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Kinetic Visual Art and Its Effectiveness in Industrial Product Design

[1]Mostafa Mohammed Khalaf, [2]Salah Nouri Al-Jilawi

[1]Department of Design, College of Fine Arts, University of Baghdad, Mostafa.Mohammed1204a@cofarts.uobaghdad.edu.ig
[2]Department of Design, College of Fine Arts, University of Baghdad, salah_bnrr@yahoo.com

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Abstract

The requirements of visual art (with its various orientations), imposed by the user's requirements and preferences for a particular type of product, our study starts to find the basic factors and requirements to achieve the orientations of visual art and its illusory kinetic effectiveness in product design imposed by market requirements and consumer desires, and between the visual art requirements that emerge from The structures of development and industrial and design leadership that industrial production institutions seek, where the research dealt with (visual art and its illusory movement effectiveness in the industrial product), where the research problem was (Is it possible to count visual art as a design direction through which it contributes to the effectiveness of the illusory movement in the design of the industrial product?), and the research is important: being a cognitive topic that sheds light on an important aspect of the design studies, which is the subject of kinetic visual art and its effectiveness in the design of the industrial product through the study of visual art and its illusory and kinetic efficacy, which enables specialists from industrial designers and other specialists in the field of visual illusion art for industrial products, and benefit from its results to improve their studies and productions that depend Determining the type of impact and effectiveness that the products have on its recipient and user.

In order to reach the goal of the research, which is (identifying the methods of visual art and its illusory effectiveness of movement in industrial product design), the second chapter included previous studies and the theoretical framework consisting of three sections and their indicators. The first topic included (visual art and its relationship to perception) and the second topic (visual illusion and its effectiveness in Industrial design) and the third topic (illusory movement and its effectiveness in industrial product design).

Keywords: visual art, kinetic illusion, industrial products.

Introduction

Industrial design is one of the scientific disciplines that has proven its existence at the present time, due to its rapid growth and development as a result of tremendous progress in the field of manufacturing systems and technology, and thanks to the ideas of innovative designers based on scientific research, and this rapid growth leads to the formation of new systems in the field of Designing new and advanced products or services that meet the needs of the user, and the emergence of the visual arts movement had an active and influential role in artistic design applications, and the products of this movement appeared in multiple forms and images.

We find that industrial design stems from its intellectual side from the study of movement in its physical and perceptual dimension, and this study will emphasize the perceptual side because it is compatible with the nature of visual illusion as an artistic direction to be a design direction to study the subject of perceptual movement and its effectiveness in industrial products, that optical illusion in industrial product designs is one of the The important design techniques with its ability to suggest multiple, which is a product received from the process of building structural relationships. This requires high skill and talent and the ability to design and shape the product according to the requirements of the design subject and body shapes to meet the different needs and desires with aesthetic and functional specifications, The industrial design in its applied dimensions stems from employing the design elements with different relationships to achieve the kinetic dimension in the appearance of its products.

Is it possible to count visual art as a design trend through which it contributes to the effectiveness of the illusory kinetic forces in the design of the industrial product?

Importance of Research:

The importance of this research is reflected in the fact that it is a cognitive topic that sheds light on an important aspect of design studies, which is the topic of kinetic visual art and its effectiveness in industrial product design through the study of visual art and its illusory and kinetic effectiveness, which enables specialists from industrial designers and other specialists in the field of visual illusion art. for industrial products, and to benefit from its results to improve their studies and productions, which depend on determining the type of impact and effectiveness that products have on their recipients and users.

Research Objectives:

The research aims to (determine the effectiveness of the kinetic forces of visual art and its reflections on the design of the industrial product).

Limitations of Research:

The research is determined by studying the art of visual illusion as a design trend with kinetic, aesthetic and functional effectiveness that is related to the phenotypic formulation in various industrial products.

Define terms:

The art of optical illusion:

Linguistically, it was defined as “falling into an illusion, and delusion of the matter, i.e. its imagination, representation, and thought, and the delusion is one of the things that delusion has gone to” (Al-Razi, 1979, p. 211), and it also came as “a kind of subjective deviation from the objective content or from the actual sensory data” (Razzouk , 1977, p. 132).

As for Wade, he defined it as the deviation of the visible space to a certain degree, and these deviations in shape, size, direction or movement are attributed to the fact that all the outer lines contain the power of information that can lead to a misperception of the space space as a result of the appearance of deviant elements in the geometrical system of the form. (Nicholas, 1988 p. 203,) As for the procedural definition of visual illusion: it is the overall design treatments that the designer makes to come up with design suggestions that serve the functional and aesthetic purpose of the design achievement.

movement

Linguistically, the movement: move, and move against its stillness, and it is said that he moved in the matter, i.e. disturbed him (Al-Munajjid, 1988, p. 128). Or it is the succession of events, and it represents the maneuver and indicates any activity or change that occurs to the thing. It is a direction and refers to the comprehensive or transforming parts of movement (into a machine) and its opposite is stillness, stability, immutability, and immobility, and it is expressed by movement or gesture (Baalbaki, 1981, p. 596).

