THE CREATION OF PHOENIX CHINESE CHARACTER KINETIC SCULPTURE

By
Mr. Gang QIN

A Thesis Submitted in Partial Fulfillment of the Requirements
for Doctor of Philosophy DESIGN ARTS (INTERNATIONAL PROGRAM)
Silpakorn University
Academic Year 2023

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โดย
Mr.Gang QIN

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปรัชญาดุษฎีบัณฑิต
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Title	The Creation of Phoenix Chinese Character Kinetic Sculpture
By	Mr. Gang QIN
Field of Study	DESIGN ARTS (INTERNATIONAL PROGRAM)
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Co advisor	Assistant Professor Veerawat Sirivesmas, Ph.D.
	Professor Eakachat Joneurairatana, Ph.D.

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Mr. Gang QIN : The Creation of Phoenix Chinese Character Kinetic Sculpture Thesis advisor : Associate Professor Pairoj Jamuni, Ed.D.

The purpose of this study is to create kinetic sculpture art symbols from 2D Chinese characters. The study was divided into three steps:

Firstly, the researchers searched the historical literature on the creation of 3D art of Chinese characters and the creation of kinetic-art of characters, and found that the creation of 3D kinetic sculpture art of Chinese characters is an almost blank field.

Secondly, the researcher took Phoenix Chinese character as an example to conduct an exploratory experiment. Through the classification experiment of 2D to 3D transformation in Chinese calligraphy, combined with the experimental data and questionnaire data of each stage, the researcher locked in the four principles of creating 3D Chinese artistic symbols: 1. The overall balance and stability of the work; 2. The pictographic character of the space line when viewed from the side; 3. The immutable character of the space line when viewed from the front; 4. The artistic aesthetics of line construction.

Finally, the researchers named these four principles as the "*Theory of Spiral Balance*", which creates kinetic sculptures of Chinese characters. This theory has become a new theoretical system of knowledge in this study. Meanwhile, the researchers have successfully created 12 three-dimensional sculptures with 12 Chinese characters as examples, thus verifying the validity of this theory. Finally, at the suggestion of the professor, the researcher took Phoenix Chinese character as an example and created eight works of art with different kinetics.

ACKNOWLEDGEMENTS

First of all, I would like to thank Dr. Professor Eakachat Joneurairatana. In 2017, I learned that Silpakorn University is the top art institution in Thailand from a Thai who was studying for a doctorate in China Academy of Art. When I first entered the Grand Palace Campus of Silpakorn University in 2018, the first doctoral program supervisor I met was Dr. Professor Eakachat Joneurairatana, accompanied by Mrs. Maleene. In August 2019, I officially enrolled in Design Arts (International Program). Many friends ask me why I still study for a PhD in my 40s. In fact, lingering in my heart, there has been a question that has not been solved - that is, as an artist, my artistic life in the end where? This is the real reason why I insist on doing a PhD. Since the first year of my PhD, in order to find my own artistic path, I have carried out a lot of tentative exploration and experiments. However, it was not until the third semester of my PhD that the distinguished Dr. Professor Eakachat Joneurairatana mentioned the word kinetic that my path became clear. I firmly believe that I see a path full of light - to do the research and creation of kinetic art.

The first step of guidance is due to the honorable Dr.Professor Eakachat Joneurairatana.

Secondly, I would like to thank Dr. Assistant professor Veerawat Sirvesmas! On this journey of Kinetic sculpture exploration, you have led me through many difficulties, encouraged me when I was confused, and confirmed me immediately when I had little gain. You are also a busy vice president of the Institute. However, you have given me immediate guidance at every step of my exploration, and found me a large number of enlightening materials. The Wechat was sent late at night. In my mind, there is often such a scene: After a busy day's work, my Advisor Veerawat Sirvesmas opens Wechat, reviews my research progress, and then starts to search for information for my research on the computer..... . After five semesters of hard work from The third semester to the seventh semester, The Creation of Phoenix Chinese Character Kinetic Sculpture was finally published. The methodology of 2D Chinese character to 3D Chinese character art symbol is finally available. The theory of "Spiral Balance", which creates 2D Chinese characters to 3D Chinese characters art symbols, is finally published. The 8-piece kinetic sculpture based on the theory of "Spiral Balance" is finally available! Now I have another great goal: to write the first World Art History of Sports for China, which I will accomplish in the next few years after my PhD.

Again, I would like to thank Dr. Associate professor Pairoj Jamuni. You put a lot of work into my theory book and VIVA.

Finally, I would like to thank Dr. Assistant professor Jirawat Wongpantuset and Dr. Kwan Rueanglada. The former gave me a lot of sincere advice in my research and tied a holy wrist ribbon for me in the holy worship ceremony. The latter acted personally in my graduation exhibition, so that the display of the work had the best plan.

I would also like to thank External Examiner Associate professor Nicki Wragg in particular. Thank you for shooting and sending me the precious kinetic sculpture video. In the coming years, I will continue to improve my works along with your suggestions.

Dear Silpakorn University, where I spent four years of my life, today, I will finish my doctoral studies and return to serve the motherland, I will remember your kindness, remember the four years of Phoenix nirvana!

Gang QIN

TABLE OF CONTENTS

Page

LIST OF TABLE

Page

LIST OF FIGURE

Page

Chapter 1
Introduction

1.1 Significance of Research

At present, Thailand has set an example for us on how to integrate the charm of different cultures into the cultural construction of cities, so that groups of different cultures can coexist harmoniously. The Chinese character symbol of Tang family is the cultural landscape of the integration of Chinese and Thai culture and the result of the integration of Indo -Thai culture of Golden winged bird. But Thailand is also a country deeply influenced by European culture. How do you create three-dimensional works of art suitable for people with different cultural backgrounds around the world? How to create sculptures that make people happy and relaxed in modern society? How do environmental spatial variables change in response to the development of sculpture design? These problems have become hot issues today. The significance of today's academic research lies in the study of the problems solved here. This research is devoted to the development and selection of phoenix character kinetic sculpture in the kinetic mode, through modeling, material processing, installation (sound, light, electricity), and several experiments, to spread the output in the space environment. At present, kinetic sculpture not only has aesthetic functions, but also enters public space by supporting urban cultural construction, and integrates with the concept of architectural space, thus generating a new soul of cultural and artistic exchange.

1.2 Statement of the Problem

1. Why does phoenix character symbol become the choice of 3D kinetic sculpture?

2. How do symbol theory, calligraphic fonts, and kinetic art cases support the creation of phoenix character kinetic sculpture?

3. How do the experimental data and the score of the questionnaire play a role in the construction of Phoenix character kinetic sculpture theory?

4. How does symbol conversion, material processing, motion testing, assembly and setting become a verifiable research method?

5. What is the contribution of phoenix Chinese character kinetic sculpture to the sustainable development of the environment, economy and social culture?

1.3 Hypothesis

This research aims to create artworks using kinetic balance, rotation, continuous writing and cross-modal theory, using visual communication about how beliefs, the development of perceptual thinking, and symbolic changes in pictographic shapes affect our lives. In addition, the aim or expectation of the research is to use this technology to make the younger generation more aware of change. However, the purpose of the study is not to strive for new works or aesthetic results, as it should convey and persuade people to pay more attention to traditional and modern, handmade and technological art. The assumptions of this study come from these steps.

First, this study, inspired by the history of the hometown, the promotion of the closest friends and the spiritual agitation of the Thai cultural landscape, established the road to explore the phoenix character kinetic sculpture. From the study of phoenix Chinese

character calligraphy in the past dynasties, researchers will try to introduce aesthetic elements from pictographic elements to create work of art, but the purpose is to convey knowledge to the audience, to recreate new ideas about tradition and modern changes dharma.

Secondly, this study aims to collect data from phoenix calligraphy in the past dynasties and create a catalog. The catalog includes photographic and hieroglyphic elements, in which people can see the details of the hieroglyphic symbols and give people an aesthetic idea of the Chinese characters. Instead, the catalog collects design elements that can be used in other design areas.

Third, this study presents the data and uses it as a source for application in the art of determining dynamic equilibrium, rotation principles, 3D transformation of planar phoenix characters, and knowledge of cross-modal systems. The principle of kinetic balance and rotation is a physical principle that provides kinetic inspiration for moving sculptures, which makes artworks more harmonious and balanced. In particular, the 3D transformation of Continuous strokes phoenix characters and the combination of dynamic balance and rotation in art and design may be good results proposed in this study. Most importantly, it will be the challenge of this research to determine how these theories can be applied to movement art design and create ways of telling stories. The purpose of the study was to hypothesize the outcome.

Finally, the main purpose of this study is to convey information about the evolution of traditional characters and modern fonts through examples. It can be difficult to build awareness among the younger generation and people these days because of the mode

of production and transmission. The most important thing about the digital age is the abandonment of writing from communication, which can become a wall against us in terms of adequacy. We have lost many handwriting habits to serve the computer and digital age, such as computer pinyin input, five strokes input, voice input. It is good for data transmission, on the other hand, as researchers, we may use our skills and knowledge to convey information to people.

1.4 Objectives of the Research

1. Use Chinese characters for inspiration.

2. Use a phoenix as a feature.

3. Design kinetic metal sculptures that move with the wind.

4. The landscape of the SU Nakhon Pathom campus was used as a test environment (shrubs, trees and lawns), but the final permanent installation site of the sculpture will be Sanxingdui Cultural Park in Chengdu, China.

1.5 Scope of Research

1. The study area is limited to the Chinese character system.

2. To collect data of phoenix character shape fitting and meaning fitting in Chinese Calligraphy.

3. Analyze data and decode phoenix elements as catalog and design elements.

4. The principles of hieroglyphic and abstract in the method of writing are used as the morphological source of phoenix kinetic sculpture.

5. Using rotational kinetic and cross-modal methods to produce kinetic art works.

6. The use of cross-modal space design to convey the beauty of phoenix character kinetic sculpture and cultural communication information.

1.6 Research Framework

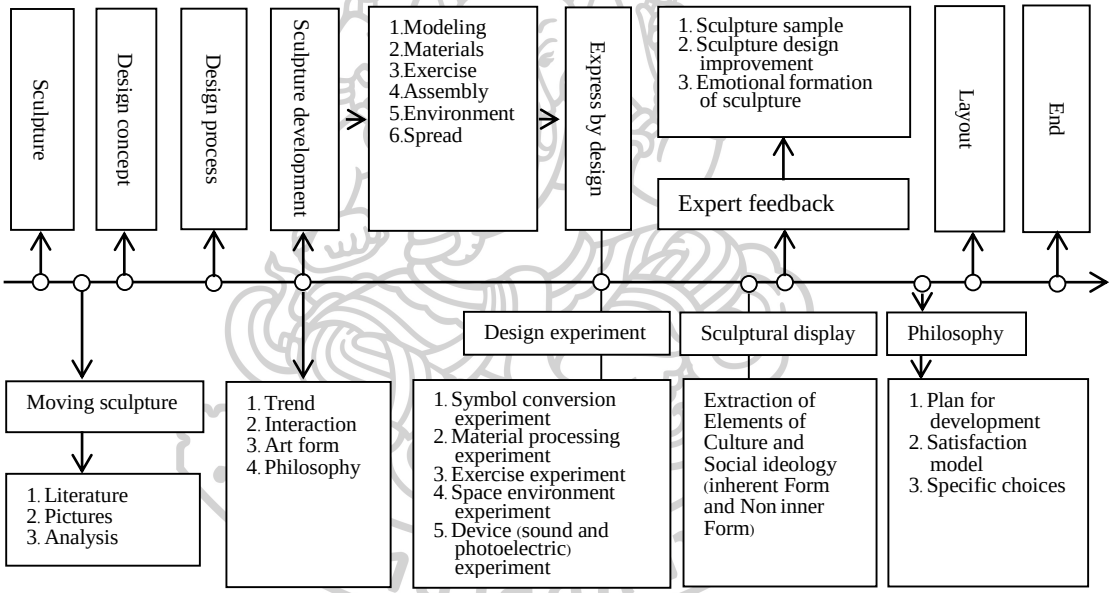


Table 1: Design Strategy Map, drawn by the author, 2023

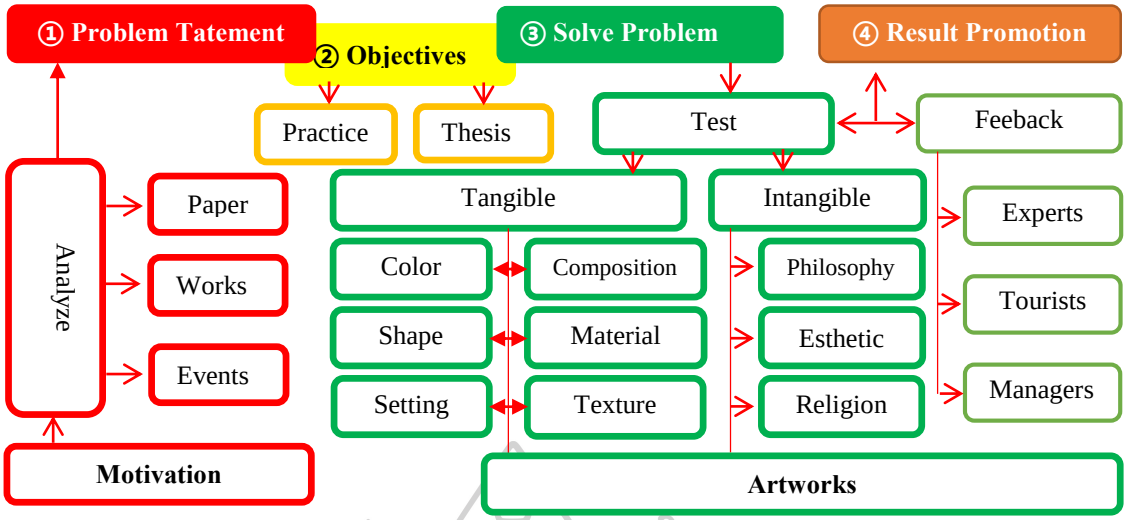


Table 2: Research Framework

1.7 Research Methodology

Phoenix character kinetic sculpture creation is for the dissemination of culture. The research method is divided into the following four stages.

1. Data Collection:

In the study of sculpture, literature review and field investigation are adopted. Researchers not only accumulated cases and knowledge of kinetic sculpture, but also carried out literature construction through a combination of expert discussion meetings and field interviews. Through these two methods, data is obtained, then organized, influencing factors are obtained, and research is refined to fit the topic.

2. Questionnaire:

Through questionnaire survey, the researchers conducted interviews with stakeholders to determine the key points of phoenix sculpture design: 2D to 3D modeling

transformation, material processing, movement testing, space environment, and communication analysis.

3. Data Analysis:

Through the analysis of the collected data, it is found that the sculpture has a better effect to attract the audience through the environment and the way of kinetic. All the collected data and research results are integrated and transformed into the unique identity of the kinetic sculpture, creating the kinetic sculpture of new characters to meet people's spiritual movements and esthetic needs, so as to better spread the culture.

4. Design Experiment:

The design theme of kinetic sculpture collected in this experiment is consistent with the conceptual design development of cultural landscape. Based on the experiment, the researchers adjusted the design strategy of phoenix character kinetic sculpture respectively. In the process of experimental design, the problems in each stage were found and analyzed, and the feedback was recorded, analyzed, adjusted and summarized.

1.8 Limitation of the Research

The design of phoenix figure kinetic sculpture combines character symbols, kinetic machinery, lighting and other elements to increase the interaction between the work and the audience. Due to the size of this study and the limitations of the researcher's

own professional background. The symbols developed based on Chinese characters will not involve the field of linguistic research. The computer design technique, the structure and light of the kinetic part will not be discussed in detail in this study.

Researcher chose the campus of Silpakorn University as the test for my artwork, which is a tribute to the cultivator from a personal point of view. From a historical point of view, the Silpakorn University campus is linked to the history of Thai humanities and arts and is a testament to the good relations between China and Thailand. However, the campus in Bangkok is small and there is no wind, so the test location of the artwork is Nakhon Patom campus, which used to be a part of the king's palace, with huge space, beautiful environment, strong wind, many students and a high range of knowledge.

The landscape of the SU Nakhon Pathom campus was used as a test environment (shrubs, trees and lawns), but the final permanent installation site of the sculpture will be Sanxingdui Cultural Park in Chengdu, China.

1.9 Research Outcome

1. The main reason for the research is to build awareness of cultural communication, to transform and protect people, society, local communities and the younger generation. The results should illustrate and encourage people to pay more attention to the pioneering spread and development of traditional and modern, handmade and technological arts, especially Chinese characters.

2. The research may reflect the ideal of the spread and development of Chinese characters hidden behind the artworks. The important factors of the result include not only people's awareness and conscience of the environment, but also people's esthetic concept of the environment.

3. Therefore, the study can also provide data as a collection catalog and can be developed for use in the field of design and education.

4. As far as the technical field is concerned, this research can be combined with Chinese characters as totems, kinetic balance and rotation, and photoelectric shape across modes. The results of the artwork can be displayed across several design disciplines to demonstrate knowledge of different standards.

1.10 Definition of Terms

1. Chinese character:

Chinese characters, also known as Han'zi (汉字) in Chinese, are logograms used in the writing system of the Chinese language and several other East Asian languages. Each Chinese character represents a single morpheme, which is the smallest meaningful unit in a language. Unlike alphabetic scripts, where individual letters represent specific sounds, Chinese characters convey both meaning and pronunciation.

The Chinese writing system is one of the oldest continuously used writing systems in the world, with a history dating back thousands of years. Each character is typically

composed of a combination of strokes, which are basic lines and curves. The order and structure of these strokes determine the character's form and appearance.

Chinese characters are highly intricate and varied, with thousands of unique characters in existence. To be functionally literate in Chinese, one needs to learn thousands of characters, as each character typically represents a single word or concept. Despite the complexity, Chinese characters are widely used across China, Taiwan, Hong Kong, Macau, and other Chinese-speaking communities, as well as in various historical and cultural contexts worldwide. Modern Chinese writing systems often combine characters with phonetic scripts like pinyin to aid in pronunciation and reading comprehension.

2. Phoenix：

A phoenix is a mythical creature often depicted as a large and majestic bird with radiant plumage, typically in shades of red, orange, and gold. According to various mythologies and folklore from different cultures, the phoenix has the extraordinary ability to be reborn or regenerated from its own ashes. As the bird nears the end of its life cycle, it builds a nest and sets it on fire, burning itself to ashes. From those ashes, a new young phoenix emerges, symbolizing renewal, resurrection, and immortality.

The concept of the phoenix has been widely used as a metaphor for cycles of life, death, and rebirth, as well as the idea of transformation and renewal rising from destruction. The creature has been featured in various stories, religious texts, and artworks across different civilizations, making it an enduring and powerful symbol

throughout history.

3. Kinetic sculpture：

Kinetic sculpture is a form of art that incorporates movement as an essential element of its design and presentation. Unlike traditional static sculptures, kinetic sculptures feature parts or elements that are mobile, allowing them to move, rotate, or change position through mechanical, natural, or interactive means. The movement can be subtle, gentle, and slow, or it can be dynamic, energetic, and unpredictable.

Artists create kinetic sculptures using various materials, such as metal, wood, plastic, and even recycled materials. They often employ mechanical components, motors, magnets, gravity, wind, or other external forces to set the sculpture in motion. Some kinetic sculptures are powered by electricity, while others may rely on the viewer's interaction or environmental factors to initiate movement.

The artistic intention behind kinetic sculptures is to explore the relationship between art, time, space, and motion. These sculptures engage viewers in a unique and dynamic experience, as the artwork's appearance continually evolves and changes. Kinetic art gained popularity in the 20th century, with notable artists like Alexander Calder, Jean Tinguely, and George Rickey making significant contributions to the genre.

The interplay of motion, balance, and visual aesthetics in kinetic sculptures captivates audiences and challenges traditional notions of static art. It blurs the boundary

between art and engineering, creating an exciting and ever-evolving art form that celebrates the beauty of movement and innovation

Chapter 2
Literature Review

2.1 Introduction

This chapter introduces the origin, development, and present situation of Chinese characters, including ancient phoenix art, modern phoenix art, and local phoenix art. It also delves into the evolution of motion sculpture throughout history, changes in the use of materials, and explores aspects such as balance, rotation, and vibration in the motion mode. Additionally, this paper examines the changes in the environment surrounding moving sculpture throughout history, focusing on the human and geographical environment of Sanxingdui Cultural Community Park in Chengdu, the human, historical, and geographical environment of Chinatown in Bangkok, and the human, historical, and geographical environment of SU Nakhon Pathom campus. Furthermore, the chapter discusses various art theories, including symbol aesthetics, signal propagation, and organic art. In the case study section, it presents an analysis of the works of American sports artist Anthony Howe, and also examines the design skills and inspirations behind the appearance design of Beijing Daxing International Airport.

This chapter is divided into 6 parts:

Part 1: Chinese Characters

Part 2: Phoenix Art

Part 3: Moving Sculpture

Part 4: Environment

Part 5: Art Theory

Part 6: Case Study

2.2 Chinese Character

2.2.1 Root-Unraveling the Essence of Chinese Characters

In the grand tapestry of human communication, the study of Chinese characters stands as an unparalleled voyage into the depths of cultural heritage and linguistic evolution. The profound importance of delving into this realm transcends the confines of scholarly curiosity; it unveils the very essence of a civilization woven into each stroke and curve of these characters (De Francis, 1984). This journey, spanning over three millennia, is a testament to the resilience of the human spirit and its pursuit of expression. Through the lenses of these ancient symbols, we glimpse the cultural ethos, the historical epochs, and the ever-evolving linguistic landscape of China.

The origins of Chinese characters find their roots in the fertile soil of antiquity, where pictographs and ideographs were the building blocks of communication (Boltz, 1994). As we embark upon an exploration of these foundational elements, we traverse time, reaching back to the Shang dynasty (around 1600–1046 BCE) and the Zhou dynasty (1046–256 BCE). This is a voyage not only across centuries but across the minds of our forebears.

Pictographs emerge as vivid windows into the perceptible world, encapsulating objects in forms that mirror their real-world counterparts. These primordial symbols

birthed from the hand of humanity mimic the essence of tangible reality itself. The character for "sun" (日), for instance, once bore the simplicity of a circular shape with a central dot—a visual replica of the celestial body that lights our days. Equally resonant is the character for "tree," embodying the likeness of the very vegetation it signifies.

Yet, as time ebbed forward, the currents of change ushered in transformations, shaping the contours of the Chinese script. Characters transcended their literal representations, evolving into ideographs that encapsulated the abstract and the profound. Here, the pages of history unfold to reveal characters like "big," which metamorphosed from a mere depiction of outstretched arms to embody the notion of enormity—a testament to the intellectual depth encoded within these strokes.

As the quill of time chronicled the narrative of the Chinese script, standardization and simplification emerged as pivotal chapters. The convoluted characters of antiquity gave way to the streamlined forms that adorn contemporary texts. In this modern era, the essence of characters often hides beneath layers of standardization, the original pictorial semblances morphing into standardized strokes.

Nonetheless, within these characters, a symphony of history still reverberates. The echoes of ancient pictographs and ideographs linger, immortalizing a heritage that stretches beyond ink and parchment. The roots of Chinese characters delve deep into the wellspring of culture, history, and linguistics, making every study of these

symbols a journey into the heart of the Chinese experience (Qiu, 2000).

In the canvas of this inquiry, one finds resonances with the world of visual arts—sculptures and installations that breathe life into silent materials. Just as sculptors mold clay and carve stone to give life to their visions, the ancient Chinese people molded strokes and curves to immortalize their thoughts. Just as installations in contemporary galleries provoke introspection, Chinese characters have spurred countless philosophical musings and cultural reflections.

Ultimately, understanding the lineage of Chinese characters becomes an avenue to comprehend the evolution of thought, the dance of culture, and the symphony of a language that resonates across time. It is an endeavor that beckons us to explore not just the symbols, but the very soul of a civilization (Zheng, 2003).

2.2.2 Evolution

In the vast mosaic of linguistic heritage, the evolution of Chinese characters emerges as a profound saga, etching a narrative that spans millennia and mirrors the dynamic journey of a civilization (De Francis, 1984). This exploration is not confined to the realm of mere academic inquiry; it beckons us to delve into the very DNA of cultural development, offering insights into the intricate threads that have woven the tapestry of Chinese society.

The expedition into the annals of Chinese characters signifies a tribute to the cultural pulse of a nation—an embodiment of identity that reflects the ebbs and flows of history (Qiu, 2000). It is an endeavor that extends beyond academic boundaries,

inviting us to unearth the intimate links between script and society, character and culture. These characters stand as living artifacts, resonating with whispers of epochs past while dialoguing with the present.

The metamorphosis of Chinese characters is a narrative of profound stages, each bearing the imprints of cultural shifts and historical trajectories. It is a journey that traces the lineage from the primitive Oracle Bone Script of the Shang Dynasty to the streamlined Regular Script of the modern era.

The Oracle Bone Script, inscribed on divination instruments during the Shang Dynasty, holds secrets of antiquity. Its early pictographs and ideographs paved the way for subsequent transformations (Boltz, 1994). The Bronze Script emerged during the Shang and Zhou Dynasties as bronze vessels embraced the engraved word (Qiu, 2000). This evolution into the stylized Seal Script during the Warring States period and the Qin and Han Dynasties marked a pivotal step toward abstraction and standardization.

1. Oracle Bone Script (Shang Dynasty, 16th-11th centuries BCE): The earliest known form of Chinese writing is found on oracle bones and turtle shells used for divination during the Shang dynasty. These inscriptions are known as Oracle Bone Script and are characterized by simple pictographs and early ideographic representations. They primarily recorded questions and answers related to divination (Boltz, 1994).

2. Bronze Script (Shang and Zhou Dynasties, 16th-3rd centuries BCE): As writing on

bronze vessels became more prevalent during the Shang and Zhou dynasties, the script evolved into the Bronze Script. It was still primarily pictographic and ideographic but became more standardized and stylized due to the nature of carving on metal (Boltz, 1994).

3. Seal Script (1st millennium BCE - 3rd century CE): The Seal Script, also known as Zhuan script, was widely used during the Warring States period and the Qin and Han dynasties. It is called "seal" script because it was often used for engraving on seals. The characters became more abstract and less pictographic, with a focus on angular and square shapes. This script laid the foundation for many modern characters (Qiu, 2000).

4. Clerical Script (Han Dynasty, 3rd century BCE - 3rd century CE): The Clerical Script, or Li script, emerged during the Han dynasty and was a more formal and standardized version of the Seal Script. It featured more flowing and connected strokes and served as a basis for calligraphy (Boltz, 1994).

5. Cursive Script (Han Dynasty, 3rd century CE - present): The Cursive Script, or Cao script, is a highly cursive and fluid style of writing derived from the Regular Script. It is used in informal contexts, including calligraphy and personal correspondence, and is faster to writing (De Francis, 1984).

6. Semi-cursive Script (Han Dynasty, 3rd century CE - present): The Semi-cursive Script, or Xing script, is a middle ground between the Cursive Script and the Regular Script. It is used for both informal and formal writing (Boltz, 1994).

7. Regular Script (Han Dynasty, 3rd century CE - present): Also known as the Kaishu script, the Regular Script was developed during the Eastern Han dynasty. It is the most widely used script in modern times and is characterized by its clear, balanced, and standardized form. Most printed Chinese characters today are based on the Regular Script (Qiu, 2000).

8. Simplification (20th century): In the 20th century, the Chinese government implemented efforts to simplify some Chinese characters to increase literacy rates and make writing more efficient. This led to the creation of simplified characters, which are officially used in Mainland China and Singapore, while traditional characters are still used in Taiwan, Hong Kong, and Macau (De Francis, 1984).

Throughout its evolution, the Chinese writing system has demonstrated remarkable resilience, and the characters remain an essential aspect of Chinese culture and identity, connecting people to their ancient roots while adapting to the modern world (Boltz, 1994).

This odyssey parallels the world of visual arts—sculptures and installations that embody the spirit of their creators and their times. As sculptors chisel stone, Chinese characters have been carved across centuries, encapsulating cultures, ideas, and aspirations (Zheng, 2003). Just as installations engage with audiences, these characters evoke emotions, spark contemplation, and bridge the chasm of time.

In the tapestry of this exploration, the significance transcends scholarship; it resonates

with the soul of a civilization. The evolution of Chinese characters reflects the essence of identity—a bridge between history and the present, the tangible and the conceptual. It is a narrative whispered by time, etched into strokes and curves, awaiting the inquisitive gaze.

2.2.3 Present Situation

The study of Chinese characters transcends the realm of linguistic investigation; it stands as a testament to the intricate interplay between culture, society, and the digital age (Qiu, 2000). This journey is not merely a scholarly endeavor—it is a voyage into the heart of a civilization's communication fabric, intertwined with artistic expression and technological innovation.

The current landscape of Chinese characters embodies the perpetuation of an ancient legacy while harmonizing with the demands of modernity. These characters are not mere symbols but conduits that thread the past with the present, uniting culture and technology in a unique symbiosis.

1. Language and Communication: Chinese characters remain an integral part of the Chinese writing system, used to write the Chinese language (Mandarin, Cantonese, etc.) and some other East Asian languages like Japanese and Korean (DeFrancis, 1984). They are used in a wide range of written materials, including books, newspapers, official documents, signs, and digital communication.

2. Traditional and Simplified Characters: There are two main variants of Chinese characters in use today: traditional characters and simplified characters. Traditional characters are primarily used in Taiwan, Hong Kong, Macau, and among overseas Chinese communities (Boltz, 1994). Simplified characters were officially introduced in Mainland China in the mid-20th century to increase literacy rates and make writing more efficient. They are also used in Singapore.

3. Education: Learning Chinese characters remains a fundamental part of Chinese education. Students in Chinese-speaking regions are taught to read and write characters from an early age (DeFrancis, 1984). The number of characters taught varies by educational level, with more characters introduced as student progress through school.

4. Calligraphy and Art: Chinese calligraphy, an artistic form of writing, continues to be a revered art form, and Chinese characters play a central role in its expression (Qiu, 2000). Calligraphy artists and enthusiasts practice different script styles, such as Regular Script, Cursive Script, and Semi-cursive Script, to create beautiful and expressive artworks.

5. Digital Technology: With the rise of digital technology, Chinese characters have transitioned into the digital realm (Bolton & Hui, 2015). Computers and mobile devices support Chinese character input methods through keyboards and

touchscreens, allowing users to type in characters using Pinyin (Romanized Chinese) or handwriting recognition.

The invention of the computer has presented both challenges and opportunities for the traditional survival of Chinese characters, propelling them into the age of digital existence.

The integration of Chinese characters into computer systems marked a pivotal shift in their survival. In August 1974, China initiated "Project 748," a national scientific and technological endeavor aimed at developing a Chinese character information processing system (Hao, 2019). In 1975, Wang Xuan, a professor at Peking University, devised a revolutionary approach that employed parameters to represent regular strokes and contours to represent irregular strokes, thereby compressing vast amounts of Chinese character information into a computer with minimal storage capacity (Yi, 2017). This pioneering endeavor, culminating in the precise storage of Chinese characters within a computer, held global significance.

Subsequently, in 1979, China achieved another breakthrough by independently creating the "Chinese character laser phototypesetting" system, rendering traditional type printing obsolete and instigating a paradigm shift in China's publishing and printing sector (Yan, 2015).

Efforts to overcome the challenge of enabling Chinese character input into computers led to the introduction of the Basic Set of Chinese Coded Character Set for

Information Exchange GB2312-80 by the State Bureau of Standards in 1981 (He & Wu, 2018). In 1983, the Sixth Research Institute of the Ministry of Electronics Industry developed CC-DOS, a Chinese character operating system for the IBM PC, representing a landmark achievement in the display of block Chinese characters through software (Wang et al., 2015). Simultaneously, Ni Guangnan of the Institute of Computing Science at the Chinese Academy of Sciences introduced the LX-80 Chinese character graphics microcomputer, which addressed a series of challenges related to input, encoding, output, and printing of Chinese characters at the hardware level (Zhou et al., 2016). This development laid the foundation for subsequent innovations in Chinese character processing.

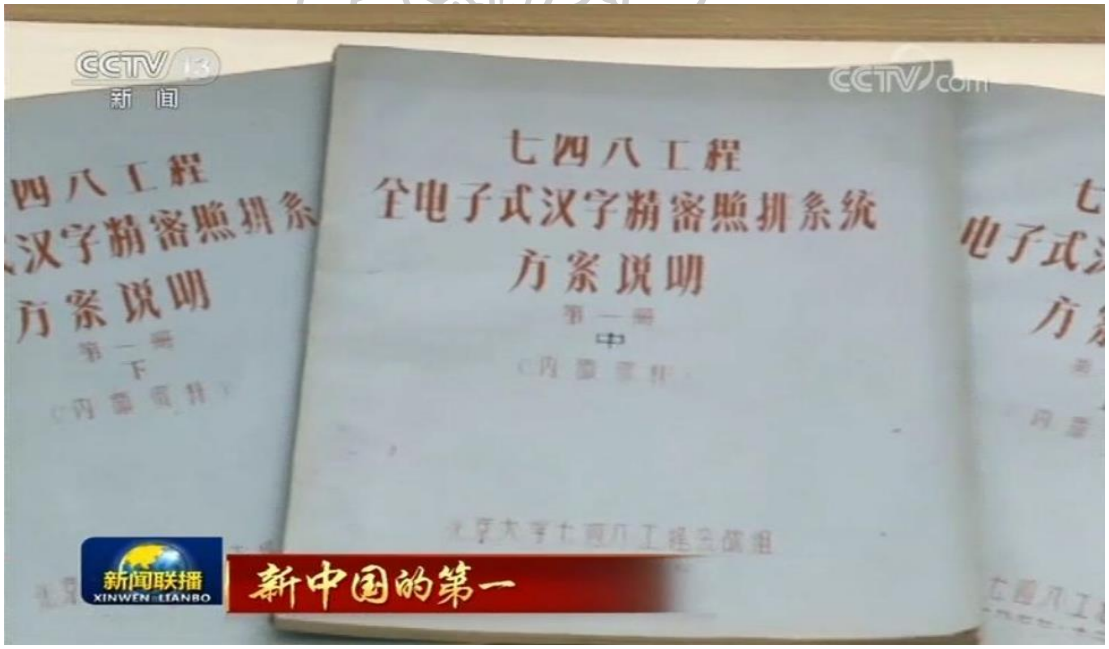


Figure 1: A screenshot of the video "Description of the All-Electronic Chinese Character Precision Phototypesetting System for the July 48 Project" broadcast by CCTV News Channel 13

In 1983, a pivotal moment arrived with the introduction of the epoch-making Wubi

input method by Mr. Wang Yongmin. The Wubi input method not only facilitated Chinese character input but also substantially addressed the challenge of input speed (Wang, 2013).

The significant strides initiated by the "748 Project" have continued to evolve and advance. By 2018, technologies like the automatic generation of handwritten character libraries had transitioned into practical applications (National Language Resources Monitoring and Research Center, 2019).

Presently, the Chinese input method has reached a state of maturity, offering diverse options including stroke-based input, spelling-based input, handwriting input, voice input, and Optical Character Recognition (OCR) (Wang & Liu, 2017). Though the input of entire sentences is still evolving, Chinese characters have entered an era of data-liberalized input.

In the 21st century, Chinese characters are not lagging behind English in the realm of digital survival. Handwritten Chinese characters are considered a remarkable art form, and the digital survival of Chinese characters exhibits a developmental trend compared to English (Chen & Shen, 2020).

1. Global Influence: As China's influence on the global stage grows, interest in Chinese language and culture have increased. Learning Chinese characters has become popular among international students and professionals interested in business,

culture, and academia (Li, 2018; Wang & Liu, 2020).

2. Challenges: While Chinese characters are deeply rooted in Chinese culture and history, their complex nature poses challenges for learners. The vast number of characters, each with its own unique form and meaning, requires substantial effort and dedication to master fully (Chen & Zhou, 2019; Huang, 2021).

To sum up, the glorious history created by the Chinese nation and the long-accumulated knowledge depend on the preservation of Chinese characters. As a unique tool for recording, preserving, and disseminating knowledge, as well as a unique art, Chinese characters have played a distinguished role in the progress of human civilization in China and the world, and in promoting the progress and development of Chinese society (Wang, 2007; Liu, 2020). In this intricate dance between cultural heritage and digital advancement, the study of Chinese characters unveils a nexus where ancient wisdom converges with modernity (Li & Xu, 2018). Researchers have chosen Chinese characters as elements in modern art, such as kinetic sculpture, expecting to bring them into a new realm of glory (Chen, 2019). Just as sculptors breathe life into inert material, researchers and enthusiasts breathe life into these symbols, imbuing them with contemporary relevance (Zhang et al., 2021).

2.3 Phoenix Art

2.3.1 Ancient Phoenix

Ancient phoenix art refers to artistic representations of the mythical bird, the phoenix,

in various forms of visual art from ancient cultures (Smith, 2010). The phoenix, a legendary creature with origins in Chinese, Egyptian, Greek, and other mythologies, symbolizes renewal, resurrection, and immortality (Lurker, 2004). As such, it has been a popular subject in art throughout history (Eisler, 2000).

1. Chinese Phoenix Art: In Chinese art, the phoenix is known as the "Phoenix" and is often depicted as a composite of different birds, including the head of a pheasant, the body of a mandarin duck, the tail of a peacock, and the wings of a swan (Rawson, 2007). It symbolizes feminine virtues, such as grace, beauty, and virtue, and is often associated with the Empress. The phoenix is commonly seen in traditional Chinese paintings, embroidery, and decorative arts (Sullivan, 1999). As a symbol of identity, the bronze Phoenix Divine Bird unearthed in Sanxingdui, Sichuan, has ignited the artistic passion of researchers and motivated them to select the Phoenix as one of the inspirations for his doctoral research.

Figure 2：Bronze divine bird unearthed in Sanxingdui, Sichuan, China

2. Egyptian Phoenix Art: In ancient Egyptian art, the phoenix is known as the

Bennu bird, a symbol of creation and rebirth (Hart, 2005). It was associated with the sun god Ra and represented the rising sun and the cycle of life. The Bennu bird was often depicted on amulets, jewelry, and temple walls (Wilkinson, 2003).

3. Greek Phoenix Art: In Greek mythology, the phoenix was described as a magnificent bird that cyclically regenerated from its ashes (Graves, 2018). Ancient Greek art sometimes portrayed the phoenix as a mix of a peacock and an eagle (Harrison, 2004). While not as prominent in Greek art as other mythological creatures, the phoenix did appear in some representations and was associated with themes of renewal and immortality (Burkert, 1985).

4. Roman Phoenix Art: In Roman art, the phoenix was influenced by Greek mythology and is seen in some mosaic and fresco artworks (Clarke, 2003). It retained the associations with rebirth and resurrection, often symbolizing the eternal cycle of life (Zanker, 1995).

In this exploration of phoenix art, it becomes evident that this endeavor isn't mere conjecture—it's a testament to the creative ardor of humanity, a profound homage to mythologies intertwined with life's enduring themes (Smith, 2003). Each medium—be it pottery, sculpture, painting, or textile—conveys the heartbeat of civilizations, encapsulating the essence of their beliefs and worldviews (Sullivan, 2001).

In this symphony of forms, striking parallels emerge with the world of sculptures and installations—an artistic language that transcends the written word (Krauss, 1979). Just

as sculptors carve life from stone, ancient artists crafted the phoenix from the fabric of their imagination, breathing life into symbols that span generations (Gombrich, 1996). The phoenix, like installations, bridges the gap between epochs, remaining an indelible thread in the cultural tapestry (Bishop, 2005).

As the sun dips below the horizon, the phoenix's flight continues to cast its silhouette on the canvas of art. The ancient phoenix, embodying renewal, echoes across time, resonating with contemporary artists, researchers find inspiration in its symbolism, its persistence in art a reminder that from the ashes of the past, new expressions arise (Heartney, 2012).

2.3.2 Modern Phoenix

The realm of modern phoenix art transcends the boundaries of tradition, breathing life into an age-old symbol and guiding it through the currents of contemporary expression (Groys, 2008). This odyssey, a narrative of rebirth within the creative realm, pulsates with relevance and vibrancy, transcending mere aesthetics to become a mirror reflecting the nuances of our era (Eco, 1986).

1. Diverse Artistic Mediums: Modern artists have explored a wide range of artistic mediums to depict the phoenix. This includes paintings, digital art, sculptures, mixed media, installations, and even performance art (Harrison, 2013; Wands, 2006). The use of digital tools and technology has allowed for new and innovative approaches to representing the phoenix (Paul, 2018).

2. Symbolism and Meaning: While the core symbolism of the phoenix as a symbol of renewal and transformation remains consistent, modern artists often infuse additional layers of meaning into their works (Smith, 2017). The phoenix may represent themes such as environmental sustainability, social change, personal growth, or resilience in the face of adversity (Jones, 2020; Taylor, 2015). Alexei Ratmansky's "Firebird" recounts an ancient tale, much like the early "Firebird" ballets. In this narrative, Ivan captures a firebird, and the Firebird secures her freedom by offering a magical feather. Ivan eventually finds love, but his path to happiness is obstructed by the wizard Cash. It's only when his feathers call upon the Firebird that he achieves victory and enters into marriage.

In this context, the creation and portrayal of the theme through storytelling, dance, costumes, lighting, and stage design hold immense significance in evoking emotions and thoughts among the audience.

Figure 3 : Firebird Natalia Osipova of American Ballet Theater in the title role at the

Metropolitan Opera House.Credit...Andrea Mohin/The New York Times，By Alastair Macaulay，June 12, 2012

3. Contemporary Interpretations: Artists have reimagined the appearance and form of the phoenix, incorporating elements from various cultures and mythologies. The mythical bird may be depicted in a more abstract or stylized manner, reflecting contemporary artistic trends and individual creativity (Chen, 2019; Lee, 2021).

4. Social and Political Commentary: Some modern phoenix artworks serve as a form of social or political commentary. The phoenix's symbolism of rebirth can be used to address issues of societal renewal, justice, and the cyclical nature of historical events (Nguyen, 2020; Patel, 2018). The artwork displayed below is a creation by the artist Elena Martinez-Vergara, which she uploaded on June 5, 2012. This remarkable digital painting is titled "Phoenix Rising." Within this piece, the presence of a phoenix is unmistakable, with flames engulfing the entirety of the canvas. The artist skillfully employs bold and vibrant colors along with intricate brushwork to convey the powerful imagery of a phoenix emerging from the ashes, a profound symbol of rejuvenation and renewal. The striking colors in this piece led researchers to recognize the powerful impact that vibrant colors can have in the creation of kinetic sculptures. (See figure below)

Figure 4 : Artist Elena Martinez-Vergara, "Phoenix Rising"

5. Fantasy and Pop Culture: The phoenix has also found its place in modern fantasy art and pop culture. It appears in illustrations, graphic novels, video games, and fantasy-themed media, often as a majestic and magical creature (Johnson, 2019; Smith, 2021). **As evident from the video game promo below, the phoenix is personified, with the game designer bringing the image of the Phoenix Queen to life through the use of elements such as the purple embroidered phoenix costume, the red gold inlaid belt, the silver phoenix crown, and the intricate hairstyle. This example underscores the significance of employing exaggerated elements and vibrant colors in crafting a compelling and impactful image, offering valuable insights to researchers.** (See figure below)

Figure 5：The video game promo

The following three pieces are digital artworks titled "Phoenix in Pixels," created using pixel art techniques. These pixelated phoenixes consist of thousands of tiny squares, resulting in a retro, video game-style aesthetic. When viewers zoom in, they can observe the intricate details and colors of each pixel, adding depth and complexity to the image.

