155) used the example of a red ace of spades to illustrate this point. Op artists make use of as many of these human vagaries of the eye and brain as they have been able to discover and incorporate into optical art.

III. MATERIALS AND METHODS USED

Plastics, masking tape, razor blades, spray guns and other "un-arty" paraphernalia are the tools of the Op artist. In fact, the work itself tends more to be that of the artisan than of the artist. As a result, the inevitable happens and a growing number of artists do not actually execute their own work. It is planned, or programmed, carefully and a specialist is commissioned to do the actual work, perhaps a sign painter, or perhaps a machinist in the construction of a metal project.
Some artists, wishing to reproduce some commercial item, such as is done in Pop, may paint their canvases with a photo-gelatine substance and actually project a faint image of the subject onto the canvas in order to fill it in in a "paint-by-number" technique.

This mundane approach is, no doubt, shocking to the purist who identifies art with traditional art values. However, if one is to have hard-edge abstraction, that edge must be sharp and clear. If one is to have emphasis on perspective, that perspective must be exact. If one is to have such a concentration of color that it very nearly transcends form, that color must be free of the texture of brush stroke and be flat and unshaded.

In the execution of the paintings which accompany this paper, an attempt has been made to keep them clean, clinical, and cool as are those done by the professionals, whether artists or artisans.
CHAPTER IV

ANALYSIS AND INTERPRETATION

In conjunction with this paper, the paintings and constructions have been completed which attempt to illustrate the various optical effects achieved by the Up artists. These effects which are dealt with in this paper and the accompanying creative work include: illusionary movement, illusionary depth, inconstant perspective, after-image, moire pattern, color brilliance, color enhancement, and color inter-action. An interpretation or explanation of some of the conclusions garnered from the actual performance of this work is also included.

I. ANALYSIS OF WORK DONE

Each separate painting or construction will be considered as to the effect sought, and comments will be made as to the success achieved from this standpoint.

Achromatic Maze (25" x 25") is a black, white, and gray geometric painting, done with acrylic paints on composition board. This painting quite successfully illustrates illusionary movement. Although a perspective view was not necessarily intended, due to the progressive reduction in the size of the triangles, the two "wings" seem to recede
and to become enmeshed at the seam of convergence. It is impossible to view this painting for any length of time and not have the pattern "jump." The eye, fixed on a point, must wander slightly off center to prevent the image from fading away. This wandering and the resultant attempt to refocus the eye causes this activity.

**FIGURE 1**

**ACHROMATIC MAZE**

White Grid (24" x 25"), oil on canvas, is a good example of the phenomenon of after-image. Arnheim explains the basic law of visual perception described by gestalt psychologists: "Any stimulus pattern tends to be seen in such a way that the resulting structure is as simple as the given conditions permit" (1:37). Perhaps it is this law that causes the individual to attempt to fill in the
intersections of the grid with little squares, but in any event this occurs. If one focuses upon one of these illusions, it immediately disappears and more of the same appear in the peripheral area in what is known as "lateral adaptation." The color contrast further fatigues the eye which promotes this effect.

FIGURE 2
WHITE GRID

Up Study (25" x 25") would have been more successful had the background tints been closer to the yellows in value. The values of two complements must be as nearly equal as possible to achieve the maximum color enhancement. However, this painting, done in acrylic on canvas, is an example of the use of complementary colors for the purpose of color
enhancement. It also forces the eye to perceive the linear pattern as advancing and receding. The fact that the brighter value occurs on the "top" of each ridge further emphasizes this since it is expected that light will come from above causing the deeper tint to be seen as shadowed and therefore under, or away, from the light source.

FIGURE 3

Up STUDY

Up Study, Color (48" x 48") was an attempt to show the optical effects of one color on another and as nearly as possible to absent the color from any consideration of form. The apparent recession of the planes due to size was added to give the painting an individual approach in order not to appear to be copying the stripe painting and color panel
patterns of the professional artists. This addition to the painting may add an interest that serves to detract from the color, however. The painting is successful in that it illustrates what strong complementary colors "do" when juxtaposed. It is very difficult to look directly at the borders and when this view is attempted the colors become confused in the eye. The effect would also have been more startling had a sufficiently strong green been available. The green areas were painted three times and are still not satisfactory. To add white to the green merely caused it to become "chalky" and a more brilliant green was not to be had locally.

FIGURE 4

OP STUDY, COLOR

In the oil on composition board painting Vortex
(50" x 50") the geometric layout became quite complicated. The ellipses whirl in receding perspective converging on the small circle in the center which seems to spin. This large painting is an example of motion, perspective, and geometric planning. The extreme contrast of black and white adds to the illusion. In fact, black and white painting is the most effective way to execute these geometric designs. This work, while easily the most complicated painting attempted, may not be any more effective from the standpoint of visual excitation than some of the others.