And in the American heritage dictionary defined movement: as a significant and

expressive change in the position of the body or part of the body, which is the act or process of changing the place, the active processes of moving plans, the style that moves the body, the movement of the body independent of actual movement (Houghton, Mifflin, 2000) .

Technically, movement is defined as “a change in the place that is caused by certain forces and that takes a certain time” (Al-Moneim, 1977, p. 40).

Hence, our procedural definition of movement is a change of event and the occurrence of spatial and temporal shifts through an internal movement or an influential external action on the basis of changing from one situation to another gradually, and the movement may occur within a specific system, scheme or style. To bring about apparent changes related to the internal performance and the external appearance.

Visual art and its relationship to perception:

2.1 Visual art, its beginnings and origins:

It is a group of arts that is mainly concerned with producing works of art that need to be tasted by a tangible visual vision in the different media used in its production. Visual arts is a general term that includes plastic arts, expressive arts, and applied arts, as the term visual arts was established within the concepts of postmodern thought,

It is the group of arts that is mainly concerned with producing artworks that need to be tasted by the tangible visual vision in the different media used in their production. They are artworks (Essak, 2019). This art has left a trace in (The Baratheon), one of the most famous Greek temples, where it appears as if its corners were built integrated and upright, but it does not contain any right angles, which dates back to 2500 BC. As in Figure (1).

Figure (1) The Baratheon Temple in Greece

With this heritage of visual arts and interest in it, however, scientific studies of optical illusions appeared very late, and the so-called geometric optical illusions did not acquire their nominal character until the middle of the nineteenth century. This art traces its roots back to the Bauhaus school, which was concerned with showing the values of colors and the values of surfaces in its productions. And to other artistic movements such as cubism and futurism, which were concerned with showing the movement element on the pictorial surface. All of these artistic trends cast a shadow on the movement of visual art, which represented a continuation and development of it with new dimensions and horizons. The artist (Victor Vassar follows) (Edward Lucy, 1995 p. 149,) is one of the most important artists who adhered to kinetic art in its comprehensive concept and has been presenting works that fall within the term since the beginning of the sixties of the last century, and has reached the use of black and white in drawing lines to deceive the movement and excite the eyes of the recipient. Vasarely mixed geometry, strength, and emotion, and expressed this with bright, glowing colors, delusions intended to deceive the human sight through the confusion announced before the eye and the mind. The elements of his art are from nature and he transformed them into clear abstract elements in his artistic productions based on the interconnected relationships between the elements of color, line, shape and space (Talal, 2001, p. 157). As in Figure (2).

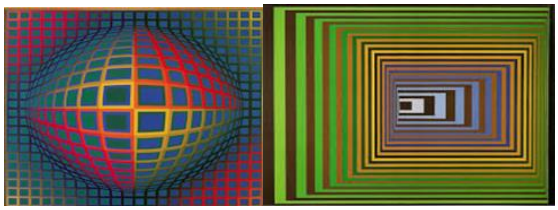

Figure (2) Arrangement of colored spaces to achieve visual irritation and the illusion of movement by Vasarely

The early works that appeared in the beginning were dominated by black and white values, and their use gave some advantages, as the interaction of white and black spaces and the illusion of movement and visual agitation left by this technique is the simple basis for it (white spaces appear to be gray as black spaces seem to move in front of receiver's sight). As for the contrast between the lines, it reaches its maximum extent, and thus the value of most of the overlapping visual effects is enhanced (Wade, 1988 pp. 21-15), And the basis adopted by this technique, which achieves the unity of the design, is that the background and the shape sparkle from opposite tensions within this background and so that they complement each other. Various phenomena of luster and glow, which result in a glowing sense of movement on the surfaces of the products, as well as the glow of colors, their spread and overlap, their contraction and extension, and then the simultaneous and successive opposites, which give a real sense of the movement of the industrial product.

2.2 Effectiveness of visual perception:

Perception is one of the basic mental processes that are characterized by its complexity, as this process interprets the sensations coming to the brain through the senses and gives them meaning, and the bulk of them take place in an automatic way without awareness or feeling of them, but sometimes they need to focus attention and exert effort and organize them mentally. Despite its reliance on the senses to investigate information and see the things that make up the vocabulary of the environment around us. Some researchers point out in this regard that there are strong relationships between the processes of sensation, attention, and cognition in the process of human intake of information, as they together constitute an integrated and interdependent part between each other (Ramzi, 1992, p. 112).

