

Interactive Materials And Their Impact On The Relationship Of The Sculptural Form To The Environment, The Recipient And The Work Parts

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Article Info	Abstract
<p>Article History</p> <p>Received: December 29, 2022</p> <p>Accepted: March 31, 2023</p> <hr/> <p>Keywords : Art, The Human Experience, Sciences, Relationship</p> <p>DOI: 10.5281/zenodo.7787253</p>	<p><i>Art has become more accommodating of the human experience in the various fields of objective sciences, meanwhile it preserves the subjective aspects of the artist. The works of art do not include pictures, paintings and sculptures only, but also contain devices, machines and raw materials with interactive properties that provide the viewer with greater opportunities to participate and gain theoretical and non-theoretical experiences. In modern times, the artwork has become an active cell rather than a passive space that conveys and represents something, whether it is real or imaginary. This is to claim that what is going on the painting or in the statue does not represent an image or a form only, but rather an event or an occurrence or a happening. Therefore, most artistic trends have often deviated from the principle of representation, and focused more on exploring abstract relationships, with the aim of widening the visual experience via novel progressive thoughts and visions, rather than arousing the imagination in a specific limited topic.</i></p> <p><i>Thus, it is possible for art to enrich and expand the borders and scope of the artistic work to extend the limits of the form or the shape on which the artwork is implemented. This is achieved by creating interactive relationships in more than one way. On one hand, the relations between the work of art and its environmental location, with its different characteristics and components. On the other hand, the relation between the work of art and its viewer or perceiver to go beyond the limits of the simple emotional interpretation of the work, and the interactive relations of the parts of the stereoscopic work with each other and the instability of those relationships. Such interactive relations are regularly changing and creating new relationships among the parts of the artworks. Thus, making the work more dynamic and varying. To do this, the artist must use materials that have distinctive characteristics in building and forming the sculptural work, which the researcher has called (interactive materials).</i></p>

Introduction

In this research, "Interactive materials" are referred to as those materials that have distinctive properties which, when used in the construction of artwork, allow variable and unstable relationships, whether by dynamic or mechanical movement, or changing light or color relationships, which allows the sculptural work to interact more with the environment, the recipient and the parts of the work of art among themselves.

Research problem:

The research focuses on using one of the materials that have such interactive properties, of which the researcher has chosen the materials that interact effectively with light, which are the light-reflecting materials, thus reflecting everything around them in the environment as well as the recipient. The three axes (environment, recipient, and form of art)

Thus, the research problem is summarized in the following question:

Is it possible to enrich the interactive relationship of the sculptural form with its environment, the recipient and the work parts among themselves through the implementation of light-reflecting surfaces as one of the interactive materials?

Research Objectives:

- Finding an interactive relationship between the sculptural form and its environment.
- Enriching the interactive relationship between the sculptural work and the recipient through the use of reflective surfaces in its construction.
- Enriching the relationships of work parts and changing them by using reflective surfaces in building the sculptural form.

• Research Hypotheses:

The researcher assumes that:

- The use of reflective surfaces in building the sculptural form enriches its interactive relationship with its environment.
- The use of reflective surfaces in building the sculptural form enriches its interactive relationship with the recipient.
- The use of reflective surfaces in building the sculptural form enriches the interactive relationships between its parts.

Theoretical framework

Light as a natural phenomenon:

Perhaps natural phenomena are one of the most important inspirations for the artist to implement the idea of a work of art, and therefore the artist's observation and contemplation of natural phenomena deepens his sensory experience and enables him to benefit from its data and its visible and mysterious aesthetic and structural features. Consequently, this is considered an enrichment in dealing with these suggestive phenomena and transcending the limits of their tangible physical structural form.

Artist, Adolph Luther, states that, "A fundamental shift has occurred in the artist's vision of nature. He has moved from looking at its apparent elements to contemplating the hidden forces that hide behind phenomena. With this shift in outlook, the artist is in agreement with both the scientist and engineer in their quest to understand and contemplate natural phenomena.

Light is one of the most important natural phenomena that help us perceive things around us generally and plastic art particularly. In fact, without light, we cannot see things and therefore we cannot perceive them. Light as a phenomenon has several characteristics and laws. Among those characteristics is the phenomenon of light reflection, which has been of great benefit to the researcher in achieving the research aims.

