

# Artistic Characteristics of Dynamic Interaction Sculpture Design

Yang Cao

Nanjing Normal University, Nanjing, China

caoyang@njnu.edu.cn

**Abstract.** Throughout the research on the development history and representative works of dynamic interaction, the paper starts with the concept of change, concept of time, concept of space, concept of power and concept of media to analyze the artistic characteristics of dynamic interaction sculpture design. In exploring the relation between man and object, dynamic interaction sculpture design promotes human cognition to a new height, namely human spiritual experience.

**Keywords:** dynamic interaction, dynamic interaction sculpture design, concept of space, concept of power.

## 1. Introduction

In traditional sculpture, the relation between art works and audiences is singular and unidirectional. It is actually “passive interaction” in nature. While dynamic interaction sculpture not only employs traditional visual language to attract aesthetic objects, but also allows participants to decide the changes of work in form and color to enrich the experiential process. Dynamic interaction sculpture transits from static state to dynamic state and gradually forms a new interactive art media. It can be asserted that dynamic design will have a much wider space of development in the future. Future design activities will integrate figures, images and entities. Though seemingly complicated, such design activities abide by certain rules.

## 2. Development of Dynamic Interaction Sculpture



Figure 1. Space and Light Regulator Moholy-Nagy 1922-1930

The artistic form of dynamic interaction sculpture could be traced back to the age of Duchamp, Gabo Calder and other masters. The first attempt of dynamic design should be the work Space and Light Regulator (as shown in Fig.1) composed by Moholy-Nagy in 1922-1930 in Bauhaus. The characteristic of this work rests in its distinctive structuralism style which generates dynamic images by combining sports with modeling art. The rudiment of dynamic interaction sculpture came into being in the 1950s. Representative artists in the international society include Soto, Takis, Agam and Schoffer etc. Subjected to modernist aesthetics, dynamic art prefers geometric forms and tends to choose new modern materials like aluminum, plastic and neon. Traditional dynamic art had its heyday in the 1960s but went downhill as of late 1960s and early 1970s.

Since the 1990s, the progress of science and technology and the growing awareness of public participation infuse new vigor into dynamic interaction sculpture. As the “thinking instrument” and expression method of new media, contemporary computer design greatly pushes forward dynamic design. Under the concerted efforts of international dynamic art organizations, dynamic interaction sculpture takes on a new look and gradually develops under the Internet environment together with computer in response to demands in public activities, community improvement and urban planning. The Torch at Rio Olympic Games in Brazil which makes world audiences perceive dynamic art style is a prominent representative. Until now, dynamic interaction sculpture finally returns to public view and enters more public spaces in a high-profile manner (Fig.2).



Figure 2. Torch Design of Rio Olympic Games Anthony Howe 2016

### 3. Dynamic Interaction Sculpture

There are multiple design languages in dynamic interaction sculpture, including changed form ratio, directional pattern incline, deformation, distribution overlap, stroboscopic movement, trace of physical force, etc.

The Torch at 2016 Rio Olympic Games designed by dynamic installation artist Anthony Howe is a representative work of dynamic interactions sculpture. Between sculpture and installation art, his work is not as static as traditional sculpture nor conceptual as early minimalism installation art. In combination with traditional sculpture, he activates static sculpture with the element of “wind”. And expands new dimension of sculpture in the form of movement. Such expansion not only exists in the layer of space design, but also the layer of metaphor. Anthony Howe takes CAD in preliminary design by using T-Spline for Rhino in modeling. In general, he begins with repeated replication of single elements, decides the curve of each element, and then derives DXF document to incision procedure. Every component of the preliminary work is produced by Anthony Howe with plasma cutting machine. Moreover, he constantly adjusts the design according to his new inspiration in assembly.

Dynamic interaction sculpture work realizes the full interaction with environment, including peripheral direct environment and global timely interaction via Internet and modern communication. Dynamic interaction sculpture works also combine with contemporary high-tech, and apply new materials and computer design. Because of its larger mass and more sophisticated appearance, audiences continually generate new experience before works. The superior form of dynamic interaction sculpture is “interaction”. The relation between man and nature is exactly of this sort. As a way of thinking and behavioral mode used to observe the world, discover problems, solve problems, create experience and add new values, design is referred to as the third driving force of innovation. The meaning of interactive design is to provide a people-oriented experiential space jointly composed by material design and non-material design. Such interaction may be the interaction between man and man, interaction between man and object or interaction between object and object. People occupy the foremost position and the ultimate goal is to present thinking interaction.

Doctor Anthony Donne, Interactive Design Department Director in Royal College of Art, considers that “design should not only show people a more beautiful world, but more importantly trigger their aspiration for this world” iii. By virtue of the concept of unfamiliarity in the field of literature, Donne proposes to add inhumanity elements in design, and poeticize the distance between man and design products with “alienation” and “dissimilation” methods. Products may not necessarily

live up to people's expectations, as they can also create surprise and stimulus to draw away the distance between man and object and obscure the relation between the two. In this way, people are able to appreciate works based on original cognition. Audiences or users are not passive receivers of design products, but active experiencers instead. Throughout free interaction, they do not have to rely on original knowledge to interpret the new design, but can expand the psychological stimulus provided by design products to more profound and private psychological demands. Interactive design offers a new feasible method for people to reflect over existing problems, and demonstrates more sophisticated and profound matters in man-nature relation in future design works. At present, nearly all interactive design works are actualized or demonstrated by computer design. Devoid of the carrier of new computer media, interactive design is nearly inconceivable.