Sensation is a process of transmitting internal and external sensory stimuli to the brain, while attention is the focus of the sense organs on these stimuli, while cognition is the interpretation of these stimuli that arrive in the form of symbols and signals to be judged and decided upon. Others believe that sensation represents the process of receiving information or stimuli (stimuli) that fall on one of the sense channels (sight, hearing, touch, smell, taste, movement), and transmitting it to the brain to work on processing, analyzing, interpreting and giving it the intended meaning (Mohammed, 2009, Pg. 97) Therefore, the process of perception works to translate those sensations that reach the brain through the senses and make them in the form of “focused messages similar to the form of electrical impulses that flow through the sensory nerves that connect between the sense organs and the brain (Al-Hadi and Al-Nadi, 2007, p. 65),” As it becomes clear through this that the role of the sense organs is to transmit stimuli to the brain without giving them any meaning, and their role lies only in the transmission work, while the role of the brain through the mind is to perceive these messages and give them the intended meaning. :

1. It is a process that mediates sensory processes and behavior, so it is a process that is not directly observable

Rather, it is inferred from the responses issued by the recipient ... and others (Hassan, 2007, p. 103).

2. It is an integrative process that takes place between the recipient's past experience and the sensations emanating from new stimuli. Through this process, new experiences can be perceived and interpreted.

3. It is a process through which the spaces are completed and the perceptual things are integrated. The recipient does not need to see or hear the whole thing. Rather, it is enough to see a part of it. After that, the brain works, and through the previous experiences that the

recipient has, to complete the missing spaces with the image and sound to determine then the image or sound. The tangible thing, for example, that just seeing a part of the room is enough for the recipient to perceive the images that appear in front of him inside the room (Mohammed, 1992, p. 18). As shown in Figure (3).

Figure (3) The effectiveness of visual perception and filling the void by the recipient

2.3 The effectiveness of sensation and its mechanisms

Sensations are of great importance for a person, as through them he can discover and identify the many stimuli that lie in front of him in the surrounding environment, such as (lights, sounds, colors, shapes, sizes, smells, temperature...etc), and the sensation has the ability to know whether the stimulus exists or does not exist. And the ability to distinguish between stimuli in terms of their shapes, colors, surfaces, sizes... and other things (Al-Nafi', 1975, p. 28). The sensory impressions that we receive differ from environmental stimuli and vary according to the diversity of the characteristics of the stimuli, their nature, and the quality of the sense that is used to receive information. These impressions can be classified into five categories represented in sensations.

Visual, acoustic, gustatory, tactile, and olfactory) Each of the receiver's senses is responsible for providing the characteristics of different stimuli that interact with them in the external environment. Therefore, the senses are called sensory receptors (Al-Samalouti, 1984, p. 3). Studies in this regard indicate that regardless of the quality of the sense that transmits the stimulus, as it occupies a certain sequence of events, it seems necessary for the sensation to occur first, and stimulates the sense of sight with sufficient force to begin the process of receiving the information represented by the color of the shape, and then the receiver (which is a nerve end Specialized for this task) by picking up the signal and transmitting it to the brain, then the signal activates a specific part of the brain that records the signal as a feeling related to the color of the shape, so the feeling does not occur before the signal has reached the brain (Produces & Arnoff, 1983 p. 123,) Taking into account the distinction between sensation and feeling, as the sensation is through the five senses, while the feeling is through other mechanisms such as the feeling of heat, cold and fear, which has direct links with perception, and the sensations can be classified into two types: :

1. The sensations that come through the sense organs that are located on the surface of the body or close to it (eyes, ears, tongue, nose and skin), which reflect the characteristics of external objects or events, examples of which are the visual sensations of shapes, objects and bodies with their colors, lines, touches, surfaces ... and others, and auditory Represented by various sounds that come in the form of tones, frequencies, music ... and so on

And the olfactory represented by the different aromas and tastes that are characterized by their sweetness, heat, salinity, acidity, and the touch that comes through the skin.

2. The sensations that come through the sense organs that are located in the internal organs (such as the digestive, respiratory, blood, and reproductive systems, the balance part in the inner ear and what is related to movement), and these sensations are responsible for the motor and mental balance of the recipient (Ramsi, Introduction to Psychology, 1992, p. 113). For example, the appearance, movement and color of the jug achieve the feeling and its mechanisms of the recipient, as shown in Figure (4).

Figure (4) shows the realization of the feeling through the shape, movement and color excitement of the industrial product

2.4 The effectiveness of attention and its mechanisms

The effectiveness of attention represents the second stage of the process of visual perception of products or things, as it is the process of directing the mind to something until it becomes in the focus of feeling, as the feeling does not turn into awareness except with the presence of the effectiveness of attention, so attention is a prerequisite for the occurrence of awareness and the components of the physical environment compete to obtain On this condition in order to turn into a stimulus or a perceptual stimulus (Amos., 1977, p. 163), the most important thing that happens in the process of attention is discrimination, and this is represented by classifying the essence of things, by classifying its structure into general features such as shape, texture, and form... etc., after examining it by the senses and determining its general features as a first stage.