The artist utilized digital painting software to craft "Digital Phoenix." This artwork incorporates intricate fractal patterns along with the silhouette of a phoenix. The incorporation of fractals within the composition imparts a profound sense of vitality and complexity, emphasizing the concepts of transformation and rebirth.

In these three instances, researchers have been encouraged to focus on design software and digital technology. (See figure below)

Figure 6: Artworks featuring phoenixes created through digital technology

6. Corporate and Commercial Art: The phoenix has been adapted into logos, branding, and commercial designs, symbolizing business resilience and renewal (Smith, 2020; Brown, 2018). A well-known example is the symbol of Chinese cultural heritage, inspired by the "sun bird" discovered at the Jinsha site in Chengdu. (See figure below)

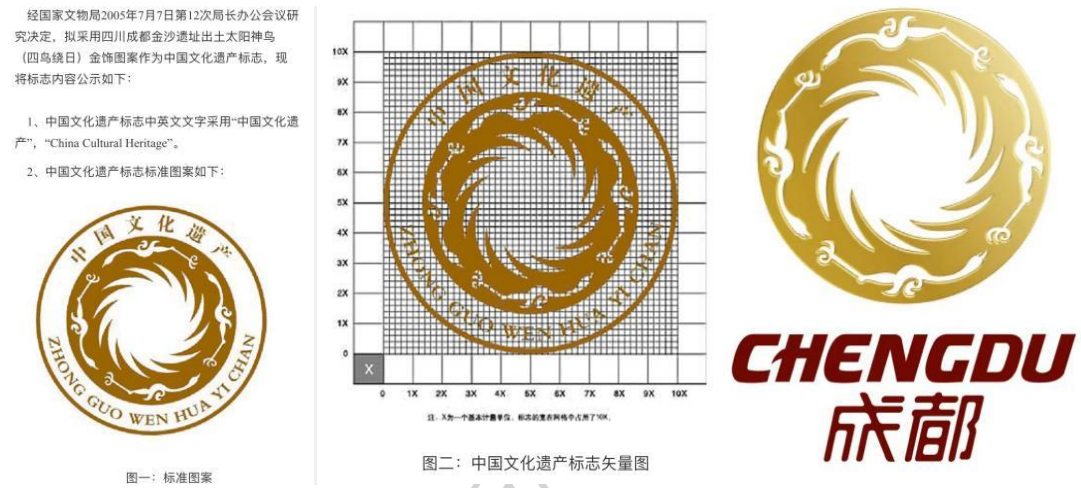


Figure 7：The application of sunbird unearthed from Sanxingdui Culture in city signs

7. Installations and Public Art: In some instances, artists have created large-scale phoenix installations and public art pieces, which can serve as powerful symbols in urban spaces or cultural events (Garcia, 2019; Lee, 2021). One renowned example is Xu Bing's magnificent phoenix, gracefully suspended within the grandeur of St. John's Cathedral on Morningside Heights. This sculpture gently bathes its unconventional materials in a soft, luminous glow emanating from delicate, flickering bulbs. The narrative of their construction materials is nothing short of extraordinary: intricate feathers meticulously crafted from layered shovels, regal crowns ingeniously shaped from cowls, bird heads artfully fashioned from power drills, and bodies painstakingly assembled from discarded construction waste, including pliers, saws, screws, plastic hoses, and drills. Through this artwork, researchers gain a profound understanding of the profound importance of material choice.

Traditionally, the phoenix is a symbol of noble harmony. However, these phoenixes, forged from commonplace building materials, provide a powerful contrast that

transcends their initial critique of Chinese labor conditions. Instead, they convey a universal message that resonates with all of us, emphasizing the fundamental principles of equitable compensation and dignified livelihoods for every individual.

(See figure below)

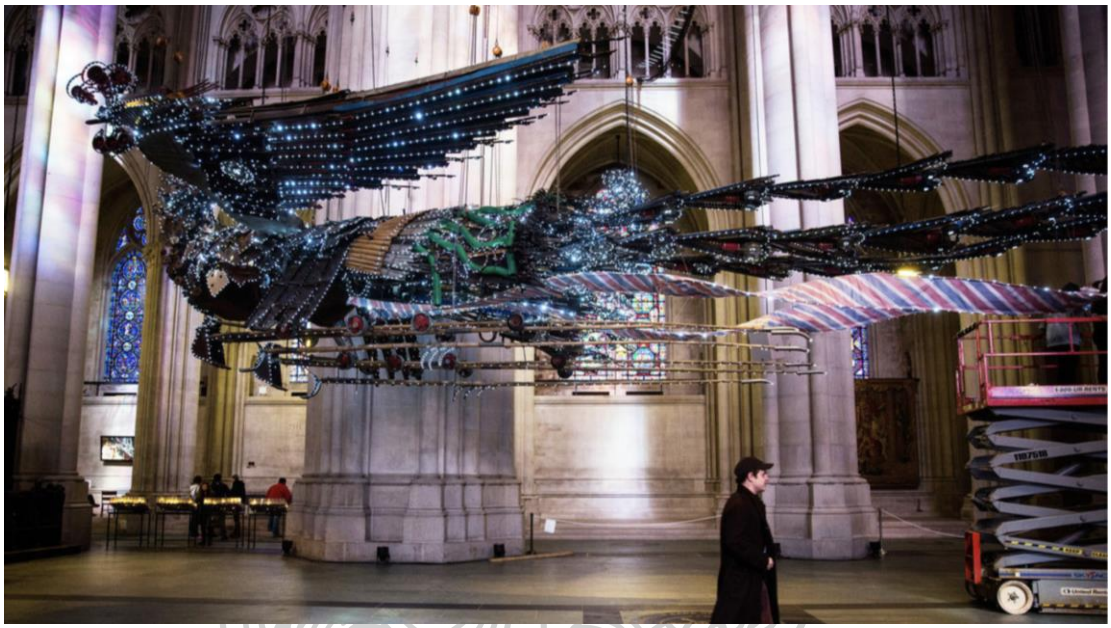


Figure 8: Chinese artist Xu Bing's pair of phoenix sculptures is currently exhibited at the Cathedral Church of St. John the Divine.

In this exploration, the narrative of modern phoenix art melds seamlessly with the realm of sculptures and installations—a world where form emerges from raw matter. Just as sculptors carve stories from stone, artists breathe life into the phoenix, fashioning its feathers from threads of symbolism and technological prowess (Smith, 2018; Chen, 2020). As installations echo through public spaces, the modern phoenix resonates across the spheres of contemporary art, mirroring our collective yearning for renewal and metamorphosis (Jones, 2019).

In the lexicon of artistic evolution, modern phoenix art resounds as a testament to the enduring allure of mythical symbols, a thread that binds cultures, generations, and the very essence of human creativity. Within the ashes of tradition, it emerges as an embodiment of hope, a beacon that guides us through the labyrinth of time's transformations (Thompson, 2021).

2.3.3 Native Phoenix

In a sense, Chengdu embodies the spirit of the phoenix. The ancient Chengdu Plain has nurtured a rich and enduring civilization. Evidence from the excavated Sanxingdui cultural relics and historical texts indicates that the phoenix has long served as a symbol of urban and cultural identity in Chengdu, a tradition dating back over 3,000 years to the Sanxingdui culture. In contemporary Chengdu, city designers have embraced and strengthened this identity, incorporating it into the designs of airports, bridges, and venues for major sporting events. Take, for example, the design of Tianfu International Airport (depicted below), which draws inspiration from the mythical Sun God bird. One can easily imagine that when an international visitor first gazes upon this magnificent airport from above, an indelible image of this mystical bird is etched into their mind, sparking their curiosity to explore the city's profound connection with this divine creature.

Figure 9：The design concept comes from Sunbird's Tianfu Airport in Chengdu, China

And he would enter the city via this impressive bridge (shown below), positioned along the city's central axis. The prominent sunbird pattern adorning the top of the bridge would surely prompt him to realize that the innovative and intelligent features of the modern airport design originated from here, highlighting its contemporary and forward-thinking approach.

Figure 10：The Sunbird sign on the Tianfu overpass

As he explores the various corners of the city during his visit, he will come to a

realization: Chengdu truly embodies the essence of a Phoenix city. The Sun Bird Phoenix stands as the central emblem in Chengdu's city image logo and serves as the logo for Chengdu Airlines. Furthermore, the Sun God Bird's golden ornament can be seen on the pastoral emblem of the Catholic Bishop of Chengdu, Tang Yuan Ge, as well as on the pastoral emblem of the Catholic Diocese of Chengdu. In 2023, even the pinnacle of the Donganhu Stadium, Chengdu Universiade's main arena, draws inspiration from the Sun God Bird.

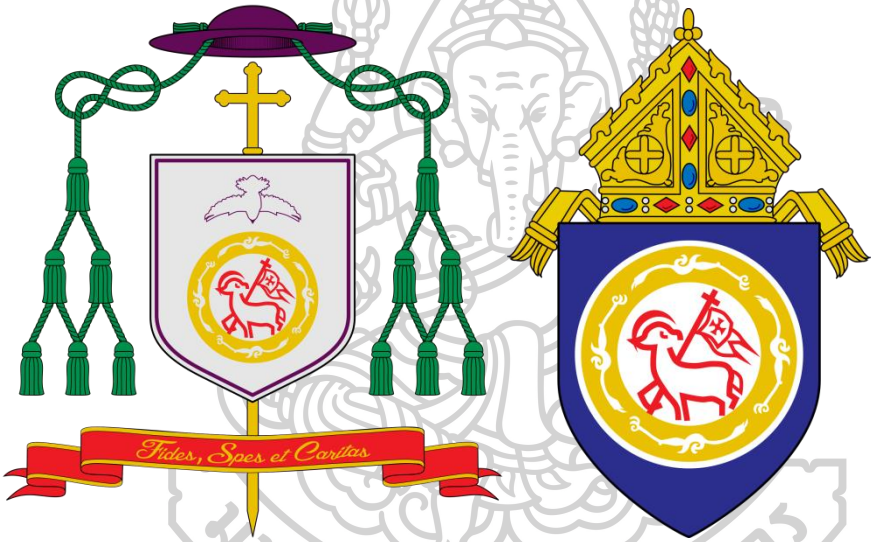


Figure 11 : Coat of arms of Tang Yuange, Catholic Bishop of Chengdu, and Coat of Arms of the Catholic Diocese of Chengdu

Figure 12 : The design concept comes from Sunbird's Universiade venue in Chengdu

When a city boasts such a strong phoenix identity, and when the researcher belongs to that city, standing on the soil of Bangkok, Thailand, gazing back at all of this, the phoenix serves as a reminder of his hometown, a memory that lingers in the researcher's heart. In this light, choosing the Phoenix as a source of inspiration for their doctoral research holds multifaceted significance.

2.4 Kinetic Sculpture

2.4.1 Shape

The historical development of kinetic sculpture in terms of shape has been characterized by a wide variety of forms and styles, evolving alongside technological advancements and artistic innovation (Popper, 1968; Gale, 2017). Here is a brief overview of its development:

1. Early Mechanical Devices: The roots of kinetic sculpture can be traced back to ancient civilizations, where simple mechanical devices and automata were created. These early devices often featured basic movements, such as rotating wheels or moving figures powered by wind, water, or human force (Cotter, 2016).

2. Modernist Experimentation: In the late 19th and early 20th centuries, as modern art movements emerged, artists began experimenting with movement and abstraction in sculpture. Artists like Alexander Calder and Marcel Duchamp were pioneers in

exploring kinetic elements in their works. Calder, in particular, is credited with creating the first "mobiles," sculptures with moving parts suspended in the air that responded to air currents (Klein, 1998).

3. Incorporation of Motors: With the advancement of technology, especially after World War II, kinetic sculptures started incorporating electric motors and other mechanical devices to achieve more complex and controlled movements (Popper, 2007). This allowed artists to create sculptures with precise, dynamic, and continuous motion.

4. Op Art and Kinetic Art: In the 1960s, the Op Art and Kinetic Art movements gained popularity, focusing on optical illusions and the perception of movement. Artists like Victor Vasarely and Jesus Rafael Soto created sculptures that seemed to vibrate or shift as the viewer moved around them (Barron, 2004).

5. Interactive Kinetic Sculpture: In more recent times, interactive kinetic sculpture has become prevalent, where viewers actively participate in the artwork's motion through touch, sound, or other interactive elements (Kwastek, 2013). These sculptures blur the line between the artist's creation and the viewer's experience, making the audience an integral part of the artwork.

6. Advancements in Technology: With the digital age, technology has further

expanded the possibilities of kinetic sculpture. Artists now use sensors, microcontrollers, and programming to create sculptures that respond to real-time data, such as the movement of people or changes in the environment (Dunne & Raby, 2001).

From the delicate pendulum of ancient marvels to the interactivity of modern incarnations, kinetic sculpture remains an enchanting journey that redefines the boundaries of what art can be (Dunne & Raby, 2001). Each iteration unfurls a symphony of balance, movement, and sensory engagement—a testament to the endless quest for artistic expression that transcends the static and embraces the dynamic.

2.4.2 Materials

In the grand tapestry of art, kinetic sculpture emerges as a symphony of form and motion, rendering life to static matter (Popper, 1968). This exploration of form, as encapsulated by the evolution of materials, stands as a testament to the boundless innovation that has shaped this artistic realm.

1. Origins in Mechanical Marvels: The inception of kinetic sculpture harks back to ancient civilizations, where ingenious automata and mechanical devices orchestrated simple movements. These creations, stirred by the forces of nature, whispered of the fascination with animation that dates back centuries (Turner, 1996).

2. Modernist Trailblazers: The trajectory veered towards experimentation in the late

19th and early 20th centuries, when modern art movements came into play. Visionaries like Alexander Calder and Marcel Duchamp breathed life into sculptures, infusing them with movement and abstraction. Calder's "mobiles" stood as ethereal dancers in suspension, responding to the tender caress of the breeze (Perl, 1998).

3. Harnessing Mechanical Might: With technology surging after World War II, kinetic sculptures embraced electric motors and mechanical wonders. The realm of motion expanded into intricate symphonies a feat once unimaginable. The transformation was no longer limited by the confines of human power, as the sculptures embraced precise and dynamic motion (Gentle, 2020).

4. Optical Illusions and Perception: The 1960s witnessed the dawn of the Op Art and Kinetic Art movements. The focus shifted towards optical illusions and the enchantment of movement. Visionaries like Victor Vasarely and Jesus Rafael Soto crafted sculptures that seemingly danced and shifted, mirroring the viewer's perspective (Masters, 2005).

5. A Dialogue of Interaction: In the contemporary realm, kinetic sculpture has taken an interactive leap. The observer becomes an active participant, plunging into a realm of touch, sound, and engagement. Here, the lines blur between artist and audience, forming a collaborative tapestry of shared experience (Packer, 2008).

6. Digital Frontier Unleashed: The digital era inaugurates a new dawn for kinetic sculpture. The marriage of sensors, microcontrollers, and coding endows sculptures with real-time responsiveness. These creations are imbued with life, responding to the ebb and flow of human movement and environmental fluctuations (Peters, 2015).

From the delicate pendulum of antiquity to the interactive marvels of modernity, the evolution of kinetic sculpture through materials echoes the heartbeat of artistic innovation (Groys, 2018). This journey unites movement, balance, and the rich tapestry of materials, painting a symphony that traverses time and enriches the artistic experience.

2.4.3 Motion

2.4.3.1 History

Within the realm of art, kinetic sculpture emerges as a captivating testament to the marriage of innovation and movement (Banes, 2020). This exploration of motion, tracing its historical journey, attests to the profound impact of dynamic engagement in the artistic landscape:

1. Origins in Nature's Whispers: The narrative of kinetic sculpture commences with the echoes of ancient civilizations (Kuspit, 1999). Through ingenious automata and sculptures, artists breathed life into inanimate matter, harnessing natural forces like wind and water. These sculptures danced to the rhythms of the elements, portraying

rudimentary yet enchanting movements.

2. Renaissance of Mechanical Marvels: The Renaissance era ushered in a mechanistic marvel, as artists interwove mechanics with sculpture. The stage was set for the infusion of gears, pulleys, and cranks, orchestrating intricate and controlled motions. Pioneers like Leonardo da Vinci paved the way for the symphony of mechanical mastery (Kline, 1994).

3. Calder's Ethereal Dance: In the 20th century, Alexander Calder introduced the "mobile," a phenomenon that suspended kinetic elements in mid-air. Responsive to the currents of air, mobiles crafted enchanting ballets of movement, transforming sculpture into an ethereal dance with the winds (Livingston, 1998).

4. Empowering Motion with Motors: The post-war era witnessed an explosion of innovation, ushering in the era of motors and dynamic movements. Electric motors revolutionized kinetic sculptures, allowing artists to mold a spectrum of motion, from graceful rotations to vibrant dances of dynamism (Popper, 1968).

5. Illusions in Motion: The mid-20th century saw artists like Victor Vasarely and Bridget Riley orchestrate symphonies of optical illusion. With deftly designed patterns and geometric configurations, kinetic art birthed illusions of movement and vibration, invoking a delicate dance with perception (Popper, 1968; Lucie-Smith, 2004).

6. Harmony in Interaction: In contemporary times, kinetic art evolved to embrace interaction. Viewers are beckoned to co-create with the sculptures, transforming passive observation into immersive engagement. Sensors and digital wizardry empower sculptures to respond to touch, sound, and environmental cues, fostering an art dialogue (Wilson, 2013; Sommerer & Mignonneau, 2006).

7. Digital Horizons Unveiled: The digital era unfurls new vistas for kinetic sculptures. Computer programming and robotics orchestrate intricate choreographies of motion, transcending traditional boundaries. The synergy between art and technology materializes into intricate narratives woven through movement (Brouws, 2019; Whitelaw, 2009).

From the genesis of nature's whispers to the digital dawn of coding, the evolution of kinetic sculpture's movement is an ode to the vitality of motion in the artistic sphere. This has led researchers to realize that this journey has redefined sculpture as not just matter, but emotion, perception, and the very essence of engagement (Pritchard, 2017; Jones, 2015).

2.4.3.2 Case study

1. Lever balance

Archimedes, an ancient Greek scientist, first put forward the theory of "center of gravity" in his essay on the Balance of Plane Figures. Second, based on the "center of

gravity" theory, Archimedes observed that "when two weights are balanced, their distance from the fulcrum is inversely proportional to their weight." The specific performance is:

(1) Hang the same weight at the same distance from the fulcrum at both ends of the weightless rod, and they will balance;
(2) in the weight of the two ends of the rod from the fulcrum at the same distance to hang unequal weight, heavy end will tilt down;
(3) in the weight of the two ends of the rod from the fulcrum is not equal distance to hang the same weight, distance far end will tilt down;
(4) The action of one weight can be replaced by the action of several evenly distributed weights, provided that the position of the center of gravity remains
the same. Conversely, several evenly distributed weights can be replaced by one hanging at their center of gravity; The center of gravity of the figure is distributed in a similar way...
(5) The lever is balanced when it remains stationary or uniformly rotating

Through careful observation and experiment of the above phenomena, Archimedes put forward the "lever balance principle". To balance a lever, the magnitude of the two forces acting on it (the force and the drag) is inversely proportional to their moment arms.

Power × power arm = resistance × resistance arm, expressed in algebraic formula as F1· L1=F2·L2.

In the formula, F1 represents power, L1 represents power arm, F2 represents resistance, and L2 represents resistance arm. As can be seen from the above equation, to make the lever balance, the power arm is several times the resistance arm, the power is a fraction of the resistance.

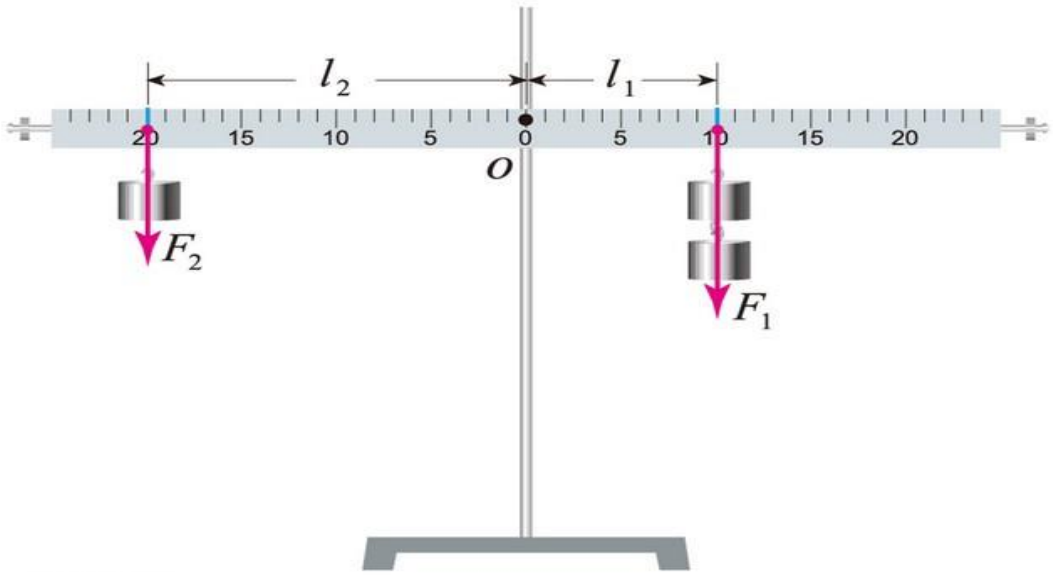


Figure 13: Balance principle

Using this principle, American artist Alexander Calder and his old friend George Rickey each created their own works of movement sculpture. When the researchers marked the force, power arm, resistance arm and resistance arm of Alexander Calder's works, it can be found that Alexander Calder's works conform to the formula F1· L1=F2·L2 of lever balance principle. In this work, the power arm L1 and the resistance arm L2 have the same length. The power blade F1 is designed into numerous scattered and flowing fractal shapes, and the shape of the resistance blade F2 is condensed into a solid sphere. In this way, the power blade F1 and the resistance blade F2 form a contrastive artistic relationship of density rhythm. However, power blade F1 and drag blade F2 maintain the same weight relationship.

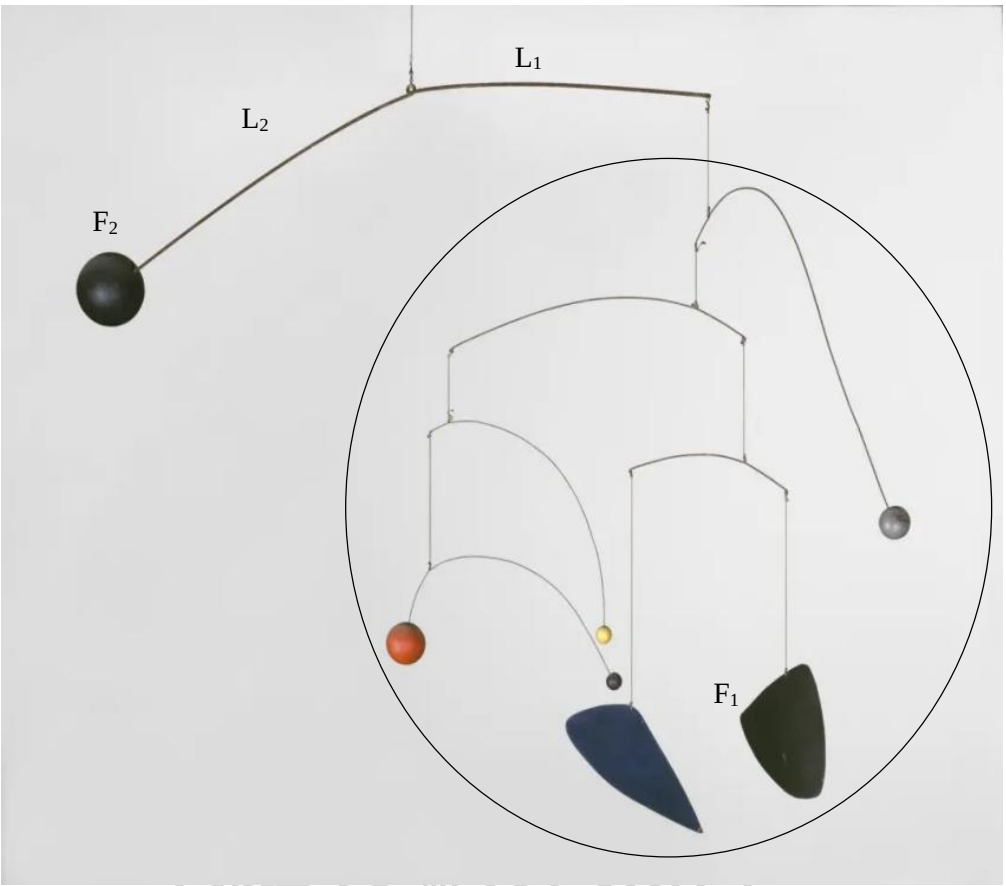


Figure 14: A balanced analysis of Calder's work

In George Rickey's work, the researchers marked the power F1 and the power arm L1 in red, and the drag F2 and the resistance arm L2 in blue. It can be found that this work of George Rickey also uses the "lever balance principle", here, F1· L1> F2·L2, because George Rickey has controlled the value of F2·L2 so that it is only slightly larger than F1· L1, which makes the power arm of this work always upward. Under the action of wind force, the power arm blade F1 and the resistance arm blade F2 swing back and forth under the action of fulcrum. However, the power arm L1 always faces upward. This was determined by the work at the beginning of its design. F1· L1>F2·L2.

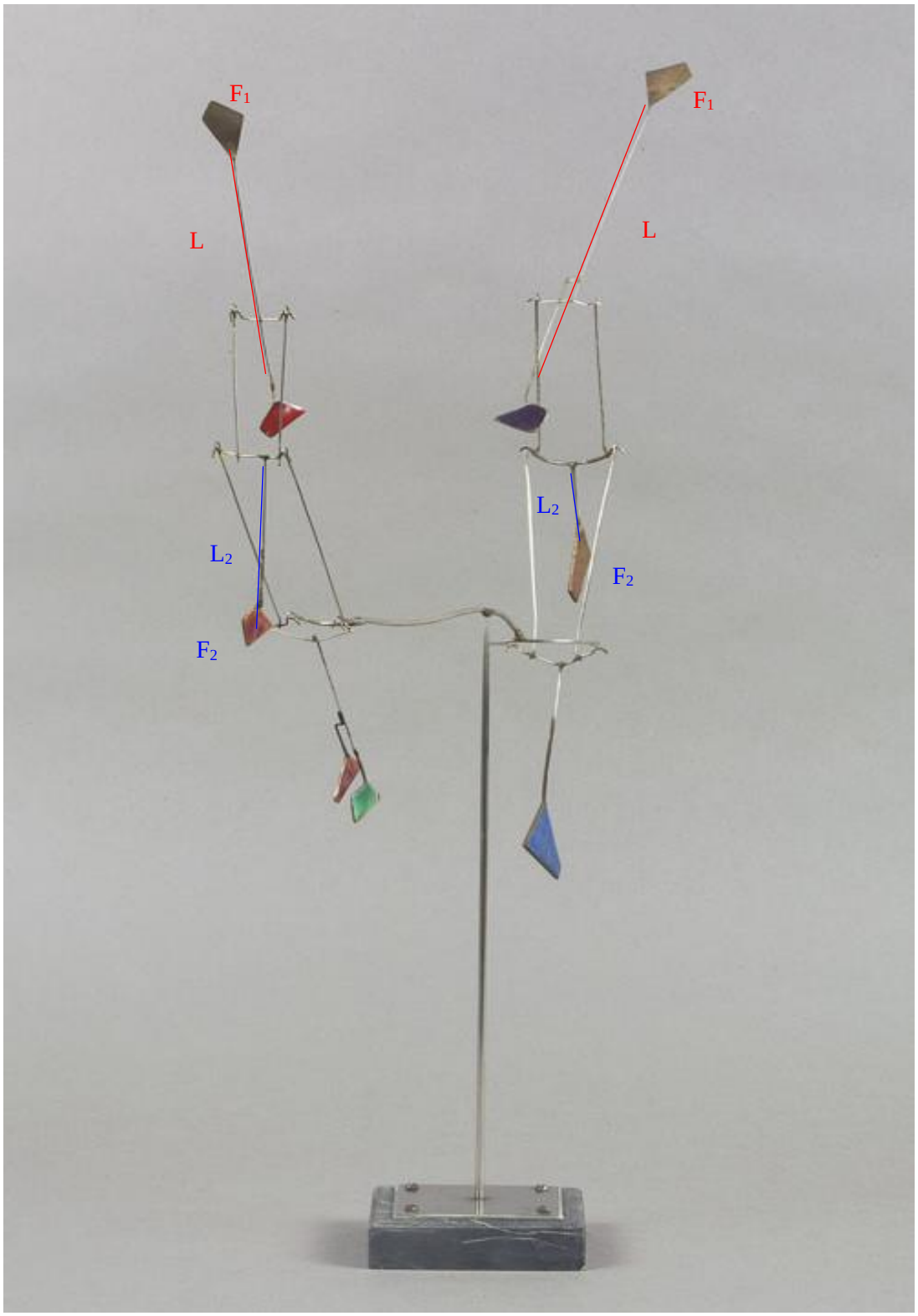


Figure 15: George Rickey Sculpture Archive // Snite Museum of Art... snite art museum. nd. edu

2. Three leaf rotation：

Children often play a game when they are children, with a small stick against a paper wind spiral aircraft, when running, three leaf paper spiral rotation. Paper spirals rotate against the wind and are related to air currents. Modern electric fans also follow this principle but use electricity to spin three blades to create a powerful stream of air to cool people down. The phoenix character movement sculpture uses this principle. When the wind blows and the rain falls from the sky, the rotating blades of the three leaves will rotate because the design of the blades conforms to the principle of rotation due to airflow interference.

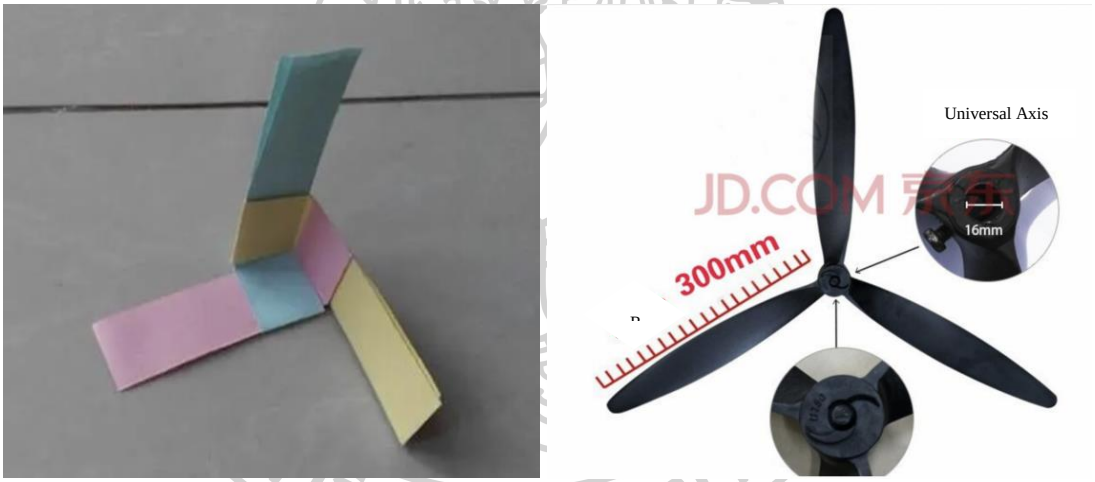


Figure 16: Principle of blade motion

2.4.4 Environment

The environment where kinetic sculpture is set plays a crucial role in enhancing the overall impact and experience of the artwork. The choice of location and surroundings can significantly influence how the sculpture is perceived, how it interacts with its audience, and how its movement is accentuated. Here is a brief introduction to the environments where kinetic sculptures are often set:

1. Indoor Settings: Kinetic sculptures can be displayed indoors, such as in art galleries, museums, and exhibition spaces. Indoor environments offer controlled lighting conditions and climate, allowing for precise presentation and protection of the artwork. In a gallery or museum setting, the focus is solely on the sculpture, providing an intimate and immersive experience for visitors to engage with the artwork's movement.

2. Outdoor Public Spaces: Many kinetic sculptures are designed for outdoor public spaces, such as parks, plazas, and urban landscapes. Outdoor settings often allow for larger and more monumental sculptures, creating a visual spectacle that interacts with the natural elements like wind, sunlight, and rain. Public spaces provide a broader audience, and the artwork becomes a part of the urban environment, enriching the cultural experience of city dwellers and visitors.

3. Natural Settings: Some kinetic sculptures are placed in natural settings, such as gardens, forests, or waterfronts. In these environments, the artwork's movement can harmonize with the natural surroundings, creating a serene and contemplative experience for viewers. The juxtaposition of art and nature can evoke a sense of connection and balance.

4. Interactive Environments: Kinetic sculptures that incorporate interactive elements may be set in spaces where viewers can actively engage with the artwork. These interactive environments could be indoor or outdoor, designed with sensors or digital

technology that respond to the audience's movements, touch, or sound. The interaction blurs the line between viewer and artwork, making the experience more personal and participatory.

5. Architectural Integration: Some kinetic sculptures are designed to integrate with architectural structures, enhancing the building's aesthetic and functional aspects. The sculpture becomes an integral part of the architecture, adding an element of dynamic movement and artistic expression to the overall design.

The selection of the environment is a thoughtful process that considers the artist's vision, the sculpture's scale and movement requirements, the intended audience, and the overall context in which the artwork will be experienced. Whether indoors or outdoors, the environment shapes the narrative and impact of kinetic sculptures, enriching the audience's experience with the beauty of movement and innovation.

2.5 Environment

2.5.1 Chengdu Sanxingdui Cultural Park

Jinsha Site Park is an archaeological site and historical park located in Chengdu, Sichuan province, China. It is a significant Sanxingdui cultural and historical attraction that offers visitors a glimpse into the ancient civilization of the Shu Kingdom, which thrived in the region over 3,000 years ago.

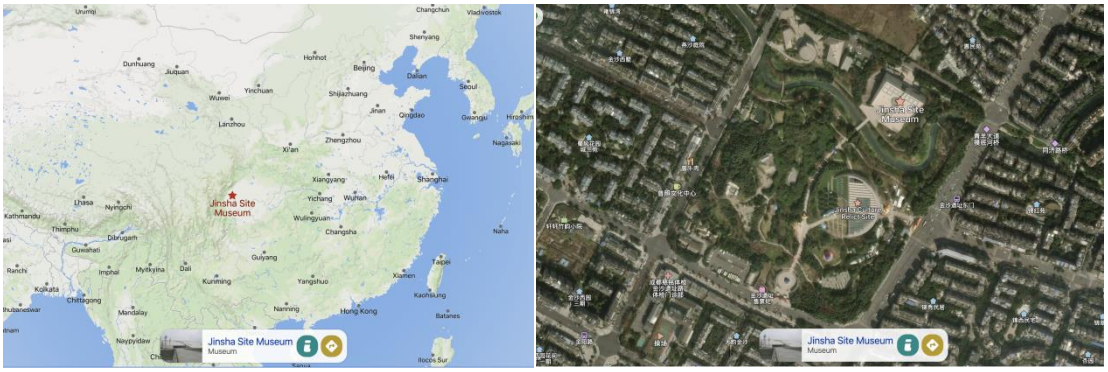


Figure 17: Satellite map of Jinsha Site Park

Environment and Features:

1. Historical Site: Jinsha Site Park is built around the remains of the Jinsha archaeological site, which was accidentally discovered in 2001 during construction work. Excavations have revealed a rich treasure trove of artifacts, including gold, jade, bronze, and pottery, providing valuable insights into the culture and rituals of the ancient Shu people.

Figure 18: Jinsha site and unearthed cultural relics

2. Museum: The park houses the Jinsha Site Museum, which showcases the archaeological finds and artifacts uncovered from the site. The museum's exhibits are well-curated and provide detailed information about the Shu civilization, including their burial practices, religious beliefs, and daily life.

Figure 19: Jinsha Site Museum

3. Cultural Experience: Jinsha Site Park offers visitors a chance to immerse themselves in the ancient Shu culture through various cultural activities and performances. Traditional dance, music, and handicraft demonstrations are frequently held to celebrate the region's rich heritage.

Figure 20: Performance activities in Jinsha Site Park

4. Beautiful Gardens: The park features well-maintained gardens with lush greenery, flowers, and scenic walkways. The serene environment makes it an ideal place for

leisurely strolls and relaxation.

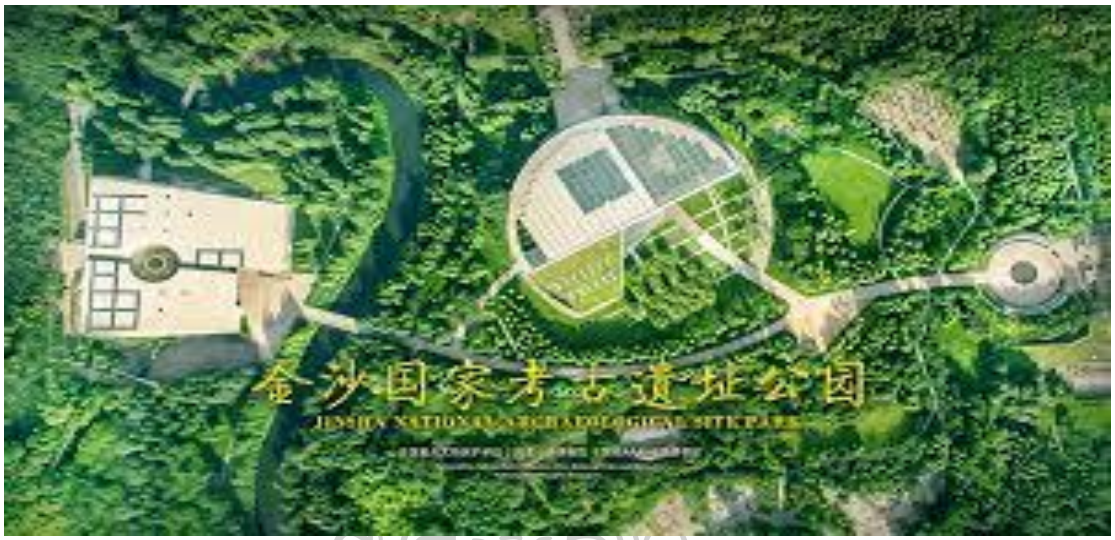


Figure 21: Aerial view of Sanxingdui Culture Jinsha National Archaeological Site Park

5. Water Features: Jinsha Site Park incorporates water features, such as streams, ponds, and fountains, which add to the park's tranquility and aesthetic appeal.

Figure 22: Jinsha Site Park water Features

6. Sculptures and Art: Throughout the park, visitors can find sculptures and art

installations that celebrate the history and culture of the Shu Kingdom, adding artistic elements to the natural surroundings.

Figure 23: Jinsha Site Park logo sculpture

7. Modern Facilities: Jinsha Site Park is equipped with modern amenities, including visitor centers, gift shops, and cafes, providing convenience and comfort to visitors.

Figure 24: Jinsha Site Visitor Center

The combination of historical significance, cultural experiences, and natural beauty makes Jinsha Site Park a popular destination for both locals and tourists. It offers a unique opportunity to explore Chengdu's ancient past and appreciate the region's rich cultural heritage in a serene and picturesque setting.

2.5.2 Bangkok Chinatown

Chinatown in Bangkok, also known as Yaowarat, is a vibrant and bustling neighborhood that reflects the rich cultural diversity of the Chinese community in Thailand. It is one of the largest and most famous Chinatowns in the world, offering visitors a unique blend of cultural heritage, geographical charm, commercial activity, and artistic expressions.

1. Cultural Environment: Chinatown in Bangkok is a melting pot of Chinese and Thai cultures. The area is characterized by its ornate Chinese temples, traditional Thai architecture, and a fusion of Chinese and Thai cuisines. Festivals like the Chinese New Year and the Vegetarian Festival are celebrated with great enthusiasm, adding a

vibrant cultural ambiance to the neighborhood.

2. Geographical Environment: Chinatown is located in the heart of Bangkok and spans along Yaowarat Road and its surrounding alleyways. It is situated close to the Chao Phraya River, making it easily accessible by boat and offering scenic views of the waterways and the city skyline.

3. Commercial Environment: Chinatown is a bustling commercial hub known for its vibrant street markets and a wide array of shops and stalls. Visitors can find everything from traditional Chinese medicinal herbs, tea, and silk to local Thai crafts, jewelry, and electronics. The area is also renowned for its food scene, with countless street food vendors offering delectable Chinese and Thai dishes.

4. Artistic Environment: Chinatown in Bangkok has become a hub for artists and creatives, attracting art galleries, studios, and cultural spaces. The neighborhood's dynamic atmosphere inspires local artists, photographers, and performers to showcase their talents and contribute to the artistic vibrancy of the area.

Chinatown is a must-visit destination for travelers looking to immerse themselves in the intersection of Chinese and Thai cultures. The lively streets, aromatic flavors, cultural festivities, and artistic expressions make it an exciting and enriching experience that reflects the city's diverse heritage and modern charm.

Figure 25: Chinese signs hanging from shops in Chinatown

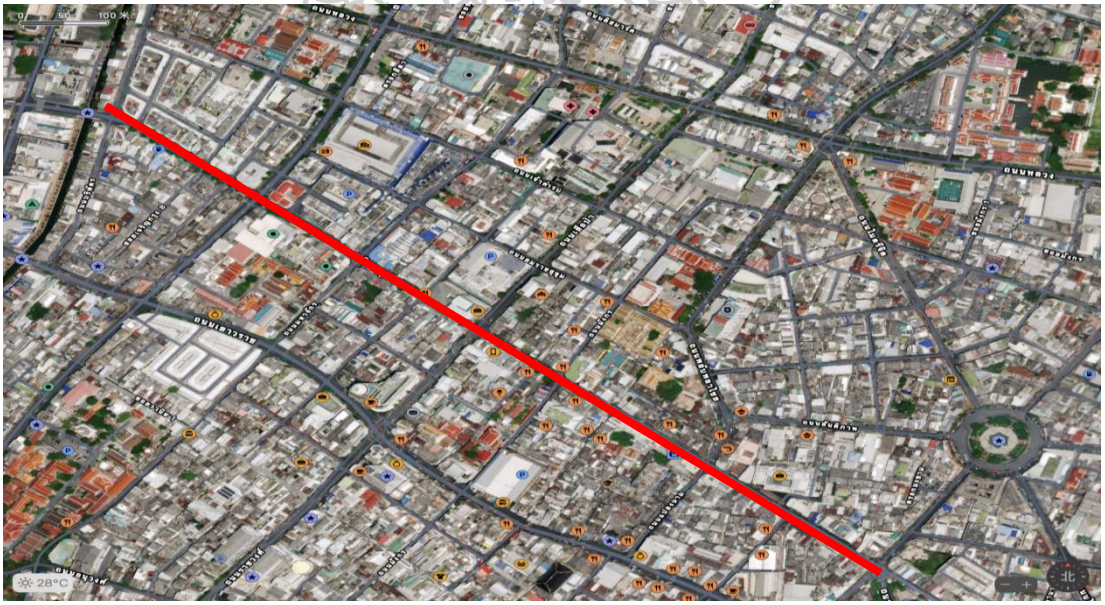


Figure 26: Satellite map of Chinatown (The red line is Yaowarat Road)

2.5.3 SU Nakhon Pathom Campus

Nakhon Pathom is a prefecture in central Thailand, about 58 km from the capital Bangkok, with an area of about 2,168.3 sq km. Its territory extends to the Supanburi in

the north; South facing Samut Songkram and Samut Sakorn; East Nonthaburi and Bangkok; To the west it is adjacent to Petchaburi and Kanchanaburi. Nakhon Pathom is mostly low-lying and flat, only Nakhon Pathom and Kamphaeng Phet Province are plateau areas; Wan Luan County, Kun Xishi County and Sanpan County, located on the Jin River, are all fertile lands with thousands of hectares of fertile fields and rich water resources. Among them, "Bingao White Rice" has won the championship in world competitions.