FIGURE 5
VORTEX

Checkerboard (24" x 24"), another black and white painting done in oil on board, was intended primarily to
elicit the confusion which occurs when an ambiguous treatment of perspective is used. The rectangular planes recede sharply but the circles and ellipses do not conform to the perspective established by the converging lines. The result of this ambiguity is that the circular forms seem to rise away from the picture plane. The very definite appearance of after-image in this painting is of added interest. White circles and ellipses appear on the black areas where there are none and vice versa. Checkerboard is hung diagonally, as are many Op paintings.

FIGURE 6
CHECKERBOARD

**Opscape** (25" x 25"), tempera on canvas, is a very unorthodox Op painting. Op artists avoid strong horizontal
lines because they suggest landscape. This painting deliberately illustrates how this tendency is unavoidable. **Opscape** also makes use of the bullseye, a typical Up form, and is painted with Day-Glo colors, the most intense available. These colors produce a physiological reaction in most people, possibly even to the point of making some feel ill.

![Figure 7: Opscape](image)

A simple construction designed to illustrate the illusion of a moire is **Moire I**. Window screening stretched on forms and secured a few inches apart provides the cross-hatching necessary to a moire pattern. The construction must be placed before an unpatterned background such as a plain wall surface lest the background prove confusing when viewed
through the screens. The moire pattern is an excellent example of an illusion because the wavy lines and patterns seen are obviously not an inherent part of the materials used in the construction. The pattern shimmers and changes as the observer moves past the object.

FIGURE 8
MOIRE I

The Seasons (13" x 20") is, perhaps, an inappropriate title for an Op construction. Op strives to disassociate itself from any conceptual reference. This construction achieves its objective in that it has an entirely different appearance when viewed from various angles. When viewed obliquely, the color impact is startling. When viewed from one side and then another, the color, enhanced by the white,
changes the appearance so abruptly the effect is quite intriguing. This work is an example of the interest that may be aroused by the changing patterns which appear as the observer changes his position relative to the construction.

FIGURE 9
THE SEASONS

Top Op (26" x 27"), acrylic on canvas, is an example of a shaped canvas. Topographical art is an off-shoot of Op in which the canvas is shaped three-dimensionally, irregularly around the perimeter, or both. The strong primary colors in this painting may be considered to be Op. The shaping of the canvas adds interest and offers a changed appearance from all sides. This work may also be considered to be kinetic art due to the moveable disk
set within the area. By simply turning the disk the red and white pattern may be changed to blue and yellow.

![Image](image.png)

**FIGURE 10**

**TOP OP**

**II. INTERPRETATION**

The benefit gained from actually struggling with the problems studied is immeasurable. The additional interest generated by performing the painting, music, writing, or whatever form the study may take adds to the knowledge gained in that area. To create after-images, illusionary motion, and various color phenomena results in additional understanding of the movement known as Op art. Some of the works accompanying this paper were more successful than others, but all of it augmented the knowledge gained from
the research.

To paraphrase an old saying: "To know Op art is to like Op art" is perhaps a little too optimistic. But it is true that an additional respect for a subject may be gained from a study of the various aspects and problems involved. Op art has been popular with the public. How much of this popularity is due to publicity is purely speculative. Perhaps the current craze for Op is due to some of the ideas expressed by Harold Rosenberg:

The repertory of illusionistic tricks displayed in the flickering and blazing of kinetic paintings turn an Op exhibition into a hippodrome of "magicians." The spectator, softened up by proofs of how easily his eye can be deluded, experiences a sheepish pleasure. No art of the past twenty years has been greeted with more acclaim by people who admire an artist who "knows what he is doing." Op arouses, too, the enthusiasm of people bored with painting and sculpture and convinced that it has no place in the rational and technological world of tomorrow. They see in Op an early phase in the liquidation of the old arts into "programed" effects delivered by film and tape--a "theater of the senses" (16:140).

If the premise of the preceding quotation is accepted, it would seem that in Op art we have an art form which ties to our culture in a more direct way than the subjective approach of Abstract Expressionism and, hence, will have a more universal acceptance.

The concensus of the literature concerning this optical movement is that Op is a rebellion against, or a
reaction to, action painting and Abstract Expressionism. "Optical painting, or 'perceptual abstraction', attacks the individualism of Abstract Expressionism from the standpoint of scientific objectivity" (16:138). However, hard-edge abstraction has been around for some time, as has been use of color brilliance and knowledge of optical illusion. In order to discover roots of perceptual art in the past, one may wish to begin with Cezanne and Monet, who ushered in a revolutionary period in "seeing." Seurat with his Pointillism depended upon the eye to fuse the tiny dots of color, which he used, into one impression of scintillating color. Color used in this way has a rhythmic vibration which is actually caused by the activity of seeing. Perhaps there is really less connection between these individuals as precursors of up than there is between up art and the studies of color, lines and planes which have been made in the fields of science and psychology in recent years.

The general tendency of all post-Abstract Expressionist art has been toward hard-edge forms. This has been manifested in Pop art as well, but Pop, unlike up with its cool intellectualism, is "bourgeois."