And then compare it with what is stored in memory and choose what matches the characteristics of the thing, and if it differs from all existing classifications, the form will be interesting (Suhair Ahmed, 1999, pp. 107-108).

Hayes points out in the effectiveness of attention that (William James) is one of the first psychologists who was interested in studying the process of attention, as he indicated that the difference in discrimination, recognition, remembering and cognition are among the direct and important results in the process of attention, and he also reached a conclusion that attention is a functional process. It is manifested in focusing on a particular stimulus at the same time, so it is not possible to distribute attention to more than one stimulus unless one of them is familiar or usual for the individual (Hayes, 1994, p. 104).

Therefore, there is confusion among many about the concept of the processes of sensation and attention, as they differ in fact, despite their close connection. Attention differs as a functional process from sensation. At a time when sensation is a process of awareness and feeling the presence of multiple stimuli surrounding the recipient, attention is a process of directing or focusing feeling. On the sensations caused by external stimuli present in the perceptual environmental field of the individual or the internal stimuli that occur inside the recipient's body. Through the feeling process, the attention process occurs, which is to direct awareness or feeling towards a specific situation or some parts of this exciting situation (Al-Nuaimi, 2010, p. 4).

Accordingly, the researcher agrees with this view that attention is a process of directing or focusing the feeling on the sensations caused by external stimuli that exist in the perceptual environmental field of the recipient in particular with regard to attention to the components of the surrounding environment through which the industrial designer tries to arouse the feelings of the recipient through Exploiting the elements of the industrial product that are characterized by their shapes, sizes, textures, colors, and their relationship to the space that surrounds them to influence it.

The concept of optical illusion

Optical illusions fascinated man throughout recorded history, and philosophers searched for their causes, and artists wrote down the many cases in which they occurred and were adopted by designers and architects to form illusory impressions and specific suggestions to provide solutions and design treatments, which necessitated shedding light on this vital phenomenon, and the rich material it presents may In turn, it opens wide horizons for its investment as one of the design tools that the industrial designer seeks during professional

practice in reality, so delusion is linguistically known that it has fallen into illusion, and the illusion of the matter, i.e. its imagination, representation and thought, and the delusion of the things that the illusion went to (Al-Munajjid, Language and Media, 1986, p. 922).

As for the New Encyclopedia Britannica, it came as (a false impression from the visible object from which the stimulus was received) (Zevi, 1980, p. 240). In philosophy, when discussing delusion as a perceptual error, the Greek writers and philosophers tend to adopt one of the following two points of view:

1- Attributing the occurrence of a sensory perception error, i.e. illusion, whenever sensations depend on them more than the brain. The sensory inputs, according to this view, are variable and inaccurate, so in order to provide a correct picture of the external environment, one of the brain functions appears to correct these errors.

2- As for the second point of view, it justifies the occurrence of those errors that contradict or interfere with the work of the brain with the work of the senses. Sensations and according to this view are genetically accurate (innately) and then they are responsible for the honest picture they present of the environment in exchange for the limitations of the brain and judgment decisions (Coven). , 1987, p. 3).

And it came in the book (Squaring and Rounding) that a person sees manufactured geometric shapes that appear circular from afar, if we do not see rectangular villages with different shapes from afar round, perhaps the sun is rectangular and the planets are square (Al-Jahiz, 1955, p. 91). As for recent studies, they indicate that at the end of the fifties and the beginning of the sixties of the last century, the Western world witnessed (the emergence of new artistic currents that are inseparable from previous attempts, Rather, it represents a continuation and development of it with new dimensions and horizons, and perhaps what these artistic currents aspire to, lies in the artist's attempt to invest the data of visual sensations, and in the plastic direction that he searches for the effect that the photographed scene leaves in the viewer's eye and investigates the shadowed optical illusions of the eye, that is, what is The eye sees it, the senses perceive it in another way, and this sensory perception is what motivates the artist to exploit what he sees as artistic exploitation (Ezzat, 1980, pp. 240-244). We conclude from the foregoing that the idea of optical illusion is built on the basis that it is fabricated or fabricated illusions according to the circumstances it aims at.

And that the most important characteristic of it is that what the eye sees is perceived by the senses in another way, and this motivated the artist to exploit what he sees as artistic exploitation in order to introduce the viewer psychologically and physically into the aesthetic process of the design work.

Psychology of optical illusion

The interest of the art of deception and optical illusion in the science of movement and optics is the structural basis for all paintings of this trend of modern art, the designer is always looking for the effect that occurs in the process of visual illusion for the recipient as well as the kinetic effect, that the interpretation of wrong information by the human mind that does not apply to its truth from Through what is transmitted by the senses, especially the sense of sight, from the ocean that contains things, so things are completely different in their appearances from their reality.