Nakhon Pathom flourished in ancient times, being Thailand's oldest city and the first place to promote Indian Buddhism when it first came to Thailand. By the 11th century, Nakhon Pathom's prosperity gradually declined, and it took 17 years until Rama IV, when the great pagoda was rebuilt, and Rama V, when the railway was built, Nakhon Pathom gradually revived and is now a modern town.

Sanam Chandra Palace Campus Located in the Sanam Chandra Palace in Nakhon Pathom, once the royal Palace of King Rama VI of the Chakri Dynasty. This camous has Silpakorn University with the largest area, full secondary faculty, and a campus with the largest number of students.

The researchers tested the environment by placing the Phoenix character kinetic sculpture at an intersection on a highway, next to the campus's famous landmark, the water tower. Since Sanfork Road is located at the school transportation hub, the Phoenix Chinese character kinetic sculpture can be widely appreciated (Figure 6).

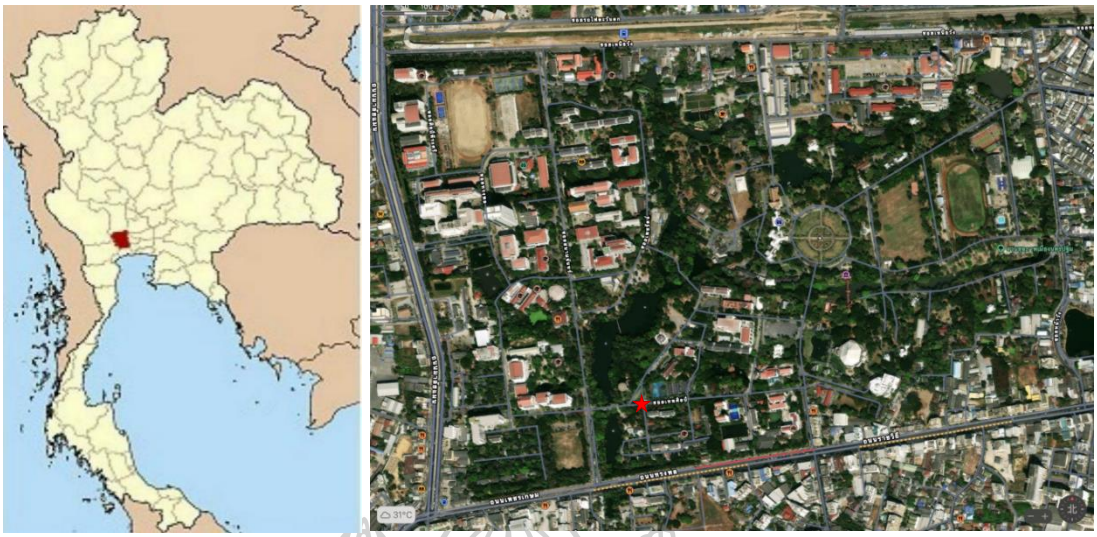


Figure 27: Satellite map of SU Nakhon Pathom Campus

2.6 Art Theory

2.6.1 Susanne K. Langer's Theory of Semiotic Esthetics

Ernst Cassirer, a German philosopher, pointed out that after possessing symbolic thinking, human overcame the natural inertia of being a creature and completed the transformation from animal to human. The whole human reason is a kind of reason that needs signs, and the nature of the whole human knowledge is symbolized knowledge. (Ernst Cassirer.2017) In her book Feeling and Form, Susanne Langer (1895-1982), an American symbol gist and Portege of Ernst Cassirer, in this paper, the art symbol, the making of the symbol and the power of symbol are divided into three parts. It raises the art symbol to the height of philosophy, and focuses on the expressive force of the art symbol and the relation with the audience. (Longer, S.K. 2013) The "Art symbol" part is the summary of the book, the "creation of symbol" part mainly discusses the problem of Form, and the "power of symbol" part mainly

discusses the problem of Feeling.

In the "art symbol" section of the summary, Susanne K. Langer asks soul questions: The philosophical thinking about art has already created a huge library, and many colorful theories have been established. However, why does the systematic theory of art not grow and develop its own philosophical implications like mathematics, logic, science, theology, law and history, and still remain in confusion? Through the analysis of the reasons for the confusion of art theory, Susanne K. Langer believes that the problem of art creation is the core of constructing systematic art theory. "Once you answer the question of 'what art creates', then the question of why and how art creates, Questions about personality, talent, genius will all emerge from this central thesis under a new narrative." "If this argument does indeed open up the landscape to a general theory of art, then the document we leave behind (which any particular thinker knows or does not know) and the question we still face will take its proper form and place itself in that landscape, no matter where we meet it in philosophical thinking."(Langer, S.K.2013)

Susanne K. Langer goes on to point out that there are "poles" of feeling and form in the question of artistic creation. Movement theory can only explain very minor questions about taste, not about form; The primacy of form usually excludes any attachment to movement; The theory based on the representation concept accommodates illusion and even movement, but cannot give independent value to the form; The concept of intuition works well with the theory of fun and is compatible with most theories of movement and more elaborate theories of representation, but not with the idea of art

as form; As for the phantom theme, it has long been proved that it must be eliminated. At this point, Susanne K. Langer believes that a concept that is not itself external to aesthetic theory but has never been fully used or fulfilled for its own purposes, has been exposed, and that is the idea of the role of symbols. Susanne K. Langer appreciated Clive Bell's "meaningful form" very much. On this basis, Susanne K. Langer further proposed that "art is the creation of symbolic form of human feeling"(Langer, S. K. 2013) In short, Feeling and Form.

In the part of "Creation of symbol" discussed as a Form, Susanne K. Langer believes that what works of art create is image. In fact, the fundamental difference between image and reality lies in that image is a pure illusory "thing". In essence, it is a "representation". Its significance lies in that it is only the carrier of abstractions, symbols and ideas. We don't use it to move towards something tangible or real, but to see it as a complete entity with only visual properties and visual associations. Its visibility is its whole existence and nothing else. For the researchers' project, the researchers created planar and three-dimensional phoenix characters, as well as several phoenix dynamic sculptures. These works are abstract, symbolic and conceptual. No matter as creators or as viewers, creating or viewing phoenix character dynamic sculpture works is not for the purpose of walking towards the real phoenix divine bird itself.

The most outstanding illusory thing in nature is recourse to the eye, and the reason

why the word "image" always goes together with sight is probably because we always must think immediately of the world in the mirror at the mention of it, and Susanne K. Langer used the word semblance to avoid this association, of course, Call it "otherness," "strangeness," "Schein," "transparency," and "self-sufficiency". The task of the artist is to create and maintain this illusion, to separate it from the surrounding reality, and to articulate the form of the illusion. In order to achieve this wooden one, he may use any material -- tone, color, sculpting material, words, gestures, or any other physical means -- that is subject to technical treatment.

In the "Power of Symbols" section discussed as a Feeling question, there are two questions closely related to symbols: (1) How can a work of art, such as a painting, a sculpture, or a house, that contains no time series, represent the always progressive experience of life? What kind of common logic is there between this sign and the form of feeling? (2) How can the meaning of artistic symbols (works of art) be recognized by anyone other than the creator?

On the first question, Susanne K. Langer answers: The plastic art demonstrates "tension". The relationship of block faces, the distribution of emphasis, the direction of lines, the depth of color, the smoothness or roughness of technique, all constitutive factors are constrained by the overall construction of the image he wants to make, and the constant contrast of these elements creates space tension in the basic illusory space, which, eventually, is unified by space resolution. For humans, a life of feeling is a river of tension and melting. All human movements, sensory tone, state of mind,

even the private "sense of life" or "identity" are tensions-concrete, complex, yet definite interactions between the physical, neural, and muscular tensions occurring within the human organism. Since all the forms of life tension are the forms of organisms, and the images created by art all have organic structures, art presents us the images of life, although its material composition is inorganic, such as plastic, metal, stone, bamboo, wood and paper dead organic matter, or no "thing" at all -- music is the vibration of air. In the overall relationship of the organic structure under the interaction of tension, works of art produce the "vitality" which we repeatedly mentioned in all successful works. Such "vitality" includes happiness, melancholy and even sadness, which are indescribable "felt life". Therefore, works of art represent the progressive life experience with the "tension" of organic structure.

On the second question, Susanne K. Langer answered: By instinct. Intuition is not rational, which is acknowledged by Bergson and Croce, two great figures of intuition theory. Intuition is the beginning and end of logic, without it, all reasoning will end in failure.

The only way to make the perceived content of a pattern, melody, poem, or any other artistic symbol accessible to the public is to present the expressive form abstractly and forcefully so that it and its emotive nature can be understood by anyone with a general sensitivity to art.

Conclusion:

Susanne K. Langer constructed her theoretical system of semiotic esthetics with her

answer to "the question of artistic creation", which is a building of philosophy of art. She believed that "the question of artistic creation" has two poles, one is Feeling, the other is Form. Susanne K. Langer praised and reformed Clive Bell's "meaningful form" and proposed that art is the creation of symbolic form of human feeling. Since works of art create images, the image is the symbol. In Susanne K. Langer's system of symbolic esthetics, feeling is the feeling of the power of symbols, and form is the form of symbols.

2.6.2 Sign Propagation

Since July 2019, the researcher has studied Philosophy of Design Art (International Program) at the School of Decorative Arts of Silpakorn University, embarking on a practical journey to explore the transformation of unique Chinese cultural symbols into artistic symbols. There are many reasons for choosing the Chinese character phoenix as the starting point for the creation of this project. First, when I stepped into a foreign land in 2019, the ubiquitous golden winged birds and divine birds in Thailand affected the minds of researchers with their unique exotic cultural shapes. Secondly, in Chengdu, the hometown of the researchers, the construction and opening of Tianfu Airport is a great event attracting worldwide attention. Tianfu Airport has become the focus of hot media discussion because of the modern shape of the Sanxingdui Sunbird. No doubt at this moment. The divine bird has become a "knock" on the researcher's mind [the knock refers to the three short notes and one long note at the beginning of Beethoven's Symphony of Destiny, which Beethoven himself once

said: "That is fate knocking at the door!"]. Finally, during their time in Bangkok, the researchers found many shops and houses with Taoist town house symbols on their doors, Chinese couplets on their door frames, and Chinese deities in their houses. It is obvious that this is a custom retained by Chinese people living in Thailand. In China Town, Chinese symbols are even more spectacular. Obviously, these numerous influences are exerted on researchers by communication, which not only promotes the topic selection of researchers, but also promotes the research of the topic from two perspectives of semiotics and communication.

According to the needs of this subject, the researcher has made a clear theoretical Introduction to Susanne K. Langer's semiotics. Based on the same reason, through the study of John Fiske's "Introduction to Communication Studies", the researcher finds that:

There are two main factions in the field of communication studies. One regards communication as the transmission of information, which can be called the process school. The theoretical model is linear. A production and exchange that takes communication as the meaning can be called the semiotic school. The theoretical model is a structural model, and all the arrows refer to the relationships among various elements of manufacturing meaning. They focus on what makes a word, image or sound a message. "The process school tries to combine social sciences, especially psychology, sociology and other fields, and position communication as a behavior; The symbolic school takes materials from fields such as linguistics and art, and positions communication as a work." (John Fiske.1990) John Fiske, in the art of

Introduction to Communication Studies, analyzed the two main schools in a comparative way. Chapter one to chapter five introduces the main modes in the field of communication. Chapter one and two introduce the representative modes of the process school. The first half of chapter four discusses the process school. The content of the symbolic school is distributed in part of the third and fourth chapters and all the chapters of the sixth, seventh and ninth chapters. Obviously, based on the language and art, the symbolic school of positioning communication as a work meets the needs of this research.

What makes a word, image, or sound a message. This needs to be studied from three areas: first, the symbol itself; second. The code or symbol system on which the symbols are formed; third. The culture in which symbols or codes operate.

First let's look at the notation itself. This includes the types of symbols, the different ways in which different symbols convey messages, and the relationship between symbols and their users (which includes the types of symbols). Pearce believes that symbols can be divided into three categories: In an icon the sign resembles its object in some way, it looks or sounds like it. In an index there is a direct link between a sign and its object: the two are actually connected. In a symbol there is no connection or resemblance between sign and object: a symbol communicates only because people agree that it shall stand for what it does. Agree that it shall stand for what it does. Saussure was not interested in indicators. As a linguist, he was only concerned with signs as words, but it is an indisputable fact that in Saussure's theory, the relations of

likeness echo portraits, and the relations of arbitrary echo signs.

The second is the code or symbol system based on which the symbols are formed. According to Saussure, there are two systematic ways for symbols to form codes. The first is paradigms, which are a group of symbols that belong to the chosen symbols. The second way is syntagmatic, where system is a message composed of selected symbols. The study of codes is bound to surpass its social significance in communication.

The genealogical axis can choose a variety of elements, but maintain two basic characteristics: first, the unit in the same genealogical axis, there must be something in common; second, on the axis of the family tree, each unit must be clearly distinguished from the others.

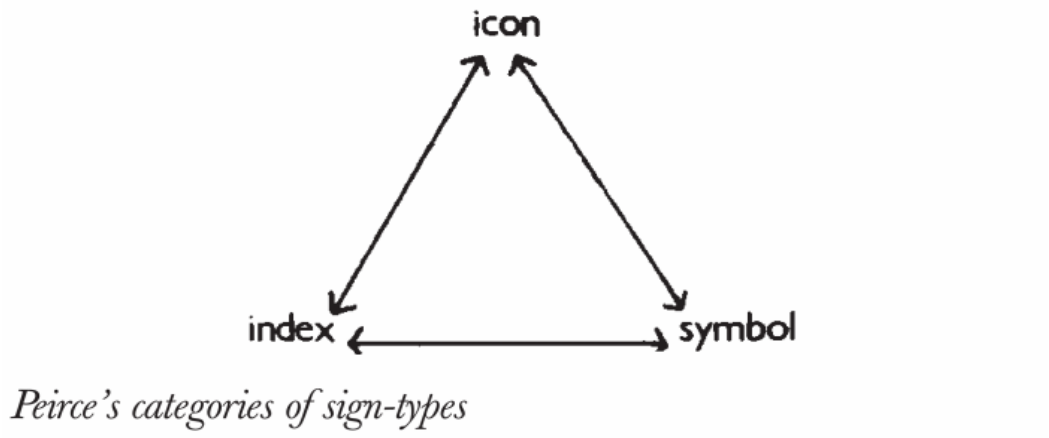


Figure 28: Types of Peirce's symbols (John Fiske.1990)

The adjacent axis is the combination of an element selected from the family axis with other elements. In music can be called melody, in dress can be called popular sense, in plastic arts can be called style. In adjacent axes, the selected symbol may be

influenced by other symbols. Because both the genealogical axis and the adjacent axis are structures, they are built on a classification system, and the meaning of these classifications is determined by their relationship to other classifications within the system, that is to say, all symbols have a structure of difference and connection.

Since the use of codes is based on the consensus of social members, we should explore its social significance in communication. Meaning is generated by the interaction between the reader and the text. If the two belong to a closely woven culture or subculture, the interaction will be smooth and effortless. If they do not belong to the same culture, the process of meaning production will be tense. The value system (also known as ideology) in the dominant position will become the mainstream value of society. Symbols only rely on the user to sing in harmony with symbols in the communication, in order to preserve the myths and implied values in the culture. When we give life to an ideology and perpetuate it, but at the same time that ideology and our response to its symbols shape us. While spreading myths and values to the public, symbols also enable them to play the function of cultural identity: members of a culture identify themselves with the culture they belong to by accepting universal and shared myths and values.

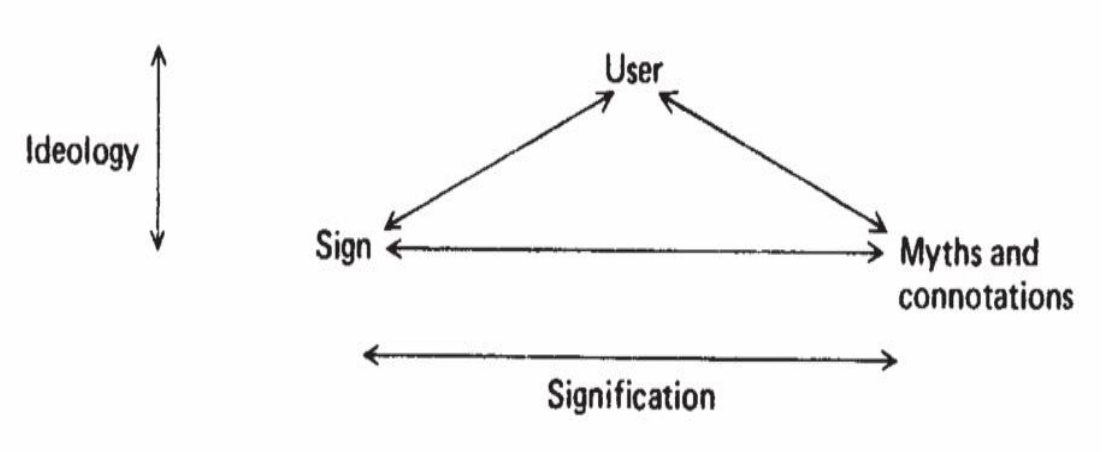


Figure 29: Diagram of user and logo land myth (John Fiske.1990)

In Marx's theory, "ideology is a false consciousness," and economics is the real reason. But as the 20th century progressed, it became increasingly clear that capitalism could not be overthrown by internal revolutions. Therefore, Antonio Gramsci, the second generation of European Marxist, introduced a new term -- hegemony. It regarded ideology as a process of hegemony. In short, the process of achieving hegemony was to constantly win and repeat the consensus of the majority of people on the ruling system. One of the main strategies for winning hegemony is to construct a common sense. Ideological goals can be achieved if the opinions of the ruling class can be regarded as "common sense". Another common ideological term is incorporation. It refers to the process in which the ruling class adopts elements from the resistance of the governed and uses them to help maintain its existing status instead of challenging it. A second ideological operation is commodification. The most important job of a capitalist system is to produce goods, so making all goods seem natural is the central goal of its ideological operation. Hegemony theory holds that the dominant system cannot be fully agreed by the ruling class, and resentment or resistance will always

exist. Hegemony theory allows space for non-traditional and rebellious meanings to exist, which challenges or revises the existing dominant meanings.

The third is the culture in which the symbol or code operates. Barthes, a follower of Saussure, established a systematic model of meaning analysis. He called the relationship between the symbol in the sign, between the meaning of the sign, and between the sign and the external thing to which it refers denotation. This is the obvious meaning of the symbol, for example, taking a photograph of the same street scene, the explicit meaning is that same street. Meanwhile, according to Barthes, explicit meaning is the mechanical reproduction of the object, and there is implicit meaning, which is the artificial part of the process and shows the movement. The same street scene, for example, can be shot in markedly different ways. You can use color film, choose a sunny day, soft focus, let the street present happy, warm, human, there are children playing scene. Or use black and white negatives, bright coke and bright contrasting colors to turn the same "street" into a cold, heartless, morbid and decadent children's playing environment. Other implicit meanings may be more social than personal. For example, in a stratified society, the difference between classes is emphasized, while the symbols and designs of the hierarchy imply the level of the hierarchy. They are often represented by gold, ribbons or laurel and garland, and the more people express the higher the class. Bart mentioned that there are three ways in the second level of symbolic production meaning, among which the second is to pass myth. A myth is a mythological story through which a culture explains or understands reality or nature. If express meaning is the first level of symbolic meaning, myth is the

second level of symbolic meaning. It can be seen from the two levels of Barthes' symbolic meaning that in the second level, the symbolic system of the first level has been embedded in the value system of culture.

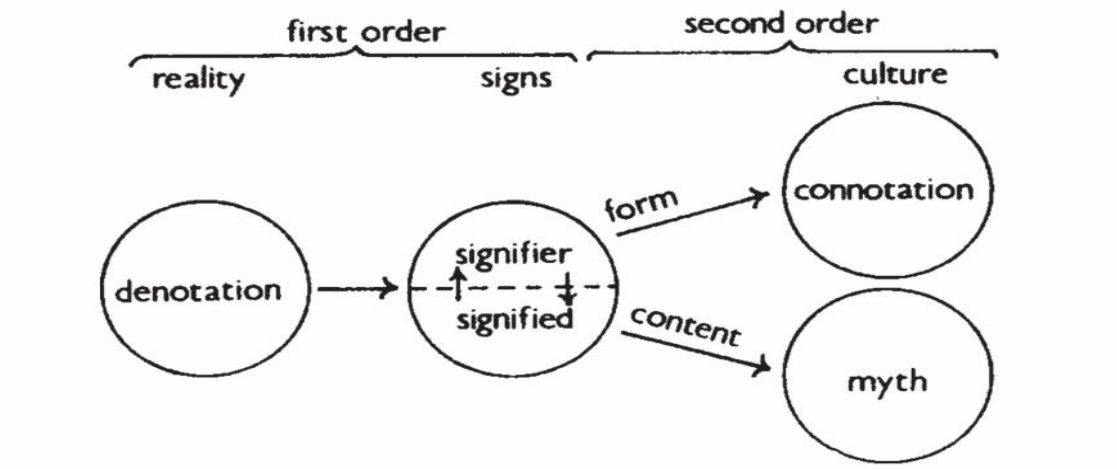


Figure 30: Barthes's two orders of signification (John Fiske.1990)

2.6.3 Organisms in Art

Herbert Read's concept of organisms in art is rooted in the belief that artworks can be understood as living entities with their own unique life and structure. He saw art as an extension of the artist's inner world and emotions, akin to the growth and development of a living organism.

According to Read, the process of creating art is akin to a living organism's growth and evolution. The artist's creative impulses and emotions are channeled into the artwork, allowing it to take on a life of its own. As the artist engages in the creative process, the artwork undergoes transformations, just as a living organism develops and matures over time.

In this context, the finished artwork is not a static object but a dynamic and living creation, embodying the artist's thoughts, emotions, and experiences. The viewer is invited to engage with the artwork on a deeper level, perceiving its vitality and the essence of the artist's inner life.

Herbert Read's concept of organisms in art places a strong emphasis on the unity and coherence of the artwork. He believed that the various elements of the artwork should come together harmoniously, forming a cohesive whole that communicates the artist's vision and emotions.

Overall, Herbert Read's concept of organisms in art offers a profound perspective on the expressive nature of artistic creation, treating artworks as living entities that grow and evolve through the artist's creative process, making art a deeply personal and emotional form of communication.

Conclusion:

In general, the symbolic school relies on a set of organized symbolic systems to serve communication. In everyday life, anything that is conventional is symbolized. codes are divided into codes of behavior and signifying codes. Ideograph codes are the main object discussed in this paper. They have five common characteristics: 1. They have several (sometimes only one) alternative family axes, from which units are selected and combined to form adjacent axes, usually in a manner consistent with rules or conventions. 2. Symbols have the function of transmitting meaning. They use various

ways and channels to refer to their external relevance. 3. The use of codes is based on the user's consensus and common culture, and there is an interactive correlation between codes and cultures. 4. All codes have social and communication functions. 5. Code transmission is carried out through appropriate channels and media.

2.7 Case Study

2.7.1 Anthony Howe's Kinetic Sculpture

Anthony Howe, an American artist, has designed a series of "Kinetic Wind sculptures" using computer software based on the principle of wind as kinetic energy, simulating pulses, swirls and even alien creatures, with a strong visual impact.

Anthony Howe's Wind Sculpture was conceived and created in 1989, and the result is a bizarre, massive piece that turns constantly when the wind blows. The whole shape combines the reflection effect of mirror metal to set off the environment of the work against the light and wind. Using science fiction works, microbial or astronomical models as inspiration for his shapes, he primarily uses stainless steel armatures to drive fractal structures to create a visually satisfying three-dimensional harmony.

Many people regard Anthony Howe's "Wind sculpture" (Figure23) as a technological invention or technological innovation. However, every piece of Anthony Howe's work is a perfect reflection of pure artistic inspiration and the use of modern technology. Like many artists, Anthony Howe puts his movements into his work. For example, when creating The Father's Influence, Anthony Howe's father was suffering from a

stroke, so he wanted to use the work to thank his father for giving and cultivating his creative talent, and to pay tribute to his father. As Anthony Howe said in his self-description: "Sculpture in movement is the geometry of artistic inspiration and complex machinery. The production of my work relies on creative expression, metal fabrication and the slow design of each component. It will change the way the viewer thinks about time and space." He believes that the beauty of sculpture lies in the unity of material, color, space structure and surrounding environment. In contemporary art creation, the combination of science and art is increasingly close, so Anthony Howe is better called an artist than a scientist.

Figure 31: Anthony Howe's "Wind sculpture"

https://bbs. zhulong. com/101020_group_201880/detail10119902/

http://www. howeart.net/work.html

American artist Anthony Howe is renowned for his mesmerizing kinetic sculptures, which captivate viewers with their dynamic and graceful movements. Let's analyze his movement sculptures from the four perspectives of appearance design: shape, color, material, and movement mode:

1. Shape:

Howe's movement sculptures feature intricate and captivating geometric shapes. He often incorporates abstract and organic forms, creating sculptures that evoke a sense of fluidity, elegance, and balance. The shapes are carefully designed to interact with the wind or other mechanical elements, allowing the sculptures to move gracefully and harmoniously, resembling living organisms in motion.

2. Color:

While many of Howe's sculptures are made from reflective stainless steel, their color is not the primary focus of his works. The sculptures' dynamic movements and captivating shapes are more central to his artistic expression. The interaction between the sculpture's polished surface and the surrounding environment often reflects and refracts light, enhancing the visual spectacle without relying on specific colors.

3. Material:

Anthony Howe primarily uses stainless steel to craft his kinetic sculptures. Stainless steel offers durability, weather resistance, and the ability to hold fine details and

complex shapes. The material's reflective surface contributes to the sculptures' interaction with light and their surroundings. The use of stainless steel ensures that the sculptures can withstand outdoor conditions, making them suitable for various environments.

4. Movement Mode:

The hallmark of Anthony Howe's kinetic sculptures is their mesmerizing and intricate movements. Utilizing wind or mechanical mechanisms, the sculptures come to life with dynamic and ever-changing motion. The sculptures' delicate balance, carefully engineered components, and precise design allow them to respond gracefully to even the slightest breeze, creating an enchanting dance that captivates viewers.

In conclusion, Anthony Howe's movement sculptures are a remarkable fusion of shape, material, color, and movement mode. The elegant and harmonious forms, crafted from stainless steel, are brought to life through the sculptures' captivating movements. The sculptures' kinetic nature elevates them to interactive and engaging art forms, leaving viewers in awe of the mesmerizing dance created by these graceful and dynamic artworks.

2.7.2 Beijing Daxing International Airport

The artistic design inspiration of the top appearance of Beijing Daxing International Airport draws inspiration from the phoenix pattern through its shape, color, and material choices. Here's a brief analysis of each perspective:

Figure 32: Design analysis of Beijing Daxing International Airport

1. Shape:

The shape of the airport's top appearance is the most direct representation of the phoenix pattern. The expansive roof structure, with its sweeping curves and outstretched wings, closely resembles the silhouette of a phoenix in flight. The graceful and dynamic form of the roof evokes the imagery of a majestic bird taking flight, symbolizing the phoenix's symbolism of renewal, growth, and transcendence. This design choice transforms the airport into a visually striking and iconic architectural masterpiece, celebrating the cultural significance of the phoenix in Chinese tradition.

2. Color:

The color palette chosen for the airport's top appearance also draws inspiration from the phoenix pattern. The dominant color used in the roof design is red, which holds great symbolic importance in Chinese culture. Red is associated with luck, prosperity, and celebration. In Chinese mythology, the phoenix is often depicted with vibrant and

richly colored plumage, with red being a prominent hue. By using red for the roof, the airport not only captures the essence of the phoenix's symbolism but also pays homage to China's cultural heritage and the country's prosperous future.

3. Material:

The material selection for the roof further reinforces the artistic design inspiration of the phoenix pattern. The airport's roof is constructed using advanced materials, such as steel and glass, which allow for the creation of the seamless single-span structure. These materials provide the necessary strength and durability to achieve the complex and flowing form of the phoenix-inspired roof. The use of glass also contributes to the airport's sustainable design approach, allowing for ample natural light to illuminate the interior spaces, reducing the need for artificial lighting during the daytime.

In conclusion, the artistic design inspiration of the top appearance of Beijing Daxing International Airport is a masterful fusion of shape, color, and material, drawing inspiration from the phoenix pattern in a holistic and cohesive manner. Through its striking form, vibrant red color, and innovative materials, the airport's top appearance embodies the spirit of the phoenix and its symbolic significance in Chinese culture, representing China's ambition, prosperity, and forward-looking vision for the future.

2.8 Summary

This chapter covers six main aspects, including Chinese characters, Phoenix art, movement sculpture, environmental data, art theory, and art design cases. In the

section on Chinese characters, it delves into their origin, development, and present situation. The Phoenix art section reviews the historical and modern representations of the phoenix in art, explores contemporary phoenix art, and discusses the survival of phoenix art in Chengdu. In the movement sculpture part, it provides a systematic and concise overview of the historical development of sculpture shapes, material usage changes, movement techniques, and historical placement environments. The environmental part describes the environments of Sanxingdui Cultural Community Park in Chengdu, Chinatown in Bangkok, Thailand, and SU Nakhon Pathom campus. The descriptions encompass various aspects, including human presence, geography, historical context, and details about the trees and bushes in these locations.

Furthermore, the chapter delves into art theory, touching upon Suzanne Lange's semiotic theory, the concept of art as a means of signal transmission, and the idea of art being an organic and integrated whole. Lastly, the case analysis section focuses on Anthony Howe's moving sculptures, highlighting the intricacies of their designs. Additionally, the chapter thoroughly analyzes how the overall appearance, color, material usage, and aesthetic form of Beijing Daxing International Airport in China draw inspiration from the imagery of the Phoenix art. This analysis provides insight into the thought process and artistic choices that contributed to the airport's design elements, creating a cohesive and visually striking environment.

Chapter 3
Research Methodology

3.1 Introduction

This part of the research focuses on research methods and processes. This chapter discusses the visual elements of phoenix characters, how to screen out continuous Chinese characters and the general rules of three-dimensional specializations of planar Chinese characters. In this study, visual elements extracted from phoenix characters are used as data collection samples to provide basic data, and materials, shapes, colors and equipment (light and electricity) are used as dynamic sculpture information to collect data and provide basic information. Environmental testing with environmental exploration as the setting of kinetic artworks. This chapter can be divided into the following 5 parts:

Part 1: Qualitative Methodology

Part 2: Analysis of Chinese Character

Part 3: Phoenix Exploration

Part 4: Experimental Method of Kinetic sculpture

Part 5: Environmental Exploration

3.2 Qualitative Methodology

3.2.1 Expert interview

3.2.1.1 Purpose of interview

The purpose of the interview is to comprehensively evaluate the phoenix sculpture, considering both tangible and intangible aspects of the artwork. The interview questions are designed to assess different facets of the sculpture's creation, impact, and appeal. The evaluation scores provided (ranging from 1 to 5) allow for a quantitative assessment of each aspect, providing valuable feedback on the sculpture's overall success and significance.

Tangible Image:

The interview addresses various tangible aspects of the phoenix sculpture's visual representation and physical characteristics:

C1 Symbol Conversion - This question examines the success of transforming the phoenix characters from a 2D representation to a 3D sculpture. The evaluation score provides insights into how effectively the essence and symbolism of the phoenix have been translated into the three-dimensional form.

C2 Material Processing - The interview assesses the sensory appeal and quality of the sculptural materials used. The evaluation score helps understand the extent to which the materials contribute to the overall aesthetic and tactile experience.

C3 Movement Test - This question explores the flexibility of the moving parts in the sculpture. The evaluation score offers insights into how well the sculpture's movement aligns with the artistic vision and enhances its overall impact.

C4 Assemble - The effect of the sculpture's component assembly on its success is examined. The evaluation score helps understand how well the different parts come together cohesively and contribute to the overall artistic expression.

C5 Environment - This question evaluates how well the sculpture fits into its environment. The evaluation score provides feedback on how harmoniously the sculpture complements its surroundings.

C6 Spread - The influence of the sculpture on the campus is analyzed. The evaluation score offers insights into the sculpture's reception and impact within the campus community.

Intangible Experience:

The interview delves into the intangible and emotional aspects of the phoenix sculpture:

C7 Cultural Background - This question explores the alignment between the sculpture, cultural background, and surrounding environment. The evaluation score helps

understand how well the sculpture embodies relevant cultural elements.

C8 Soul of Chinese Character - The interview examines the figurative and abstract nature of Chinese characters in the sculpture. The evaluation score provides feedback on how effectively the sculpture captures the essence and artistic significance of these characters.

C9 Dynamic - This question assesses the interactive effect of the sculpture on the audience. The evaluation score offers insights into how engaging and resonating the sculpture is for viewers.

C10 Aesthetic - The interview evaluates the beauty and artistic merits of the phoenix sculpture. The evaluation score helps understand its visual appeal and aesthetic qualities.

C11 Light - This question examines the effect of light on the sculpture and how it enhances or alters its visual perception. The evaluation score provides feedback on the lighting's impact on the artwork.

C12 Sense of Technology - The interview explores the appeal of technology to the audience when interacting with the sculpture. The evaluation score helps understand how technology enhances the overall experience and engagement with the artwork.

By covering both tangible and intangible aspects, the interview questions provide a holistic evaluation of the phoenix sculpture, shedding light on its artistic success, cultural relevance, and overall impact. The evaluation scores allow for quantitative assessment, facilitating a comprehensive understanding of the sculpture's significance and contribution to the artistic landscape.

3.2.1.2 Interview Question Formulation

The interview question design for evaluating the phoenix sculpture is comprehensive and covers various aspects of both tangible and intangible elements. The use of a five-point evaluation score provides a structured approach for participants to express their opinions and perceptions on each aspect of the sculpture.

1. Asking Questions in the Interview Question Design:

The questions are clear and specific, focusing on distinct aspects of the phoenix sculpture such as symbol conversion, material processing, movement test, and others.

The questions are designed to be objective and measurable, allowing participants to provide concrete responses based on their observations and experiences.

The questions are framed in a way that avoids bias or leading the participants to a specific response, ensuring a fair and unbiased evaluation of the sculpture.

2. Using the Five-Point Score for Data Evaluation:

The five-point evaluation score (ranging from 1 to 5) offers a standardized scale for

participants to rate each aspect of the sculpture. This scale allows for consistent and comparable data collection.

The scoring system provides a range of options, from low to high, enabling participants to express their opinions with granularity.

For each question, participants can choose the score that best represents their perception or evaluation of the particular aspect being addressed.

Data evaluation can be conducted by calculating average scores or using other statistical methods, providing a quantitative analysis of the sculpture's performance in different aspects.

The combination of well-designed interview questions and the use of the five-point score allows for a systematic and structured evaluation of the phoenix sculpture. This approach ensures that various aspects of the sculpture are thoroughly examined and provides valuable insights into its success, impact, and artistic significance. Additionally, the use of standardized scoring facilitates data analysis and enables a comprehensive understanding of the sculpture's overall reception and effectiveness.

3.2.1.3 Interviewer group

This is to gather in-depth content from one-on-one scenarios that can be used to discover and understand hidden information about the subject. Interview subjects: The interview subjects included three professors, three sculptors, and three aesthetic

theorists. (Appendix 2 Interview)

1. Professor Group:

Professor Xia Fan -- Sichuan Conservatory of Music. Women，41 years old，Chengdu，China.

Professor Yin Hong -- Chengdu Academy of Fine Arts. Men, 48 years old，Chengdu，China.

Professor Yin Xinan -- Sichuan University. Men, 56 years old，Chengdu，China.

2. Sculptor Group:

Sculptor Shi Xiangdong -- Guangxi Academy of Arts. Men, 54 years old，Nanning, China.

Sculptor Lou Jin -- Sichuan Fine Arts Institute. Men, 43 years old，Chongqing，China.

Sculptor Zhen Yalei -- Hebei Academy of Fine Arts. Men, 42 years old，Shijiazhuang，China.

3. Aesthetic Theory Group:

Aesthetician Ren Bo -- Art Document Management, Nanjing Museum. Men, 38 years old, Nanjing, China.

Aesthetician Qiao Qian -- North China University of Technology. Men, 56 years old，Beijing，China.

Aesthetician Qian Sihua -- Cultural Relic Management and Restoration, Sichuan Sculpture Academy. Men, 59 years old, Chengdu，China.

Reason for choice: In the field of sculpture, the expression of sculpture can be collected data from the environment, materials, shapes, decorative textures, colors, and installation (sound, light, electricity) as information.

Setup problem: Start from the basic principles of sculpture. References and field research. (See: Expert Questionnaire)

3.2.2 Expert Questionnaire

Problem Category		Problem Content	Evaluation Score				
			1	2	3	4	5
Tangible image	C1 Symbol conversion	The success of phoenix characters from 2D to 3D					5
	C2 Material processing	Sensory degree of sculptural material					5
	C3 Movement test	The flexibility of the moving parts of sculpture					5
	C4 Assemble	The effect of sculpture component assembly on sculpture success				4	
	C5 Environment	How well the sculpture fits into the environment					5
	C6 Spread	The influence of sculpture on campus			3		
Intangible experience	C7 Cultural background	The fit between culture and environment and sculpture				4	
	C8 Soul of Chinese character	The figurative and abstractness of Chinese characters				4	
	C9 Dynamic	The interactive effect of sculpture			3		
	C10 Aesthetic	The beauty of phoenix sculpture					5
	C11 Light	The effect of light on sculpture				4	
	C12 Sense of technology	The appeal of technology to the audience					5

Table 3: Expert questionnaire

3.2.3 Result Analysis

3.2.3.1 Expert group analysis

1. Location Distribution:

The expert group is geographically distributed across different cities in China, including Chengdu, Nanning, Chongqing, Shijiazhuang, Nanjing, and Beijing. This

diverse location distribution ensures a broad perspective and allows for the incorporation of regional insights and cultural influences in the evaluation of the Phoenix Chinese character moving sculpture.

2. Age Composition:

The age range of the experts varies from 38 to 59 years old. The group comprises individuals in their late 30s to late 50s, providing a mix of younger and more experienced perspectives. This age diversity allows for a comprehensive evaluation that considers both contemporary sensibilities and wisdom acquired through years of expertise.

3. Academic Level:

The expert group consists of three distinct academic levels: professors, sculptors, and aesthetic theorists. This multidimensional academic background brings different expertise and knowledge to the evaluation process. Professors offer academic perspectives, sculptors provide insights from their practical experience in the field of sculpture, and aesthetic theorists contribute theoretical understanding and analysis.

4. Academic Subject Distribution:

The experts represent diverse academic subjects, including music, fine arts, document management, technology, cultural relic management, and restoration. This broad distribution of academic subjects ensures a comprehensive analysis of the sculpture, considering various aspects such as aesthetics, cultural significance, technical aspects, and historical context.

5. Data Scores Analysis:

The data scores from the expert questionnaire indicate generally positive evaluations of the Phoenix Chinese character moving sculpture. Most of the questions received high scores of 4 and 5, suggesting that the sculpture successfully captures the essence of the phoenix characters in its 3D form, utilizes sensory sculptural materials effectively, exhibits flexibility in its movement, fits well into its environment, possesses aesthetic beauty, and appeals to the audience with its sense of technology.

Some aspects received scores of 3, indicating that there may be room for improvement. The areas that received slightly lower scores include the influence of the sculpture on the campus, the interactive effect of the sculpture, the fit between culture, environment, and sculpture, and the effect of light on the sculpture.

6. Guiding Role in Creation:

The location distribution, age composition, academic level, and academic subject distribution of the expert group collectively provide a comprehensive and well-rounded evaluation of the Phoenix Chinese character moving sculpture.

The high scores in various categories affirm the success of the sculpture in many aspects and offer positive reinforcement to the creators. The areas that received slightly lower scores can serve as specific points of improvement, guiding the artists in refining and optimizing the sculpture to achieve a more impactful and resonant artistic expression. The diverse perspectives and expertise of the expert group enrich the data analysis and ensure that the creation of the sculpture is well-informed and

reflective of multiple viewpoints.

3.2.3.2 Five fractional value result analysis

The collected data scores from the expert questionnaire provide valuable insights into various aspects of the Phoenix Chinese character moving sculpture. Let's analyze the data scores for each problem category:

1. Tangible Image:

The symbol conversion (C1) received a high score of 5, indicating that the success of transforming the phoenix characters from 2D to 3D is well-accomplished.

The sensory degree of sculptural material (C2) also received a high score of 5, suggesting that the materials used in the sculpture effectively evoke sensory experiences.

2. Movement Test:

The flexibility of the moving parts of the sculpture (C3) received a high score of 5, indicating that the movement of the sculpture is well-designed and executed.

3. Assemble:

The effect of sculpture component assembly on sculpture success (C4) received a score of 4, indicating that the component assembly has been successful but may have room

for improvement.

4. Environment:

How well the sculpture fits into the environment (C5) received a high score of 5, indicating that the sculpture harmoniously integrates with its surroundings.

5. Spread:

The influence of the sculpture on campus (C6) received a score of 3, suggesting that the sculpture's impact on the campus may need further consideration and enhancement.

6. Intangible Experience:

The fit between culture and environment and sculpture (C7) received a score of 4, indicating that the sculpture resonates with its cultural and environmental context.

The figurative and abstractness of Chinese characters (C8) received a score of 4, suggesting that the sculpture effectively captures the essence of Chinese characters.

The interactive effect of sculpture (C9) received a score of 3, indicating that the sculpture's interactive features may need further development.

The beauty of phoenix sculpture (C10) received a high score of 5, affirming the aesthetic appeal of the sculpture.

The effect of light on sculpture (C11) received a score of 4, suggesting that the use of lighting enhances the sculpture but may have room for further improvement.

The appeal of technology to the audience (C12) received a high score of 5, indicating that the technology incorporated in the sculpture resonates with the audience.