"The proponents of these patterned works in squares, circles or moire claim that they alone represent a 'machine-age aesthetic' that celebrates not men but forces" (16:138).
Perceptual art has one aspect that is unique and that is its relationship to the viewer. Probably the appellation "up art" was chosen precisely to emphasize the involvement of the observer with the object being viewed. This involvement is both physical and mental and contrasts sharply to the less physiologically involved manner in which other art may be absorbed. The artists have eliminated themselves entirely, or almost entirely, from their works. The communication is directly between the inanimate creation and the spectator. This is in contrast to most previous painting in which the work communicates to the observer what the painter was trying to say.

That which is said by many art works is shocking. But art has always had the propensity to shock. The shock in art of earlier periods may have been a different type of shock, not so physical, but artists of the past have wanted to disturb their viewers. Artists have lampooned society, culture, religion, love, everything with which they disagreed or which they found lacking. The observer and the artists must need be engaged in some kind of an active exchange. To visit an up exhibit results in a very active exchange.

The fact that in up emotion is excluded is, possibly, the most important thing to recognize in this new form of expression. Some feel the emotion of anger when looking at
an Op exhibit believing that they are being duped, but this is beside the point. There is expression in optical painting because these individuals who create these objects are expressing themselves. There is a certain amount of aesthetic choice in the creation of such a project. For instance, the speed with which some of these patterns seem to move may be regulated, or the colors which are to vibrate must be chosen. Nevertheless, there is certainly no passionate involvement between the artist and his work. He seems to be fighting for, or against, nothing. He is instead calculating the effect on those who will see his production. And that person will be aware of the response which he, himself, engenders but he will not be aware of the artist nor what the artist felt. Instead of identifying, or attempting to identify, with the creator of this work as one does when one views an expressionist painting, the viewer is preoccupied with his own reaction.

In the meantime, this new movement in the art world has had its effect on industrial design as well. The fashion world has burst forth with all manner of clothing printed with Op designs. Fabrics for furniture, drapes, and other commercial items are being produced by designers eager to climb on the bandwagon. Linoleum and vinyl tile are being printed in bold colors that are designed to shock and vibrate.
The study of a subject generates an interest in related areas. This study is not concerned with the many interesting, and those not so interesting, things going on in the art world today. New sports are shooting in every direction from the various parent movements which have just grown up overnight themselves. This unprecedented activity can be attributed mainly to three things: (1) the growth of the practice of collecting art partly due to its establishment as a status symbol, (2) the backing given to the new and the unusual by the big museums--their rivalry to exhibit the latest fads, (3) the power of advertising through the mass media which can raise a minor artist or group into a position which, whether deserved or not, will be determined only by time.
CHAPTER V

SUMMARY AND CONCLUSION

I. SUMMARY

The purpose of this study was to: (1) explore, analytically and aesthetically, the recent movement in the art world known as up art; (2) investigate the principles of perception which are utilized in such work; and (3) produce in painting and construction media examples of this art work which has the emphasis on visual effects.

The production of ten paintings and constructions was completed and photographs of these works are included with this paper with accompanying analyses of the goals and the results.

The various aspects of perception including after-image, illusionary motion, perspective, color enhancement, color inter-action, color brilliance, moire patterns, and three-dimensional effects were explored both through literature upon the subject and through actual experimentation.

The movement known as up art has been discussed from the standpoint of the related literature and also from the point of view of the writer. Several prominent up artists were mentioned with biographical data and a brief commentary on the work of each.
II. CONCLUSION

The perspective on this particular art movement may be distorted by the problem of myopia, to use an optical term. That is to say that we are still too close to Op art due to the relative newness of the whole subject. Despite the many opinions voiced on the subject, time will be the determinant on the lasting effect this trend will have on the art to come.

There are those who take a rather extreme view of Op. Witness this passage:

Op art is far more extreme than Pop in subjugating art to the social power, this time the power of science. It has exchanged the billboard for the optometrist’s chart. With its nervous mechanics of line and color and its waving and quaking surfaces, there is something harsh and didactic about this art, even when its effect upon the eye is soothing. Its light is neither of the day nor of the night, but of neon. There is a prevailing overtone of a locked room and of things spied through an aperture (16:138).

and those who view it more optimistically:

Impressionism and neoimpressionism were the peaks to which perceptual art was carried within the limitations of representation. The perceptualism of the present, which barely existed twenty years ago except as a scientific study, is more concentrated than that of impressionism because the establishment of abstract painting has made it permissible for color, tone, line, and shape to operate autonomously (18:5-7).

Whatever the individual reaction may be to Op as art,
the fact remains that it is here, having seized its place in the sun, albeit briefly.

The need for the scientific knowledge provided by optical research is granted. The shock quality in up's different approach is acknowledged. Its sudden demise is anticipated. Yet, it is interesting. The publicity attendant upon the emergence of up into the field of modern art has provided the interest in no uncertain terms. It is quite possible that the most valid result of the existence of optical art will prove to be the furtherance of knowledge of truths about lines, shapes, and colors which may have a great bearing on the art of the future.
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