For example, the planet appears small even though it is moving, and our sight is also affected by watching stars that are far from the characteristics of real stars and others through color, size, nature of composition, (Ashihara, 1981, p. 15) It was the beginning of the art of optical illusion and deception through the use of two colors Black and white as in Figure (5), due to the severity of the impact on the viewer of seeing opposite or overlapping areas, making him feel visual illusion. After that, these attempts developed to using cold and hot colors, as cold colors appear as if they are regressing, while hot colors appear as if they are advanced, The movement of the elements is perceived by the recipient through the sense of

sight, and that is the result of the fluctuation of vision by disrupting the fixed system by creating the phantom movement through convergence and divergence between distances, color contrast, repetition of shapes, lines and colors, as well as the difference in sizes, whether by increase or decrease or both, as in the figure (6), then the scope of these visual attempts expanded so that the accumulation of geometrical construction, the juxtaposition of lines and the distribution of flat colors of varying depths led to various phenomena such as luminescence or ripple, and the glow of colors, spread, overlapping, contraction and extension, and the resulting simultaneous and successive contrasts as in the figure (7), As a result of visual blending, comprehensive confusion, and permanent volatility of the design elements, the retina becomes irritated and convulsed so that the recipient turns into a partner in design, and the art of optical deception does not depend on the sense of sight only in the process of perception, but also depends on the human brain in recording and photographing the design elements, there are many processes What the human brain does after recording the elements on the retina, the brain may lead to perceiving the design elements in a certain position, which leads to a meaning, then we perceive them in another position and with a different meaning, although these elements are the same and have not changed due to the change in the angle of vision (Ammar, 2016, p. 7).

Figure (5)

Figure (6)

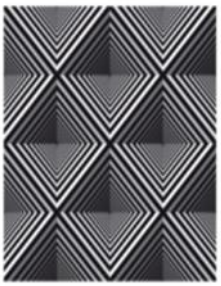

Figure (7)

Factors affecting the achievement of optical illusion

Industrial products consist of a set of configurations, elements and design relationships through which the appearance of the design is established through the compatibility of the elements with each other in order to serve the content of the design idea, and some of them have a sense of visual illusion through the resulting relationships between those formations and elements that the industrial designer tries to harness to create his idea In a visual system within those formations and design relationships that are essentially the result of the overlap of structural elements that depend on one another to confirm their effects and effectiveness in building design processes. (Fares, 1999, p. 235). Among the design elements that directly enter into the design of industrial products that the designer adopts and employs in order to highlight the content of the idea are as follows:

1- Point factor: The point is one of the design elements that are included in the design of industrial products, as it determines the lines and places of intersection of lines in the corners of bodies and shapes. Abu Debsah and Ghaith, 2010, p. 61)

The point was classified as an element that attracts attention, and the point may be the center of attention or focus within the composition, but in itself it has no value as it gains its importance from its presence in the overall organizational framework, as a group of points gives a form or a body, and another group gives a form and a body. Others (Al-Hamid, 2008, pp. 110-112). The point in the designs of industrial products works a lot to show various organizations on the area or design size, as other organizations are derived from them, such as taking into account the different types of them in the same design or the different degrees of their color or tactile value...etc.

The role of the point in industrial product designs can be activated through the many technical uses to establish illusory effects that give design vitality.

2- The Line Factor: Lines were classified as a set of points connected to each other, and the line is an important design element for industrial products, so that no design can be devoid of the line element. The font is descriptive, that is, it is visible to the user to describe something with it, and sometimes it is illusory, that is, it gives a feeling of the font, but it is not visible (Al-Smadi, 2008, pg. 60). The lines have been divided into broad, weak, intense, scattered, vertical, or horizontal..etc. They are embodied in the design of industrial products for themes, borders, bodies, shapes, division of space, segmentation of spaces and volumes, defining the basic unit of product composition and for creating design movements

And the designer should find interesting separations between the lines to facilitate the perception of the overall design (Al-Ani, 1999, p. 32). Lines have an effective role in the formation of surfaces and volumes, and from their interactions, stereotypes are created, and it has a variety of visual effects. They generate stability in industrial product design. As shown in Figure (8).