Overall, the data scores show that the Phoenix Chinese character moving sculpture has been successful in many aspects, including symbol conversion, material processing, movement, environment integration, aesthetic appeal, and the use of technology. However, there are areas, such as sculpture component assembly, interactive features, and campus influence, where further improvements and considerations could be made.

The data from the expert questionnaire play a crucial guiding role in the creation of the sculpture. The high scores in several categories validate the success of the artistic choices and techniques employed in the sculpture, while the areas with lower scores indicate specific aspects that require more attention and refinement. The expert feedback helps the creators make informed decisions to enhance the overall artistic impact and cultural significance of the Phoenix Chinese character moving sculpture.

3.3 Analysis of Chinese Character

3.3.1 Seven Fonts

The study of typefaces encompasses five distinct styles: oracle script, bronze script, seal script, official script, and regular script. These typefaces emerged in chronological order, with oracle script being the earliest, followed by bronze script, seal script, official script, and finally regular script.

By analyzing the data of regular script phoenix characters, a detailed examination of each character becomes possible. This analysis delves into various aspects, including the shape and pattern, the flow of broken strokes and complete strokes, the overall structure, the angles from the beginning to the end of each stroke, and the use of color.

The following five pictures vividly illustrate the unique and captivating patterns present in the phoenix characters. These intricate designs leave a lasting impression on viewers, showcasing the richness and artistic intricacies of the regular script typeface.

In conclusion, the evolution of Chinese typefaces, ranging from the ancient oracle script to the modern regular script, has played a crucial role in the artistic representation of characters. Through the analysis of regular script phoenix characters, we gain valuable insights into the artistic evolution and unique characteristics of each typeface. The captivating patterns showcased in the accompanying images serve as a testament to the creative mastery and cultural significance of Chinese calligraphy. (Figure 23).

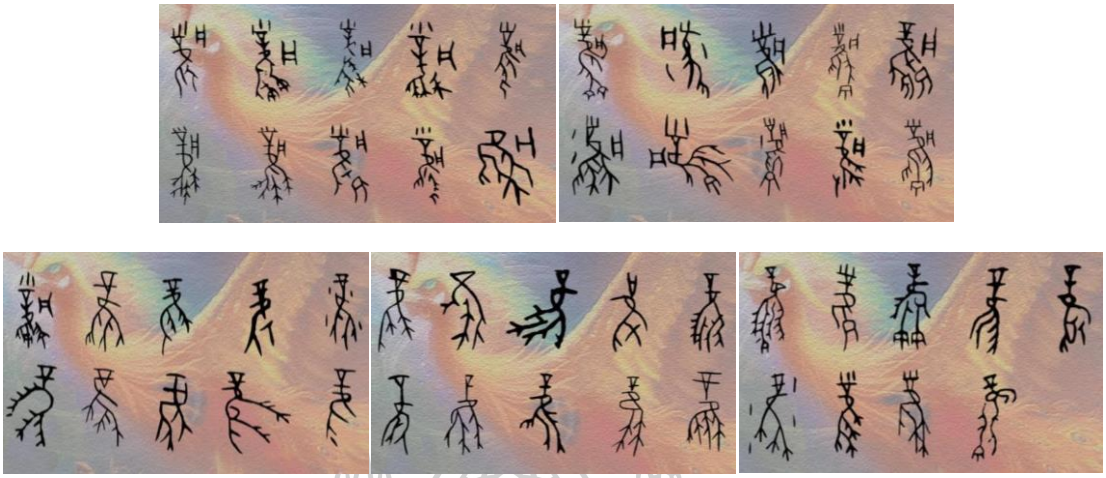


Figure 33：The first font: Oracle bone script

Figure 34：The second font:Bronze inscription; The third font: seal script

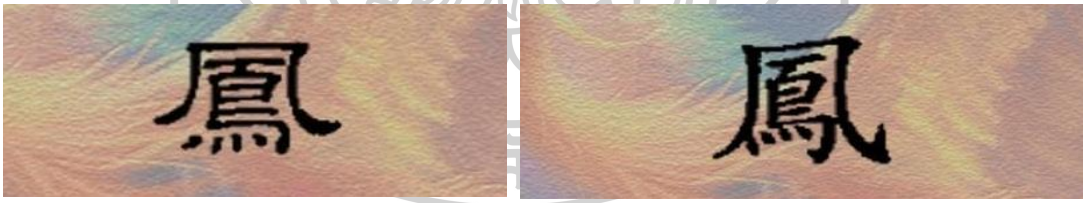


Figure 35: The fourth font: official script; The seventh type: regular script

As a symbol of characters, phoenix character has experienced the development and evolution of many times, and finally formed into oracle script, bronze script, seal script, official script, cursive script, running script and regular script, a total of seven styles. These periods include the Shang, Zhou, Qin, Han, Wei and Jin, Northern and Southern, Sui, Tang, Song, Yuan, Ming and Qing dynasties. The following figure

shows the evolution trend of the phoenix character in orthographic style in different dynasties.

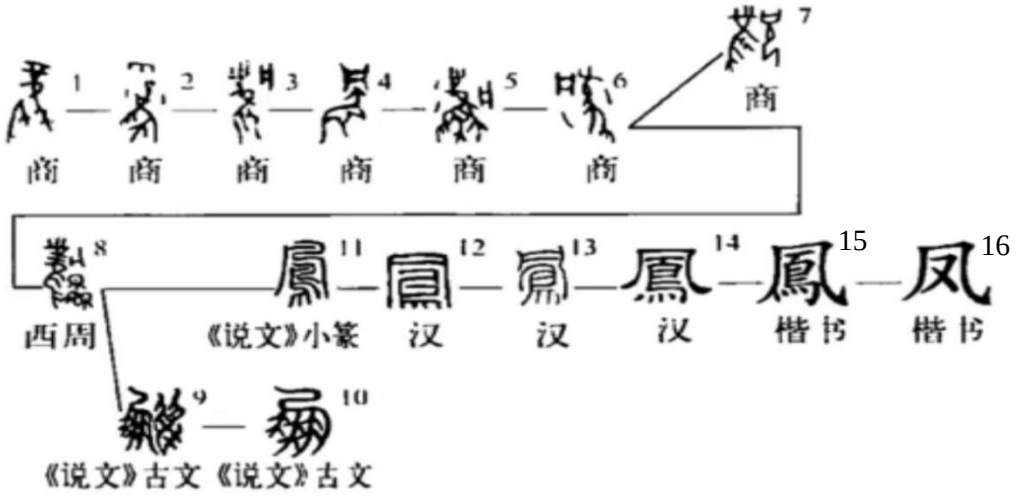


Figure 36: Phoenix font evolution diagram

In the Shang Dynasty, the character phoenix was first found on oracle bone inscriptions. It originally referred to the perfect divine bird that had the function of being able to communicate with gods when priests and wizards were offering sacrifices in ancient times. Through the study of the unearthed oracle bone inscriptions, scholars have reached a consensus: the early oracle bone inscriptions "phoenix" basically described the image of a divine bird, which has the head shape of a bird, a high crown, and extremely rich feathers. In these oracle bone inscriptions, we can even find the wings and feet of a divine bird. In terms of gesture, we may also find these phoenixes symbolizing divine birds. Some seem to be flying with wings, while others seem to be concentrating on thinking. For proof, the researchers collected all forms of oracle bone inscriptions and summarized them below. (Https.2023)

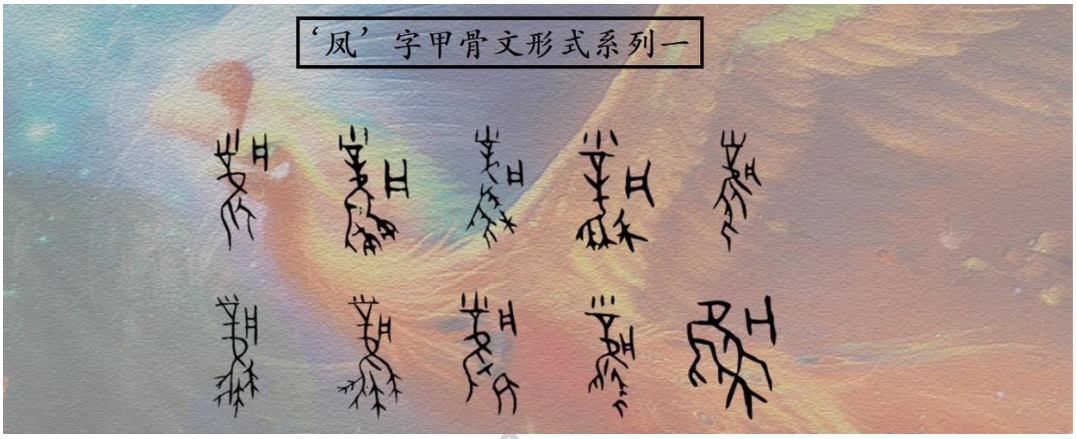


Figure 37: Phoenix Oracle Bone Inscriptions Shape series 1

Figure 38: Phoenix Oracle Bone Inscriptions Shape series 2

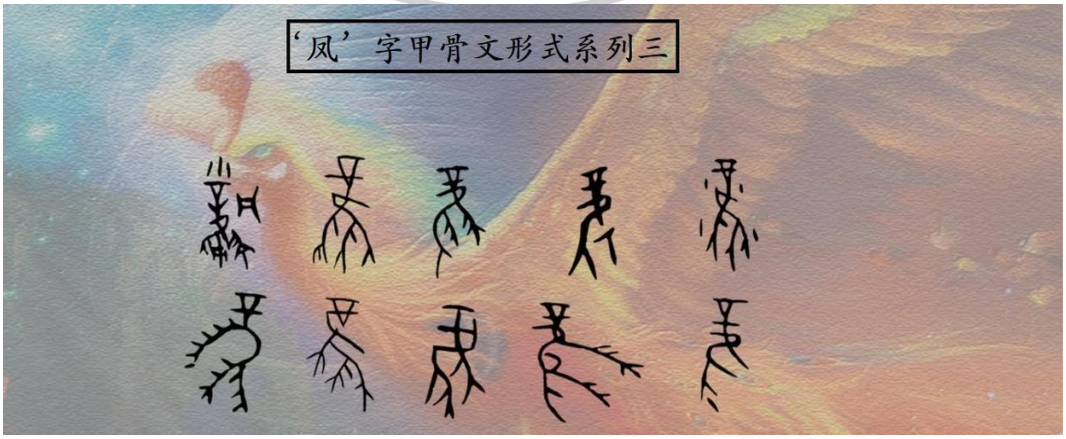


Figure 39: Phoenix Oracle Bone Inscriptions Shape series 3

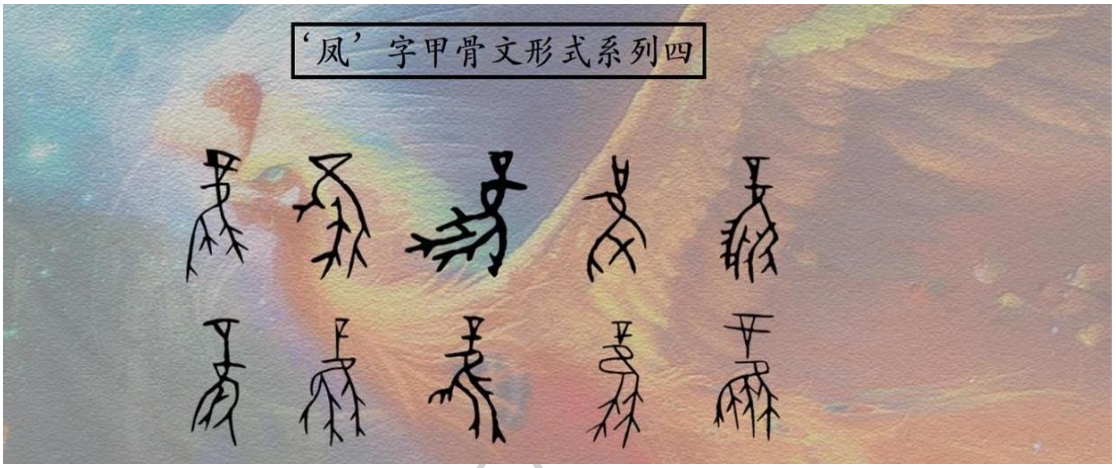


Figure 40: Phoenix Oracle Bone Inscriptions Shape series 4

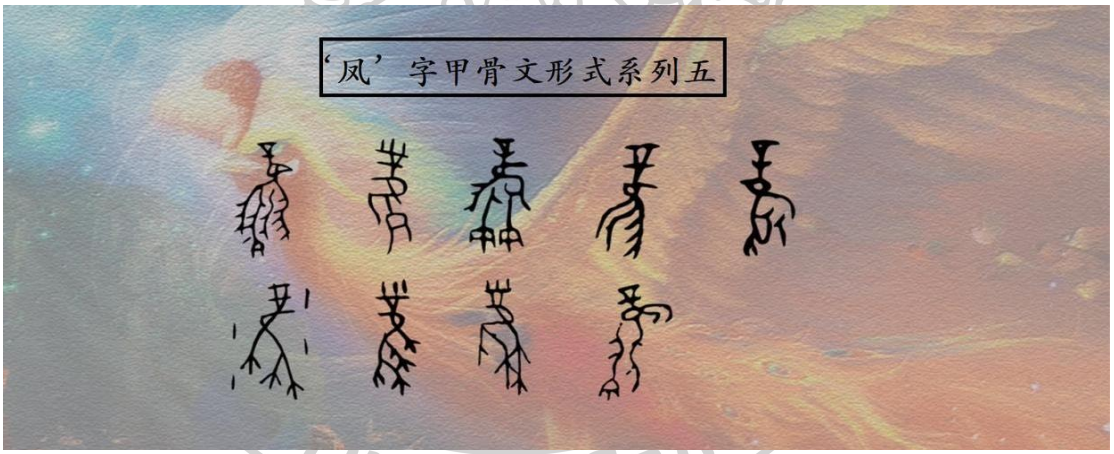


Figure 41: Phoenix Oracle Bone Inscriptions Shape series 5

During the Zhou Dynasty, after the various forms of oracle bone script in the Yin and Shang dynasties, it was clear that phoenix character was advancing in the direction of simplification. It was probably during the Spring and Autumn and Warring States periods of the Western and Eastern Zhou Dynasties that phoenix character also developed into a form of bronze inscription, which was very close to oracle bone script.

Figure 42: The shape of bronze inscriptions of Phoenix characters

In the Qin and Han dynasties, the ancient literati copied some ancient phoenix characters based on the oracle bone script and the bronze script. It can be found that these characters inherited the phoenix characters in the oracle bone script and the bronze script.

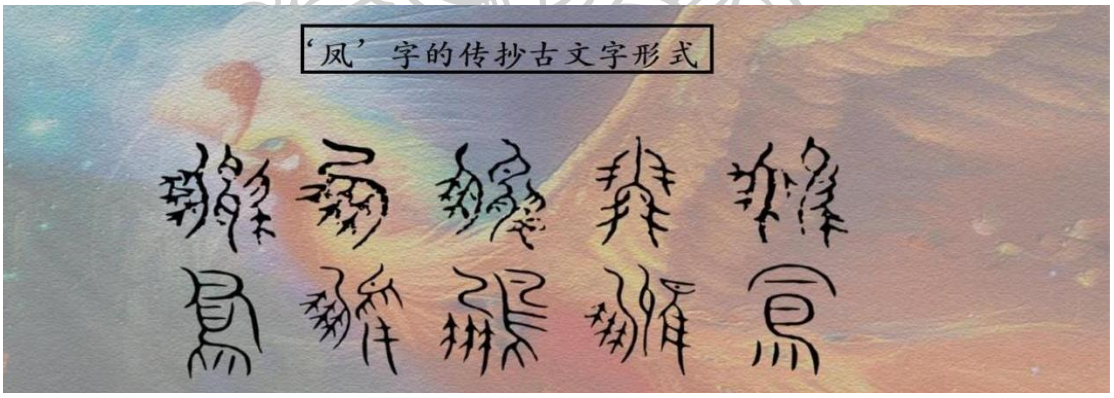


Figure 43: Phoenix character seal character shape

By the time Xu Shen of Han wrote *Speak the text and interpret the character*, the three seal characters recorded and described continued to progress along the trend of simplification. It was also because in the Han Dynasty, culture was at its peak, military affairs and government affairs were busy, which required the standardization and simplicity of characters. Therefore, in the Han Dynasty, based on the combination of

Qin Small seal character, official script appeared, followed by regular script (see Figure 23).

Figure 44: Phoenix character small seal character of Speak the text and interpret the character

In the Wei and Jin dynasties, cursive script, running script and regular script appeared one after another. In Wei, Jin, Sui, Tang, Song, Yuan, Ming and Qing dynasties, calligraphy masters came forth in large numbers, and various styles of phoenix calligraphy were colorful.

Finally, in the New China period, the Chinese character simplification project began. In the final Simplified *Chinese Character Summary Table*, the "bird" inside the traditional Chinese character "phoenix" (see Figure 23 No. 15) was further simplified to "you". Finally, the simplified "phoenix" character was formed (see Figure 23 No. 16).

3.3.2 Two Fonts

3.3.2.1 Cursive

The cursive type encompasses both cursive and running typefaces, with cursive type appearing before the running type. Cursive letters distinguish themselves from regular letters by featuring continuous connections of strokes. Among them, the cursive font stands out for its highly symbolic system, where strokes flow seamlessly from start to end, often forming abstract and profound meanings. However, due to its intricate and abstract nature, the cursive font is not suitable for practical purposes such as military affairs or government information exchange. Instead, its application shines in the realm of artistic creation and appreciation, making it an elegant art form and earning it the title of the crown of Chinese calligraphy art.

On the other hand, the running script font occupies a middle ground between the cursive and regular script. It boasts an ease of identification and offers the rapidness of writing. This script type finds practical application in everyday use, as it strikes a balance between artistic expression and legibility.

When comparing phoenix text collected in orthography and cursive font, noticeable differences in visual elements become apparent (Figure 34). Cursive style allows for more variation and artistic freedom, resulting in a diverse range of phoenix characters throughout different dynasties. Each dynasty's unique artistic influences and calligraphic styles leave a distinct imprint on the representation of phoenix character, showcasing evolution and development of Chinese calligraphy over time.

The following figure illustrates the captivating diversity of the phoenix character in cursive style across various dynasties. Each representation carries the essence of its respective era, reflecting the artistry and ingenuity of Chinese calligraphers throughout history.

In conclusion, the cursive type, with its intricate and expressive strokes, holds a special place in the realm of Chinese calligraphy. Its connection to artistic creation and appreciation, combined with the practicality of the running script, highlights the richness and versatility of Chinese calligraphy as an art form. The ever-evolving and diverse representations of the phoenix character in cursive style demonstrate the artistic brilliance and cultural significance embedded in the strokes of Chinese calligraphy throughout the ages.

Figure 45: The fifth type: cursive; the sixth font: running script

By analyzing the visual elements of phoenix text in each font, this study tries to follow the following methods:

①. Phoenix character texts are systematically collected in Chinese calligraphy documents from the aspects of shape and pattern, line shape, structure, Angle from beginning to end, color and so on.

②. Take a picture of each phoenix text with your camera and see the details that appear.

③. The visual elements of phoenix character are analyzed, and the phoenix Character is dissected by Photoshop program and illustration.

④. Create a ledger that provides data collection.

3.3.2.2 Running Script

The running script of the phoenix Chinese character in calligraphy exhibits distinct qualities that contribute to its beauty, shape, center of gravity balance, stroke

disconnection and connection, and its frequency of use in life:

1. Beauty and Shape:

The running script of the phoenix character adds a sense of dynamism and vitality to the traditional character. The flowing and cursive strokes create a more artistic and expressive rendition, enhancing its visual beauty. The fluidity of the running script captures the graceful essence of the phoenix, bringing the mythical bird to life on paper.

2. Center of Gravity Balance:

In running script calligraphy, maintaining a balanced center of gravity is vital to creating an aesthetically pleasing and harmonious character. The calligrapher skillfully balances the thick and thin strokes to ensure that the character retains its equilibrium, evoking a sense of grace and stability in the flowing script.

3. Stroke Disconnection and Connection:

The running script introduces more fluid and connected strokes, which can lead to some disconnections between characters. However, skilled calligraphers maintain the overall flow and coherence of the script, ensuring that the disconnections do not disrupt the visual appeal or readability.

4. Frequency of Use in Life:

In modern daily life, the running script of the phoenix character is less commonly used than its standard script counterpart. Running script calligraphy is often reserved for artistic and ceremonial purposes, such as traditional Chinese paintings, scrolls, or

special occasion calligraphy. As a result, it may be encountered less frequently in everyday communication compared to the standard script version.

5. Font Usage in Life:

In digital and printed materials, the running script of the phoenix character is less commonly used due to its calligraphic nature and the complexities of its strokes. However, it remains a prominent feature in traditional Chinese art, calligraphy exhibitions, and cultural events, where its artistic value and cultural significance are appreciated and celebrated.

In conclusion, the running script of the phoenix Chinese character (凤) exhibits a unique beauty and expressiveness in calligraphy. Its flowing and cursive strokes capture the essence of the mythical bird, infusing the character with grace and dynamism. While it may not be as frequently used in everyday communication, its artistic charm and cultural importance endure in traditional Chinese art and calligraphy, keeping the spirit of the phoenix alive in the world of artistic expression.

3.3.2.3 Visual Elements

Among the seven types of characters, including oracle script, bronze script, seal script, official script, cursive script, running script, and regular script, the phoenix character exhibits a remarkable diversity in its forms, stemming from variations in fonts and the artistic touch of different calligraphers. Notably, oracle script, bronze script, seal script, official script, and regular script are classified under the brush-breaking typeface category, characterized by the disconnection of strokes.

For the construction of the phoenix character plane symbol, the researchers deliberately selected phoenix characters in cursive script and running script. These script types offer unique expressive qualities, allowing for a dynamic and fluid representation of the phoenix's essence. The choice of these two scripts enhances the potential for artistic creativity and visual impact.

To curate a comprehensive collection of phoenix characters, the researchers embarked on the process of gathering writings from esteemed calligraphers proficient in both cursive and running scripts. The curated selection served as the foundation for further analysis and investigation.

The careful sifting and examination of the collected phoenix characters became a crucial step in the research. The researchers meticulously assessed each character, considering its visual elements, stylistic features, and artistic significance. This process allowed for the identification of standout representations that captured the spirit of the phoenix character in cursive and running scripts.

By drawing from the rich and diverse pool of calligraphy, the researchers aimed to create a phoenix character plane symbol that embodies the grace, elegance, and dynamic essence of the legendary bird. Through the fusion of calligraphic artistry and innovative design, the researchers sought to create a symbol that resonates with the audience.

Figure 46: Phoenix character calligraphy collection 1

According to the need of phoenix character movement sculpture on the ground, we need to find the end pen just in the text under the Fang phoenix character. The phoenix character is further in line with the standard. In this time screening, as well as cursive, Huai su, bian body intelligence wing, Xian Yushu, Jane books, like the emperor, Deng Wenyuan, Zhao Yong, Wu Zetian, Zhao Menghu, Sun Guoting, Wang Xizhi, and partial phoenix Xu Boqing words are excluded.

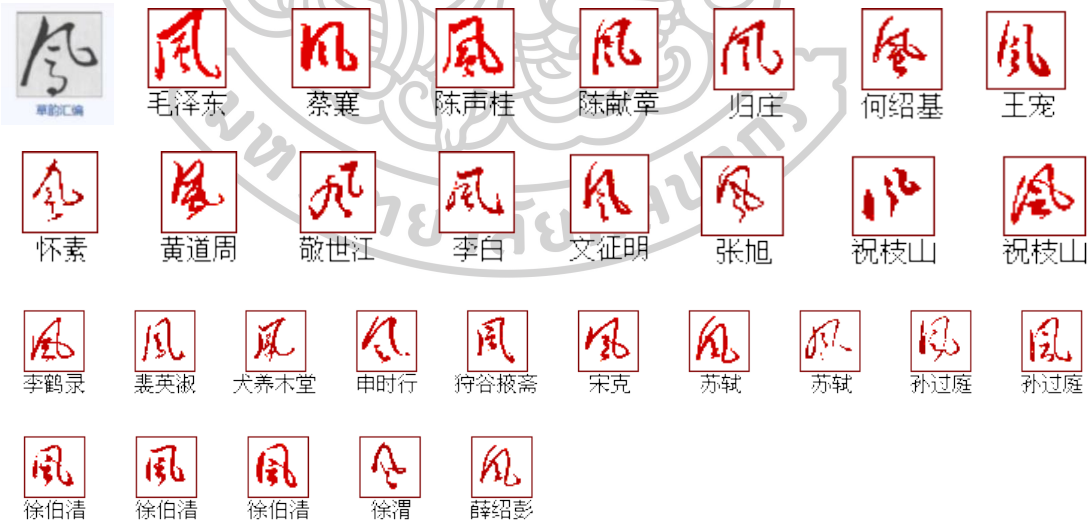


Figure 47: The final stroke of the phoenix Chinese character is right below

In the second screening, the characters whose final strokes are higher than the others

need to be selected. The cursive script Compilation, He Shaoji, Huai Su, Huang Daozhou, Wen Zhengming, Zhang Xu, Shen Shixing, Sun Guoting, Xu Wei were retained from the screening.

Figure 48: In the phoenix character, the stroke at the end is the highlighted calligraphy work

In the third screening, it is to eliminate the characters with complex strokes, this time the elimination of He Shaoji, Huang Daozhou. The remaining seven phoenix characters are all materials for building flat phoenix characters.

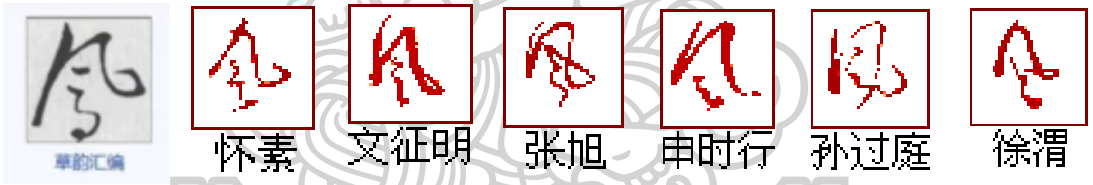


Figure 49: A phoenix character with simple strokes

Pictograph is an important feature in Chinese characters. From the selection of 7 plane phoenix characters, basically consists of two parts. The upper part is derived from the head and wings, while the lower part is derived from the phoenix body and feet. The researchers numbered seven flat phoenix characters, with the top half consisting of a 1 and a 2 and the 3 being the bottom half. From the graph observation, 1 is the abstraction of the crested and crested parts; 2 is the abstraction of phoenix neck, wings and tail; 3 is the abstraction of phoenix body and chicken feet.

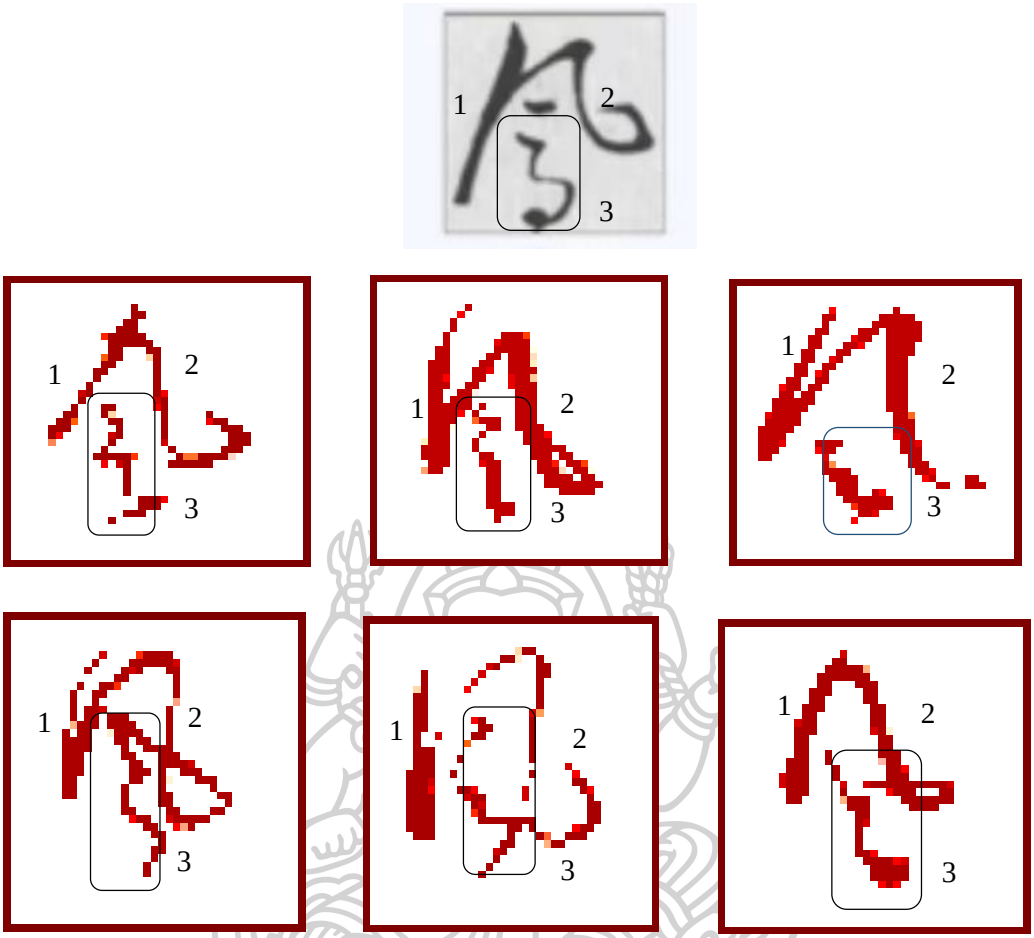


Figure 50: Analysis of phoenix character shape structure

From the density relationship of graphic lines, the density relationship of phoenix characters in cursive compilation is symmetrical; Huai Su phoenix word upper wide sparse; Wen Zhengming's phoenix characters 1 and 3 combine closely, 2 and 3 appear wide and sparse; Zhang Xu phoenix word upper right corner and lower left wide sparse; Shen Shi line of phoenix word to 1, 2, 3 form a surround, the middle wide sparse; The upper right part of Sun Guoting's phoenix character is wide and sparse; Xu Wei's phoenix word upper wide thin.

3.4 Phoenix Exploration

3.4.1 Abstract Phoenix

The researchers embarked on an innovative and creative artistic endeavor, creating kinetic sculptures with abstract phoenix elements, including feathered eyes (see Figure 54). Through expert and public inquiries, the artwork has some potential downsides to consider, particularly regarding the audience's perception of the Phoenix.

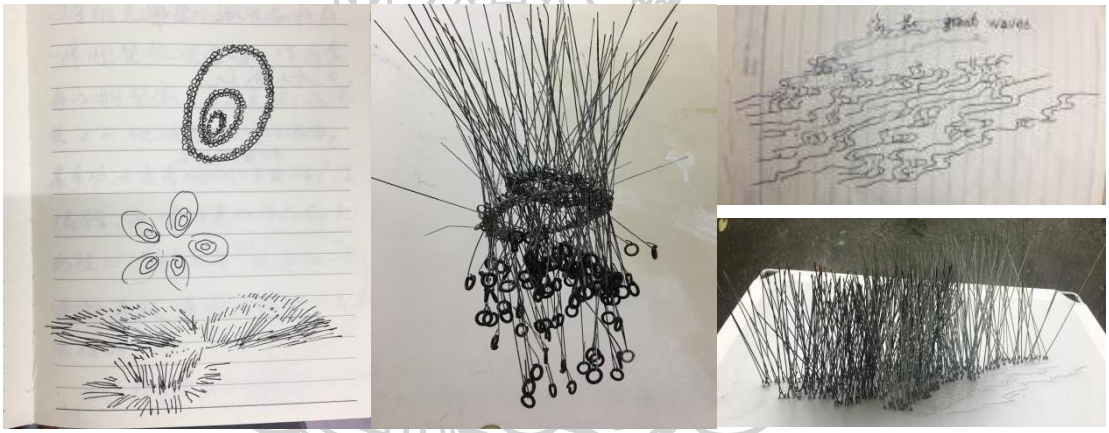


Figure 51: Pure abstract kinetic sculpture design practice

1. Lack of Recognizability: Abstract representations can be challenging for viewers to interpret and identify, especially when attempting to recognize a specific subject like the phoenix. The abstract nature of the sculpture may obscure the recognizable features of the phoenix, leading to a loss of visual connection and understanding for the audience.

2. Ambiguity of Symbolism: While abstraction can allow for artistic freedom and open interpretation, it may result in ambiguity when conveying the symbolism of the

phoenix. The abstract elements might not effectively communicate the essence and meaning of the mythical bird, making it difficult for viewers to connect with the intended message.

3. Potential Disconnect: The abstract nature of the moving sculpture may lead to a disconnect between the artist's intention and the viewer's perception. If the representation of the phoenix is too abstract or obscure, it might not evoke the intended emotions or associations related to the legendary creature.

4. Loss of Emotional Impact: The abstract representation may not capture the emotional impact that a more recognizable or detailed portrayal of the phoenix could achieve. Viewers might not experience the same awe, beauty, or symbolism that a traditional and identifiable depiction of the phoenix might elicit.

5. Audience Accessibility: Artworks with abstract representations often require a certain level of artistic appreciation and understanding. For some viewers, the abstract phoenix elements may be too esoteric or challenging to connect with, limiting the artwork's accessibility and appeal.

Despite the potential disadvantages, abstract art can be a powerful means of expression, encouraging viewers to explore and interpret the artwork on a more personal level. To mitigate the drawbacks, the artist can consider striking a balance between abstraction and recognizable elements to maintain a connection with the phoenix symbolism. Incorporating elements that evoke the phoenix's essence while

retaining artistic freedom can create a moving sculpture that intrigues and captivates viewers, even if the representation is not entirely explicit.

3.4.2 Imagist Phoenix

The researchers' decision to create imagist sculptures reflects a desire to depict the essence of the phoenix in a simplified yet evocative manner. By focusing on vivid and recognizable images, they aim to engage the audience through visually compelling representations of the legendary creature, conveying the deeper essence of the phoenix. However, the work also exhibits its shortcomings as a kinetic sculpture:

Figure 52: The researcher's early design sketch of the Phoenix artwork

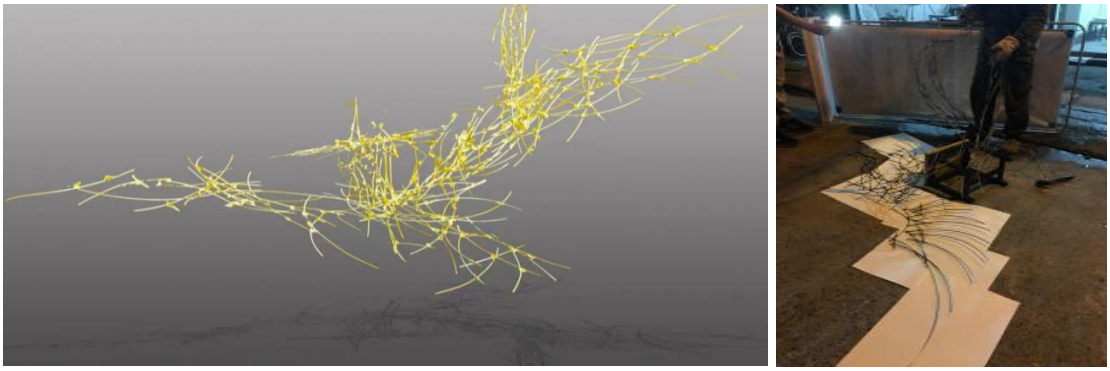


Figure 53: The creation experiment of phoenix bird in imagist

1. Technical challenges: Limitations in motion flexibility arise due to the complexity of transforming vivid and recognizable images into dynamic sculptures. Achieving realistic and dynamic motion while maintaining the sharpness of the phoenix image became a considerable technical challenge in this experiment.

2. Balance of form and function: Striking a balance between recognizable phoenix images and fluid movement can be difficult. The researchers faced the challenge of preserving the aesthetic integrity of the sculpture while ensuring that its dynamic aspects conveyed the essence of the phoenix's elegant flight.

3. Iterative process: Although the researchers are committed to perfecting the sculpture through an iterative process, the challenge of overcoming the lack of movement flexibility involved extensive trial and error, yet a satisfactory solution to achieve the best balance of form and movement has not been found.

3.4.3 Phoenix Chinese Character

In the analysis of the differences between phoenix images and kinetic flexibility of phoenix sculptures created in different fonts, three font types were experimented with: Chinese oracle bone character phoenix, bronze inscriptions phoenix, and cursive character phoenix.

1. Chinese Oracle Bone Character phoenix:

The Chinese oracle bone character phoenix is a pictographic representation of the

phoenix, and its image is very clear in the graphic design draft. However, when attempting to create a kinetic sculpture, the smoothness of the movement was achieved, but the clarity and strength of the phoenix image were compromised. The intricate details and pictographic nature of the oracle bone character may have limited the fluidity of the movement, as the sculpture struggled to capture the dynamic essence of the phoenix.

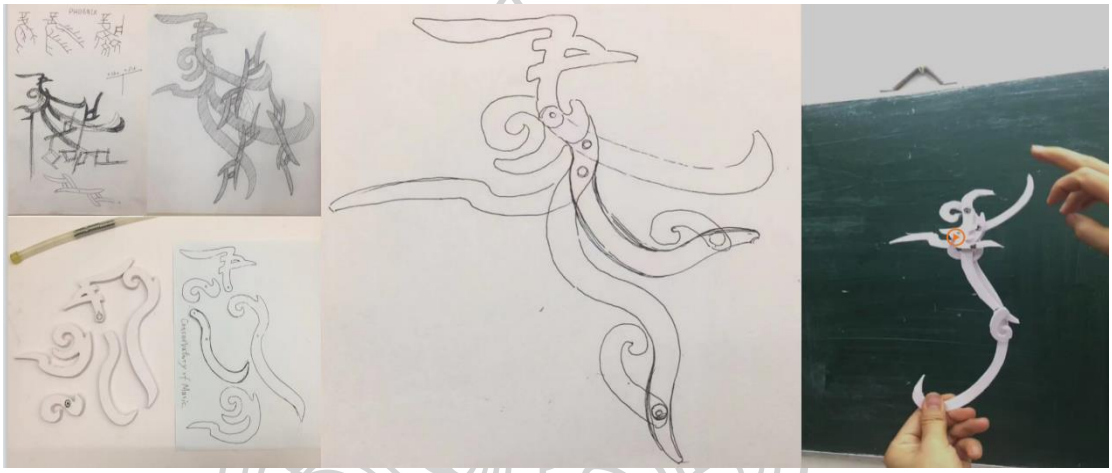


Figure 54: Experiment 2 of kinetic sculpture based on oracle characters

2. Bronze inscription Phoenix:

The researchers experimented with a bronze inscription phoenix, which enhanced the fluidity of the kinetic compared to the oracle bone character. The fluidity of the kinetic refers to the smoothness and natural flow of the sculpture's motion. While the visuality of the phoenix was improved, the strength of the phoenix image still lacked the desired impact. The bronze inscription likely provided a visually appealing and elegant representation, but the sculpture may have remained somewhat restrained in its portrayal of the phoenix's dynamic attributes.

Figure 55: Experiment of kinetic sculpture based on bronze inscriptions

3. Cursive Character Phoenix：

In the third attempt, the researcher chose the cursive character phoenix to create the kinetic sculpture. This time, both the fluency of the movement and the intensity of the phoenix image were successfully expressed. Cursive characters, with their flowing and fluid strokes, allowed the sculpture to capture the dynamic and graceful movements of the phoenix effectively. The cursive font's abstract and expressive nature may have contributed to the sculpture's ability to convey the essence and intensity of the phoenix's character.

Figure 56: The process of designing the front movement track of phoenix character kinetic sculpture from calligraphy

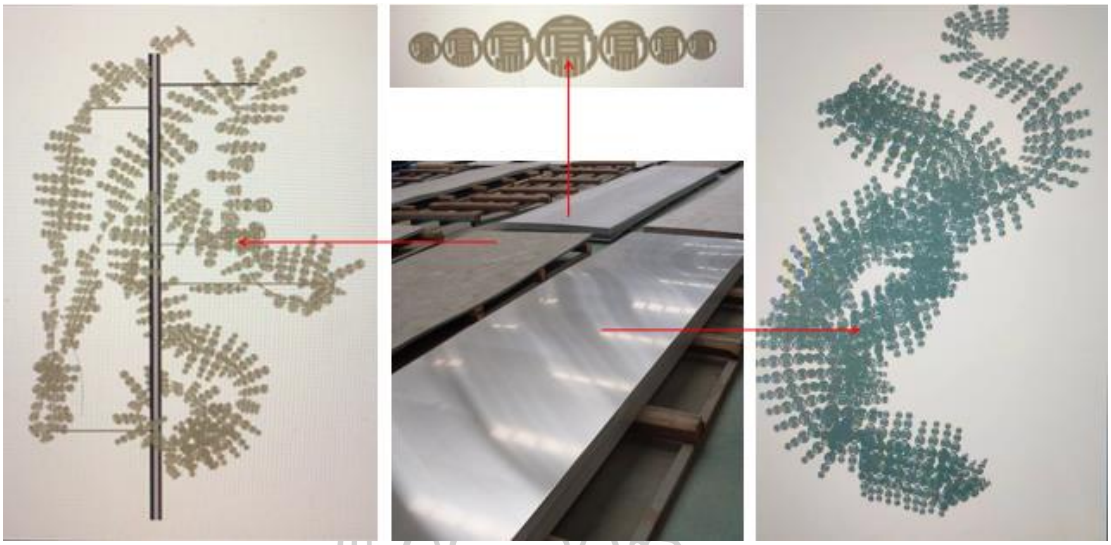


Figure 57: Inspiration from Sanxingdui Sacred tree, phoenix character kinetic sculpture sketch

Figure 58: The researchers sketch phoenix character design inspired by Sanxingdui Sacred Tree

In summary, the differences between phoenix images and movement flexibility of phoenix sculptures created in different fonts lie in the font's visual characteristics and expressive qualities. While pictographic fonts like the Chinese oracle bone character phoenix may provide a clear image of the phoenix, they can limit the fluidity of movement. On the other hand, fonts with more fluid and expressive strokes, such as

cursive characters, allow for both smooth movement and intense portrayal of the phoenix's dynamic attributes. The choice of font plays a significant role in determining how effectively the kinetic sculpture captures the essence of the phoenix and engages the audience with its visual appeal and intensity.

3.5 Experimental Method of Kinetic sculpture

3.5.1 Shape

Continuous writing of each stroke of phoenix Chinese characters without interruption is called continuous writing in calligraphy. Continuous writing is bound to cause the lines of cursive characters to have folding relations, and these folding angles have different degrees. When the lines of Chinese characters in the plane are transformed into the lines of Chinese characters in the space, the angles which only have the degree of folding on the plane are bound to change the degree of folding in the space.