• Reflection

It means a change in the direction of the light waves falling on a reflective surface, so when the surface of the material receives some energy waves and rejects others, it radiates on what surrounds it. However, this does not mean that the light energy is divided into two parts so that one part is retained by the material composition, while the other part is radiated. On the contrary, it rather means that the amount of energy input is great whereas the output is small, and the difference between them varies in capacity from one reflective surface to another according to the degree of polishing and color and the degree of transparency and opacity.

Reflective materials:

Some light-reflecting materials have a very high degree of light reflection on them. It is worthy of noting, in this regard that the technological awareness of the nature and treatment of different raw materials had had a direct impact on the implementation and progression of many reflective materials." In the nineteenth century, scientific theories had proved the benefit of chemistry and awareness of changes in the internal composition of materials, in reaching more effective treatments for materials, and this indicated a fundamental change in the degree to which the understanding of the basic nature of materials stands. Furthermore, at the end of the century, scientists had developed new methods for producing aluminum, carbon, silicon and stainless-steel metals, so that these metals became of a high degree of quality and brilliance.

In the twentieth century, the discovery of the internal structure of the materials resulted in the development of polymeric fibers, plastics, plastic mirrors, high-quality metal alloys, glass fibers, and other reflective materials, which show the most accurate reflection on their surfaces.

The types of materials and reflective surfaces and their characteristics vary, including glass mirrors, plastic mirrors, and metals with reflective surfaces. Moreover, each of these types differs in the images formed on their (reflected) surfaces depending on the shape of the surface, whether it is flat, convex, or concave, and these differences are due to the different angles of light reflection from the reflective surface. These are in turn subject to mathematical regulation according to the laws of light reflection. This is to argue that building stereoscopic sculptural forms using reflective surfaces requires a special mathematical organization

Mathematical Organization:

The mathematical organization is an organization prepared with calculated mathematical relations, to which all elements of work are subject, with the aim of creating specific effects, and not just an organization through which the work is only balanced.

Therefore, when investing light-reflecting surfaces, whether in the fields of public, scientific or artistic life, it is necessary to rely on mathematical calculations and geometric angles in assembling the component parts of the work. This is because the general character that can be realized through the geometric organization behind which lies a mathematical system is represented in the fall of light rays in straight lines whose reflection at the angle of incidence determines the direction of the new reflection, and so on. Therefore, the artistic works formed by reflective surfaces require when organizing a conscious understanding of the laws of reflection and the changes arising from the diversity of different surfaces as well as the engineering construction of the relations of

juxtaposition, contrast and contact of those units, and the angles of their openness to the internal and external void of the artwork, as well as the impact and influence of the units established with what this void contains of variables Light, movement, color and shape, as factors, are subject to construction processes to mathematical systems that include the laws of reflection and calculations of emerging variables, which is a necessity to control the final form of the artwork and the variables expected to be added to it.

Therefore, these works tend to be abstract and liberal from the subject, and the main goal is to reach calculated plastic formulations that contain many variables and shapes resulting from light reflections.

Abstraction And Emancipation From The Subject

Scientific discoveries related to the laws of light affected some artists' tendency towards liberation. This trend is apparently clear among the impressionist artists who are interested in the language of form and the process of vision, and liberated from the literary subject that preoccupied feelings, from contemplating the aesthetic and structural relations in the artwork. Thus, the historian of the movement, Franka Steal, states: What distinguishes the impressionists from other artists is their treatment of the subject for its tonal differences, not for the subject itself.

From the point of view of the modern artist, the subject of the artwork is the work itself because of its constructive style, pure artistic values of lines, colors and shapes, and the relationships it contains arising from the distribution of lights and shadows and the elements of the artwork. Such artistic construction, which is achieved through reflective surfaces, as well as the concepts of time and space, has changed dramatically because of their influential role in interacting with the sculptural work.