Figure (8) Optical illusion in vertical, horizontal, diagonal and dashed lines in industrial product design

3- Appearance factor (shape): It is the basic and important characteristics in the priorities of producing the industrial product and presenting it to the user or consumer. Whenever the design has a good aesthetic value, and is pleasant and pleasing to the eye, it achieves visual and emotional communication with the user, which is the embodiment of the physical presence and the ability to clearly and clearly understand the relationships inherent in things (Haiso, 2008, p. 2) that the processes of designing the appearance of industrial products are on According to conditions and limitations that are affected by the functional nature of the product on the one hand, and the requirements for aesthetic values on the other hand, The extent to which the Authority is suitable for the job it offers and how the Authority expresses the job on a third side, and how the job is received from the Authority on a fourth side. As the form of the industrial product is related to the function provided by the product, and therefore the body must be expressive of the functional aspects through the functional receipt interfaces, and the functional receipt interfaces are the parts through which we receive the function such as buttons, levers and digital display screens, and these parts must be expressive and understandable (Al-Ugaili, 2014, p. 52)

The shape and appearance of the industrial product is based on a specific system and its structure through which the industrial designer chooses the patterns of geometric and structural relationships for the body of the product to bring about coherence and homogeneity for all the elements of its appearance components, including the lines and their physical balances, and the external appearance of the industrial product is without taking the details that it contains. The details, in that case, there is a duality between form and form, as the latter represents the basic formulation of the body or matter, while the form is the general concept of form and the group of forms and elements where we find the effect of the shape is determined as a result of the overlapping of lines in different directions or as a result of the combination of elements within studied design relationships, and the innovative industrial designer must work to complete the design with his experience and style in order to find design techniques that contribute to achieving visual illusion. As shown in figure (9).

Figure (9) optical illusion in the design of the chair through merging and formation

4- The color factor: Color plays an important role in perceiving the shape of the industrial product, and color is linked to texture, both of which change with the influence of the other. Diversity in the use of colors in industrial product design establishes different rhythmic patterns of design that are perceptually and visually perceptible by the recipient (the user) and this gives harmony and visual pleasure. The color It has a visual importance in generating rhythm and sensory harmony in the design, as well as giving it a special and distinctive identity for the mechanism of work of that product) Rasmo Sen, 1986, p. 213). In addition, there are colors that give us an illusory function in the designs of industrial products, as they give us a sense of their large size, and others that give the sense that they are smaller in size despite the equal size of the industrial product (Nathan, 1987 p. 93.)

Morton's study states three facts: Whenever the red and yellow colors are dominant, then the dye is known to be warm, and it is characterized by being exciting and stimulating, so it appears advanced and demands attention, and this is what we find in industrial products colored with warm color, we see it larger and more prominent than its reality (Mahnke, 1993). It should also be noted that the designs of industrial products with exaggerated vocabulary and stark colors increase the small size of the product (Gad, 1986, p. 12). As for the value of color, the study highlights the fact that the high contrast or contrast of values will confirm the size of things while reducing similar values in return. Apparent size, and with regard to the property of intensity,

The study shows that the wider area occupied by the color, as usual, is not the most intense, which requires choosing lighter or less dark colors, and accordingly, the dark color values give a smaller apparent size to the product and make the industrial product appear smaller, while the light color values that give a large apparent size make the product appear smaller. The industrial one looks big, and we find in Example (10) that the white iPhone phone device suggests to the user the large and vastness of the device, while the black iPhone device suggests the user’s feeling that it is smaller in size, and then we find that the color has an illusory function and an illusory aesthetic through what the colors suggest.

Figure (10) Optical illusion in a phone through color difference

5- Texture factor: Texture is the feeling of the material through contrast, an expression that indicates the surface properties of materials, and it is the surface value of each material, which is what reaches the user first when dealing with any industrial product. The texture differs from one material to another, even if they are similar in color, size, etc., as well as the difference in the qualitative characteristics and special features of each of them. These characteristics are recognized first through visual perception (of the recipient) and then through tactile perception (of the user).

Among the characteristics in which the materials differ from each other, which is the first reason for perceiving the rhythm is the size of the surface grains, the extent of their convergence or divergence, and their regularity, whether they are random or regular, as well as the extent to which light is reflected or absorbed by the surface of that material. Rough surfaces differ in the extent of their reflection and absorption. To light on soft surfaces (Ezzat, 1980, p. 75). The designer may link two or more materials, and that is a state of creativity, imagination and the ability to create for a functional or aesthetic purpose, and this gives the shapes vitality and a direct impact on the recipient (the user).

As straight, refracted and curved lines overlap to form different and indefinite shapes that have their fingerprints in the design of the industrial product, and the texture has the ability to attract the recipient through expressiveness and its techniques, and it has the ability to make the shape of the industrial product rich through superficial values and what they reflect (Al-Hadi and Al-Nadi, 2007, p. 104). As in Figure (11) it shows a refrigerator containing two ores of plastics, which were in black with somewhat close gradations, as well as golden aluminum. Mixing the two materials gave this product has an aesthetic shape.

Figure (11) Diversity in the use of material and color

6- The light factor: light has an imaginary function, i.e. when the light intensity increases, it makes us see surfaces more rough, so the surface roughness or smoothness depends on the intensity of the incident light and the angle of its incidence as well (lynes, 1964, p. 41), as well as when the intensity is Weak lighting reduces the strength of the shadow, so it appears faint and weak, and the contrast between light and shaded surfaces decreases. As for the sizes of products and objects, they appear larger under intense lighting than weak lighting. A light product appears larger if it is placed in a dark space (Ihsan, 1985, p. 17).