If continuous brush lines of cursive Chinese characters after three-dimensional spatial design are regarded as the spatial axis of all moving parts of sculpture, position of this axis circling in space must be so that all parts moving around it cannot knock each other. Based on this principle, it is necessary to maximize folding Angle of Chinese cursive script originally on plane in 3D space, and to maximize the distance between two lines adjacent to plane without the folding relation. This maximization must first satisfy need to make sculpture parts move around line not knock each other. After meeting this demand, it can also have a variety of specific Angle and space distance selection according to the needs of artistic creation.

1. The center line of the cursive line is captured as the plane line of the movement axis design of the kinetic sculpture:

The lines of Chinese characters cursive are flat on the plane, and although the flat shapes also show various variations, this is not the point of capturing the center line of cursive lines. Capturing the center of a cursive line is not complicated and can be accomplished by intuition. If a scientific and accurate description is made, it is first to mark the maximum undulation point of the edge line on both sides of the cursive line, and then draw a line segment perpendicular to the opposite edge line with this point, and then measure the middle point of this vertical line and express it. When the midpoint of the maximum relief point on both sides of the cursive line and the vertical line segment on the opposite side are all marked out, the midpoint connecting all these vertical lines will get the center line of the entire cursive character line. Because this work is done by putting flat cursive lines into Rhino software, the resulting center line has the character of stretching into space.

2. Plane angle to space maximum rule:

There are four common working Windows in Rhino: Top, Front, Right, and perspective. Chinese characters in continuous cursive writing can be pasted into the positive window in the form of pictures, and then the font lines can be reconstructed to realize the space stretching of the reconstructed lines in the window. But to ensure that the line does not deform when viewed from the front window, all lines can only be stretched forward and backward.

Before stretching the lines back and forth, the character is flat, and when viewed from the side window, there is no Angle, only a line segment showing the height of the character. At this moment, there is no Angle change in the folding Angle viewed from the front window. In other words, the folding Angle of the plane does not change. When the forward and back stretch is complete, we see from the side window that each plane fold has a new fold Angle in the side view window. After many experiments, the researchers found that the Angle of the front window was in the side window, with a minimum of 0 degrees and a maximum of 90 degrees. The method to achieve these 90 degrees is: one folded line is stretched forward, the other is stretched backward, and the line segment originally presented as the height of Chinese characters in the right window is taken as the central axis. Each broken line takes this central axis as the common right Angle and stretches out two right Angle equilateral triangles. The two angled segments in the original front window are now converted to the right sides of two right equilateral triangles. (See Figure)

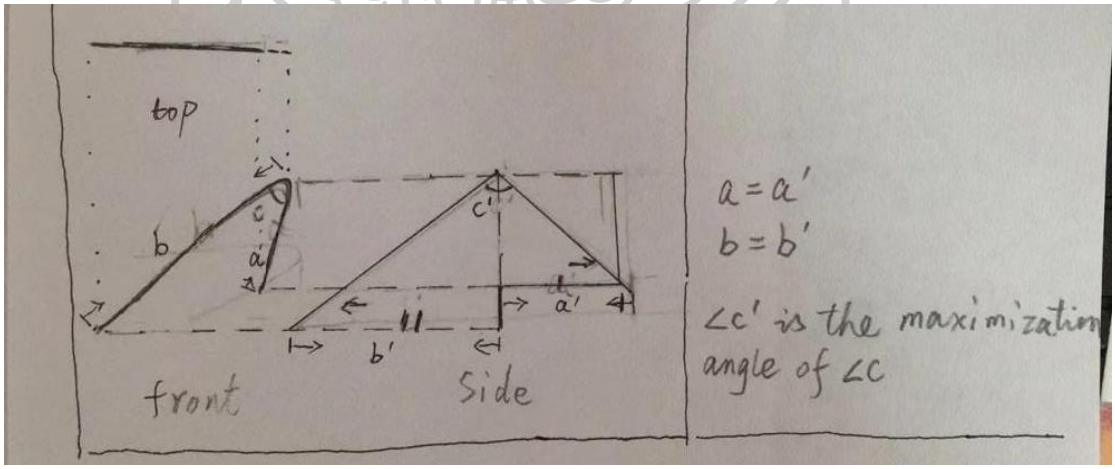


Figure 59: Method of making polyline into maximum angle

3. Maximizes the space of two adjacent line distances in the plane:

In addition to the Angle relationship of cursive Chinese characters, maximizing the spatial distance between two adjacent lines on the plane is also the key to make the moving sculpture parts have free movement space. In the following figure, some angles and line segments are taken as an example. Line segment AB and Angle EDF are adjacent. Line segment CD is their closest distance in the plane. When the phoenix line in the plane window completes the transformation in space, the position of point D in space remains unchanged, but point C moves forward with the movement of line segment AB. As the Angle of ∠EDF stretches out into space, the shape of a line segment changes dramatically when viewed from the top window, the right window, or the perspective window. But in the front window, there is no change in the phoenix shape because the movement of the ABCDEFG point follows the principle of only moving forward and backward in space. The closest distance between point C and the post-design space of ∠EDF is line segment CG. According to the needs of the design, the distance between point C and line segment EF remains the closest distance in the front window. This distance also becomes a standard, the shortest distance of all adjacent relations of lines is greater than or equal to this distance. If the distance is less than such a distance, the moving parts of the phoenix sculpture will collide and cannot freely rotate around the axis of the line. When free rotational movement cannot be achieved, the design is a failure.

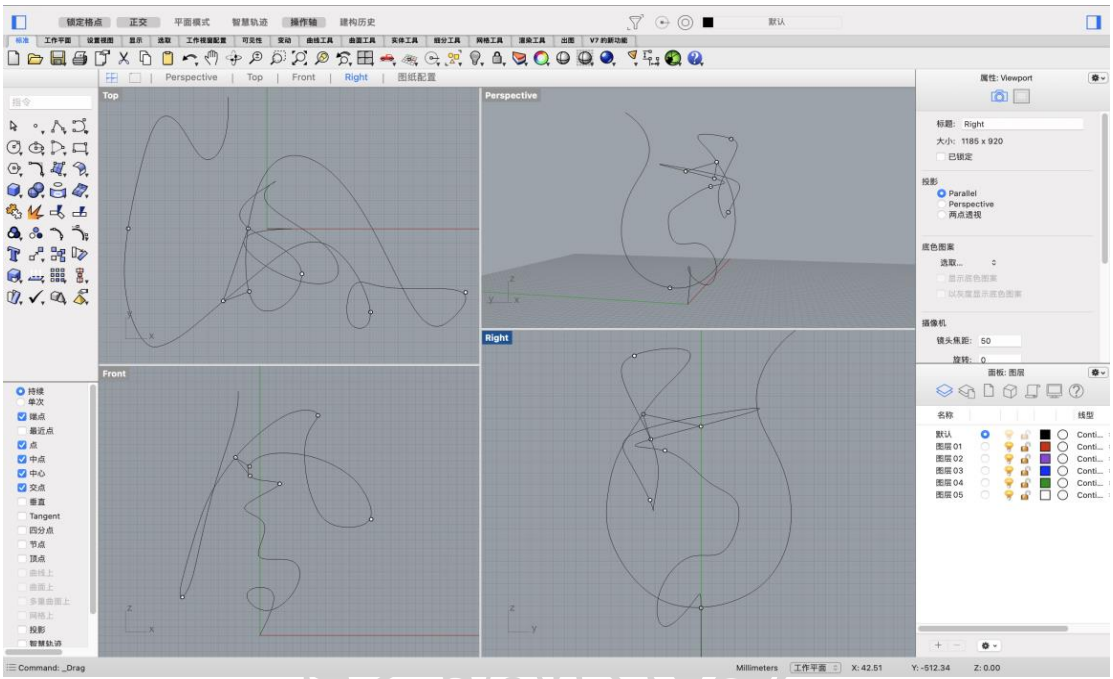


Figure 60: A spatial rule that maximizes the distance between two adjacent straight lines in a plane

4. The influence of pictographic on sculptural form:

The figure below provides a vivid example of the pictographic principle. As a moving sculpture, the phoenix character is viewed from the front, the left and the right, and the bottom and top are not conventional viewing angles. Because our design follows the principle of not changing the phoenix shape in the front view, and the front view and the back view are only a mirror image, so the changes that can be made are placed in the side view. In other words, the design principle of pictographic can only be accomplished through the left and right work Windows

J

I

K

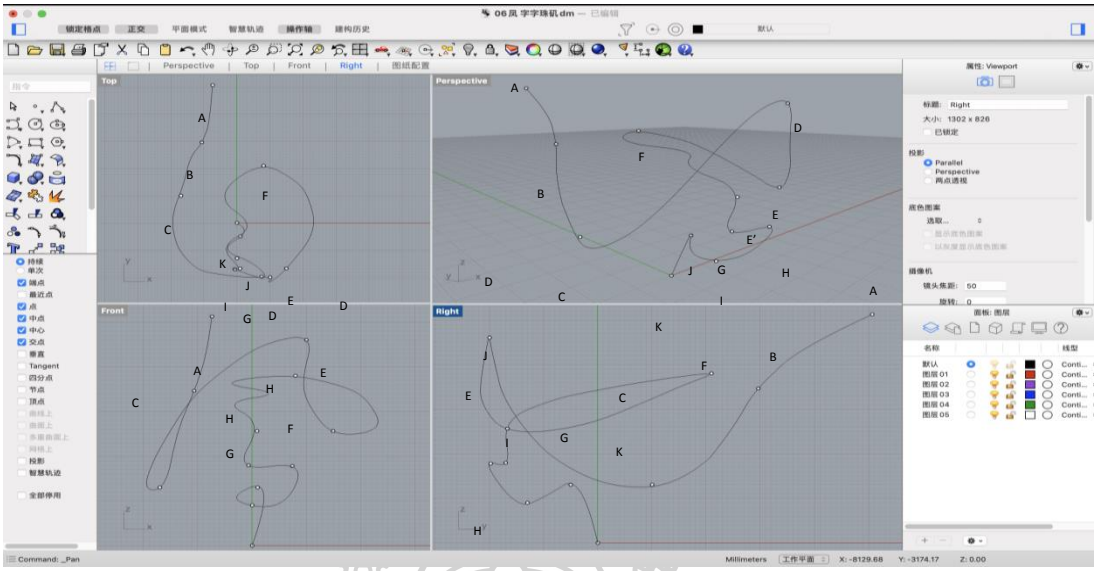


Figure 61: The influence of pictographic on sculptural form

As you can see from the four working Windows of the Rhino software, the phoenix character shape has not changed in the front window, and the pictographic character is reflected in the right window. In the right window, points A to K can move horizontally, and their horizontal movement results in different spatial shapes of phoenix character works. According to the pictographic principle of side window design works, in this case, A is the head of phoenix character works, B is the neck, C is the abdomen, D is the tail, E to I is the hip, JK is the foot and EF is the wing.

5. Balance provides stability for phoenix characters:

In mechanics, there are two kinds of equilibrium. One is the equilibrium of an object under the action of a copoint force (i.e., the equilibrium of a copoint force); The other is the equilibrium of the object under several torques (i.e., rotational equilibrium). A common point force is a body acting on several coplanar forces at the same time. If these forces all act on the same point of the body, or the lines of action of these forces

all intersect at the same point, these forces are called common point forces. The equilibrium of copoint forces causes the body to remain static or at rest stable in a straight-line state with uniform velocity. In this study, using the balance of common point forces and the center of gravity theory, the researchers used the suspension method to test the stability of 3D phoenix character works, and finally made the phoenix character kinetic sculpture get good stability through constant correction.

Archimedes put forward the concept of center of gravity in his paper on the Balance of Plane Figures and solved the center of gravity of different plane figures by mathematical formula. (Archimedes.2010) After successive experiments by physicists, the Center of Gravity of an irregular object can be found by the hanging method:

A. At A random point A, hang the irregular object vertically with a thin line, and draw the gravity line after the object is stationary (Figure 49 A).

B. In the same way, turn the other direction to a random point B and draw the gravity line of the object at rest (Figure 49 B).

C. The two gravity lines intersect at point C, which is the center of gravity of the irregular object.

Figure 62A-B：The suspension method looks for the center of gravity of an irregular object

The balanced design of phoenix character artworks needs to view whether the font is changed with the plane window, view the three-dimensional space effect in the perspective window, and carry out the stretching design of the lines in the top window and the right window. It can be seen from the plane window in the following figure that curve segment AL is the barycenter area of phoenix character, point D is the barycenter, and point L is the supporting point of the character. In the spatial design of phoenix character, the center of gravity of its irregular object should be located on the green lines of the front window and the side window. Only in this way can the phoenix character sculpture maintain its stable balance in the perspective window and maintain its upright phoenix shape when viewed from the front.

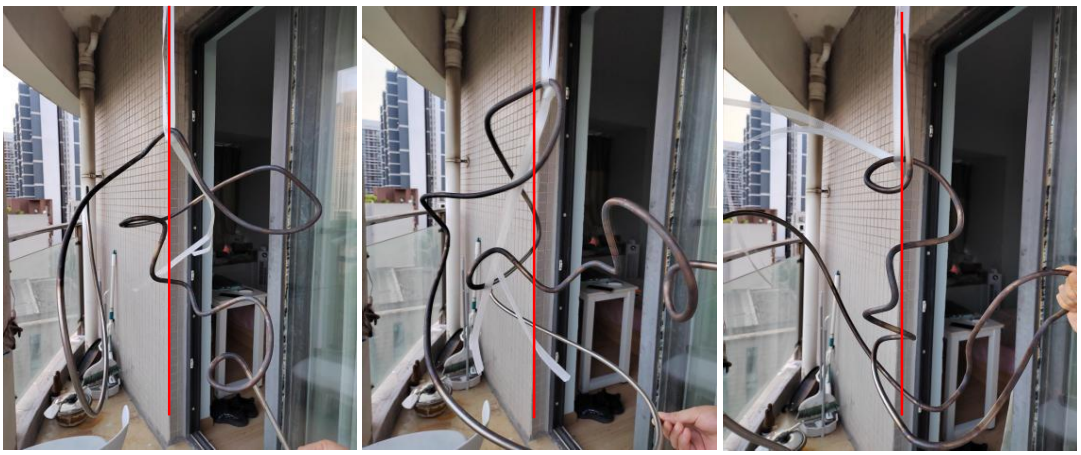


Figure 63: Detection of center of gravity of phoenix character 3D symbol

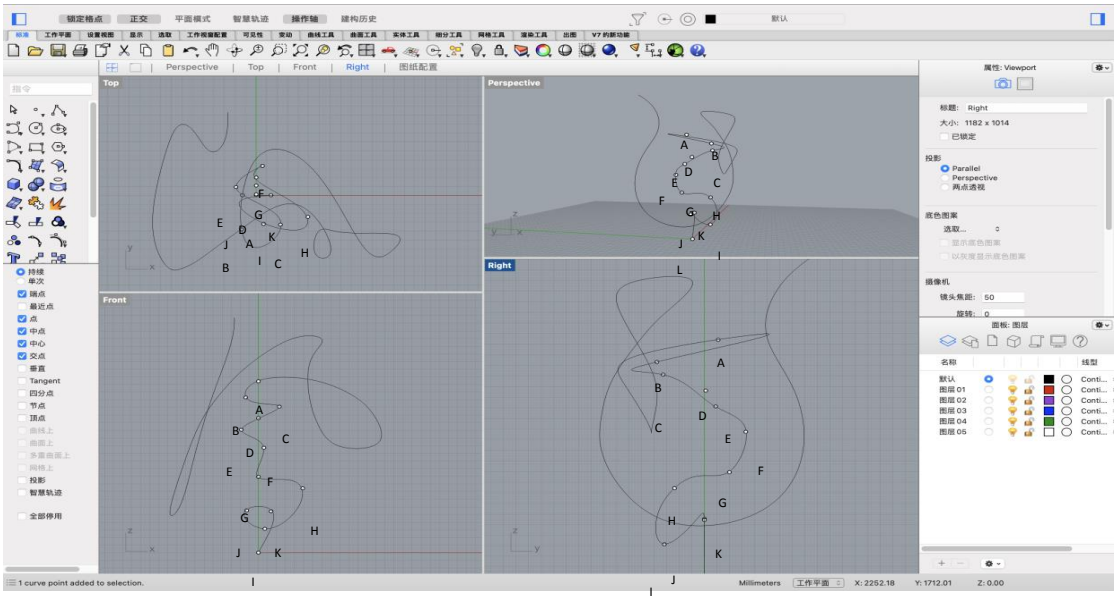


Figure 64: Balance provides stability for phoenix characters

At the time of design, the key turning point B, C, E, F, G, H, I, J, K of phoenix A to L line segment is first demarcated. These turning points stretch forward and back in the front window and do not change the shape of phoenix in the front window. But in the side window, these points serve the principle of pictographic modeling. To design different pictographic shapes.

In line segment A to L, the center of gravity of phoenix sculpture needs to be designed at point D. According to the suspension measurement method, the D point in the plane window is located on the green vertical axis; In the right window, it needs to be on both the green line and the curve segment AL.

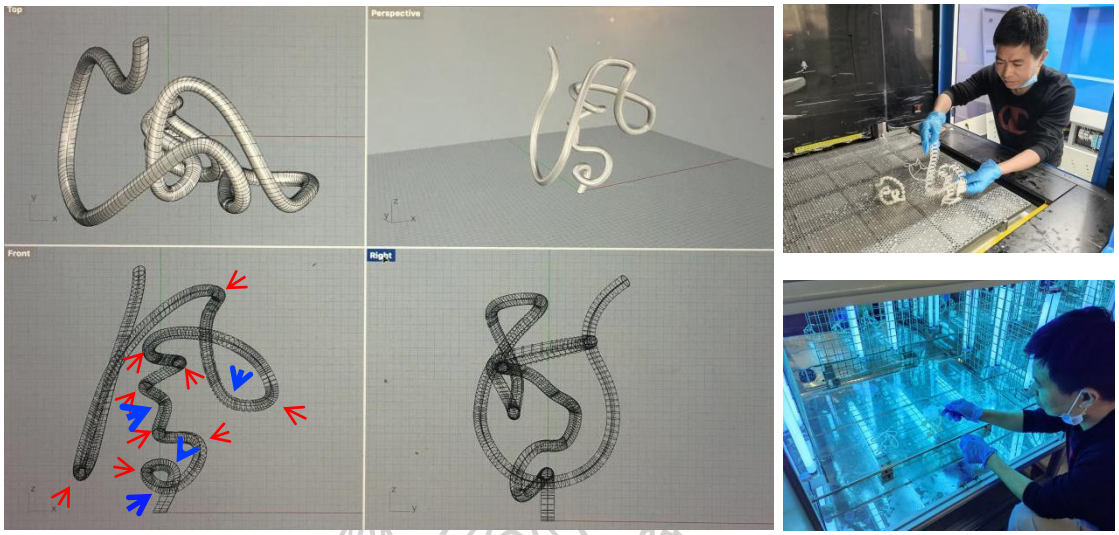


Figure 65: Red arrow: Stroke Angle < 90 degree (Change the Angle to 90 degrees in space)

Blue arrow: Stroke Angle > 90 degree (The Angle in space doesn't change)

3.5.2 Material

3.5.2.1 Material selection

Because of its movement characteristics, the material of each moving part should have good flexibility and hardness, and the work should be set outdoors, so its corrosion resistance is also extremely important. Stainless steel has good formability and good weldability. It is often used as a super-high strength material in the nuclear industry, aviation and aerospace industry. It is also a material often used in modern tableware, architecture and modern art. It is undoubtedly a good choice to use as the making material of Phoenix character movement sculpture.

Stainless steel is often divided into martensitic steel, ferritic steel, austenitic steel, austenitic ferritic (two-phase) stainless steel and precipitation hardening stainless steel, etc.

According to the composition: chromium stainless steel, chromium nickel stainless steel and chromium manganese nitrogen stainless steel. Specifically, it can be divided into Cr series (400 series), Cr-Ni series (300 series), Cr-Mn-Ni (200 series), heat-resistant chromium alloy steel (500 series) and precipitation hardening series (600 series).

200: Chrome-Manganese-Nickel

201, 202, etc.: Manganese instead of nickel, poor corrosion resistance, widely used as a cheap substitute for 300 series in the Chinese market.

300 Series: Chrome-Nickel (Austenitic stainless steel)

301: Good ductility for molding products. It can also be rapidly hardened through mechanical processing, good weldability, wear resistance and fatigue strength better than 304 stainless-steel.

302: The corrosion resistance is the same as 304, and the strength is better because the carbon content is high.

303: Adding a small amount of sulfur, phosphorus to make it easier to cut 304.

304: General purpose model. The standard ingredient is 18% chromium and 8% nickel. Stainless steel that is non-magnetic and cannot be modified by thermal processing. The GB brand is 06Cr19Ni10.

304L: Same characteristics as 304, but low carbon so more corrosion resistance, easy heat treatment, but poor mechanical property, suitable for welding and not easy heat treatment products.

304N: With the same characteristics as 304, is a nitrogen containing stainless steel, nitrogen is added to improve the strength of the steel.

309: Compared with 304 has better temperature resistance, temperature resistance up to 980°C.

309S: With a large amount of chromium, nickel, so the heat resistance, oxidation resistance is good, such as: heat exchanger, boiler components, jet engine.

310: Excellent elevated temperature oxidation resistance, the highest use temperature1200℃.

316: After 304, the second most widely used steel, used in the food industry, watch accessories, pharmaceutical industry and surgical equipment, molybdenum is added to give it a special structure resistant to corrosion. Because of its better resistance to chloride corrosion than 304, it is also used as "Marine steel". SS316 is commonly used in nuclear fuel recovery units. Grade 18/10 stainless steel is also usually suitable for this application level.

316 L: Low carbon so more corrosion resistance, easy heat treatment, products such as: chemical processing equipment, nuclear power generators, refrigerant storage tank.

321: Other properties are like 304 except that titanium is added to reduce the risk of corrosion in the material weld.

347: Adding stabilizing element niobium, suitable for welding aviation equipment parts and chemical equipment.

400 Series: Ferritic and martensitic stainless steel, manganese free, can replace 304 stainless-steel to extent

408: Good heat resistance, weak corrosion resistance, 11% Cr, 8% Ni.

409: The cheapest model (Anglo-American), commonly used as an automobile exhaust pipe, is ferritic stainless steel (chromium steel).

410: Martensite (high strength chromium steel), good wear resistance, poor corrosion resistance.

416: The addition of sulfur improved the workability of the material.

420: "Tool grade" martensitic steel, similar to Brinell high chromium steel, the earliest stainless steel. Also used in surgical knives, can be made very bright.

430: Ferritic stainless steel for decorative purposes, such as automobile ornaments. Good formability, but poor temperature resistance and corrosion resistance.

440: High strength cutting tool steel, slightly higher carbon content, after appropriate heat treatment can obtain high yield strength, hardness can reach 58HRC, belongs to the hardest stainless steel. The most common example is the "razor blade". There are three common models: 440A, 440B, 440C, and 440F (easy to process).

500 Series: Heat resistant chrome alloy steel.

600 Series: Martensitic precipitated hardened stainless steel.

Through the comparison of stainless-steel materials of various series (Baidu Encyclopedia, 2023), 304 is selected as the main material for phoenix character sports sculpture.

Figure 66: 304 Stainless Steel Rod

3.5.2.2 Material exploration

1. Material experimental equipment:

In this study, the key experimental equipment included: rhino design software, 3D printer, laser cutting machine, argon arc welding machine. Rhinocceros Design software provides researchers with virtual three-dimensional design of phoenix character moving sculpture. The four working Windows of the software provide researchers with an intuitive and scientific platform to express their creativity in the way of moving sculpture and can detect the spatial freedom of the moving parts of the work. The researchers used Rhino ccros7 (7.7.21160.05002, 2021-06-09), which provides design, model, present, analyze, realize and other capabilities.

3D printer provides fast model printing of works, saves time for the physical inspection and improvement of the design of works, and can reduce the cost of design and physical production to the greatest extent Laser cutting machine Argon arc welder, Macford gas cutter.

Figure 67: Combustion gun; Stainless steel welded machine gun

Figure 68: Metal cutting machine; Stainless steel welding machine

2. Material cutting：

Because 304 stainless steel is a universal model, has no magnetism, cannot be changed by the hot processing way to change its metallographic structure characteristics. The researchers used a hot machining method to create the 3D phoenix characters. In the experiment of material processing, the researcher first printed the 3D phoenix characters designed on the rhino software through a 3D printer. Because the

3D phoenix characters have two sizes of 60cm and 200cm, which have exceeded the maximum printing size of the 3D printer used by the researcher, the researcher processed the 3D phoenix characters in sections for printing. The photosensitive resin models are then oven-dried and then stitched together into a complete 3D phoenix model. After the 3D phoenix model is tested and found to be correct, the next step is to number each splicing segment and measure the length. The design of the Phoenix character sculpture with a height of 200cm is made of 304 round steels with a height of 16cm, and the design of the Phoenix character sculpture with a height of 60cm is made of 304 round steels with a height of 8cm. In order to facilitate the burning and bending of 304 round steels, it is necessary to cut 304 round steels with a length of 1.5 times longer than the numbered length, and the extra length of 0.5 times is used as the stress point during the burning and bending. The researchers used a Chinese Mackerel gas cutter.

Figure 69: The phoenix character number stainless steel material processing

3. Torching Materials：

304 stainless steel rods purchased from stainless steel stores are usually 600 cm long with optional diameters. The researchers used steel rods with a diameter of 6 centimeters to make small works with a height of 60 centimeters, and steel rods with a diameter of 16 centimeters to make large works with a height of 200 centimeters.

The linear stainless-steel rod is burned with natural gas at high temperature to bend it into a 3D phoenix character number twisting in space. When the distance and angle of the modeling part of the work are wrong, the modeling is also corrected by burning. The burning technology becomes the key to the hot working of stainless-steel rod.

After several rounds of burning experiments, the researchers found the burning rules for accurately making 3D phoenix symbols:

(1). Gas selection - Natural gas is burned by the spray gun, its temperature is about 650 degrees Celsius, and the combustion temperature of natural gas can reach 2300 degrees Celsius under the combustion of high-pressure oxygen. Because 304 stainless steel has a melting point between 1398 and 1454 degrees Celsius, so. The researchers used natural gas and oxygen as two gases at the same time.

(2). Gas control - Check gas cylinder valve and spray gun valve are in normal condition and close the valve before ignition. After checking, gently unscrew the gas cylinder and oxygen cylinder valves so that the barometer pointer is at the median

value. Then, gently unscrew the gas valve of the spray gun, ignite the gas and gradually increase the gas delivery. Finally, gradually unscrew the oxygen valve of the spray gun, so that the combustion temperature of natural gas gradually increases to 1500 degrees.

(3). Burning temperature -- The melting point of 304 stainless steel is between 1398 and 1454 degrees Celsius, so the steel rod should be burned to a temperature between 1100 and 1200 degrees Celsius.

(4). Arc bending -- When the bending shape is an arc, the whole arc is burned until the whole body is thoroughly red. During the burning, the gas should move around the steel rod repeatedly to make the whole arc heated evenly. Bend vigorously at both ends of the arc.

(5). Angle bending -- When the bending shape is Angle bending, the Angle part of the whole body burned to 1200 degrees Celsius. Apply force at both ends of the corner when bending.

(6). Angle expansion and contraction -- when the Angle of the arc needs to be expanded or reduced, the whole arc is also burned; When the Angle needs to be expanded or reduced, first burn the corner, and then extend the burn to both ends of the corner, so that the corrected Angle can become smooth.

(7). Angle twist -- when the end of the Angle needs to be twisted to the Angle does not

change. The burn is not at the corner point. The Angle of∠AOB is set to be rotated. When line segment AO needs to be rotated, the burning point is near point O of line segment BO. When line segment BO needs to be turned, the burning point is near point O of line segment AO.

Figure 70: Burn the stainless steel rod

4. Welding process of Kinetic parts

The welding of stainless steel requires the use of an argon-fluorine welder, as shown in Figure 42. The key to the success of welding is to adjust the voltage of the argon fluorine welder, the weight of the stainless steel welding gun switch and the contact time between the welding needle and the welding port.

The first step is to polish one end of the tungsten steel welding needle sharp, into the welding gun, because the welding is precision parts, welding gaps are small, so let the welding needle exposed 3mm gun barrel.

The second step is to adjust the welder to an appropriate voltage, which is determined

by the thickness of the welded parts. Because the researchers' welded parts are all less than 1mm, the current is controlled around 80-100A.

The third step is the difficulty in the whole welding process. When welding round welds, the welding wire should form an Angle of 10-15º with the left side of the welding face, and the welding needle should form an Angle of 70-80o with the right side of the welding face; in the welding of plane welds, the welding wire should form an Angle of 10-15º with the left side of the welding surface, and the welding needle should form an Angle of 75-85º with the right side of the welding surface; when welding the fold-shaped welds, the welding needle shall form an Angle of 45-60º with the flat welds, and the welding wire shall be sent from the left side at an Angle of 10-15º with the flat welds.

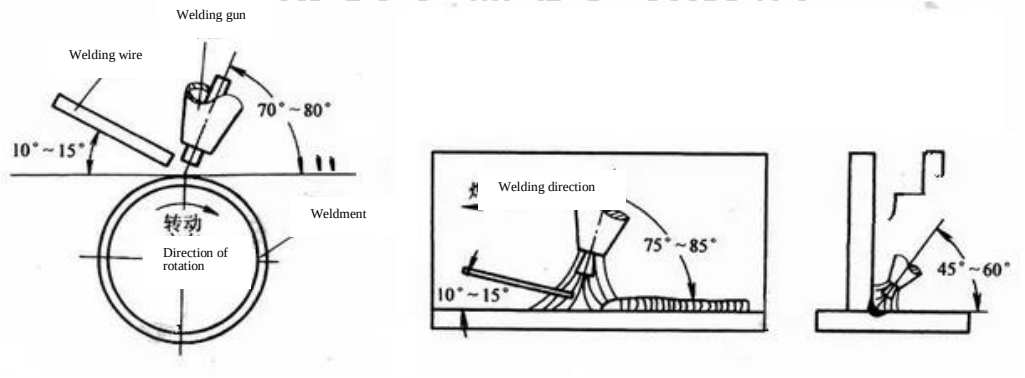


Figure 71: Welding process diagram

3.5.3 Movement Mode

3.5.3.1 Organic Element

After testing, the organic element should maintain the clarity of the phoenix image in

the movement, and its movement should be a lever balance type of up and down and left and right movement, rather than rotating movement.

The researchers' artwork "*Light and Shadow Fly Together*" (Figure 81) is a combination of the "lever balance principle" and the "gravity center principle". First of all, through the "hanging method" (see Chapter 3 -3.6-3.6.1-⑤ for details) to design the center of gravity of 2D bird shape pictographic phoenix character A, the A point perforated, suspended on the steel needle test. Move the phoenix character 10 times and observe its rotating state. The researchers found that the phoenix could spin smoothly at point A in all 10 rotations until the rotation finally stopped, with the bird's head facing a different direction each time the rotation stopped. However, in *Light and Shadow Fly Together*, the bird's head is always facing 11 o 'clock. How do you make the bird's head face 11 o 'clock at the end of each rotation? The researchers redesigned the phoenix character's new fulcrum A1 based on the "lever balance principle".

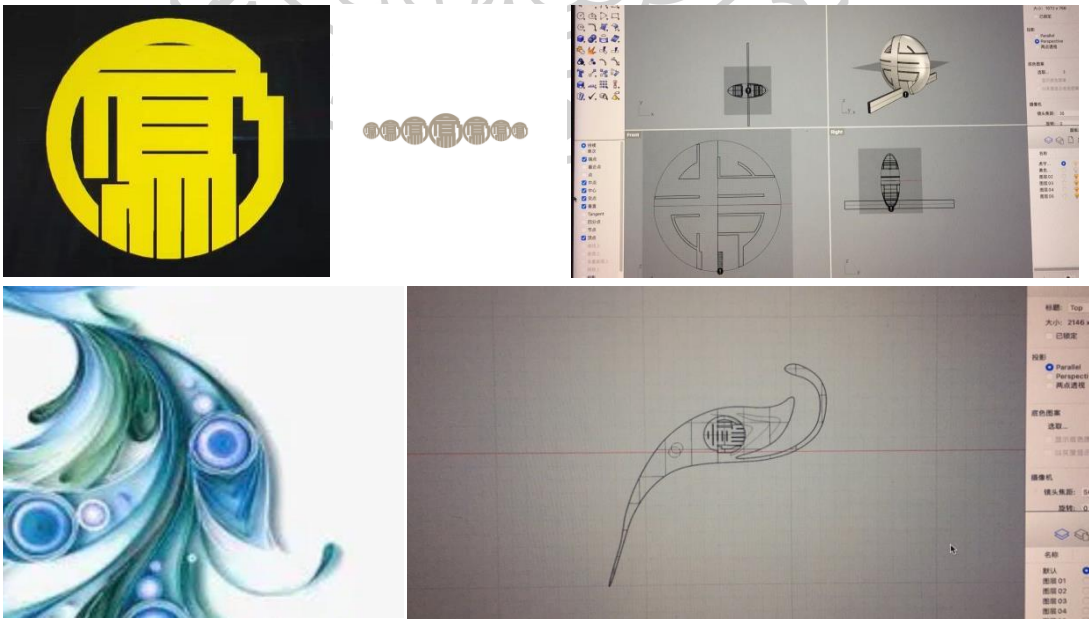


Figure 72: Phoenix character movement sculpture organic element design

The design of point A1 is based on the "lever balance principle". Point A, the center of gravity of the irregular plane, is the fulcrum of the balance lever. When the phoenix character in the *Light and Shadow Fly Together* returns to A static state from movement, it should keep the bird's head toward 11 o 'clock, that is, the gravity under A1 as the fulcrum is greater than the gravity above it. In order to meet this condition, A1 point is designed 1mm above the central point A. According to the "lever balance principle" F1· L1=F2·L2, the bird's head in the direction of the power arm does not move towards the 11 o 'clock direction, but stays at the 10 o 'clock direction, which does not meet the design requirements. When F1· L1> At F2·L2, the power arm will be raised, so the position of the new fulcrum A1 must be above left of point A. Next, the researcher takes point A as the standard and redetermines A1 at its 11 o 'clock direction, so that the deviation distance between A and A1 is 1mm. Another test of 10 rotations, with A1 as the phoenix axis, found that in each case when the phoenix stopped, the bird's head was pointing towards the 11 o 'clock direction.

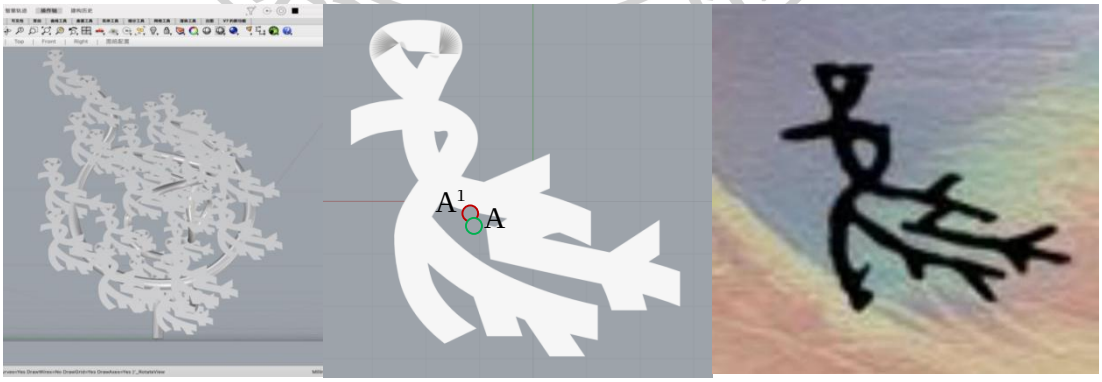


Figure 73: Light and shadow fly together design sketch and center of gravity

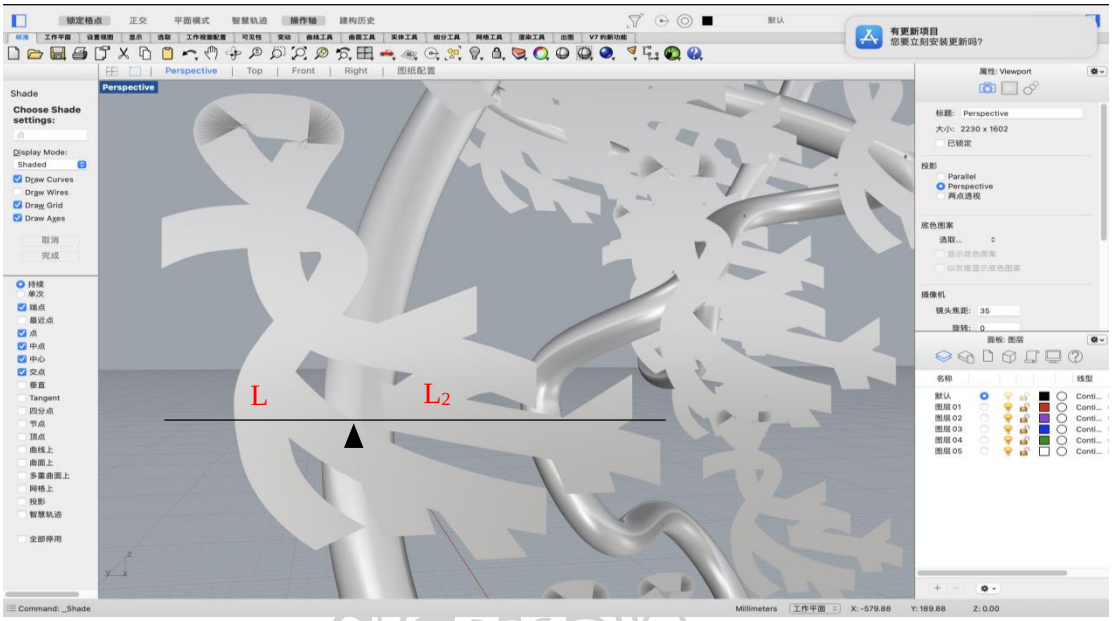


Figure 74: Equilibrium analysis of phoenix characters as moving parts

3.5.3.2 Geometric Element

Movement test is a kind of wind detection which belongs to the art of movement. It will test the movement sensitivity of phoenix moving parts under the action of wind. In the first test, the wind blades were composed of 2 groups of gradually shrinking flat discs, a total of 6 discs, which were symmetrically welded to both sides of the bearing. The wind blades were welded to a 90-degree Angle to the movement axis, and the electric fan was started, but the wind blades did not rotate. The researchers increased the rotation speed of the electric fan, and the wind blades faced the wind from all angles, resulting in the wind blades never rotating. In the second test, the researchers twisted the blades so that they were at a 30-degree Angle to the bearings. When the reprocessed blades were facing the wind of the electric fan, the blades rotated. To make the wind blade spin more smoothly, the researchers continued to improve the

structure of the wind blade. In the third test, the researchers replaced the flat disc with a concave bowl cover, which was welded together with bearing 90. Under the same wind force, it spun more smoothly. In the fourth test, the cap was welded together at a 30degree Angle with the bearing, and the wind test showed that its movement was slower than that of the 90-degree welding. In the fifth test, the researchers welded three sets of circular cover blades on the bearing, and the welding Angle was 90 degrees from the bearing. In the wind test, the rotation speed was the fastest under the same wind force.

Figure 75: Wind test drawing of moving parts of phoenix character moving sculpture

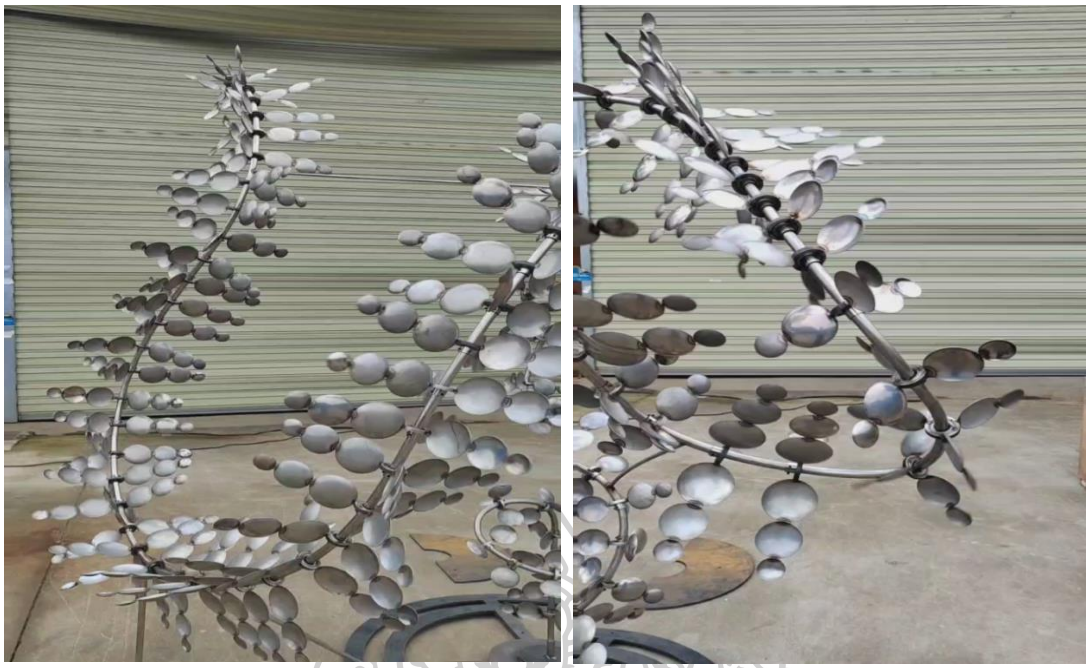


Figure 76: Assembly picture 3 of mechanical moving parts

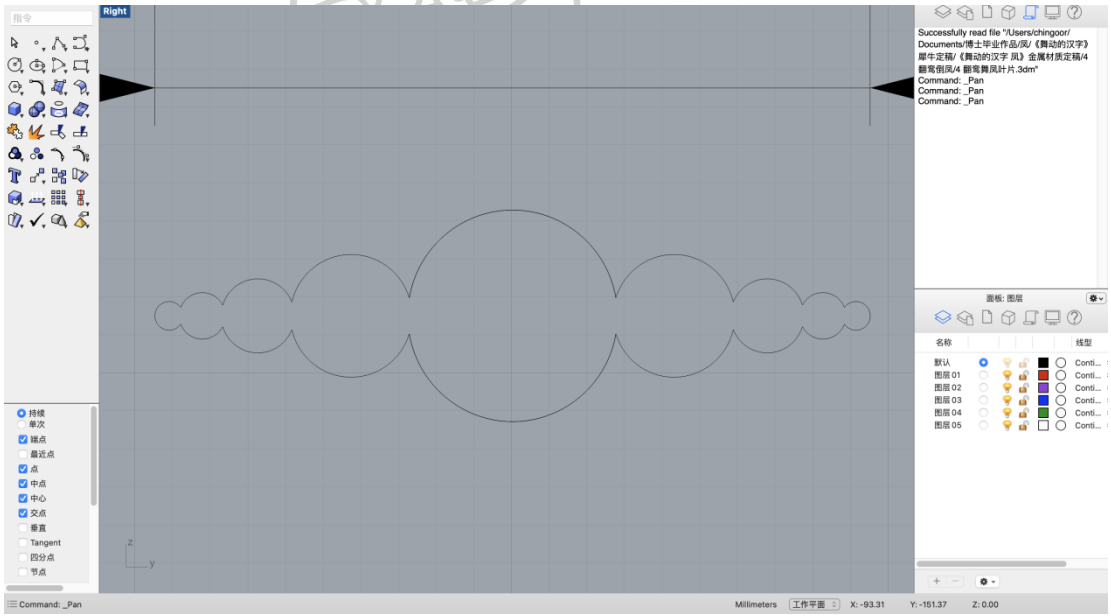


Figure 77: Rotary blade design sketch

3.5.3.3 Light Element

Light movement is another important movement type in phoenix character movement sculpture works. The red, blue, and white colors move from the mouth to the foot of the 3D phoenix character. The movement of the second color begins only after the previous color has moved. The realization of this mode of light tracking lies in the application of light control program. Light tracking program system is composed of 12mm wide optical tape, wire, power plug, power switch, light speed adjustment switch, light tracking controller and other 6 components. In the first step, the researchers loaded the LED light strip into the flexible silicone light strip, and then cut the back of the flexible silicone light strip. Next, the 3D symbol of phoenix character made by 6mm diameter stainless steel rod was embedded into the silicone light strip, and it was glued together with hot melt glue. In the second step, the researchers purchased the optical tracking control program from the Internet and fed it into the optical tracking controller. In the third step, the researchers connected wires, a power switch, a power plug, a light-speed regulating switch, and a light-tracking controller. The fourth step, switch on the power, open the control switch, adjust the speed of light tracking, red, blue, white three-color light in accordance with the program successive movement.