Time and place have their role in perceiving the work of art. In this sense, "Philosophy at the beginning of the twentieth century emphasized the supremacy of the values and arts of temporal movement, not the arts of spatial stability... Modern science changed the concepts of time and space, especially with the emergence of the theory of relativity at the beginning of the twentieth century. Absolute place or absolute time are relative, where Einstein made it clear that any calculations of a world in which everything is in motion must depend on the position of the observer, which is a variable position. At a certain distance, the world thus appeared to be a continuous spatio-temporal entity.

Time reveals similarity (or resemblance) through continuity (or permanency) and reveals change (or difference) through succession (or sequence). Likewise, space reveals unity, as it is (connected) and reveals multiplicity (or plurality) in that it is a complex of parts. It is the connection of the spatio-temporal reality of these two characters that made it impossible to establish any separation between "space and time." For this reason, "Alexander" decides that what replaces time with its unity is place, and that what deprives space of its abundance is time, and if it were not for that, time would be just a succession, and space would be just an empty unit. Furthermore, the use of such interactive materials in building the stereoscopic sculptural form, among which are the reflective surfaces, emphasizes this concept of time and place effectively. In fact, it demonstrates that the presence of the work in a place that reflects its elements and characteristics makes it a part of that place, and is affected by the movement and scope of the viewer from different angles of reflection, resulting in new formations and relationships. Thus, allowing the viewer himself to become part of the work, as he is regarded among the essential factors of the work environment when he is next to the artwork.

Thus, the light-reflecting material can be used as an interactive material to enrich the relationship of stereoscopic work with the environment, scenes, light and work system:

♣Relationship to the environment:

As the works of art that use reflective surfaces in their creation are more compatible with their internal and external environment, as their surfaces acquire the distinctive character of that environment, whether the color, formal, or kinetic rhythm of them.

Furthermore, it is possible for the artwork to interact with any environment in which it is clarified, which results in dynamisms in the workplace, and makes it valid to be located in specific environments rather than others. This is because it will reflect images of that environment and thus the interdependence will be achieved through it as it makes its environment richer through the modification of the reality of the environment which gives other forms of the environment.

♣Relationship to the viewer:

The viewer of works of art created with materials with high light reflection, is not subject to a specific vision, but always sets out to discover new horizons in which he is liberated from the constraints of rigid vision. Thus, with the new configurations, the vision is extended for the viewer.

It also arouses the viewer's imagination, as the images on reflective surfaces do not represent a material reality, but rather it is a subjective combination between the existential and the non-existential, or the present and the absent at the same time. It enriches the viewer's imagination, by the interaction between the internal and external image as derived from the viewer's personal experience.

Reflective surfaces also contribute to the viewer's awareness of the environment in various and novel ways, where the shapes appear sometimes larger and sometimes smaller than their original size, compressed,

elongated, or repeated by meeting the reflective surfaces at certain angles, which multiplies the reflected elements and increases the sense of depths and voids.

In fact, it may be claimed that the attractive sensory appearance of the lights emanating from the reflective surfaces provokes visual perception of the viewer, and gives a new and attractive appearance to the viewed objects.

♣Relationship to light:

Reflections change according to the amount of the incident light and the angle of its incidence, which makes the dynamics of time also in the realization of the stereoscopic work formed by the reflective surfaces.

For example, we can imagine a field work made of reflective surfaces. Its appearance in the morning light is different from at noon time, as the intensity and angle of the light are also different from its appearance in the evening and its relationship to artificial lighting and its different colors, which makes the work different in its appearance at each time from the other. Thus, dynamics and deviations are achieved in the visual perception of the artwork.

♣Relationship to the system at work:

This is the system to which the reflective shapes are subject within the artwork, and it affects the ways in which these shapes interact with each other, and the ways in which those shapes interact with external influences in the environment. Through the system, surfaces do not become merely reflections of objects, but science interacts dynamically with place and time, thus completing the excitement of the recipient as he views the stereoscopic shapes, especially those in the external environment (Outdoor) at any moment throughout the day.

Application framework:

In light of this theoretical framework, the researcher attempted to create stereoscopic sculptural formulations based on reflective surfaces as one of the interactive materials, using mathematical systems in the construction of these stereoscopic bodies to achieve research objectives and verify the research hypotheses.

The following is a presentation and analysis of the above mentioned works.