## **4. Conclusion**

The development of dynamic art has an increasingly intimate connection with computer design, and corresponding creativity, expression and way of communication also transit from static direction to dynamic and even interactive direction. The artistic characteristics of dynamic design comprise five major concepts.

### **4.1 Concept of Change**

Change of visual language elements fabricates the foundation of dynamic design, including the change of elements and the change of movement state. Visual language elements contain form, color and texture. While visual language elements in movement state contain position, direction and speed of movement. The change of elements and movement state are always interlaced to form a more compound form of movement. The changing forms of visual language elements include gradual change form and sudden change form. Moreover, the two sorts of changing forms decide the pace of element movement. Dynamic design explores the changing path of visual language in multiple regards. Computer design can simulate all possibilities of changes in the dynamic design process. For instance, new tactile sense and texture will be created by introducing various materials and merging with patterns in the computer. Designers are able to explicitly show the visual characteristics of materials, such as softness or hardness, thickness or fineness, brilliance, dim, transparency or non-transparency, and further apply such experience in design.

### **4.2 Concept of Time**

Time is the coordinate indicative of movement which could be used as a referent of changes. Time as the continuity of material movement shows the chronological association and sequence of movement. In static design works, plot is static for the reason that no time dimension is involved. While time in dynamic design possesses the traits of continuity and fragment and it can be either objective or subjective. In dynamic design, movement is shown by space changes and concluded as the spatialization of time in the end. In the three-dimensional space of computer dynamic design, analysis on research subjects is more hierarchical and associated. As subjects may be combined or separated, the design is capable of creating an ever-changing space. Consequently, timeliness is simultaneously introduced along with space authenticity virtualization.

### **4.3 Concept of Space**

Time structure and space structure are correlated in dynamic design. Space structure lies in the foundation of time structure. Owing to the invisibility of time, time structure needs to be displayed by space movement. Space is the scope of movement, including mobile object position, size and volume. Space falls into two-dimensional space and three-dimensional space, static space and dynamic space, interrupted space and continuous space, confined space and infinite space, objective space and subjective space, realistic space and fantastic space, etc. Dynamic design expresses the infinite possibilities of space in works, and reveals static or dynamic changes. As computer graphics correspond to a series of data, different rules could be directed to change data and graphics

concurrently. These rules are actually instruction programs used for creating space depth and movement characteristics. Through these instruction programs, computer design can construct and modify forms in the space and accordingly seek dynamic design inspiration from quasi-realistic three-dimensional space.

#### **4.4 Concept of Power**

Material changes not only show changes alone, but also driving power. Dynamic changes could be only perceived via such power. Different properties of power also result in different presentations of material movement. For instance, power includes internal power and external power. The difference between the two is whether the form of material changes in movement. Under some circumstances, racing automobile and rocket may also show certain “low” properties in high-speed movement. The reason is that objects in such movement do not show internal explosive power and the movement is driven by external force. When wild geese and cheetahs move in the animal world, their internal power will be released so that movement form regularly changes with pace. Computer design can observe object movement state and direction of power, or calculate the relation of all parts in crossing, contrast or collision, thereby realizing the free expression of all powers in dynamic design.

#### **4.5 Concept of Media**

The interaction relation between man and nature is actualized by media. The “man-made world of object” is inundated with mediating roles between man and nature. While in the man-made world of object, computer and network are exceptions. As stated by Bill Moggridge in *Designing Interactions*, “two things initiate the age of interaction, namely interface and mouse”. Nowadays, the computer to which interface and mouse refer is representing objects in more diversified, novel and flexible forms. People are surrounded by so many visible and invisible computers and connected to the high-speed Internet here and there. In such embedded and wearable Internet of Everything, interaction form and contents are constantly expanded. Future interface will be no more even, regular and tangible as a screen, but will overlapped with the real world as a whole. Former focus on visual and tactile sense will be replaced by auditory sense, smell sense, taste sense and more sensory organ experience. Data mining and detection and social computing make design feedback and experience more precisely acquired. V In interactive design stage, dynamic design still inherits the intrinsic design characteristics like “relation-based design”, “start with human experience and feedback”, etc. However, the high-related computer technology revolution made up of Internet, big data, cloud computing and artificial intelligence creates new forms and contents for relation, experience and feedback.

Characteristics of dynamic interaction sculpture illustrate that its design means has highly generalized the world of people and the relation between man and world. Nowadays, prosperous dynamic interaction sculpture is not limited to the creation of a sculpture or an object. Dynamic interaction sculpture design promotes human recognition to a new height in exploring the relation between man and object, namely human spiritual experience.

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