It is the duty of the industrial designer to take into account the division of dark and luminous spaces through the control of lighting and how the areas of color values are balanced, varied and arranged within the limits of the design unit in an aesthetic order through the balance of the light value, i.e. the balance between light and darkness and colors in their different degrees (Al-Ani H., 2002, p. 37). In addition,

we find that modern ores have their own suggestion in addition to the suggestion that they can express, and the credit for the formation of these suggestions is due to new excretory techniques, for example, fiberglass that can be used to suggest the ores of many minerals, As well as plastics, as they give us a material similar to wood through some treatments, including color and texture, and the light value cannot be dispensed with, and some materials have the ability to absorb light and others reflect it, and in this way it allows the designer to manipulate the texture of the product through lighting. The method of distributing the light value in any shape or form is one of the distinctive characteristics of that shape, and the formal characteristics of the shape and the body are determined according to the fact that the light value is one of the most important intrinsic characteristics that determine the characteristics of the element, and therefore changing the light value of any shape will affect our perception of the formal characteristics of the product.

When the light disappears, all that disappears with all the details of the shape, shape and colors that it carries, because the light achieves a strong effect by increasing the contrast between the degree of light and dark and increasing the sense of movement. 1969, p. 323), because we cannot see and perceive anything around us without light. As shown in the following Figures (12).

Figures (12) illustrate the optical illusion in the lighting units

3.1 Movement and its illusory effect on the industrial product

Movement is the main factor by which man expresses his being, whether in the field of design or in other areas of life. In the field of design, movement has become the element that determines the launch of the design work. Movement is inseparable from the structural elements. Each element embodies a movement (inside and outside) the structure of the design composition to give a vital functional character as well as continuity and sensory pleasure that promotes the design work from monotony and boredom to activity, renewal and vitality.

Therefore, we find that the illusion of movement leads to arousing dynamic sensations that use means that provoke a sense of the spatial change of the thing with the continuity of this change and this is by tangible material means or through semantics (Al-Fattah, 1973, pp. 297-298), and we see that the three-dimensional movement is illusion It is clear and evident for the presence of the condition of light, which is a key factor in the illusion of movement and movement, there may be an actual natural movement either in the form or in the light, and the movement of light affects the movement of the body because it leaves a trace of shadows that appear as forms that are perceived and felt, as the surface receives a state or A uniform light effect and size that receives different light and gives a different effect of its light space (praise, 1999, p. 68).

The movement is a means and not a goal, that is, it is considered one of the means of the structural realization of the idea, but as a result it will be among the achieved goals, which is the clearest characteristic through the formal organization processes and reaching its events is a basic requirement for the form, because the movement has an effect in drawing attention or in visual illusion or in areas of attraction. Or in other factors (Ismail, 2002, pg. 7), as example (13) will show how the direction can be conflicted. We note the seating units contain several repeated horizontal and vertical pieces, which suggest movement as well as indicate the movement of the direction, which generates a conflict with the kinetic directions available within the body industrial product.

Figure (13) Trends of illusory movement in the design of the industrial product body

The imaginary space and its effect on industrial products

Space in general encircles our existence and contains us constantly, as we move and see things and shapes and hear sounds. Its identification, formulation and regulation by these elements (Ching, 1979, p. 108).

And we find that the illusory space is the one that the illusion proves and perceives from the surrounding form in another way, and the illusory space does not exist outside, rather it is a perceived illusion, which is the feeling and illusion of the depth achieved through the forms and their relationships on the flat surfaces (Derry & Williams, 1960, p. 29). Achieving the illusory space through (the overlap of a shape with another shape, so it can be seen in front of it or above it, or in the change in size, for the large size shows the shape closer, while the small size indicates that the shape is farther) (Raghad Ni'mat Allah, 1997, p. 30).

In industrial product designs, shapes act as surfaces in relation to their space, varying in size and some tend to advance and some to regress, move or remain static in their own context, so whatever they have formative, symbolic or illusory connotations that lead to the spatial or spatial space (Al-Amri, 2005, p. 52), as shown in Figs (14).

Figure (14) shows the effect of the imaginary space on the industrial product

We conclude from the above that space is important for the industrial designer as it represents the space and container of the form and the visual relations between the units of the design work in order to form a single entity that this space includes and contains to achieve the visual illusion that contributes to the realization of the imaginary space.