• First Work



Pic. (A)



Pic. (B)

Materials: Reflective balls + glass mirrors

Dimensions: 52 x 48 x 60 cm

This work is made from glass mirrors and silver balls, and it is composed of a pyramid with three sides and equal angles of 120 between the three parts. Furthermore, it consists also of two silver-colored balls, one of them, namely, the largest, is in the lower spatial part, between the parts constituting the pyramid shape. The other one is situated at the top of the pyramid shape. The base is in the form of a rectangle at the top and its sides open at an angle of inclination to the outside, and the shape is perpendicular to the base.

It is obviously, noticeable in picture (A) that the parts of the figure are reflected in the environment surrounding the work in different ways and angles, giving different lighting and shades. Thus, the work gains its colors in relation to the structural organization of the work. It is also notable that the base reflects part of the surrounding environment, which gives the work unreal extra dimensions in the vision.

As for the picture (B), with the change in the angle of vision of the artwork, we find that the environmental reflection on the work has varied in terms of its colors and shades, and the parts of the work have been reflected on each other, especially on the left part of the work in the picture. Thus, it resulted in an overlap and repetition

of the image of the parts and the environment. In addition to this, it also gave depth inside the surface, and made the reflection of the great ball on the work more noticeable, which gave it an impression of both repetition and extension within the base. Thus, it gave rise to the intensification of the elements of the work and other new formative relationships within the work. Therein, we can observe in the same process the presence of a miniature reflection in the confined part between the other two representing the two sides of the pyramid, which gave new perceptual images of the work.

Finally, we can realize that with the different angles of vision of the artwork, the perceptual picture changes as a result of the change in the light reflections of the work parts, and the diversity and difference of the reflected images, whether they are the product of an interaction between the work and the environment, or between each of the artwork parts among themselves.

- **Second Work:**



Pic. (A)



Pic. (B)



Pic. (C)

Materials: stainless steel + glass mirrors
Dimensions 45 x 25 x 58 cm

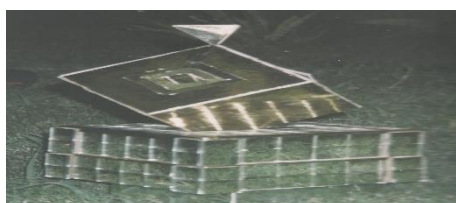
This work is made from stainless steel, but its base is of square, flat glass mirrors.

It consists of three main units, each of which represents a right triangle, part of which has been removed at a straight angle in the form of a curve, which gave a variety between straight and curved lines. Its three parts are of different sizes arranged from the largest to the smallest. Two parts were installed consecutively at a cropped angle in-between of 90 degrees. the third and smaller part is installed upside down on the other side, in such a way so that the curved part faces the larger part of the shape. Finally, a silver reflective ball is placed over the smaller part, and the base is in the form of a rectangular parallelepiped of flat square mirrors.

It is noticeable that in picture (A) parts of the environment are reflected on parts of the work, and the change of color in the upper part is the result of the reflection of colored objects in the environment. We can also notice the reflective variations on the ball, which are in miniature because of the convexity of the surface of the ball.

As for the picture (B), with different viewing angles, there are some deviations in the form of the work, because of the reflection of the work parts on the base, which gave it an extension inside the base (imaginary). The color of the artwork changed with the changing reflections from the environment on it. This confirms that in picture (c) , the shape of the extension of the shape inside the base has changed, and this resulted in new relationships between the parts of the work themselves.

Third Work:



Pic. (A)

Pic. (B)

Materials: copper foil + glass mirrors
Dimensions: 25 x 25 x 43 cm

This work is made of brass and the base is made of squared mirrors.

The work consists of a basic unit, namely, the cube, and on top of it is another relatively small unit in the form of a triangular prism. The base cube has been placed in such a way so that one of the corners is the base and the other is the top. The corner of the top bears the small prism, so that the angle of the prism is the fulcrum point on the corner of the cube. The researcher made formations on the surfaces of the cube to enrich them.

We note in picture (A) that the reflection of the environment on the shape and the base, and the reflection of the base on the shape, have enriched the value of the artistic work with a diversity of shadows and lighting for different reflections.