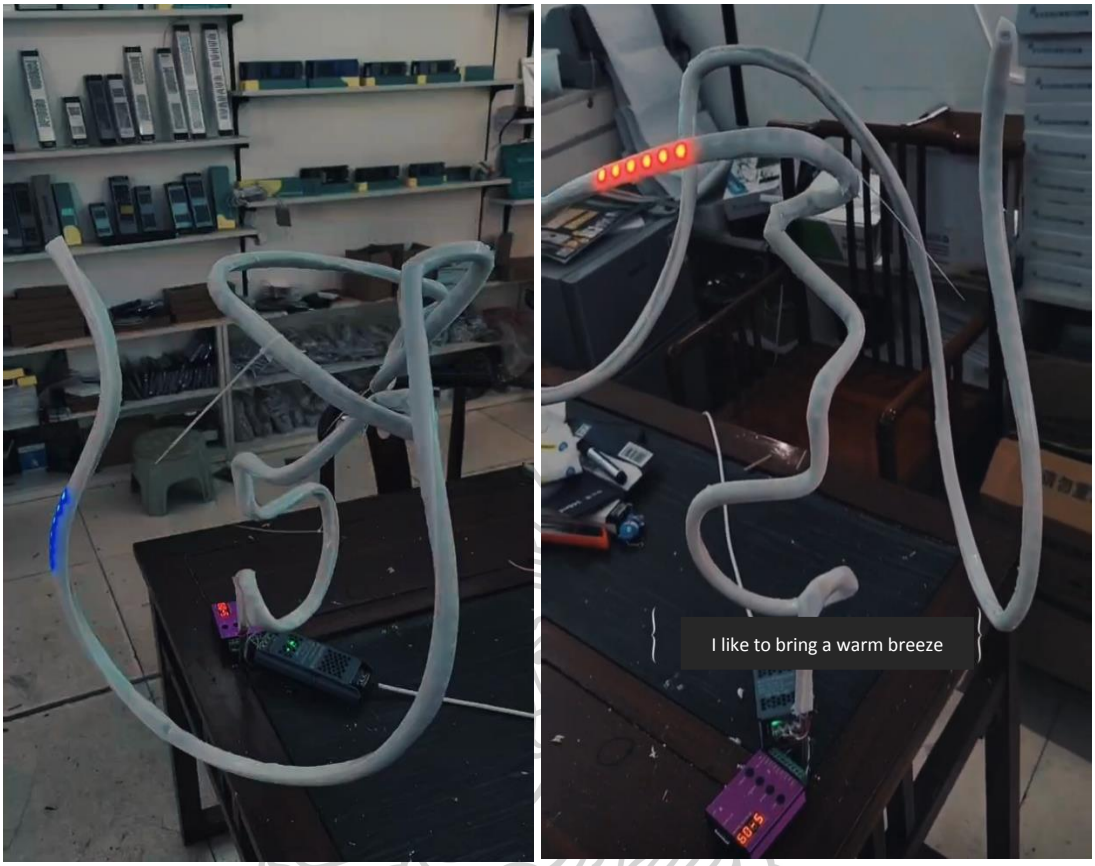


Figure 78: Follow the light motion effect to take pictures

Figure 79: Light tracking control system components and silicone lamp belt

3.5.4 Kinetic Sculpture

The flexibility of moving parts needs to be tested in the installation test, and the balance and stability of each sculpture also need to be tested in the installation test.The combination of motion, sound and light in the shape of the sculpture allows the theme of the work to be perfectly interpreted.

After studying Chinese characters as inspiration and phoenix as content in motion sculpture, and conducting experiments on sculpture shape, material and movement mode, the researcher 3D printed all the design parts. Through the 3D printed model, the real effect of the art work can be directly observed and the shortcomings can be improved. In order to obtain a more perfect art work.

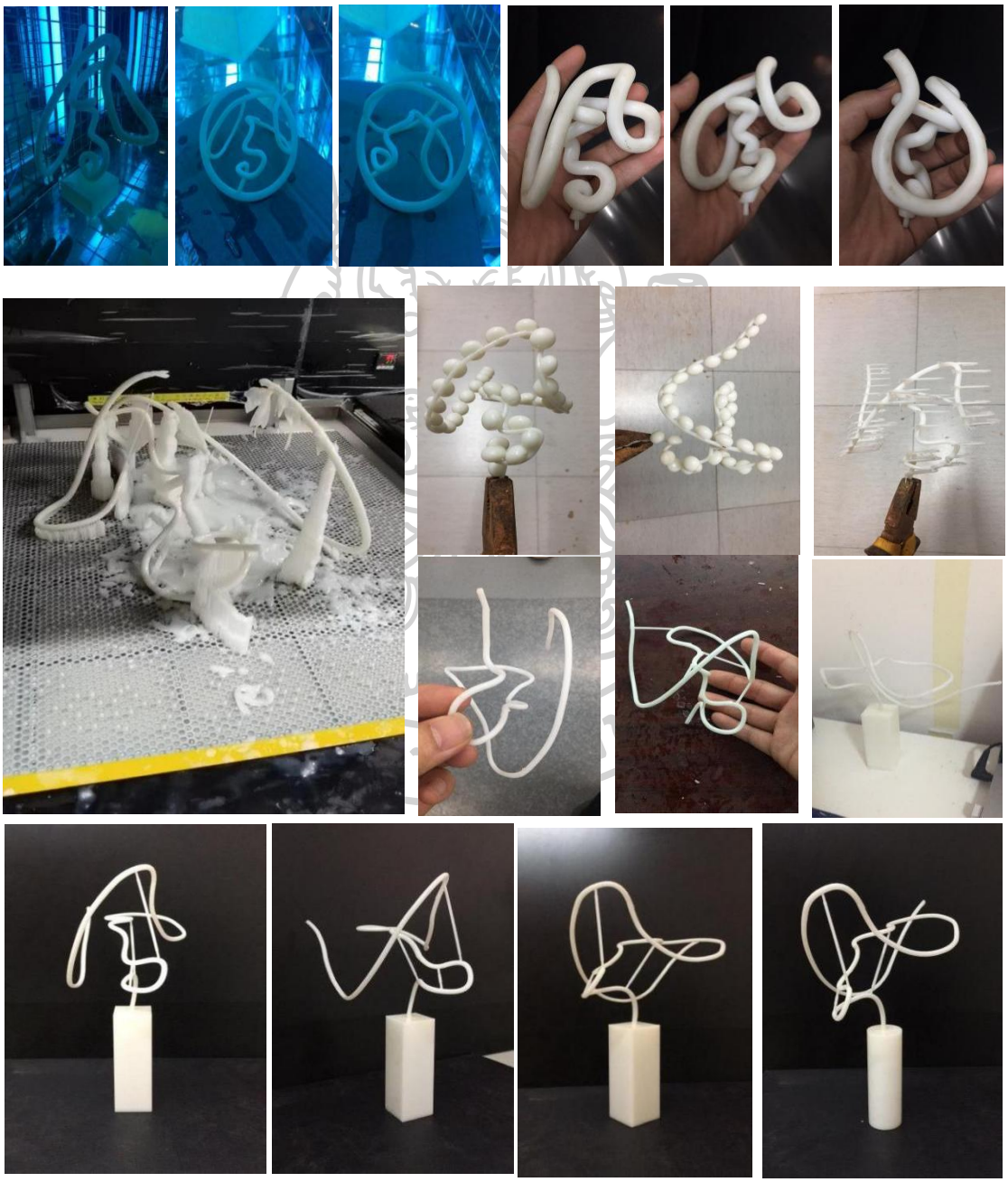


Figure 80: Phoenix character movement sculpture 3D print sketch

To assemble the artworks, the researchers conducted two experiments. In the first, they assembled moving parts welded from flat circular plates onto the skeleton of a three-dimensional phoenix character. When the wind is tested, the moving blades do not rotate. The researcher found this problem, so the improvement of the wind blade and the wind test were carried out again. The movement test was as mentioned above, and the best results were obtained after the test. The researchers fabricated three groups of wind blades with circular covers by batch welding. The second time, the researchers attached the latest round cap Wind 3 blade to the phoenix character three-dimensional symbol skeleton. In the wind test, the wind blade rotated smoothly. But in a windless environment, its wind blades remain static.

Figure 81: Assembly picture 1 of mechanical moving parts

Figure 82: Assembly picture 2 of mechanical moving parts

3.5.5 Experimental Feedback

The choice of data collection method in this study was an important decision because questionnaires are an effective empirical test method for social systems. The use of statistical, mathematical or computational techniques to process quantitative data provides a directional approach to statistical measurement.

Participants were told at the beginning of the survey that they had been informed of the purpose and that the questionnaire was anonymous, so that they could fill in the data as objectively as possible. The contribution of the survey results to the research results was quantified through the score of the questionnaire evaluation, the scoring range was: very good (5) good (4) average (3) bad (2) very poor (1). Finally, statistics were carried out, and the report was reported through four stages: data collection, data pre-scoring, data analysis and analysis. The final influencing factors were obtained by statistical analysis and linear programming analysis. The age of participants was controlled between 18 and 70 years old, the sample size was set to 400, and the

groups of participants were set as students, residents and tourists. The survey visited only locations: Nakhon Pathom Campus of Silpakorn University.

As Silpakorn University's Nakhon Pathom campus is dominated by Thai university students, the 100 questionnaires were written in Thai English. The Thai-English questionnaire can be filled out by Thai teachers and students, as well as by European and American tourists.

By summarizing the data of the public questionnaire, we can identify and analyze 10 of the 20 key factors that are considered to have an impact on the construction of research methodology, and then conduct qualitative research on these 10 key factors.

Figure 83: Questionnaire scene photography

Get

10 Factors

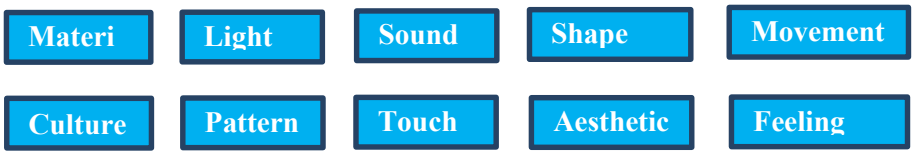


Table 4: Get the diagram from the questionnaire to the element

Questionnaire Survey

This questionnaire is from the doctoral research project of Silpakorn University. The research purpose is to design the Chinese character moving sculpture transformed from 2D to 3D. Please fill in the questionnaire objectively. The statistical results of the samples are of great reference value to my research work. Thank you very much for your participation!
Contact email: qingangphd@163.com

Gender: Male ☐ Female ☐
Age: Under 30 years old ☐ 30 - 40 ☐ 40-50 ☐ Over 50 years old ☐
Occupation: Government employee ☐ Private employee ☐ Student ☐ Other ☐
Degree: Below High school ☐ Above university level ☐
Interviewee: Undergraduate ☐ Resident ☐ Tourist ☐
Evaluation score: Very good (5) Good (4) In general (3) Not good (2) Very poor (1)

Number	Problem Content	Evaluation Score				
		1	2	3	4	5
1	You have a spiritual experience in sculpture				4	
2	The feasibility of Chinese character sculpture			3		
3	The spiritual experience gained in the sculptural space environment				4	
4	Your satisfaction with contemporary sculpture and cultural integration					5
5	The sculpture fits in with the environment					5
6	The atmospheric impact of sculpture on the environment					5
7	Sculpture material experience				4	
8	Sculpture and human interaction				4	
9	Sculpture meaning					5
10	Sculpture night view experience					5
11	Perceive the meaning of culture from sculpture				4	
Number	**Problem Content**	**Evaluation Score**				

		1	2	3	4	5
12	You can feel the atmosphere of sculptural art in the environment					5
13	Sculpture in the environment of overall spatial planning satisfaction					5
14	Sculptural form expresses satisfaction				4	
15	Your satisfaction with the color of the sculpture			3		
16	Your satisfaction with the material of the sculpture					5
17	You are satisfied with the Chinese character dynamic sculpture transformation					5
18	You can get cultural knowledge from sculpture design					5
19	You are satisfied with the combination of sculpture and local characteristics					5
20	You can accept the modern design of the sculpture					5

Table 5: 100 Public Questionnaire

By analyzing the shape, materials, installation (sound, light, electricity) and environment of the three-dimensional Phoenix figure, the researchers can design feedback questions, and the scores obtained from the experimental feedback data can be adjusted in time to improve the final design.

After many experiments and feedback, the researchers obtained eight key factors from 12 impressions.

Category	Factors	Proportion (%)	
Sculpture （Tangible）	Symbol conversion	60	Source proportion and feedback questionnaire
	Material processing	20	
	Movement test	40	
	Assemble	20	
	Space environment	55	
	Spread	30	
Sculpture	Cultural background	60	
	Soul of Chinese character	35	

（Intangible）	Dynamic	40	survey statistics
	Aesthetic	20	
	Light	10	
	Sense of technology	35	

Table 6: Model exhibition feedback questionnaire 1

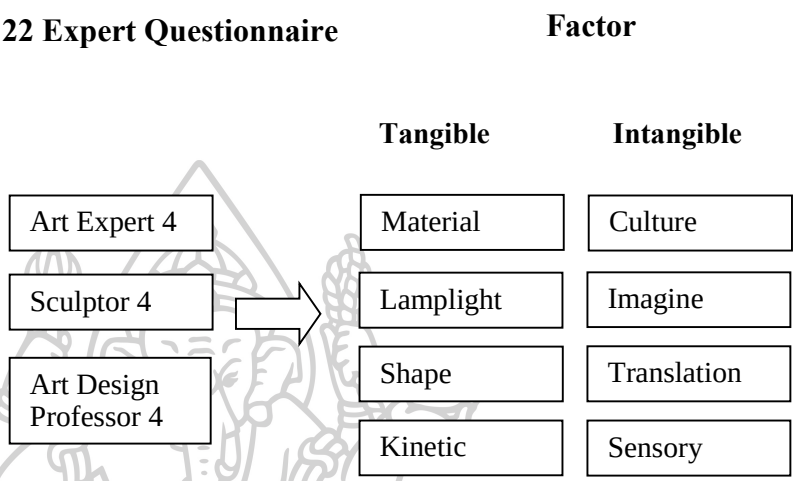


Table 7: From expert questionnaires to element acquisition diagrams

Model Experiment Feedback Questionnaire

Model Feedback of the Sculpture

This questionnaire is from the doctoral research project of Silpakorn University. The research purpose is to design the Chinese character moving sculpture transformed from 2D to 3D. Please fill in the questionnaire objectively. The statistical results of the samples are of great reference

value to my research work. Thank you very much for your participation!
Contact email: qingangphd@163.com

Gender: Male ☐ Female☐
Age: Under 30 years old☐ 30 - 40☐ 40-50☐ Over 50 years old☐
Occupation: Government employee☐ Private employee ☐ Student ☐Other ☐
Degree: Below High school☐ ☐bove university level☐
Interviewee: Undergraduate ☐ Resident☐ Tourist ☐
Evaluation score: Very good (5) Good (4) In general (3) Not good (2) Very poor (1)

Number	Category	Factors	Evaluation Score				
			5	4	3	2	1
1	Sculpture Tangible	Satisfaction degree of 3D phoenix Chinese character model	**5**				
2		Your satisfaction with the material of the sculpture	**5**				
3		The degree to which a moving part moves smoothly	**5**				
4		The complexity of the construction of sculptural components		4			
5		The sculpture fits in with the environment	5				
6		The role of 3D art with strong identity in spreading culture	5				
7	Sculpture Intangible	The cultural background perceived from the sculpture			3		
8		The ideographic soul of Chinese characters perceived from the phoenix character		4			
9		The effect of sculpting movement on your mood				2	
10		The role of sculpture in enhancing aesthetic consciousness		4			
11		The attraction of moving and changing lights to the audience		4			
12		A sense of technology		4			

Table 8: Model Experiment Feedback Questionnaire 2

3.5.5.1 Font selection for Phoenix

1. Font Selection:

The data from the Chinese character analysis indicates that the font selection for Phoenix Chinese character movement art was highly favored by the participants. The grass and Running script received overwhelmingly positive feedback, with 48 out of 50 participants (96%) giving it the highest score of 5. An additional 2 participants (4%)

rated it 4, further confirming its popularity. This font choice was well-received across different demographics, including education level, occupation, and age group.

2. Font Selection Improvement and Recommendations:

Considering the high satisfaction rate for the grass and Running script, it appears to be a successful choice for the Phoenix Chinese character movement art. However, to ensure a well-rounded assessment and potentially improve the experiment, future studies could explore the following areas:

Diverse Font Options: While the grass and Running script received positive feedback, it may be beneficial to include other font options in the experiment. This would allow participants to compare and evaluate different font styles, providing more comprehensive insights into the most suitable font for the dynamic sculpture.

Cultural Significance: Consider exploring font styles that hold significant cultural relevance to the ancient Shu civilization or other relevant historical periods. This can add depth and authenticity to the artwork while honoring the cultural heritage.

Calligrapher Input: To gain a deeper understanding of the aesthetic and artistic qualities of the fonts, involving calligraphy experts or artists in the font selection process can provide valuable expertise and ensure the chosen font aligns with the desired artistic expression.

3.5.5.2 Phoenix feature

1. Abstract Phoenix:

The feedback data on the abstract phoenix indicates that it did not perform well in terms of maintaining movement fluidity and image. Out of 50 participants, 32 individuals (64%) gave it the lowest score of 1, indicating that the abstract representation failed to effectively convey the desired movement and visual characteristics of the phoenix. Additionally, 9 participants (18%) rated it 3, which suggests that a significant portion of participants found the movement and image of the abstract phoenix lacking.

2. Image Phoenix with Not Smooth Movement:

The image phoenix received relatively positive feedback, with 41 participants (82%) giving it the highest score of 5 for maintaining a clear image. However, there were 7 participants (14%) who rated the movement as not smooth, with 5 points, and 2 participants (4%) who rated it 4 points. This suggests that while the image was recognizable, improvements may be needed to enhance the smoothness of its movement.

3. Image and Movement of Phoenix from Text:

The data indicates that the image and movement of the Phoenix from the text in the three-dimensional moving sculpture were well-received. A majority of the participants, 47 out of 50 (94%), gave it the highest score of 5 for both image and movement. This

indicates that using text to represent the phoenix was successful in achieving the desired fluidity of movement and maintaining a clear image.

4. Improvement and Recommendations:

Based on the feedback data, the following improvements and recommendations can be considered for the Phoenix content experiment:

Enhancing Abstract Phoenix: Since the abstract phoenix received low scores for movement fluidity and image, it may be beneficial to revisit the design and consider ways to make the abstract representation more dynamic and visually appealing. Experimenters can explore different abstract forms and techniques to find a style that effectively captures the essence of the phoenix while conveying movement.

Smoothing Movement for Image Phoenix: To address the feedback about the image phoenix's movement not being smooth, experimenters can analyze the specific aspects of the movement that caused this perception and make adjustments to ensure a seamless and natural flow in the sculpture's motion.

Exploring Innovative Text Representation: Given the positive feedback on the image and movement of the Phoenix from the text, further exploration of innovative text-based representations can be considered. Experimenters can experiment with different font styles, calligraphic techniques, and textual arrangements to create visually captivating and fluid text-based sculptures.

Engaging Diverse Age Groups: The feedback data indicates that participants spanned a wide age range. To ensure the experiment's success and appeal to a broader audience, consider seeking feedback from a diverse group of participants representing different age groups. This will provide valuable insights into how the artwork resonates with people of various ages.

Collaboration with Artists and Sculptors: To perfect the spiral balance theory of Phoenix Chinese character moving sculpture, collaborating with artists and sculptors can bring in valuable expertise and creative perspectives. Experts in sculpture and art can provide guidance on enhancing the sculpture's aesthetic qualities and ensuring a harmonious balance of elements in its movement.

By incorporating these suggestions and using the feedback data, the experimenters can improve the Phoenix content experiment and further develop the spiral balance theory to create a captivating and dynamic Phoenix Chinese character moving sculpture.

3.5.5.3 Experimental feedback of kinetic sculpture

1. Success Rate of 2D-3D Conversion in the Moving Sculpture Experiment:

Based on the data, the success rate of the 2D-3D conversion in the moving sculpture experiment is high. Out of 50 participants, 49 individuals (98%) scored the successful transformation of 2D Chinese characters into 3D Chinese characters by spiral balance

theory with the highest score of 5. Only 1 participant (2%) scored it with 3 points, suggesting that the vast majority found the transformation to be successful.

2. Appropriateness of Material Selection:

For the material choice of mirror stainless steel, the feedback data indicates that it was mostly appropriate. Out of 50 participants, 40 individuals (80%) gave it the highest score of 5, indicating that mirror stainless steel was considered suitable for the sculpture. Additionally, 5 participants (10%) rated it 4 points, and 5 participants (10%) rated it 3 points. This suggests that while the majority found the material choice appropriate, there were some participants who may have had reservations or felt that other materials could be considered.

3. Technical Success of Material Firing:

The data on the success of the material firing method shows a favorable outcome. Out of 50 participants, 26 individuals (52%) gave it the highest score of 5, indicating that the material firing method was successful. Additionally, 13 participants (26%) rated it 4 points, and 9 participants (18%) rated it 3 points. A smaller number of participants rated it with 2 and 1 point (2% each), respectively. Overall, a significant portion of participants found the material firing to be technically successful.

4. Suitability of Organic, Geometric, and Light Elements in the Motion Mode:

5. Organic Elements Suitable for Vibration:

39 out of 50 participants (78%) recognized organic elements as suitable for vibration in the motion mode, and they gave it the highest score of 5. Additionally, 11 participants (22%) rated it 4 points. This indicates that organic elements, likely representing more natural and flowing shapes, were well-received for conveying vibration in the sculpture.

6. Geometric Elements Suitable for Rotating Motion:

The data suggests that geometric elements were highly suitable for rotating motion in the motion mode. Out of 50 participants, 46 individuals (92%) gave it the highest score of 5, indicating a strong consensus that geometric elements were effective for creating rotating motion. Additionally, 4 participants (8%) rated it 4 points, further supporting its suitability.

7. Light Elements in the Motion Mode:

The feedback on light elements in the motion mode shows mixed responses. 28 participants (56%) gave it the highest score of 5, indicating that they found light elements effective for enhancing motion. However, there were 8 participants (16%) who rated it 4 points, 3 participants (6%) who rated it 3 points, and 10 participants (20%) who rated it 2 points or lower. This indicates that while a significant number of participants found light elements suitable for motion, there were also some who had reservations or felt that improvements could be made in this area.

3.5.5.4 Improvement and Recommendations

Based on the feedback data, the following improvements and recommendations can be considered for the Phoenix Chinese character moving sculpture experiment:

Material Selection Diversity: To address the small percentage of participants who had reservations about the material choice, consider offering a wider range of material options for participants to evaluate. This will provide more comprehensive insights into the most suitable material for the sculpture.

Refinement in Material Firing: To enhance the success of the material firing method, experimenters can review the feedback and identify specific aspects that may need improvement. Further refinement in the firing technique can contribute to an even more successful outcome.

Light Element Enhancement: Given the mixed feedback on light elements in the motion mode, consider experimenting with different lighting techniques and intensities to optimize the visual impact and emotional resonance of the sculpture. Fine-tuning the use of light can potentially improve the overall effectiveness of the motion mode.

Engaging More Age Groups and Backgrounds: While the data represents a diverse set of participants, striving for an even broader demographic representation can provide a

more comprehensive understanding of the artwork's appeal across different age groups and backgrounds.

By incorporating these suggestions and using the feedback data, the experimenters can improve the Phoenix Chinese character moving sculpture and further refine the spiral balance theory to create a captivating and dynamic artwork.

3.5.5.5 Perfecting the Spiral Balance Theory

To enhance the spiral balance theory of Phoenix Chinese character movement sculpture, the following steps can be considered:

Fluidity of Movement: Analyze the feedback from the Phoenix content experiment to identify specific areas where the fluidity of movement can be improved. Fine-tuning the sculptural elements responsible for movement and incorporating smoother transitions can elevate the dynamic qualities of the artwork.

Material Selection: While mirror stainless steel was generally well-received, the feedback from a few participants indicated room for improvement. To enhance material selection, consider experimenting with alternative materials that can better accentuate the movement and convey the desired aesthetic and cultural significance.

Lighting and Technology: As the feedback on light elements in the movement mode was mixed, explore different lighting techniques, colors, and technology to optimize

the visual impact and emotional resonance of the artwork. Lighting can play a significant role in enhancing the overall experience of the sculpture.

Expert Input: Seek feedback and guidance from experts in the fields of sculpture, art, and cultural history. Expert input can provide valuable perspectives and ideas for refining the spiral balance theory and ensuring a well-executed and impactful sculpture.

By incorporating these suggestions and using the feedback data, the experimenters can improve the Phoenix Chinese character movement sculpture and further develop the spiral balance theory to create a compelling and culturally resonant artwork.

1. Data Feedback Statistics for Chinese Character Analysis

Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	48	2	0	0	0

	1 Score	2 Score	3 Score	4 Score	5 Score
Sex	32	18	0	0	0
Age	11	29	8	2	0
Occupation	18	32	0	0	0
Educational Background	31	19	0	0	0
Interviewee	46	4	0	0	0
Evaluation score	0	0	0	2	48

2. Phoenix Content Data Feedback Statistics

Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	1	2	9	6	32

Q 2	41	7	2	0	0
Q 3	47	3	0	0	0

	1 Score	2 Score	3 Score	4 Score	5 Score
Sex	30	20	0	0	0
Age	10	18	3	19	0
Occupation	16	34	0	0	0
Educational Background	28	22	0	0	0
Interviewee	31	19	0	0	0
Evaluation score	32	6	9	2	1

3. Sculpture Experiment Data Feedback Statistics

Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	49	0	1	0	0
Q 2	40	5	5	0	0
Q 3	26	13	9	2	0
Q 4	39	11	0	0	0
Q 5	46	4	0	0	0
Q 6	28	8	3	10	1

	1 Score	2 Score	3 Score	4 Score	5 Score
Sex	17	33	0	0	0
Age	7	21	5	17	0
Occupation	10	40	0	0	0
Educational Background	26	24	0	0	0
Interviewee	43	7	0	0	0

3.6 Environmental Exploration

3.6.1 SU Nakhon Pathom Campus

The environmental test site for the Phoenix Chinese character kinetic sculpture is located on Silpakorn University's Nakhon Pathom campus, which was formerly the residence of King Rama VI of Thailand and is adjacent to a historic stupa. Its compatibility with the environment includes both the natural and human environments.

Regarding the fit with the natural environment, the sculpture's height of up to 200cm was chosen to serve as a green platform at the fork. During the day on campus, the intersection of the three roads receives strong sunlight, which directly shines on the sculpture. The material of stainless steel, being a good reflective material, causes the Phoenix Chinese character kinetic sculpture to shine during the day. From a modeling perspective, the Phoenix Chinese character kinetic sculpture is a physical void work that combines points, lines, and faces. In the environment, the segmentation of space does not form a strong silhouette effect but rather integrates with the surrounding space and environment.

Regarding the fit with the human environment, the human environment mainly corresponds to the region and people's feelings. The cultural environment significantly influences public environment sculptures, serving as a concentrated expression and embodiment of local culture. When setting up a sculpture in a public environment, it is essential to consider the people around the area, their level of acceptance, age group, and various levels of education. Silpakorn University is Thailand's top art school and enjoys a high reputation in the country. The students at the school also possess a high level of artistic accomplishment. Thus, the Phoenix Chinese character kinetic

sculpture on Nakhon Pathom Campus is immersed in a dual atmosphere of profound historical tradition and modern fashion. Silpakorn's teachers and students were not surprised by the kinetic sculpture, as they had become accustomed to such modern art in their studies of art history. However, the blades rotating in the wind caught their eye.

3.6.1.1 The Relationship between Environment and People (Spatial scale)

Man is an advanced creature that lives on the blue planet. The blue planet provided them with oxygen, water and food, and they also learned to use fire, keep warm and collect and produce food. In harmony with the environment, human society developed from hunter-gatherer civilization to agricultural and commercial civilization, and then into industrial civilization, and to the present digital civilization. Art growing in the development of civilization inevitably needs to consider the spatial scale relationship between environment and human. The setting of Phoenix moving sculpture was decided after the investigation of the relationship between environment and human space scale.

In the Nakhon Pathom Campus of Silpakorn University there is an iconic building, the Water tower. The campus lake is on the north and south sides of the water tower. Standing right below the water tower and facing north, the President's administration Office building is about 500cm away from 3 o 'clock. Located near the water tower, like an aorta, the road connecting the president's administrative office building and other institutions of the school across the lake forms a fork in the road here, which is

the traffic artery of Campus. The road is four meters wide, and the sidewalks on both sides are about 1.5 meters wide. A 60cm tall sculpture is set up every five meters on both sides of the road, and a larger one is set up at the corner of the road. The green space platform at the three forks is triangular in shape, with a height of about 20cm, a length of 600cm on the east side, 600cm on the north side and 1885cm on the northwest beveled side. Walking around the tree-lined road that divides the triangular platform, art students walk in twos and threes. Walking along the road from the school gate to the phoenix statue, you can smell the fresh smell of the water mixed with grass and fish. Hear the fountain in the lake. Beautiful learning environment and elegant teachers, handsome young men full of youthful vitality and beautiful girls have become beautiful scenery in the campus.

Such a place where the environment and people live in harmony is the perfect place for teachers and students of Silpakorn University to display phoenix character sculpture and spread culture.

Figure 84: Satellite map and on-site photos of phoenix kinetic sculpture works

3.6.1.2 The Relationship between Sculpture and Human (Spatial Scale)

Sculpture space can be roughly divided into real space, virtual space, compressed space, static space, dynamic space, extension space and cohesive space. Psychological space is the psychological feeling brought by the sculpture entity to the audience, namely the sense of space. Its essence is the expansion of the entity to the surroundings, which is the actual effect of human perception. We often say that the tension is generated by the entity, but it exists in the emptiness, this tension comes from the entity's internal force movement changes impact the surface, forming the potential of virtual movement, so the tension of space is the essence of space.

The teachers and students of Nakhon Pathom Campus are mainly Thai, the official language of Thailand is Thai. Although there are a large of Chinese in Thailand, they have been integrated into Thai culture through historical changes. Although there are

still many Chinese characters in the streets and alleyways of Bangkok, Thailand, those characters have been transformed into a symbol of identity and blessing to ancestors. The communication function of language is no longer used. Moreover, the phoenix character movement sculpture uses cursive font, which is only retained in Chinese calligraphy art and does not play the role of social communication. Therefore, when teachers and students at Nakhon Pathom Campus see the phoenix character movement sculpture, they will be amazed at the exquisite design of the movement sculpture and wonder why the designer curved the skeleton of the sculpture in such a way. However, it is difficult to associate it with Chinese characters. The characters here just become the inspiration source of art creation. The appearance of phoenix character sports sculpture here is only a modern sports sculpture, not a self-declaration of foreign culture. In terms of the mobilization of visual experience, teachers and students in Nakhon Pathom Campus have strong awareness sensitivity because it is the highest art college in Thailand. Therefore, teachers and students in Nakhon Pathom Campus can find the phoenix character moving sculpture from the side Angle, which has the image of a bird. Moreover, the moving parts of the phoenix character moving sculpture will rotate under the impact of wind and rain, which arouses the association of art teachers and students to their own artistic life.

3.6.2 Artwork Perspective Feedback

1. Front facing view (Recognizable Chinese Characters):

When driving or walking to the SU Executive Center building, or to the east gate of

the campus, you must pass this road by the water tower. The researchers' sculpture of a rotating phoenix turbine blade stands here. This is a fork in the road. The work is located at the top of the intersection. Enter from the south gate of SU, turn right and take the first road leading to the president's office building.

In front of the intersection of the three roads, you can see a three-dimensional art piece in a strange shape. When there is strong wind and heavy rain in the campus, its turbine blades will rotate at a fast and slow pace. Mirror stainless steel material can reflect the surrounding environment.

At a fork in the road, you see the front of it. Although its design concept is derived from the phoenix character, unless you are a Chinese cursive calligrapher, even if you are familiar with Chinese characters, you will not be able to spot the phoenix character on the front at first glance. After a questionnaire survey, 99% of the audience thought that what they saw was a work of art. At first glance, they felt that it was an abstract spatial linear work and did not think it was a text. This is also the intention of the researcher. The researcher does not show a text to the audience, but only designs from the text symbol. So that the large number of Chinese characters can become a source of inspiration for researchers to create. From the author's point of view, he connected each stroke of phoenix character to smooth the lines and increase the curvature of the curved part of the stroke. But without changing the shape of the phoenix character, there are many calligraphers in Chinese history, who left precious ink and inscriptions, which have become a treasure house for researchers to collect

materials. From the viewer's point of view, it's a work of art. Because of its linear composition, this work of art presents a kind of virtual space that can be traversed in space, rather than the solid modeling of traditional three-dimensional artworks. Standing on the road in front of the work, it can be found that it is easy to be submerged by the environment, and the independence and prominence of the work is not enough. The improvement is to differentiate the color of the material from the surrounding green space. In addition, it can be added gurus, so that at night, it can also stand out from the night.

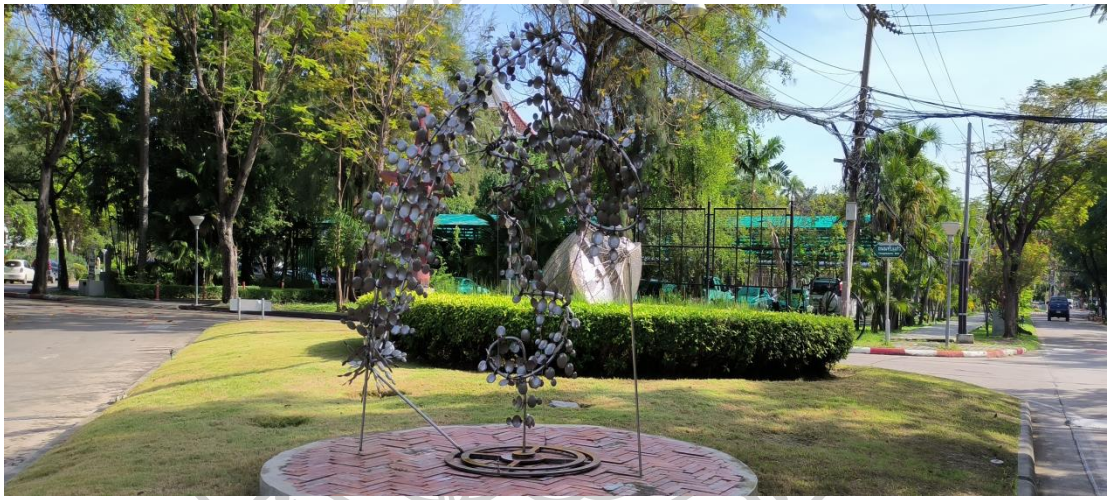


Figure 85: Front view of phoenix kinetic sculpture in the public display

2. Side View with Pictographic Image (1/2 Left):

From the left view, the white color of the mirror-like stainless steel stands out from the background of the thick dark brown tree trunks. This gives researchers a revelation that environmental color plays a prominent role in the presentation of works. When the environmental color is integrated with the color of works, it is necessary to find ways to make the color of works different from that of the environment.

The left-hand view also shows an abstract figure of a distinct bird. This, in the survey, stands at 78% positive attitude. The visual effect of motion produced by the rotating blades is also the main reason to attract the audience's attention.

Figure 86: Left view of phoenix kinetic sculpture in the public display

3. Three Quarters Angle (3/4 Left):

Viewed from the left 3/4 Angle, 63% of respondents believed that the Angle showed an

abstract linear spatial modeling, while the abstractness of the bird remained. In this Angle, there is a road in the background and the color is obviously white, which makes the work not prominent in the environment. In the case that the color of the work cannot be prominent, the movement of the sculpture leaves becomes the main attraction factor for the audience.

Figure 87: Left view, 3/4 Angle, of phoenix kinetic sculpture in the public display

4. Side View (1/2 Right):

The right view shows the position of the work. Because in the background of the work is the iconic SU Nakhon Pathom Campus water tower. In addition to positional information, the Angle shows the abstract and complex changes of the bird's modeling imagery. The movement of the sculptural blades also attracts the eye of the audience. The color of the sculpture does not stand out from the environment.

The side view and the front view also have the problem of audience attention time.

The front view is the view that the viewer will pay more attention to. The side view shows intimacy. The abstract image of the bird also attracts the audience to reflect on whether the abstractness of the front image has the clever design and use of hidden symbols. Due to the multiple influences of movement, intentionality of shape and depth of thinking, the importance of the base of the work is also reflected here. Because the base of the work is too short, the work loses its sense of nobility. Although the intimate interaction with the audience is enhanced, the movement of the leaves has safety considerations, and the audience is too close to the sculpture. Therefore, the future improvement lies in the height of the pedestal of the work, the height of the pedestal is appropriate to the height of the person. In this way, the wind at high altitude will also become stronger, so that it is easy to increase the speed of the blade motion. In this way, under the condition of increasing security, the works will be more attractive to the audience.

Figure 88: Right view of phoenix kinetic sculpture in the public display

5. Rear View:

The rear view is a private viewing Angle, and it has a kind of penetration. Because the view can only be seen when you step on the lawn, the attraction of this perspective is mainly reflected in the teachers and students of three-dimensional art. The average spectator does not set foot on grass that is considered off-limits. But teachers and students of three-dimensional art want to explore the whole shape of the work, so they will quietly go behind the work to find out the intention of the author and the shape.

Figure 89: Rear view of phoenix kinetic sculpture in the public display

3.7 Summary

The focus of this chapter is on the methodology for studying and evaluating dynamic sculpture inspired by Feng characters in Chinese calligraphy. In the course of the research, a qualitative approach was adopted, using expert interviews and questionnaires to evaluate various aspects of the sculpture. Experts, including professors and sculptors, provided valuable feedback to guide the refinement of the

artwork.

Additionally, the chapter conducts an in-depth analysis of different Chinese characters, especially Feng characters, in terms of shape, structure, stroke flow, and cultural significance. It highlights the artistic evolution and unique characteristics of these fonts, showcasing their representation of the divine bird.

Moreover, this chapter explores the challenges and potential of using abstract and imagist methods in dynamic artistic creation. It examines the material selection, movement patterns, and assembly of the dynamic sculpture to ensure its visual impact and environmental integration.

Overall, this chapter provides valuable insights into the artistic expression of Phoenix characters in the creation of dynamic sculpture, the evolution of Chinese fonts, and the methodological system between art and the environment. It offers theoretical support for the final result of the study of Phoenix dynamic sculpture of Chinese characters.

Chapter 4
Research Result

4.1 Introduction

This chapter first reviews the need to use art theory in research. They include Art as experience, art is Expression, and A Significant Form. Secondly, the eight works created by this research are listed one by one. Thirdly, in Jinsha Site National Park, Sanxingdui Cultural Community Park, Chengdu, the state of art works in the field was photographed and displayed. Finally, the researchers collected feedback survey data from neighborhood kiosks, restaurants, streets, and parks.

This chapter consists of 4 parts:

Part 1: Art theory

Part 2: Series of works

Part 3: Setting in Chengdu environment

Part 4: Chengdu feedback

4.2 Art Theory

4.2.1 Art as Experience

The phrase "Art as experience" is associated with the American philosopher and educator John Dewey (1859-1952). Let's delve deeper into his art theory, his significant work, the reasons for its formation, and its influence on art history.

1. Author:

John Dewey was a prominent American philosopher, psychologist, and educational reformer. He is considered one of the leading figures of pragmatism, a philosophical movement that emphasizes the practical consequences of ideas and the importance of experience in shaping knowledge and understanding.

2. Work:

Dewey's most influential work on art theory is his book "Art as Experience," published in 1934. In this seminal work, Dewey presents a comprehensive philosophy of aesthetics and art, challenging traditional views and proposing a more holistic understanding of the artistic experience.

3. Reasons for Formation:

Dewey's ideas on art as experience were rooted in his broader philosophical framework. He rejected the dualism between mind and body, emphasizing the interconnectedness of thought and action. For Dewey, experience was central to human existence, and he sought to bridge the gap between abstract theories and concrete human experiences. His philosophy focused on the continuity of human experience, with art as an integral part of daily life rather than a separate realm.

4. Influence on Art History:

Dewey's concept of "Art as experience" had a profound impact on art history and

aesthetics. His ideas challenged the prevailing notion of art as detached from everyday life and transformed the way art was perceived and understood.

Shift from Art as Object to Art as Process: Dewey emphasized that art is not merely a static object but a dynamic process that unfolds within the lived experience of the individual. He viewed the creation and appreciation of art as ongoing transactions between the artist, the artwork, and the viewer.

A. Aesthetic Experience and Engagement: Dewey highlighted the importance of aesthetic experience as a transformative and enriching encounter with art. He believed that the aesthetic experience involves active engagement with the artwork, where the viewer's emotions, thoughts, and senses are deeply involved.

B. Art's Role in Human Experience: Dewey argued that art plays a vital role in human experience by enhancing perception, emotion, and understanding. Art enables individuals to express themselves creatively, appreciate the world around them, and cultivate a deeper connection with their surroundings.

C. Influence on Art Education: Dewey's ideas significantly influenced art education. He advocated for art to be integrated into the curriculum to nurture students' creativity and critical thinking. His progressive approach to art education emphasized hands-on learning, self-expression, and the importance of the artistic process over rigid academic techniques.

Overall, John Dewey's theory of "Art as experience" revolutionized the understanding of art and aesthetics. His ideas continue to shape discussions on the nature of artistic experience, the role of art in society, and the relationship between art and life. His work has left a lasting impact on art history, inspiring artists, educators, and scholars to explore the profound connections between art and human experience.