2.3.3 Transparency and its role in activating the optical illusion in the industrial product

Transparency is defined as a description of a material that allows light to pass through it, and the light is the physical presence of the transparent material, with its different sources and diversity, whether it is natural lighting or a focus of light achieved by artificial lighting or light reflection or refraction. Industrially, it contains a transparent material, so it becomes the subject of the object of response to the viewer and his reaction (Maitland, 1990, p. 73). Transparency here generates a successive series of units that enables the recipient to see the two forms at the same time, and this technical design method depends on the light, color, and material available in the product. Frederick, 1993 (p. 57, The use of transparency in industrial products leads to an increase in attention to industrial products grafted with transparent materials, as the design elements formed for the basics of dealing with transparent materials are intertwined constructively, and if the designer can employ color in the texture of the material To form the

aesthetic sense in two types of directions due to the trends of mental perception, which are:

The first trend is the initial aesthetic sense of the transparent material, which produces instantaneous, variable and finite effects, as in the perception of the material itself, regardless of what can be seen through it. general.

As for the second trend, it is the pure aesthetic feeling, which is a mental process that is aware of the pure facts in materials and shapes and how to employ transparent materials in industrial products (Kamouna, 2006, p. 44).

In the design of transparent industrial products, the technical performance of transparent products designed in a way that allows the shapes to be seen one through the other, is realized by the presence of what lies in front of them in order to achieve more color intensity, showing a disparity between the shapes and making them precede each other, which is a visual illusion of the depth of space (Khafaji). , 2010, p. 61).

As the critic (Rainer Banham) emphasized this idea as "it is nothing but a kind of illusion". The small apparent size of industrial products using transparent material is one of the most factors affecting our visual sense, because it does not reflect a sense of capacity through a specific shape or fixed suggestion, but rather provides images and scenes in three dimensions that increase the depth of the perceived scene, and to achieve a situation delusions.

That is, transparent plastics can be employed in several ways in industrial products. The designs of chairs in Figure (2-120) used transparent plastics to a great extent, through which a process of penetration and visual influence occurred that helped achieve a reduction in the size of the chairs. This phenomenon occurred because of the three-dimensional scenes transmitted that reflect a state of virtual depth that breaks the feeling of stagnation and generates a visual suggestion not to cut off vision and continuity, and then the recipient falls into the impossibility of actually estimating what the size of the industrial product he is about is an illusion. . Figure (15) below shows the state of transparency in some industrial products, and how transparent plastics change the shape of industrial products (Kamouna, 2006, p. 45)

Figure (15) Transparency and its role in the visual illusion of the industrial product

From the foregoing, we can say that the success of the design process lies in choosing techniques that meet the design needs (functional, aesthetic) because they give the designer the ability to innovate and renew his ideas and methods to activate and develop utilitarian and aesthetic characteristics to communicate the idea, in addition to the expressive energy that transparency carries, which depends on the possibility of drawing attention and attracting Attention and the formation of rhythms or suggest motor directions, which serve to form an optical illusion for the recipient.

Conclusions:

1. The visual sense is considered the most important element of the sensory perceptions, which is determined in the light of reading the industrial products, identifying them and testing their structure at the level of sensory perception and mental awareness. As the visual sense represents the basic inputs to the visual

aspect of the products and the effect it generates represents a kind of excitement resulting from seeing the products and feeling their formal and appearance variables.

2. Recognizing the formal variables of industrial products generates many psychological and sensory effects, which are effects resulting from the nature of the impact that industrial products have on the user as a result of their impact on us on the sensory and cognitive level, which is the main point for generating a state of attraction and influence on the user.

3. The eye movement represents the basic condition in which the user reads the phenotypic variables of industrial products, and the eye movement represents the visual readings that affect the cognitive awareness of the industrial product and the sense of delusional movement in the product design.

4. A sense of the perspective that consists of the gradual installation of the penalty according to structural consequences in the design of models leads to a sense of the state of the realistic perspective at the level of the phantom movement. This generates a kind of movement in the perception of products.

5. Lines and their compositional and directional variables contribute to enhancing the character of optical illusion in the design of industrial products. As the change in the types of fonts and the change in their directions generates perceptual and cognitive changes in the readers of the product, which contributes significantly to increasing the value of visual illusion in the design of products

6. The formal variables resulting from differences in the phenotypic composition are an essential element in determining the nature of the body and how it is received by the user. The more varied the formal variables, the more the factors of optical illusion. As the diversity of the formal variables generates a diversity of visual perception and a diversity of directions of the sanctity of the eye, which increases the intensity of visual and kinesthetic illusion.

7. The association of delusional movement in the design of the industrial product with the formal aspect and not in the functional aspect, was as a result of the fact that the visual perception of delusional motion depends on the nature of perception of fixed formal variables and we feel its movement as a result of differences in formal variables and differences in perception and eye movement at different levels.

8. The adoption of illusory space formulas represents the realization of a kind of illusion of real space, which is directly related to the perception of parts with a sense of depth and overlap between the real and imaginary, internal and external spaces, which increases the intensity of the visual variables and the value of the delusional movement.

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