In picture (B), we notice a change in the perceptual image of the shape of the work, because of the difference in the scope of vision. The extension of the lines of the cube inside the base is also obviously noticeable. The surface of the prism also reflected part of the surface of the cube, which supported the formal interaction between them. The different angles of the constructive formation and reflection, which were made by the researcher on the surface of the cube, gave the shape a diversity and richness.

• **Fourth Work:**



Pic.
Pic.
Pic.



(A)
(B)
(C)



Materials: glass mirrors + reflective balls.
Dimensions: 58 x 42 x 60 cm

This work is made from several materials, namely, glass mirrors, plastic mirrors, stainless steel, and transparent glass.

It consists of several parts. Firstly, there is a cube of transparent glass, the inner surface of which is glass mirrors. Secondly, inside this cube another small cube of stainless steel is leaning its weight on one of its corners and carrying a small silvery ball. Thirdly, on the sides inside this stainless cube, there are two relatively larger silvered balls. In addition to this, around the work itself, there are slices of plastic mirrors connected with different angles of reflection and of different lengths. Furthermore, directly behind the work, there are three strips of plastic mirrors at different angles. Finally, at the bottom of the glass cube there are parallel rectangles of mirrors divided into squares. This artwork is placed on a plate of glass mirrors.

In picture (A), the extent to which images from the environment are reflected in the work in different ways and at different angles as well as their reflected colors are noticeable. This is explained in such a way that the balls and the small cube have been reflected on the inner surface of the big square and in the plastic, mirror slices on the sides of the cube. Furthermore, it is worthy of noting that the reflection of the balls and slices on the lower mirrors gave the work an imaginary depth inside the base.

This is confirmed by image (B) where the angle of vision has differed, leading to different angles of reflection, and seeing different repetitions of the hierarchical part in the back slices. That is to say that as the repetitions of balls in different shapes in the side slices is observed, the cube's reflection on the floor of the large cube becomes more noticeable, whose mirrors are divided into squares, thus, creating new relationships between the parts of the work, the diversity of the perceptual image, and the intensification of units more, as it is typically noticed in picture (C).

This leads to the diversity of forms of work with different viewing angles and interaction with the surrounding environment, including the viewer as well, thus achieving a dynamism of vision in the realization of the stereoscopic artwork.

- **Fifth Work:**

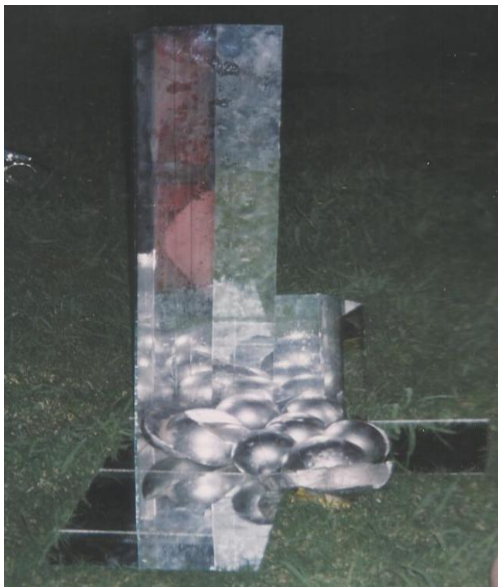


Materials: glass mirrors + stainless steel.
Dimensions: 40 x 31 x 58 cm

This work is made of stainless steel, with a base of glass mirrors. It consists of three triangular units graded from largest to smallest, in the form of a regular repetition. Each unit cuts one of its corners with a curved error, and a ball is placed under it. The whole work represents a semi-pyramidal structure

The environment is reflected on the three parts of the work, and the parts of the work are reflected on each other. These reflections are noticeable in the places where the component parts meet with each other. It is worthy of noting that there is also a reflection of the balls on the triangular parts, and the work is reflected on its base which is formed by the glass mirrors. Thus, a sense of replication and repetition of balls and shapes is created, which results in an extension of the work forms in the imaginary depth inside the base. In fact, the new and interactive relationships that have arisen between the work parts themselves, and between the artwork and the environment could be obviously observed through the optical reflections of the work surfaces. Thus, the dynamic vision of the form is obtained in agreement with the environmental variables, and changes in the angles of vision.