4.2.2 Art is Expression

The concept of "Art is expression" is associated with the German philosopher and art historian, Wilhelm Worringer (1881-1965). Let's explore his art theory, significant work, the reasons for its formation, and its influence on art history.

1. Author:

Wilhelm Worringer was a German philosopher, art historian, and cultural theorist. He was associated with the expressionist movement and played a significant role in shaping modern art theories.

2. Work:

Worringer's major work related to the concept of art as expression is "Abstraction and Empathy: A Contribution to the Psychology of Style," originally published in 1908. In this book, Worringer delves into the psychological underpinnings of artistic styles, particularly abstraction and empathy.

3. Reasons for Formation:

Worringer's theory of "Art is expression" emerged as a response to the changing artistic landscape of the early 20th century. During this period, various art movements were challenging traditional representational art, and artists were exploring new modes of expression, including abstraction and non-representational forms.

Worringer sought to understand the psychological motivations behind these emerging styles. He believed that artistic expressions were deeply connected to the artists' inner emotions, fears, and desires. His theory aimed to provide insights into the aesthetic impulses that drive artists to create and viewers to appreciate art.

4. Influence on Art History:

Worringer's theory of "Art is expression" had a considerable influence on art history, particularly on the understanding of modern art and its departure from traditional representational forms. Some key points of influence include:

Emergence of Abstraction: Worringer's analysis of abstraction and its link to the artist's emotional expression helped legitimize abstract art as a valid form of artistic expression. His work contributed to the acceptance and understanding of non-representational art forms.

A. Psychological Perspective on Art: Worringer's focus on the psychological aspects of art opened up new avenues of inquiry in art history. His exploration of how art reflects the inner states of artists and evokes empathy in viewers added depth to the understanding of artistic creation.

B. Influence on Expressionism: Worringer's ideas aligned with the philosophy of the Expressionist movement, which aimed to convey emotional and spiritual truths through art. Expressionist artists, inspired by Worringer's theories, embraced subjective and emotive approaches to their artistic practices.

C. Legacy in Modern Art Theories: Worringer's work laid the groundwork for subsequent theories that explored the relationship between art and emotion, psychology, and human experience. His ideas continue to be relevant in contemporary discussions on aesthetics and the interpretation of artistic expression.

Overall, Wilhelm Worringer's theory of "Art is expression" contributed to a deeper understanding of the psychological underpinnings of artistic creation. His influence on modern art theories and the exploration of abstraction and empathy helped shape the

trajectory of art history and paved the way for the appreciation of diverse forms of artistic expression.

4.2.3 A significant Form

Clive Bell (1881-1964) was a British art critic and writer who played a significant role in the development of art theory and aesthetics during the early 20th century. He is best known for his concept of "significant form" and his influential book "Art" published in 1914.

Works and "Significant Form":

In his book "Art," Clive Bell introduced the idea of "significant form" as a central theory of aesthetics. According to Bell, significant form refers to the visual elements and arrangements within a work of art that evoke a powerful and emotional response in the viewer. He believed that certain combinations of lines, colors, and shapes in an artwork have the ability to communicate directly with human sensibilities, transcending cultural and historical contexts.

Bell argued that significant form is a universal language of art that can evoke aesthetic emotion and appreciation across different individuals and cultures. He focused on the formal qualities of art rather than its subject matter or representation of reality. For Bell, the essence of art lies in its ability to communicate directly through form, independent of any narrative or symbolic content.

Reasons for Formation and Influence on Art History:

Clive Bell's theory of "significant form" emerged during a time when art was undergoing significant changes, particularly with the rise of modernism. Artists were exploring new ways of abstraction and non-representational art, moving away from

traditional artistic conventions. Bell's ideas provided a theoretical framework that supported and legitimized these new artistic expressions.

His concept of significant form also had a profound impact on art criticism and aesthetics, influencing how artworks were analyzed and interpreted. By focusing on the formal elements and their emotional impact, Bell encouraged a deeper appreciation of abstract and non-representational art, which had previously been met with skepticism by some traditional art critics.

Bell's ideas also contributed to the development of formalism, an art theory that emphasizes the importance of form, composition, and other visual elements in analyzing and understanding art. Formalism became a significant approach in art criticism and art history, shaping how scholars and critics evaluate and discuss artworks.

Although Clive Bell's theories, particularly his concept of significant form, received both praise and criticism, his contributions to art theory and aesthetics have left a lasting impact. His ideas continue to be studied and debated in the fields of art history and philosophy, and his work remains an important reference point in discussions about the nature of art and the aesthetic experience.

4.3 Works Series

4.3.1 Work 1- The Abstraction of Phoenix Shape

1. Concept of Creation: This work is to show the most Chinese character formation law - pictographic. And create a 3D space for the plane phoenix characters.

2. The Design Process: This selection will be cursive compilation of phoenix character design into a 3D space. First paste the phoenix image into the "front" window of Rhino

software, through the toolbar "multipoint" command, determine the phoenix line on the center point, select the toolbar "curve through several points" command, create a continuous new line through the center point of the calligraphy phoenix. This line becomes a 3D stretch line using the Rebuild command. Next, double-click the "right" window in the working window, and design multiple 3D phoenix characters according to the three principles of balance, pictographic and plane line space maximization. They are printed out by a 3D printer for testing and testing the stability of the work when it is placed. If the center of gravity of the 3D phoenix character cannot fall on the end point, the 3D Phoenix character will collapse due to the center of gravity deviation. In addition, it is necessary to detect whether the moving parts will collide with each other after the installation of the 3D phoenix character. After passing these two tests, the design is modified in software to get the correct 3D phoenix works. Finally, the 3D characters were hot-worked with stainless steel round steel to create a 60cm tall piece of real material.

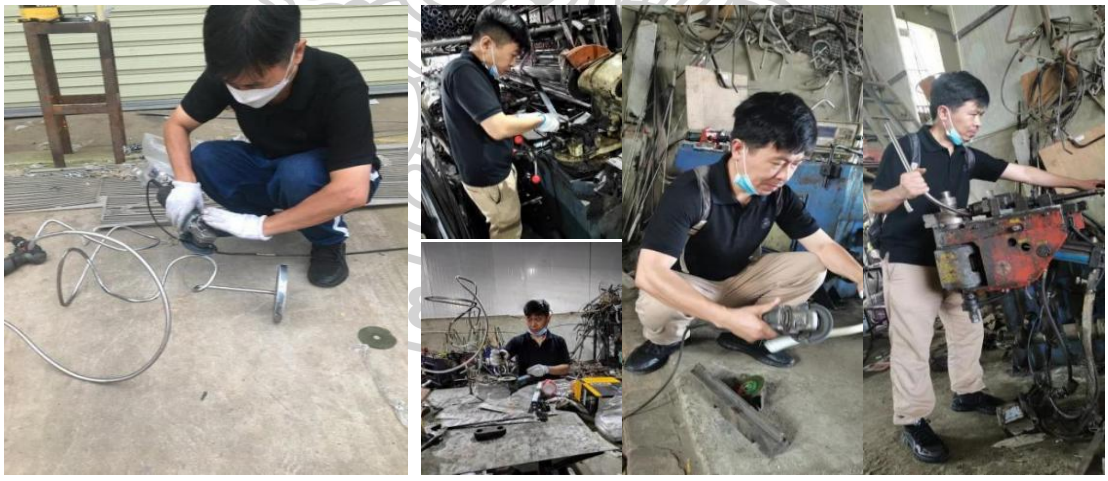


Figure 90: Real 3D phoenix character number production

Figure 91: Work 1-The abstraction of phoenix shape

4.3.2 Work 2- Listen to the Wind

The creative inspiration behind the Phoenix Movement sculpture "Listening to the Wind" is deeply influenced by Dewey's art theory, which emphasizes the emotional embodiment of artistic creation and the reflection of life experiences. The researchers utilized various artistic elements, such as form, material, sound, and light, to design and create the artwork "Listening to the Wind," seeking to evoke emotional responses and connect with the viewers.

In the process of exploration, the researcher experimented with abstracting the strokes of seal characters into rectangular strips to create a moving sculpture inspired by the phoenix. Although the initial intention was to capture the explicit image of the phoenix, the dynamic motion of the geometric rectangular bars swaying in the wind caught the researcher's attention. This unexpected discovery led to a shift in the artistic direction, focusing on the dynamic interaction between the sculpture and the environment rather than a static representation of the phoenix image.

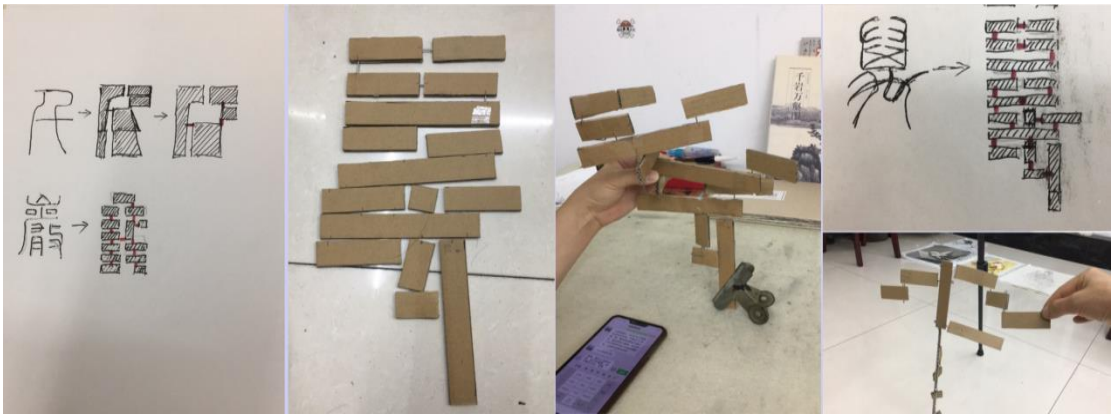


Figure 92: Experiment 2 of kinetic sculpture based on seal characters

Following Dewey's theory, the researchers successfully explored the three-dimensional representation of Phoenix Chinese characters using continuous strokes. Building upon this achievement, they integrated the rectangular strips into the three-dimensional model of Phoenix Chinese characters, metaphorically resembling wind chimes. The incorporation of mirror stainless steel strips on both sides of the three-dimensional Phoenix character allowed the sculpture to respond to the wind's movement, generating a pleasant sound of metal collision akin to wind chimes. This integration of sound and movement in the artwork resonates with Dewey's idea of art as an emotional experience.

By creating a sculpture that not only visually represents the phoenix but also engages with the environment through its dynamic attributes, the artwork "Listening to the Wind" aligns with Dewey's concept of art as a transformative and experiential process. The emotional response elicited from the viewers, combined with the symbolic representation of the phoenix, captures the essence of Dewey's art theory, as the artwork becomes a vessel for emotional expression and human experience.

In summary, the creative inspiration behind the Phoenix Movement sculpture "Listening to the Wind" is a compelling amalgamation of Dewey's art theory, the exploration of abstract forms, and the utilization of dynamic elements like wind

chimes. The sculpture embodies both the symbolic representation of the phoenix and the emotional essence of Dewey's understanding of art as a profound and transformative experience.

Figure 93: Work 2- Listen to the wind

4.3.3 Work 3- Chasing the Sun's Rays

The creative inspiration behind the Phoenix movement sculpture "Chasing the Sun's Rays" is deeply rooted in Oriental phoenix art, where the phoenix is depicted as a divine bird with a deep connection to fire and a relentless pursuit of the sun. This theme serves as the foundation for the researchers' exploration of their own unique artistic style, which took several years to develop. The journey of self-discovery and artistic growth can be likened to the phoenix rising from the ashes, symbolizing transformation and rebirth.

Guided by the Art theory that Art is Expression, the researchers harnessed various artistic elements, including form, material, sound, and light, to design and create their masterpiece, the Phoenix Chinese character "Chasing the Sun's Rays." Stainless steel

remains the chosen material for the sculpture, providing both durability and flexibility for artistic expression.

The use of mirrored stainless steel discs and spheres in the artwork serves as a metaphor for the sun, connecting the sculpture to the phoenix's pursuit of the fiery celestial body. As the sun's rays interact with the hanging disc, the wind's movement causes it to sway gracefully, resulting in a dazzling display of reflected light from every angle.

This combination of form, material, sound, and light artfully captures the essence of the phoenix's mythical journey and its connection to the sun. The sculpture "Chasing the Sun's Rays" embodies not only the spirit of the phoenix but also the researchers' personal artistic journey, culminating in the creation of a dynamic and visually captivating moving sculpture.

The use of stainless steel as the medium ensures the sculpture's enduring quality, while the incorporation of mirrored surfaces and movement adds depth and symbolism to the artwork. By skillfully blending form, material, sound, and light, the researchers effectively express the phoenix's pursuit of the sun and its transformative journey, resulting in an evocative and emotive artistic creation.

In summary, the creative inspiration of the Phoenix movement sculpture "Chasing the Sun's Rays" emerges from Oriental phoenix art and the phoenix's affinity with fire and its pursuit of the sun. The sculpture embodies the researchers' personal artistic journey, akin to the phoenix rising from the ashes. By using stainless steel, mirrored surfaces, and movement, the artwork successfully symbolizes the phoenix's mythical quest and transformation. Guided by the Art theory of Expression, the researchers create a dynamic and emotive art piece that resonates with viewers, capturing the beauty and symbolism of the phoenix's journey "Chasing the Sun's Rays."

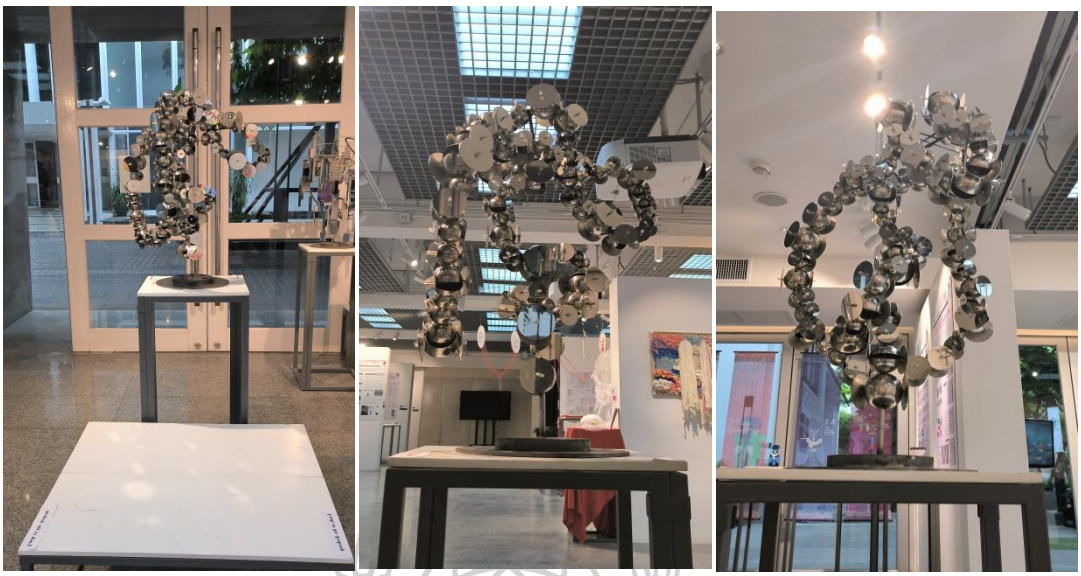


Figure 94: Work 3-Chasing the sun's rays

4.3.4 Work 4- Light and Shadow Fly Together

The creative inspiration behind the Phoenix Movement sculpture "Light and Shadow Fly Together" is deeply rooted in the symbolism of the phoenix as the king of birds in Eastern phoenix art. Birds worship the phoenix as a way to affirm its majestic status, and this theme has been beautifully interpreted through various art forms such as movies, music, dance, and painting.

Guided by this theme, the researchers designed and created the Phoenix Chinese character sculpture, "Light and Shadow Fly Together." The chosen material for the sculpture remains stainless steel, which allows for both durability and artistic expression.

In the artwork, the bird element is derived from the oracle phoenix character, and it serves as a moving part that interacts dynamically with the spatial lines of the three-dimensional phoenix sculpture. This clever design creates a sense of motion and fluidity, as if the bird is gracefully flying alongside the majestic phoenix, evoking the imagery of light and shadow in flight.

To bring their artistic vision to life, the researchers expertly use form, material, sound, and light in the sculpture's design. Stainless steel ensures the sculpture's lasting quality and provides the structural foundation for the intricate movement of the bird element.

The incorporation of sound and light further enhances the artistic experience. The movement of the bird part might produce subtle sounds as it glides through the air, adding an auditory dimension to the artwork. Additionally, carefully positioned light sources create captivating shadows that interact with the sculpture's three-dimensional form, adding depth and visual allure.

The result is a breathtaking art piece that captures the essence of the phoenix as the king of birds and the captivating allure of birds' worship of the phoenix. Through the skillful use of form, material, sound, and light, the researchers bring forth an evocative and dynamic artwork, "Light and Shadow Fly Together," that beautifully conveys the mythical and transcendent nature of the phoenix.

Figure 95: Work 4-Light and shadow fly together

4.3.5 Work 5- All Birds Worship the Phoenix

The creative inspiration behind the Phoenix Movement sculpture "All Birds Worship the Phoenix" stems from the significance of the phoenix as the king of birds in Eastern phoenix art. The act of birds worshipping the phoenix symbolizes the affirmation of the phoenix's esteemed status and embodies a beautiful story in this cultural context. To portray this theme, the researchers embarked on creating sculptures that capture the essence of birds' devotion to the phoenix.

Figure 96: Work 5-All birds worship the phoenix

To bring this concept to life, the researchers employed form, material, sound, and light in the design and creation of the artwork. The material chosen for the sculpture is stainless steel, which offers both durability and flexibility for artistic expression.

In the design, the researchers utilized the new feathers of the lever balance parts to resemble the feathers of a phoenix. The intricate design of the feathers, along with the

addition of Phoenix Chinese characters in seal script for the eyes, enhances the representation of the phoenix in the artwork. These details contribute to the sculpture's visual appeal and add depth to the depiction of birds worshipping the phoenix.

Furthermore, the sculpture's dynamic quality is achieved through the strategic placement of the phoenix feathers. As the sculpture interacts with changes in air flow, the phoenix feathers move gracefully in various angles, embodying the act of birds worshipping the phoenix. This movement creates a sense of reverence and awe, capturing the essence of the artwork's theme.

The addition of sound and light further enhances the artistic experience. As the sculpture's feathers sway in the wind, they might produce subtle sounds, mimicking the rustling of feathers, and adding an immersive aspect to the artwork. Additionally, carefully positioned light sources cast shadows that further accentuate the sculpture's form, adding depth and dimension to the portrayal of birds worshipping the phoenix.

In conclusion, the researchers skillfully employ form, material, sound, and light in the design and creation of the "All Birds Worship the Phoenix" sculpture. Through the use of stainless steel and intricate feather designs, they successfully capture the symbolism of the phoenix as the king of birds, while the dynamic movement and interplay of sound and light further enhance the emotive and immersive experience of birds' devotion to the phoenix.

4.3.6 Work 6- Luminous

The creative inspiration behind the Phoenix Movement sculpture "Luminous" stems from the exploration of Chinese calligraphy as a unique art form. During the research process of the art of Phoenix Chinese characters, the researchers discovered that not all Chinese character fonts are suitable for designing moving sculpture tracks. They

realized the importance of continuous writing in creating dynamic and flowing sculptures. As a result, the researchers selected Phoenix characters in cursive and running script, which embody the essence of continuity in Chinese calligraphy.

Drawing inspiration from the fluidity and flow of calligraphy, the researchers designed the sculpture "Luminous" to express the seamless connection between the brushstrokes in cursive writing. The sculpture seeks to emulate the graceful and continuous strokes of calligraphy, evoking a sense of movement and elegance.

To enhance the artistic expression, the researchers employed form, materials, sound, and light in the design and creation of "Luminous." The sculpture's form is carefully crafted to capture the essence of the continuous brushstrokes, creating a sense of motion and rhythm in the artwork.

Materials play a significant role in representing the ink color of calligraphy. The sculpture utilizes three colors of light – red, yellow, and white – to simulate the traditional ink colors commonly used in Chinese calligraphy. These colored lights add a dynamic and vibrant element to the artwork, creating a visually stunning display of color and movement.

Figure 97: Work 6- Luminous

In "Luminous," the use of light serves as an integral part of the artistic experience. The three colors of light travel from the top down, tracing beautiful linear trajectories in space. This interplay of light and space further emphasizes the continuous and flowing nature of the calligraphic strokes, making the sculpture truly luminous.

The reference to Picasso's light painting suggests that the researchers draw inspiration from the works of renowned artists to enrich their artistic expression. Picasso's exploration of light and movement in his paintings aligns with the themes explored in "Luminous," demonstrating how artists can influence and inspire one another across different art forms.

In conclusion, the Phoenix Movement sculpture "Luminous" is inspired by the fluidity of Chinese calligraphy, particularly in cursive and running script. The artwork captures the essence of continuous brushstrokes, expressed through form and the use

of colored lights. By combining form, materials, sound, and light, the researchers have created a dynamic and visually striking piece that celebrates the art of calligraphy and the beauty of continuous movement.

4.3.7 Work 7- Cultivation Brings Inner Peace

The Phoenix Movement sculpture "Cultivation brings inner peace" is profoundly influenced by the researcher's personal journey of perseverance and growth throughout the study. The researcher faced numerous challenges and failures, leading to a mental and emotional journey. However, the key to overcoming these obstacles lay in self-encouragement, self-belief, and maintaining inner peace as a means to delve into the realm of art successfully.

The sculpture's creative inspiration is centered around the transformative power of inner peace amid the turmoil of failure. Drawing on the balance compass design found on maritime giant ships, the sculpture ensures that the Phoenix character always faces up, regardless of how it rotates in the circle. This symbolism represents the ability to navigate through life's turbulent waves and artistic challenges while preserving inner serenity and composure.

The form of the sculpture plays a significant role in conveying its theme of inner peace and resilience. The design allows the Phoenix character to remain balanced and upright, visually reflecting the strength and unwavering resolve found in cultivating inner peace.

Materials are chosen thoughtfully to contribute to the sculpture's symbolic representation. The use of stainless steel, a durable and resilient material, further reinforces the theme of strength and perseverance in the pursuit of inner peace.

The incorporation of sound and light adds depth and emotional resonance to the

artwork. For instance, gentle wind chime sounds or soft ambient lighting create a serene atmosphere, enhancing the overall experience of the sculpture and deepening the connection with its message of inner peace.

Overall, the sculpture "Cultivation brings inner peace" embodies the researcher's personal journey of resilience and self-discovery. Through its form, materials, sound, and light, the artwork conveys the essence of finding tranquility amidst adversity and serves as a powerful reminder of the transformative power of inner peace in the pursuit of artistic expression.

4.3.8 Work 8- Dance of the Wind

The creative inspiration behind the Phoenix Movement sculpture "Dance of the wind" draws from the works of American movement artists, serving as a study case for the researchers. The sculpture's movement track takes the form of a three-dimensional phoenix symbol, capturing the essence of the phoenix in its lines, shapes, and wind-driven rotational motion, akin to the shape of three-leaf fan blades.

The use of the spiral balance theory in the design ensures the smooth rotation of the three blades without any collisions, demonstrating the technical prowess in creating a harmonious and fluid motion. This technical aspect aligns with the theme concept, serving as a metaphor for the graceful and liberated flight of the divine phoenix bird.

Materials play a crucial role in the design, with mirrored stainless steel being chosen for its durability and stability. The reflective properties of the mirrored stainless steel imbue the artwork with an ever-changing appearance, as it continually reflects and interacts with its surrounding environment. This dynamic quality of movement and reflection captures the attention of passers-by, enhancing the appreciation and admiration of the Phoenix Chinese character movement sculpture.

Incorporating sound and light may further elevate the artistic experience of "Dance of the wind." For instance, gentle wind chime sounds may be added to accentuate the sense of movement and create a multisensory experience for viewers.

Overall, "Dance of the wind" is a captivating piece of art that masterfully combines form, material, sound, and light to express the rhythmic and graceful flight of the phoenix. Its technical ingenuity, thematic metaphor, and interactive quality contribute to its aesthetic appeal and make it a remarkable addition to the world of Phoenix movement sculptures.

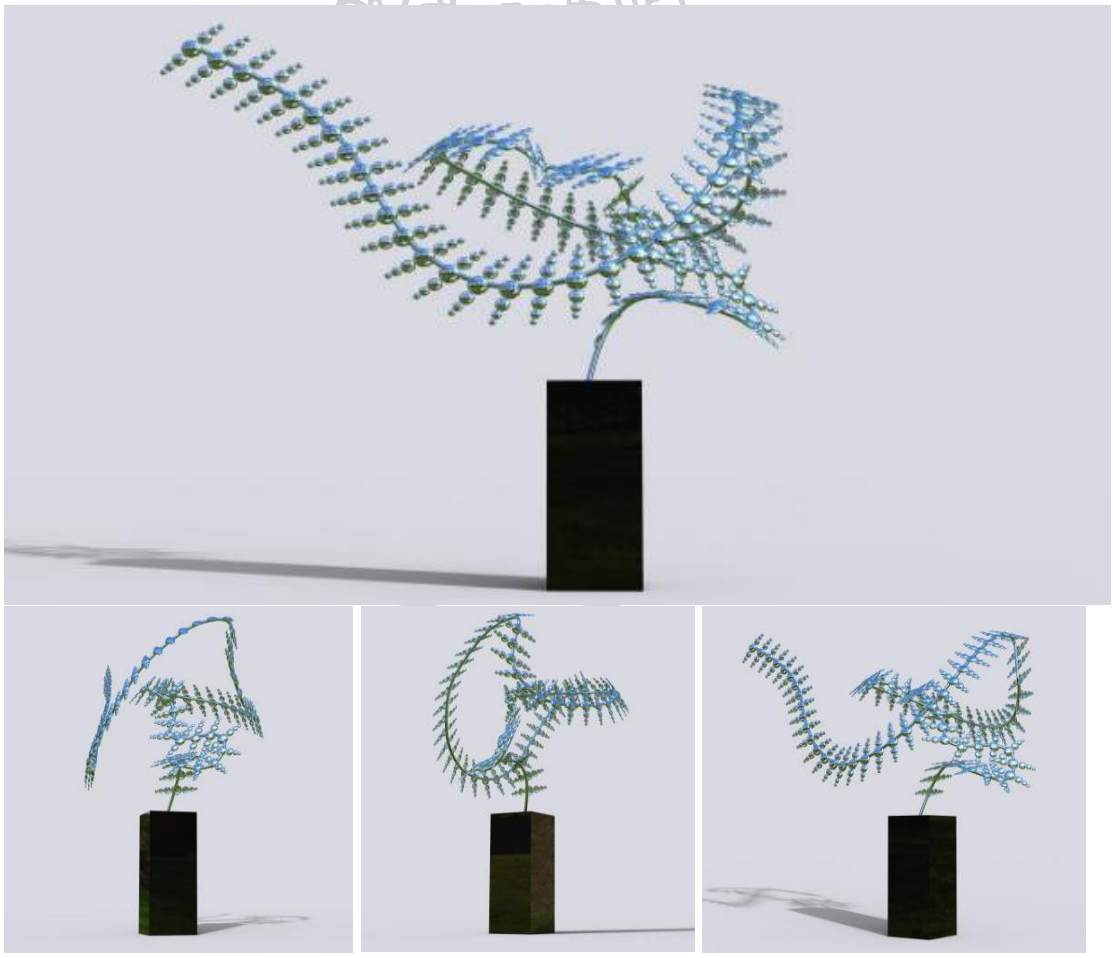
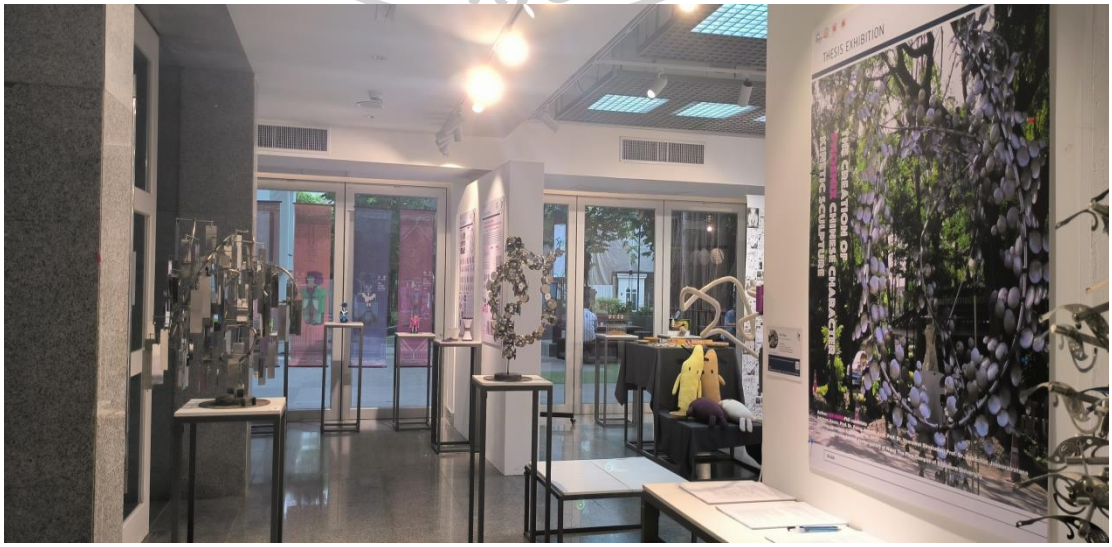


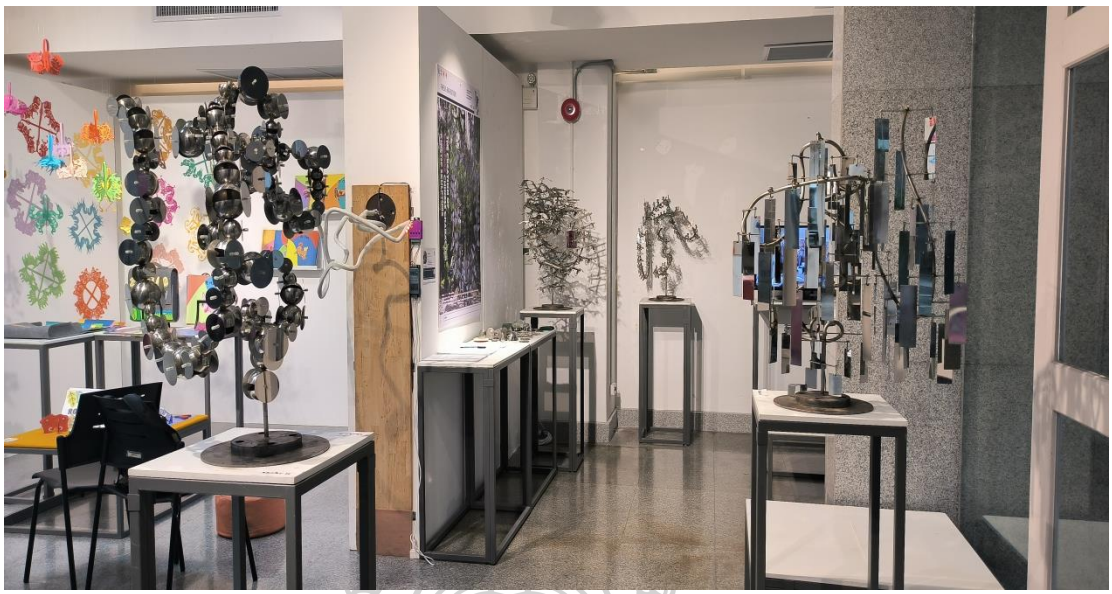
Figure 98: Phoenix character movement sculpture Basic form design

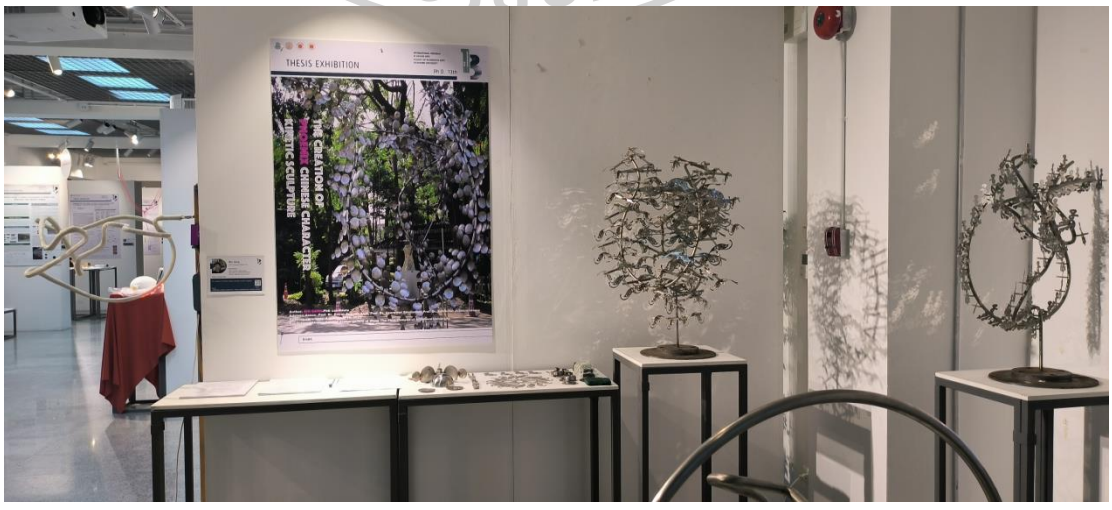
4.3.9 Sculptural Works

During the 13th Graduation Exhibition of the Doctor of Philosophy in Design Art, the artist showcased a collection of seven indoor works, alongside an additional outdoor collection that was displayed at the SU Nakhon Pathom Campus. The precise location of the eighth outdoor work is explicitly indicated in Section 3.6 of this study. The initial seven interior works were positioned in the upper right corner of the exhibition hall. The right entrance to the hall was intentionally kept closed, which inadvertently led to the exhibition area being overlooked. However, on the final day of installation, two works were relocated to a publicly accessible area at the behest of the project mentor, Kwan Rueanglada.

Reflecting on the history of graduation exhibitions held in this very space, it's evident that in each graduating class, one work is consistently chosen to be showcased in a prominent position. This position holds a special significance, signifying the tutors' recognition of the artist's contribution. Following this tradition, the placement of two works in a visible public passage area draws the attention of visitors as they enter the exhibition hall. This deliberate arrangement encourages the audience to engage deeply with all the presented works. This strategy equally extends to the official exhibition presentation.






THESIS EXHIBITION

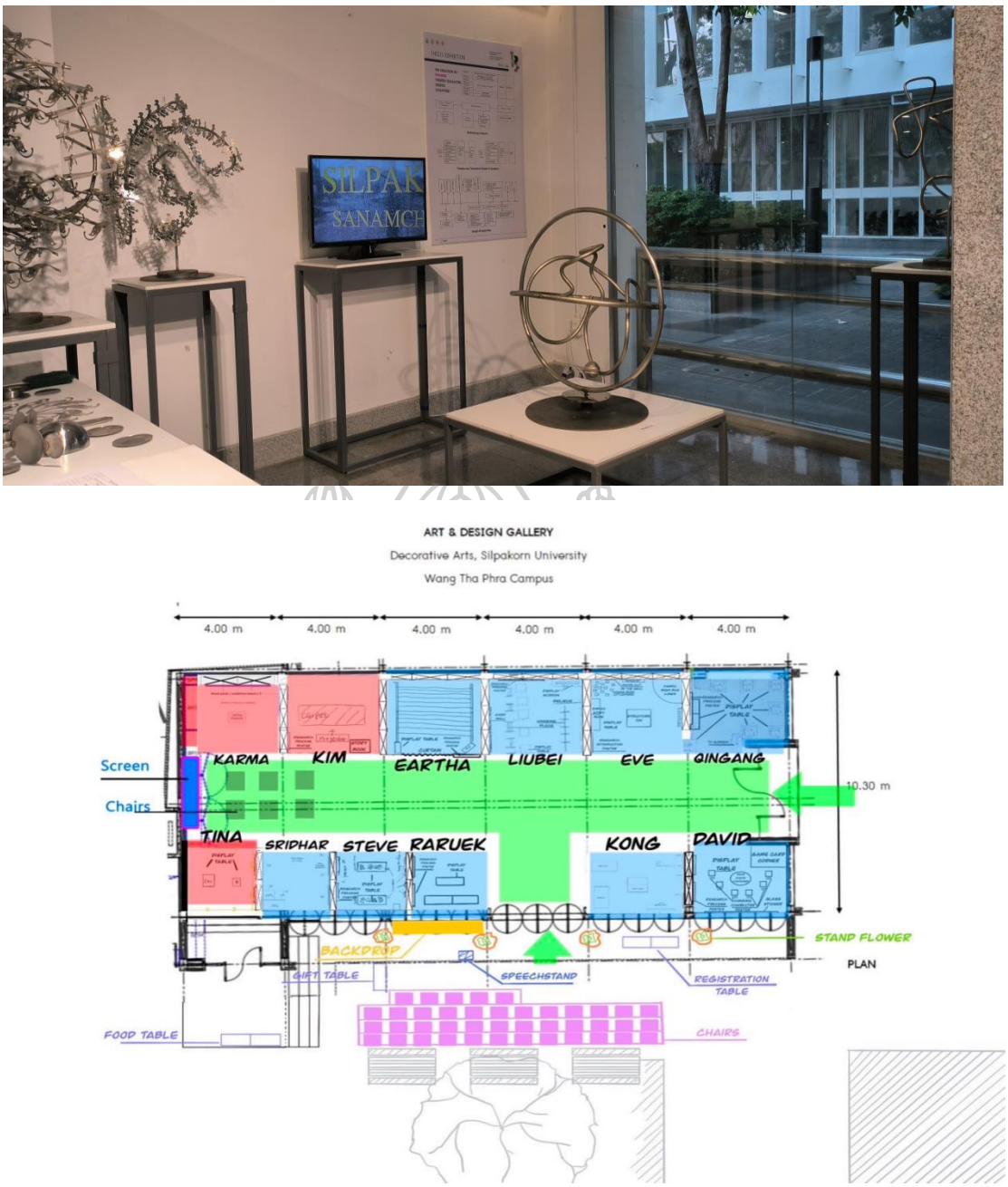


Figure 99: Participated in the 13th graduation exhibition of Doctor of Philosophy of Design Art

4.4 Setting Location

The Phoenix Chinese character Movement sculpture in Sanxingdui Cultural Community Park, Chengdu, China, is a significant and eye-catching art installation that holds great success both in the human and geographical environment.

Firstly, the sculpture's location within the Sanxingdui Cultural Community Park plays a vital role in its success. The park itself is a vast area that encompasses several key attractions related to the ancient Shu civilization, such as the Jinsha Site Park, Jinsha Riverside Park, and Sanxingdui Cultural Square. By being placed in this prominent cultural hub, the sculpture gains increased visibility and significance, as it becomes part of a larger narrative celebrating the historical heritage of the region.

Moreover, the sculpture's positioning at important locations within the park further enhances its impact. Placing it at key nodes and making it stand out creates a strong focal point for visitors, drawing attention to both the artwork itself and the surrounding cultural elements. This strategic placement helps visitors explore and engage with the ancient Shu culture while appreciating the contemporary artistic representation of the Phoenix Chinese character Movement sculpture.

Figure 100: Name - Divine Phoenix; Material - mirror stainless steel; Height -3 meters; Address - Bronze Museum South Square

Figure 101: Name - Listen to the wind; Material - mirror stainless steel; Height -5 meters; Address - Beside the carved stone in Jinsha Riverside Park

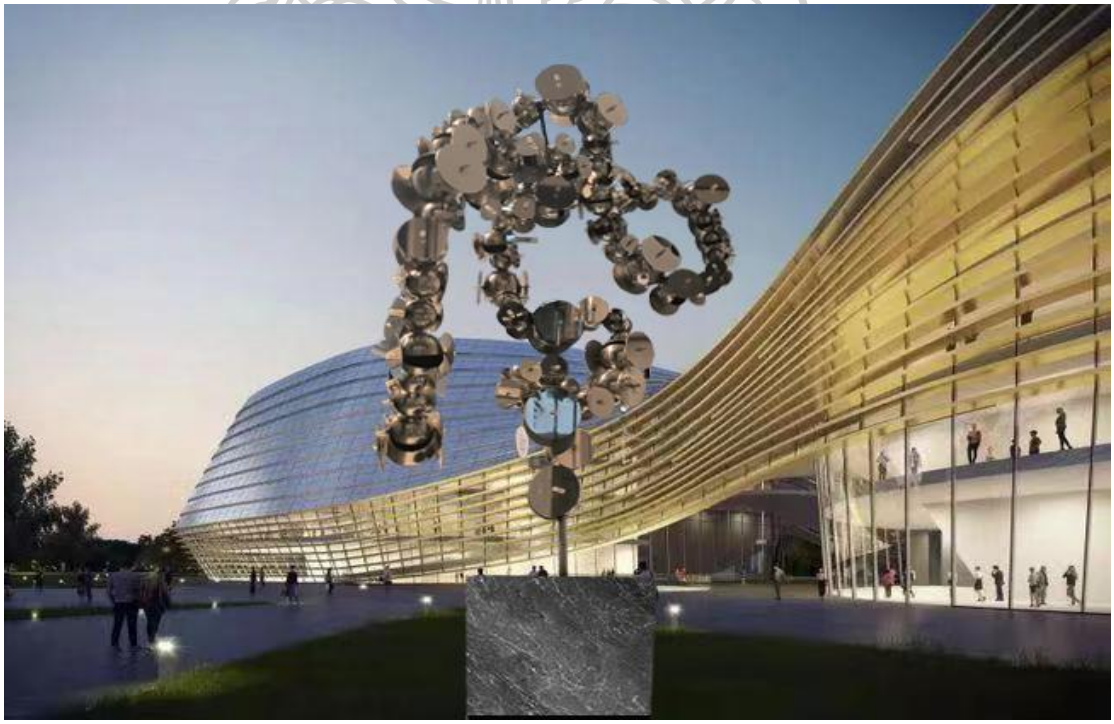


Figure 102: Name- Chasing light; Material - mirror stainless steel; Height -5 meters; Address - Xingu Shu Culture and Performing Arts Hall

Figure 103: Name- Fly; Material - mirror stainless steel; Height - 6 meters; Address - Jinsha Site Park Library

Figure 104: Name- Birds paying homage to the Phoenix; Material - mirror stainless steel; Height -5 meters; Address - Jinsha Site Park Archaeological site Hall

Figure 105: Name - Zen Heart; Material - mirror stainless steel; Height - 6 meters; Address - Sanxingdui Cultural Park Square

Figure 106: Name - Dance of the Wind; Material - mirror stainless steel; Height -5 meters; Address - Ivory Square, Sanxingdui Cultural Park

4.5 Setting Location Feedback

The placement and size of the Phoenix Chinese character Movement sculptures in the Sanxingdui Cultural Community Park have contributed significantly to their success and positive feedback from the public. Here's a feedback analysis based on the settings and sizes of the sculptures:

Strategic Location: The sculptures are strategically placed at important locations within the Sanxingdui Cultural Community Park, such as the Bronze Museum South Square, Jinsha Riverside Park, Xingu Shu Culture and Performing Arts Hall, Jinsha Site Park Library, Jinsha Site Park Archaeological site Hall, Sanxingdui Cultural Park Square, and Ivory Square. This ensures that visitors have ample opportunities to encounter the sculptures while exploring different areas of the park. The diverse placement helps create a cohesive artistic experience that complements the cultural significance of the surrounding attractions.