- **Sixth Work:**



Materials: glass mirrors + reflective balls.
Dimensions: 40 x 41 x 60 cm

This work is made of strips of plastic mirrors, silver balls and a base of glass mirrors.

It consists of a base of glass mirrors in the shape of the letter (L) and on top of it there are several reflective balls. Behind them are placed longitudinal strips of plastic mirrors, three of them are greater in length than the other two.

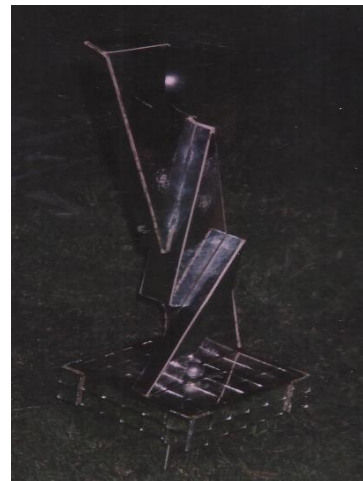
As shown in the picture of the artwork, the reflection of the external environment on the parts of the work, as well as the reflection of its colors are clearly observed. Furthermore, the reflection of part of the scenes on the work in the middle background slide of the pink-colored work is also perceptible. Through the reflection, the viewer can easily notice that the balls are repeated inside the slides, which gave a sense of condensation and depth. Thus, new relationships have emerged between each of the balls, as well as between the balls and back slides, and in relation to the base as well.

The lines of the slides are extended on the base, and the silver balls are repeated, which gave them different images from their reality. Thus, the diversity of the perceptual images of the work is achieved, which in turn vary according to different viewing angles. As it is shown in the work, it represents the extent of the interaction that is achieved through the reflective surfaces between the work and its environment, and between the work and the scenes, and the interaction of the parts of the work with each other, which led to the realization of the dynamic vision of the form.

- **Seventh Work:**



Pic. (A)



Pic. (B)

Materials: glass mirrors + stainless steel.
Dimensions: 40 x 35 x 59 cm

This figure consists of two parts. The first represents the main part, which is in the form of a rectangular parallelepiped on the vertical axis to the left in picture (A). The curved part has been deleted from the top and bottom, each of which is in the opposite direction of the other. An inward displacement has been made in the upper part of the cuboid so that it results in an angle of 90 between it and its complement part. Furthermore, there is another part that represents a small triangle. Recurrently, the same curved part has been removed, and installed in a reverse axis (in terms of direction) of the cuboid, to achieve equilibrium in the mass. As a result, a lower void is located, and in the upper part of the curve there is another relatively larger silver ball. The figure is constructed in accordance to a geometrical mathematical system in such a way that achieves both symmetry and equilibrium between its components. In picture (A), the reflections of environmental shapes and colors on the

figure are represented in the green color in its variant degrees. The reflections are also evident in the base, which is in the form of a rectangle, composed of mirrors divided into square parts.

Picture (A) represents the reflections of the work parts on each other in their meeting places, which gives it an extension and an illusion of depth and repetition. This is noticed in the reflection of the base on the bottom of the figure, which removes the separation between them and makes it an integrated unit. This is further achieved by the extension of the lines of the figure and by their reflection on the base. As the angles of vision varied, the angles of reflection will consequently change, causing a change in the relationships between the elements, in terms of their perception of the viewer, thus achieving the interaction and dynamism of the figure.

- **Eighth Work:**



Pic. (A)



Pic. (B)

Materials: Reflective ball + glass mirrors + glass cube.

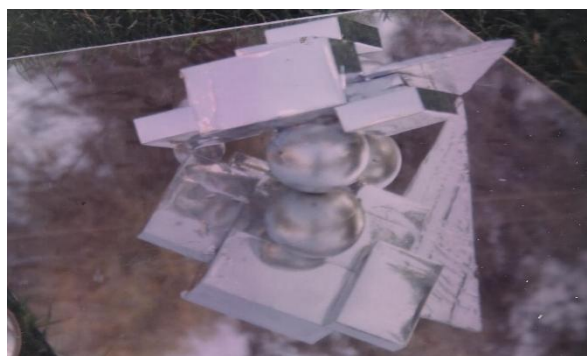
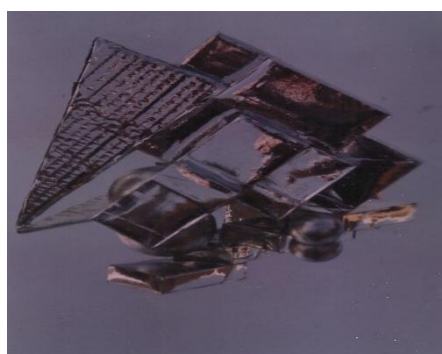
Dimensions: 30 x 30 x 57 cm

The work consists of a cube of glass mirrors open from the front, and the upper face of it is transparent glass. A pyramidal shape of glass mirrors has been placed inside it. The second part of the work is a pyramidal shape of glass mirrors interspersed with a lower void with a reflecting ball.

In picture (A), the reflection of the environment surrounding the work on the lower cube and the upper hierarchical shape are remarkably noticeable. Furthermore, as it is clear in picture (B), a reflection related to its appearance in the structural organization of the work is observed on the hierarchical shape inside the cube, and the upper shape with the presence of repetitions of those images on the inner side surfaces of the cube. In terms of the interaction of the parts with each other, this is noticeable in both pictures. In picture (A), there is a repetition of the pyramid inside the cube inside, as well as a repetition in the upper pyramidal shape, especially at the line of their convergence.

This is intensely apparent in picture (B) inside the cube, where the distortions and hesitations in the images of the environment are noticed. This is the result of the interaction of the surfaces of the upper hierarchical shape with the surfaces of the pyramid inside the cube, due to the transparency of the separating part between them, which gave an opportunity for interaction and the emergence of repetitions and distortions in the perceived shape images. This is obviously perceived in the clear difference between the two images (A) and (B), which results from changing the perceptual angle. It could be concluded and deduced that the difference in the images that perceive the shape with different angles contributes to the achievement of the dynamic shape in its vision.

- **Ninth Work:**



Pic. (A)

Pic. (B)

Materials: silver reflective sticker + reflective balls + glass mirrors.

Dimensions: 35 x 37 x 22 cm

The work consists of several parallelograms of rectangles, covered with a material (with a reflective surface, and the other surface is a “reflective sticker”), and they were assembled in an aesthetic form, according to an appropriate mathematical organization. A further triangle wrapped with the same material was added to the figure, and the figure was placed on a base of glass mirrors resting on a silver ball, so that it is given an aesthetic composition resulting from the reflection on the base.

Picture (A) was taken from above, which means that it has a horizontal projection and the base, and the shape reflects the color of the sky. Furthermore, parts of the figure (according to the angles of their reflections) have reflected parts of the environment that formed pictures of different appearances, characteristics and colors on the parts of the figure. It is noticeable that the triangular part has the effect of the soft texture on the reflection, and the clarity of the image reflected on it.

In the other image (B), the reflection of the shape on the base has led to the realization of a new composition that differs in its appearance and aesthetic value from image (A). This is seen in an extension and repetition of the components of the shape in the illusory spatial depth in the base. It is also noticeable the reflection of the environment on the base and the merging of its images with the form, which leads to the realization of the type of interaction between the elements of the artwork itself and the perceiver.

- **Tenth Work:**



Pic. (A)



Pic. (B)

Materials: stainless steel + reflective balls + glass mirrors.

Dimensions: 50 x 50 x 52 cm

The work consists of several parts. The main part is in the form of an inverted pyramidal formation, permeated from the top by a void in the middle, in which a cube of coated plastic (with a reflective sticker) is placed, and it is based on one of its corners, and the upper corner holds a small silver ball. As for the lower part, with comparison to the upper balls, relatively larger silver balls were placed, and the work was fixed on a base of glass mirrors divided into four parts.

As for picture (A), the reflection of the environment on the upper part of the figure, and on parts of the base are observed. As part of the base is reflected on the figure, the appearance of the surface in its perceived image has varied, which is also clearly realized seen in picture (B).

In picture (B), the reflective surfaces of the main part of the shape are filled with green, which is the color of the surrounding environment. It is also noticed that the reflection of the parts on each other in the places where they meet, and the reflection of the shape with its reflective balls on the base, have contributed to more depth, repetition, intensification and overlap in the images perceived by the figure. Changes in some parts of the base in terms of color, due to the reflection of other forms of the environment on it other than the green color are also noticeable.

Thus, by comparing the two pictures (A) and (B), and analyzing them technically, it can be noted the extent of the change in the form, and the extent of its interaction with the environment. Likewise, the viewer who is part of the environment, and the extent to which the parts of the work interact with each other, and the existence of new relationships, all of which arise through changing the viewing angles, and depending on the reflective materials, thus, achieving the dynamic vision of the form.

- **Eleventh Work :**

- **Twelfth Work:**



- **Thirteenth Work:**



Research Results

Through the above presentation and analysis of the artworks, the findings could be concluded in the following:

- The surfaces of the stereoscopic figure executed with reflective surfaces interact with the environment through the reflection of images from the environment, and the presence of interference and repetition of these images, as well as the presence of distortion in the images.
- The surfaces of the stereoscopic figure executed with reflective surfaces interact with the viewer in being part of the environment surrounding the work, when it is in the environmental space reflected on the figure.
- The parts of the stereoscopic figure executed on the reflective surfaces interact with each other, which gives a diversity in the perceptual images of the figure, and new relationships between those parts also arise.
 - Achieving perceptual paradoxes among the viewer, because of the differences in perceptual images of the form executed on reflective surfaces, and their diversity in different viewing angles.
- The stereoscopic artwork executed with reflective surfaces does not end once its implementation is completed, as it is prepared to be completed in a changing manner in all its scenes, or when the place (environment) changes, or any stimulus appears in the environment that contributes novelty to the work through its reflection.
- The mathematical organization is an important factor that must be taken into consideration when performing stereoscopic works of art based on scientific mathematical laws.

Research Summary

Interactive materials and their impact on the relationship of the sculptural form to the environment, the recipient and the work parts.

- **Research problem:**

The problem is summarized in the following question:

- Is it possible to enrich the interactive relationship of the sculptural form with each of its environment, the recipient, and the work parts among themselves through the use of light-reflecting surfaces as one of the interactive materials?

- **Research aims :**

- Finding an interactive relationship between the sculptural form and its environment.
- Enriching the interactive relationship between the sculptural work and the recipient using reflective surfaces in its construction.

- Enriching the relationships of work parts and changing them using reflective surfaces in building the sculptural figure.

- **Research Hypotheses:**

The researcher assumes that:

- The use of reflective surfaces in building the sculptural figure enriches its interactive relationship with its environment.

- The use of reflective surfaces in building the sculptural figure enriches its interactive relationship with the recipient.

- The use of reflective surfaces in building the sculptural figure enriches the interactive relationships between its parts.

The following results were also obtained:

- The surfaces of the stereoscopic figure executed with reflective surfaces interact with the environment through the reflection of images from the environment, and the presence of interference and repetition of these images, as well as the presence of distortion in the images.

- The surfaces of the stereoscopic figure executed with reflective surfaces interact with the viewer in being part of the environment surrounding the work, when it is in the environmental space reflected on the figure.

- The parts of the stereoscopic figure executed on the reflective surfaces interact with each other, which gives a diversity in the perceptual images of the figure, and new relationships between those parts also arise.

- Achieving perceptual paradoxes among the viewer, because of the differences in perceptual images of the form executed on reflective surfaces, and their diversity in different viewing angles.

- The stereoscopic artwork executed with reflective surfaces does not end once its implementation is completed, as it is prepared to be completed in a changing manner in all its scenes, or when the place (environment) changes, or any stimulus appears in the environment that contributes novelty to the work through its reflection.

- The mathematical organization is an important factor that must be taken into consideration when performing stereoscopic works of art based on scientific mathematical laws.

"The authors would like to thank the Deanship of Scientific Research at Umm Al-Qura University for supporting this work by Grant Code:(22UQU4330151DSR01)"

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