Height and Size: The sculptures vary in height, with sizes ranging from 3 meters to 8 meters. The substantial height of some sculptures, such as "Fly" and "Zen Heart" at 6 meters, makes them visually striking and adds to their commanding presence in the park. The use of different sizes also creates a sense of dynamic rhythm and diversity, enriching the overall visual experience for visitors.

Material Choice: The sculptures are made of mirror stainless steel, which not only adds to their visual appeal but also complements the modern artistic interpretation of the Phoenix Chinese character Movement. The reflective nature of the material allows the sculptures to interact with their surroundings, reflecting the natural elements and architecture of the park, further integrating them into the geographical environment.

Figure 107: Chengdu Sanxingdui cultural community park survey visit atlas

Artistic Themes: Each sculpture has its unique artistic theme, such as "Chasing light," "Dance of the Wind," and "Birds paying homage to the Phoenix." These themes add depth and meaning to the sculptures, connecting them with the concept of movement and capturing the essence of the Phoenix Chinese character Movement.

Interaction with the Environment: The placement of the sculptures in various squares and parks allows them to harmoniously interact with the natural environment, green spaces, and architectural elements of the park. The sculptures' fluid and dynamic designs create a sense of movement that resonates with the park's lively atmosphere and historical significance.

Based on the positive public feedback, the success of the Phoenix Chinese character Movement sculptures in the Sanxingdui Cultural Community Park can be attributed to the careful consideration of their settings and sizes. The strategic placement, varying heights, and appropriate material choice have all contributed to the sculptures' impact and integration with the human and geographical environment. Moving forward, maintaining the balance between contemporary artistic expression and cultural

heritage will be crucial to perfecting the spiral balance theory of the Phoenix Chinese character Movement sculptures.

Public Questionnaire in Chengdu, China
中国成都公众调查问卷

This questionnaire is from the doctoral research project of Silpakorn University. The research purpose is to design the Chinese character moving sculpture transformed from 2D to 3D. Please fill in the questionnaire objectively. The statistical results of the samples are of great reference value to my research work. Thank you very much for your participation!
此问卷来自泰国艺术大学博士研究项目。本研究的目的是设计由二维到三维的汉字移动雕塑。请客观地填写问卷。样本的统计结果对我的研究工作有很大的参考价值。非常感谢您的参与!
Contact email: qingangphd@163.com
电子邮箱：qingangphd@163.com
Gender: Male ☐ Female☐
性别: 男 女
Age: Under 30 years old☐ 30 - 40☐ 40 - 50☐ Over 50 years old☐
年龄： 30岁以下 30 - 40 40 - 50 50岁以上
Occupation: Government employee☐ Private employee ☐ Student ☐ Other ☐
职业: 政府雇员 自由职业 学生 其它
Degree: Below High school☐ Above university level☐
学历: 高中以下 大学以上学历
Interviewee: Resident☐ Tourist ☐
受访者: 居民 旅客
Evaluation score: Very good(5) Good(4) In general(3) Not good(2) Very poor(1)
评价分数: 很好(5) 好(4) 一般(3) 不好(2) 很差(1)

Number 序号	**Problem content** 问题内容	**Evaluation Score** 评价得分				
		5	**4**	**3**	**2**	**1**
1	The sculpture fits in with the environment 这个雕塑与环境很协调					
2	You can feel the atmosphere of artistic beauty in the environment 你可以在环境中感受到艺术美的氛围					
3	Sculpture is non-destructive to the air environment 雕塑对大气环境的非破坏性					
4	The character phoenix can be seen on the front of the sculpture 该雕塑的正面可以看到是一个草书的凤字					
5	The imagist phoenix can be seen on the side of the sculpture 该雕塑的侧面可以看到凤凰的意象					
6	The form of sculpture expresses flight 雕塑的形式表达了飞翔					
7	The sculpture is in Chinese style 该雕塑具有中国风格					
8	The sculpture expresses the spirit of Sanxingdui culture 该雕塑表达了三星堆文化精神					
9	Your satisfaction with the color of the sculpture 你对雕塑颜色的满意程度					
10	Sculpture material experience 雕塑的材料感觉很现代					
11	Your satisfaction with the solidity of the sculptural material 你对雕塑材料坚固性的满意程度					
12	The degree to which the movement of the sculpture attracts you 雕塑运动时对你的吸引程度					
13	Sculpture in the environment of overall spatial planning satisfaction 雕塑在整体空间规划的环境满意度					
14	Sculpture night view experience 雕塑夜景体验					
15	The sculpture draws your attention to Chengdu's ancient culture 雕塑让你关注成都的古老文化					
16	You are satisfied with the combination of sculpture and local characteristics 雕塑与地方特色的结合让您满意					
17	You can get cultural identity from sculpture design 你可以从雕塑设计中获得文化认同					
18	You have a spiritual experience in sculpture 在雕塑中你体验到一种精神力量					
19	You can accept the modern design of the sculpture 你可以接受这个雕塑的现代设计					
20	This type of sculpture should be set up more in communities and parks 该类型的雕塑应该更多的设置在社区和公园					

Table 9: Public Questionnaire in Chengdu, China

Chengdu, China Public Survey Questionnare Table (Total)

Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	89	10	1	0	0
Q 2	87	10	3	0	0
Q 3	90	2	7	0	1
Q 4	92	8	0	0	0
Q 5	91	5	4	0	0
Q 6	93	4	1	1	1
Q 7	88	11	1	0	0
Q 8	90	2	7	1	0
Q 9	87	6	5	0	2
Q 10	85	7	3	5	0
Q 11	91	3	3	1	2
Q 12	96	4	0	0	0
Q 13	92	8	2	0	0
Q 14	83	9	4	3	1
Q 15	94	3	2	1	0
Q 16	95	2	2	1	0
Q 17	89	6	5	0	0
Q 18	92	7	1	0	0
Q 19	90	8	2	0	0
Q 20	95	5	0	0	0

Chengdu, China Public Survey Questionnare Table (Female)

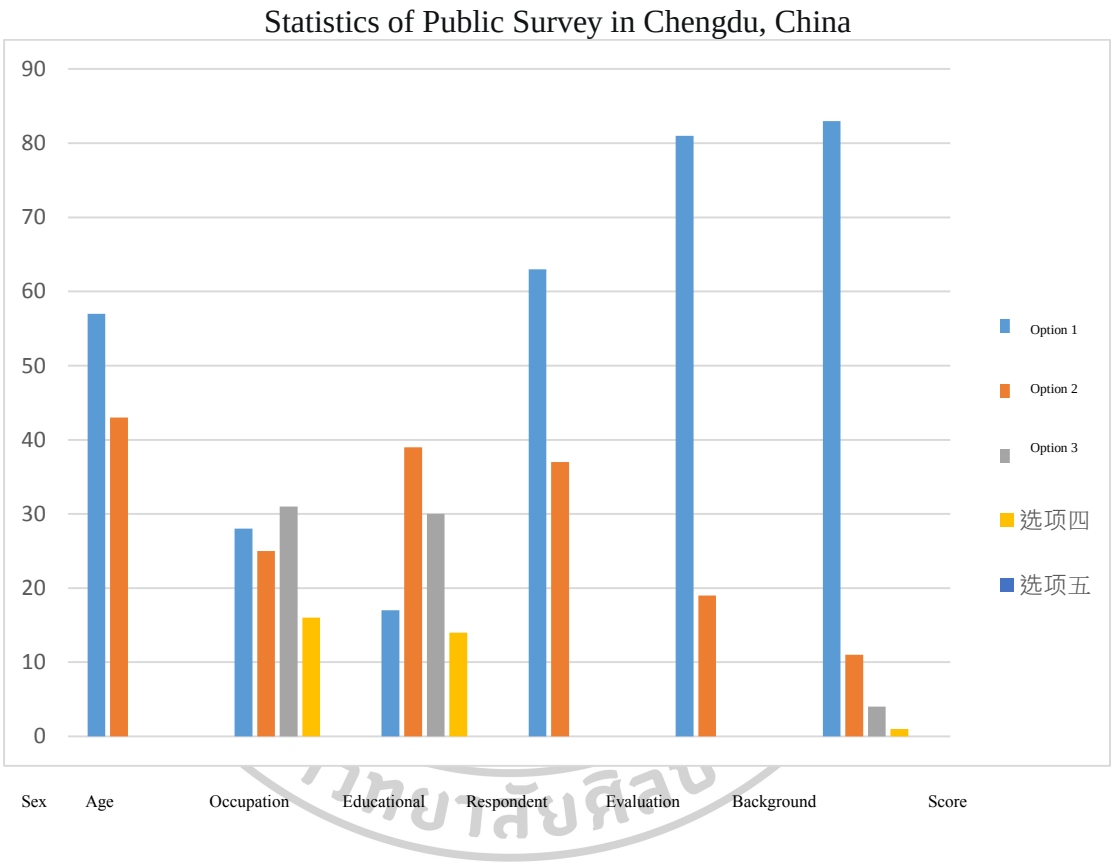
Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	38	5	0	0	0
Q 2	41	0	2	0	0
Q 3	40	0	2	0	1
Q 4	43	0	0	0	0
Q 5	38	3	2	0	0
Q 6	43	0	0	0	0
Q 7	40	2	1	0	0
Q 8	38	2	2	1	0
Q 9	43	0	0	0	0
Q 10	40	0	0	3	0
Q 11	36	3	2	0	2
Q 12	40	3	0	0	0
Q 13	40	3	0	0	0
Q 14	40	1	1	0	1
Q 15	42	1	0	0	0
Q 16	43	0	0	0	0
Q 17	41	2	0	0	0
Q 18	40	2	1	0	0
Q 19	39	3	1	0	0
Q 20	40	3	0	0	0

Chengdu, China Public Survey Questionnare Table (Male)

Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	51	5	1	0	0
Q 2	46	5	1	0	0
Q 3	50	2	6	0	0
Q 4	49	3	0	0	0
Q 5	53	2	2	0	0
Q 6	49	3	1	1	0
Q 7	48	9	0	0	0
Q 8	52	0	5	0	0
Q 9	44	6	5	0	2
Q 10	45	7	3	2	0
Q 11	55	0	1	1	0
Q 12	56	1	0	0	0
Q 13	50	5	2	0	0
Q 14	43	8	3	3	0
Q 15	52	2	2	1	0
Q 16	52	2	2	1	0
Q 17	48	4	5	0	0
Q 18	52	5	0	0	0
Q 19	51	5	1	0	0
Q 20	55	2	0	0	0

	Male	Female			
Sex	57	43			
Age	Under 30 years old	30-40	40-50	Over 50 years old	
Age population	28	25	31	16	
Occupation	Government employees	freelancers	students	Others	
Occupational number	17	39	30	14	
Educational Background	Below high school	Above college			
Number of Academic Qualifications	63	37			
Interviewee	Resident	Visitor			
Number of respondents	81	19			
5 Point Score	5	4	3	2	1
Evaluation Score	83	11	4	1	0

	1 Score	2 Score	3 Score	4 Score	5 Score
Sex	57	43	0	0	0
Age	28	25	31	16	0
Occupation	17	39	30	14	0
Educational Background	63	37	0	0	0
Interviewee	81	19	0	0	0
Evaluation score	83	11	4	1	0



Chapter 5
Conclusions and recommendation

5.1 Reflection on the Results

5.1.1 Exhibition Result

On April 18, 2023, in the Art Exhibition Hall of the Grand Palace Campus of Silpakorn University, the 13th Doctoral Graduation Exhibition of Art of Design (International Program) officially kicked off. At around 5 PM, the chairman of the school board, the president, the chairman of the project, the external audit experts of the graduation defense, the leaders of relevant departments and the students of the project team all attended the opening ceremony. The opening ceremony was grand and warm. After the opening ceremony, the school leaders entered the exhibition hall to see the students' works one by one. The researcher's work booth is located in the upper right corner of the exhibition hall.

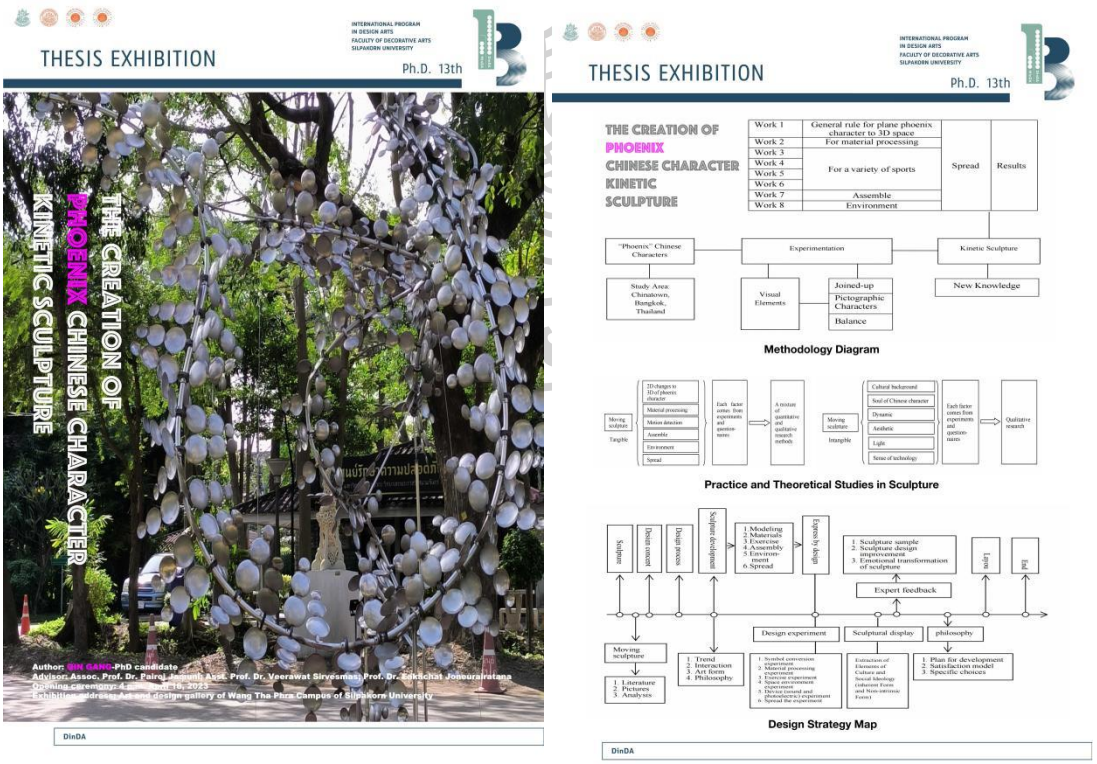


Figure 108: Exhibition poster

The exhibition lasted for nearly two weeks, and the works of the researchers were widely praised and achieved great success. Teachers and students from art colleges, art lovers from society, as well as experts and professors in the field of art, all pay attention to the meaning and beautiful shapes conveyed by the researchers' works. This is not only the affirmation of the research results of the researchers, but also the confidence of the researchers to continue the in-depth study and development of the Chinese character series of moving sculptures. How to create more and better works and hold various art exhibitions, so as to establish the reputation of continuous Chinese character movement sculpture, so as to better spread Chinese character culture, has begun to enter the scope of researchers' thinking.

Figure 109: The President of the Lao PDR University of Science and Technology visited my works

Figure 110: The Dean of the Faculty of Ceramics, Silpakorn University appreciates the works

Figure 111: The children observe the light and shadow of my works

Figure 112: Photo with Australian Professor Nicki Wragg at the exhibition site

Figure 113: Photo with Veerawat Sirvesmas, the creative advisor

Figure 114: Concept Tutor Eakachat Joneurairatana made a presentation to the Chairman and President of the University Board of Trustees

Figure 115: Photo of Prof. Emeritus Khaisri Sri-Aroon, Silpakorn University Council and the researcher

5.1.2 Exhibition Feedback

1. In the exhibition, researchers used public survey questionnaires and expert survey questionnaires as feedback questionnaires, and received 23 feedback questionnaires. The statistics are as follows:

A. Data feedback statistics of 14 public questionnaires:

Data definition:

In the table, 0 represents exclusions

Gender options - 1 for male, 2 for female.

Age options - 1 for 30 years old, 2 for 30-40 years old, 3 for 40-50 years old, and 4 for over 50 years old.

Occupation option - Use 1 for government employees, 2 for private employees, 3 for students, and 4 for others.

Education options - 1 for high school, 2 for college or above.

The value of a Interviewee is 1 for local interviewee and 2 for tourist Interviewee.

Evaluation score options: Worst use 1 representative, bad use 2 representative, general use 3 representative, good use 4 representative, very good use 5 representative.

Exhibition Feedback (Public Questionnaire) -3 Male

	1 Score	**2 Score**	**3 Score**	**4 Score**	**5 Score**
Sex	3	0	0	0	0
Age	1	1	1	0	0
Occupation	1	1	1	0	0
Educational Background	0	3	0	0	0
Interviewee	1	2	0	0	0
Evaluation score	0	0	0	13	46

Question Number	**5 Score**	**4 Score**	**3 Score**	**2 Score**	**1 Score**
Q 1	2	1	0	0	0
Q 2	2	1	0	0	0
Q 3	2	1	0	0	0
Q 4	3	0	0	0	0
Q 5	2	1	0	0	0

Q 6	2	1	0	0	0
Q 7	2	1	0	0	0
Q 8	2	1	0	0	0
Q 9	3	0	0	0	0
Q 10	2	1	0	0	0
Q 11	3	0	0	0	0
Q 12	3	0	0	0	0
Q 13	2	1	0	0	0
Q 14	1	2	0	0	0
Q 15	3	0	0	0	0
Q 16	3	0	0	0	0
Q 17	3	0	0	0	0
Q 18	1	2	0	0	0
Q 19	2	1	0	0	0
Q 20	2	1	0	0	0

Question Number	**5 Score**	**4 Score**	**3 Score**	**2 Score**	**1 Score**
Q 1	8	3	0	0	0
Q 2	7	3	1	0	0
Q 3	8	3	0	0	0
Q 4	11	0	0	0	0
Q 5	6	5	0	0	0
Q 6	7	3	1	0	0
Q 7	8	1	2	0	0
Q 8	7	4	0	0	0
Q 9	5	5	1	0	0
Q 10	9	1	1	0	0
Q 11	10	1	0	0	0

Q 12	9	2	0	0	0
Q 13	9	2	0	0	0
Q 14	11	0	0	0	0
Q 15	9	2	0	0	0
Q 16	9	2	0	0	0
Q 17	9	2	0	0	0
Q 18	7	3	1	0	0
Q 19	10	0	1	0	0
Q 20	10	1	0	0	0

Exhibition Feedback (Public Questionnaire) -11 Female

	1 Score	2 Score	3 Score	4 Score	5 Score
Sex	0	11	0	0	0
Age	5	3	3	0	0
Occupation	0	4	4	3	0
Educational Background	4	7	0	0	0
Interviewee	9	2	0	0	0
Evaluation score	0	0	8	40	172

B. 9 expert questionnaire data feedback statistics:

Exhibition Feedback (Expert Questionnaire) - 3 Male

Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	2	1	0	0	0
Q 2	1	1	1	0	0
Q 3	1	2	0	0	0
Q 4	1	1	1	0	0
Q 5	1	1	1	0	0
Q 6	0	2	1	0	0

Q 7	0	2	1	0	0
Q 8	2	1	0	0	0
Q 9	2	1	0	0	0
Q 10	1	2	0	0	0
Q 11	1	1	1	0	0
Q 12	1	1	0	1	0

	1 Score	2 Score	3 Score	4 Score	5 Score
Sex	3	0	0	0	0
Age	1	2	0	0	0
Occupation	1	0	0	2	0
Educational Background	0	3	0	0	0
Interviewee	2	1	0	0	0
Evaluation score	0	1	7	13	15

Exhibition Feedback (Expert Questionnaire) - 6 Female

	1 Score	2 Score	3 Score	4 Score	5 Score
Sex	0	6	0	0	0
Age	3	2	1	0	0
Occupation	2	2	0	2	0
Educational Background	0	6	0	0	0
Interviewee	5	1	0	0	0
Evaluation score	0	0	2	12	57

Question Number	5 Score	4 Score	3 Score	2 Score	1 Score
Q 1	5	1	0	0	0
Q 2	5	1	0	0	0
Q 3	6	0	0	0	0
Q 4	6	0	0	0	0
Q 5	3	3	0	0	0
Q 6	4	2	0	0	0
Q 7	5	1	0	0	0

Q 8	6	0	0	0	0
Q 9	4	2	0	0	0
Q 10	5	1	0	0	0
Q 11	5	0	1	0	0
Q 12	4	1	1	0	0

2.According to the feedback data, the researchers conducted analysis, and the results are as follows:

Based on the exhibition feedback data, we can analyze the achievements and areas for improvement of the Phoenix Chinese character moving sculpture as follows:

Shape of the Sculpture: The shape of the sculpture received positive feedback from both male and female visitors, with a majority of respondents giving high scores (4 or 5). This suggests that the overall design and form of the sculpture were well-received and visually appealing.

Color: The data on color feedback is not provided, so it is difficult to assess the success of the color choices in the sculptures. Obtaining feedback on color preferences and its impact on the overall impression of the sculptures would be valuable for future improvements.

Material: The choice of mirror stainless steel as the material for the sculptures garnered positive feedback from both male and female visitors. Most respondents gave high scores (4 or 5) for the material selection, indicating that it was appropriate and well-received due to its visual appeal and reflective properties.

Movement Mode: Unfortunately, there is no data available on feedback regarding the movement mode of the sculptures. Understanding visitors' responses to the movement would be essential to evaluate whether it effectively conveys the intended message and enhances the sculptures' overall impact.

Spirit Expressed in the Works: The data does not provide specific insights into the spirit expressed in the sculptures. Gathering qualitative feedback or conducting interviews with visitors could shed light on their interpretations and emotional connections to the artwork, helping to assess whether the intended spirit is effectively conveyed.

Role in Cultural Communication: The Phoenix Chinese character moving sculpture is located in the Sanxingdui Cultural Community Park, which is dedicated to celebrating the ancient Shu civilization. The positive feedback from both male and female visitors, along with high evaluation scores, indicates that the sculptures have played a successful role in cultural communication. They appear to effectively engage visitors with the rich historical heritage of the region.

Areas for Improvement:

Gather feedback on color choices used in the sculptures to assess their impact on visitors' perceptions and emotional responses.

Conduct qualitative research to explore visitors' interpretations of the spirit expressed in the sculptures to ensure that the intended message is effectively conveyed.

Collect data on the movement mode of the sculptures to determine its success in enhancing the overall artistic experience.

Continue to monitor public feedback and conduct periodic evaluations to identify areas for improvement and ensure the sculptures remain engaging and relevant to visitors.

Consider incorporating interactive elements or educational materials near the sculptures to provide visitors with a deeper understanding of the ancient Shu civilization and its significance.

Enhance the documentation and analysis of feedback to facilitate ongoing improvements and ensure the success of the Phoenix Chinese character moving sculpture in promoting cultural communication and artistic appreciation.

Figure 116: Exhibition site feedback

5.2 Conclusion

The culmination of the research journey in the pursuit of the Doctor of Philosophy in Design Art, entitled "The Creation of Phoenix Chinese Character Kinetic Sculpture" has been a profound exploration of the intricate interplay between sculptural art design and the artist's cultural identity.

The extensive investigation encompassing elements such as environment, materials, forms, textures, colors, and installations has provided an illuminating foray into the realm of sculpture, unveiling the profound connections between graphic and artistic elements and the embodiment of the artist's cultural heritage. This endeavor, far from being confined to a mere scholarly exercise, has not only enriched the comprehension of contemporary sculpture but also shed light on the transformative potential of expressing the artist's distinctive cultural identity through the dynamic medium of written symbols.

Throughout this study, six pivotal factors – symbol conversion, motion analysis, material processing, intricate assembly of moving components, harmonious spatial integration, and the recognition of artistic symbols as carriers of identity – have been meticulously examined. The process of experimentation and analysis has yielded a

comprehensive understanding of how these factors interact, contributing significantly to the cultural transmission and enhanced aesthetic appreciation within the relationship between individuals and the world of sculptural creation.

The evolution of the Phoenix Chinese character motion sculpture necessitated a sensitive fusion of the artist's unique style, a nuanced deconstruction and reconstruction of complex forms, and the seamless integration of geometric abstractions into the sculptural essence. This synthesis aimed to resonate seamlessly with contemporary artistic and spiritual sensibilities, ultimately birthing a visual language that bridges the symbolic and the tangible. The exploration of motion and form has led to the genesis of a novel sculptural style that captures the very essence of cultural identity and communicates it vibrantly to the beholder. This research triumphantly succeeds in extracting novel elements that can symbolically metamorphose sculptural designs, pushing the boundaries of traditional aesthetics.

The rapid tide of urbanization has kindled an outpouring of artistic, cultural, technological, and musical expression, consequently amplifying the recognition of sculptures rich in cultural and artistic significance within the public domain. The study's diligent exploration into the transition from two-dimensional symbols to three-dimensional spatial representations has unveiled the distinct aesthetic appreciation and understanding that symbols can evoke. The meticulous analysis of the Phoenix Chinese character motion sculpture's kinetic dynamics and spatial adaptability further deepens this insight, delivering a multi-faceted psychological framework that evokes enriched visual experiences.

Moreover, the research beckons towards future exploration into the intersection of cultural and educational institutions, a realm where the fusion of institutional identity with sculptural design holds immense potential. This novel approach transcends the visual realm, forging connections that are both tangible and symbolic. This expansion of conceptual boundaries promises to inject layers of cultural significance and

historical memory into sculptural design, catalyzing a profound resonance within the viewer.

As this study concludes, the path ahead becomes illuminated with the prospects of advancing art theory and expanding the boundaries of spatial knowledge. This progression will not only contribute to the evolution of sculpture within urban parks capes but also forge deeper bonds between art, public spaces, and the human experience. The mission of encapsulating the essence of cultural symbols and artistic identity within the context of three-dimensional motion sculptures remains an ongoing journey, underscoring the vitality of artistic expression and its profound impact on the collective human psyche.

In summary, the research voyage undertaken in "Creating Phoenix Chinese Character Motion Force Sculpture" extends beyond the confines of art aesthetics. It unfurls the intricate tapestry woven between sculptural design, human emotion, and cultural resonance, hinting at boundless possibilities in the endeavor to convey the profound currents of our shared human experience through the medium of art.

Sculptural Artwork Form	Symbol conversion	Combination
	Movement detection	
	Material processing	
	Assembly of moving parts	
	Space environment	
	Art symbol communication	

Table 10: Factors combination

5.3 Contribution

The Phoenix Chinese character movement sculpture creation research goes beyond its primary focus on Chinese characters and the phoenix theme to recognize and appreciate the contribution of other cultures in enriching the form of culture. While the sculpture primarily draws inspiration from Chinese cursive and running script fonts, it also acknowledges the significance of exploring less commonly used and endangered words and motifs from various cultures.

This broader perspective allows the research to delve into the depths of cultural diversity and historical value embodied in these texts and motifs. By studying their origin, development, and meanings, the research seeks to unravel their cultural significance and understand how they have evolved over time. This exploration provides valuable insights into the interplay between language, symbolism, and cultural expression across different civilizations.

As the study delves into the unique aspects of these lesser-known cultural elements, it aims to shed light on their potential for artistic regeneration. The researchers seek to reimagine and reinterpret these words and motifs in the context of modern artistic expressions, particularly through the captivating medium of symbolized movement sculpture. By infusing these cultural elements with dynamic and visually engaging movements, the sculpture breathes new life into ancient symbols, bridging the gap between tradition and contemporary art.

In doing so, the research not only pays homage to the diverse cultural heritage of different civilizations but also plays a crucial role in preserving and promoting their legacies. By revitalizing these features and motifs in the medium of movement sculpture, the study contributes to the continuous evolution and preservation of global cultural heritage.

Moreover, this research goes beyond the confines of cultural boundaries, fostering a deeper appreciation for the interconnectedness of human expression. It highlights how the fusion of different cultural elements can lead to the creation of new artistic possibilities that transcend borders and resonate with a global audience.

In conclusion, the Phoenix Chinese character movement sculpture creation research celebrates the richness of cultural diversity and recognizes the contribution of other cultures in shaping and enriching the form of culture. Through the exploration and

revitalization of lesser-known words and motifs, the research showcases the profound interplay between art, language, and cultural expression, ultimately contributing to the preservation and evolution of cultural heritage while nurturing innovative expressions in contemporary art.

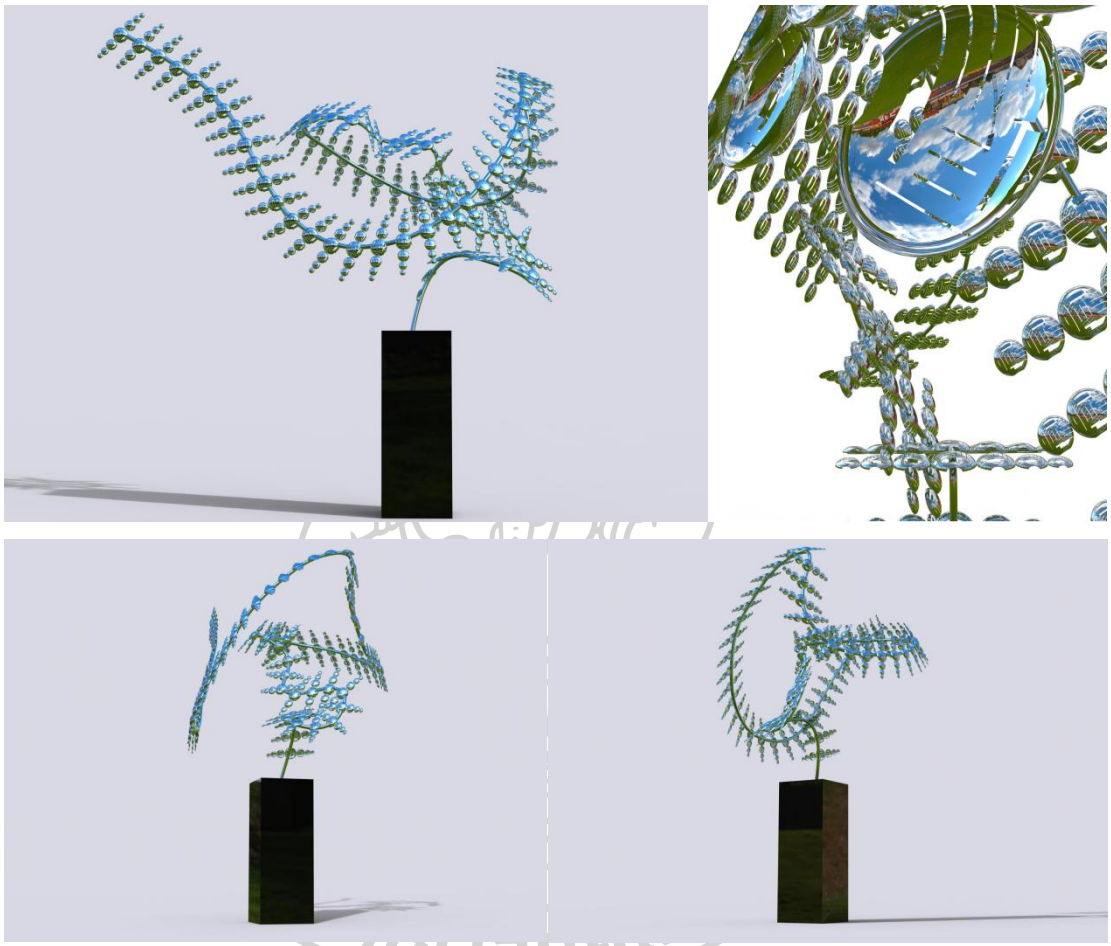


Figure 117: Patent work name: Sculpture (Wind dance), Author: Qin Gang, Material: Mirror stainless steel， Size: 60*60*100 cm.

Figure 118: China Design Patent Certificate (Left: original, right: international edition)

5.4 Recommendations for Future Development

Creation Automation Program: To enhance the efficiency and creativity of the sculpture creation process, researchers can explore the development of a creation automation program. This program can utilize advanced technologies like artificial intelligence and machine learning to analyze and interpret Chinese characters and motifs. By automating certain aspects of the design process, artists can focus more on the conceptualization and artistic expression, leading to innovative and diverse sculptures.

Virtualization and Augmented Reality: Embrace emerging technologies like virtualization and augmented reality to bring the Phoenix Chinese character movement sculptures to life in virtual environments. Virtual galleries and exhibitions can allow global audiences to experience the sculptures remotely, transcending

geographical boundaries and promoting cross-cultural appreciation. Augmented reality installations in physical spaces can also provide an immersive experience, blurring the lines between the traditional and digital art worlds.

Interactive Installations: Introduce interactive elements into the sculptures to create engaging experiences for viewers. Incorporate sensors and motion tracking technology to enable the sculptures to respond to the presence and movements of visitors. This interactive approach can foster deeper connections between the audience and the artwork, encouraging active participation and exploration of Chinese cultural themes.

Collaboration with Other Art Forms: Encourage interdisciplinary collaborations with artists from diverse fields such as music, dance, and literature. By merging various art forms, researchers can create multi-dimensional and immersive artistic experiences that amplify the impact of the Phoenix Chinese character movement sculptures.

Art and Cultural Exchange Programs: Facilitate cultural exchange programs to showcase the sculptures in international art events and exhibitions. Collaboration with artists and scholars from different cultural backgrounds can lead to cross-cultural insights and interpretations, enriching the symbolism and meaning of the sculptures.

Digital Documentation and Archiving: Ensure comprehensive digital documentation and archiving of the research findings, design processes, and finished sculptures. Establishing a digital repository will not only aid in preserving the research for future reference but also facilitate academic discourse and collaboration within the global art community.

Educational Outreach: Develop educational programs and workshops to engage students and the public in the significance of Chinese characters and cultural symbolism. These initiatives can foster a deeper understanding and appreciation of Chinese culture while promoting the value of art and creativity in society.

Sustainability and Eco-Friendly Practices: Emphasize sustainable and eco-friendly practices in the creation of the sculptures. Research into environmentally conscious materials and manufacturing processes can ensure that the art form contributes positively to the environment and aligns with contemporary sustainable practices.

Public Art Installations: Collaborate with urban planners and city authorities to integrate the Phoenix Chinese character movement sculptures into public spaces. Placing these sculptures in prominent locations will not only enhance the aesthetic appeal of the cityscape but also promote cultural identity and appreciation among the general public.

International Art Competitions: Encourage participation in international art competitions and events to gain exposure and recognition on a global scale. Winning accolades in prestigious competitions can attract attention to the research, leading to potential collaborations and partnerships.

By embracing technological advancements, fostering cultural exchange, and engaging with the public, the future development of the Phoenix Chinese character movement sculpture research can pave the way for a vibrant and culturally rich artistic landscape that transcends boundaries and inspires audiences worldwide.

REFERENCES

"Archimedes. (2010). The Complete Works of Archimedes. Translated by Zhu Enkuan, Chang Xinyi Et Al. Taiyuan: Shanxi Science and Technology Press, 381-413."

"Banes, S. (2020). Before, between, and Beyond: Three Decades of Dance Writing. University of Wisconsin Press."

"Barron, S. (2004). "Op Art and Kinetic Art." in D. Freedman (Ed.), Art History: The Basics (Pp. 153-154). Routledge."

"Bishop, C. (2005). Installation Art: A Critical History. Routledge."

"Boltz, W. G. (1994). The Origin and Early Development of the Chinese Writing System. American Oriental Society."

"Brouws, M. (2019). Kinetic Art in the Digital Era: An Investigation into the Relationship between Art and Technology (Doctoral Dissertation). University of Huddersfield."

"Brown, L. M. (2018). From Ashes to Success: The Use of the Phoenix Symbol in Corporate Logos. International Journal of Business Symbolism, 5(2), 78-92."

"Chang, A. (2019). Rising from Ashes: The Phoenix as a Symbol of Political Transformation in Contemporary Art. Journal of Social Commentary in Art, 35(2), 45-60."

"Chen, Hui. (2007). Environmental Sculpture. Beijing: Tsinghua University Press, 1."

"Chen, L. (2019). Research on the Expression of Chinese Characters in Modern Art. Art & Design, (12), 97-98."

"Chen, L. (2019). The Modern Phoenix: Cross-Cultural Mythology in Contemporary Art. Art Today, 28(3), 67-82."

"Chen, Q. (2022). Resilience and Renewal: Exploring the Meaning of the Phoenix in Contemporary Art. Journal of Visual Culture, 45(2), 198-213."

"Chen, Z. (2019). Research on the Expression of Chinese Characters in Modern Art. Art & Design, (12), 97-98."

"Chen, Z., & Shen, Z. (2020). Research and Application of Chinese Character Input Method. Open Journal of Social Sciences, 8(8), 263-268."

"Garcia, L. S. (2020). Digital Realms and Mythical Creatures: Reimagining the Phoenix through Technology. Digital Art and Culture, 15(4), 256-273."

"Gentle, R. (2020). Kinetic Art: Theory and Practice. Thames & Hudson."

"Gombrich, E. H. (1996). The Sense of Order: A Study in the Psychology of Decorative Art. Phaidon Press."

"Groys, B. (2008). Art Power. Mit Press."

"Hao, X. (2019). The History of Chinese Information Processing. Higher Education Press."

"Harrison, C. (2013). Modern Art: Painting, Sculpture, Architecture, Photography. Thames & Hudson."

"Hart, G. (2005). The Routledge Dictionary of Egyptian Gods and Goddesses. Routledge."

"He, W., & Wu, J. (2018). Design and Implementation of Chinese Character Input

Method Based on Big Data. International Journal of Pattern Recognition and Artificial Intelligence, 32(2), 1850018."

"Heartney, E. (2012). Installation Art. Thames & Hudson."

"Huang, C. (2021). The Cognitive Process of Chinese Character Learning and Its Influential Factors. In Proceedings of the 6th International Conference on Education and Management (Pp. 7-10)."

"Hutton, K. (2008). The Myth of the Phoenix in the Nineteenth and Early Twentieth Centuries. Journal of Literature and Science, 1(1), 18-32."

"Janson. (2004) Janson's History of Art. The Western Tradition. 7e, 9780131934559 by Davies, Penelope J. E. Denny, Walter B: Hofrichter, Frima Fox: Jacobs, Joseph: Roberts, Annm.: Simon, David, Published by Pearson Education, Publishing as Prentice, Copyright 2007, by Pearson Education, 1011."

"John Fiske. (1990). Introduction to Communication Studies. London & New York: Routledge (Routledge Is an Imprint of the Taylor & Francis Group), 14."

"John Locke. (1689). An Essay Concerning Human Understanding. London: Printed by Eliz, Holt, for Thomas Basset, at the George in Fleet Street, near St. Dunstan's Church."

"John Russell. (2003). Significance of Modern Art. Translated by Chang Ningsheng. Beijing: China Renmin University Press, 294."

"Johnson, R. A. (2019). The Phoenix in Modern Fantasy Literature: Symbolism, Transformation, and the Hero's Journey. Journal of Fantasy Studies, 6(2), 45-61."

"Jones, A. (2020). Rethinking the Phoenix: Contemporary Art and Social Change. Art and Society Journal, 18(3), 156-172."

"Jones, L. (2015). Kinetic Art: The Technology of Time. Tate Etc., (34), 78-85."

"Klein, M. (1998). Motion in Sculpture: The Art of Alexander Calder. The Mit Press. Retrieved from Https://Mitpress.Mit.Edu/Books/Motion-Sculpture."

"Kline, M. (1994). Mechanical Marvels: Invention in the Age of Leonardo. J. Paul Getty Museum."

"Kuspit, D. (1999). The End of Art. Cambridge University Press."

"Kwastek, K. (2013). "Interactive Kinetic Sculpture." in A. H. Reilly (Ed.), the Oxford Handbook of Sound Studies (Pp. 339-356). Oxford University Press."

"Lee, J. (2021). Transformative Forms: Contemporary Artists' Renditions of the Phoenix Myth. International Journal of Visual Arts, 9(1), 24-39."

"Lee, M. A. (2020). From Ashes to Activism: The Symbolism of the Phoenix in Modern Art. Art and Society, 28(1), 34-47."

"Lee, S. H. (2021). Cultural Festivals and Urban Identity: Exploring the Role of Large-Scale Art Installations. Urban Studies, 38(5), 721-736."

"Li, M. (2018). Trends and Challenges in Teaching Chinese Characters to Non-Native Chinese Learners. Studies in Literature and Language, 17(2), 87-95."

"Li, M., & Xu, C. (2018). Study on the Development and Heritage of Chinese Characters

Art. In 2018 International Conference on Social Science and Education Management (Pp. 174-177)."
"Lindstrom, M. (2008). Buyology: Truth and Lies About Why We Buy. Crown Business."
"Liu, L. (2020). The Cultural Connotation of Chinese Characters and Their Artistic Expression. In 2nd International Conference on Education, Management and Humanities Science (Pp. 61-65)."
"Longer, S. K. (2013). Feeling and Form. Translated by Gao Yanping, Nanjing: Jiangsu People's Publishing House, 10."
"Longer, S. K. (2013). Feeling and Form. Translated by Gao Yanping, Nanjing: Jiangsu People's Publishing House, 38."
"Lucie-Smith, E. (2004). Movements in Art since 1945. Thames & Hudson."
"Lurker, M. (2004). The Routledge Dictionary of Gods and Goddesses, Devils and Demons. Routledge."
"Miller, J. R. (2020). Shaping Myth: The Evolution of the Phoenix in Modern Art. Journal of Contemporary Art Studies, 38(4), 567-582."
"National Language Resources Monitoring and Research Center. (2019). Annual Report on the Development of National Language Resources (2018). Language Resources Research, 1(2), 107-112."
"Nguyen, H. T. (2018). Shifting Perspectives: Cultural Hybridity and the Modern Representation of the Phoenix. International Journal of Contemporary Art, 23(3), 56-72."
"Nguyen, T. H. (2020). From Ashes to Action: The Phoenix Symbol in Contemporary Art and Activism. Journal of Social Commentary in the Arts, 40(2), 78-92."
"Packer, R. (2008). Interactivity and Kinetic Art: A Historical Perspective. Digital Creativity, 19(4), 235-246. Doi:10.1080/14626260802568343."
"Patel, R. M. (2020). The Cyclical Phoenix: A Visual Metaphor for Repeating Patterns in Sociopolitical History. Visual Arts Journal, 28(4), 87-104."
"Patel, S. (2018). Rebirth and Revolution: Political Discourse in Modern Phoenix Art. Contemporary Visual Arts, 36(4), 56-69."
"Paul, C. (2018). Digital Art. Thames & Hudson."
"Perl, J. (1998). Calder: The Conquest of Time: The Early Years: 1898-1940. Knopf."
"Peters, B. (2015). Digital Kinetic Sculpture: An Aesthetic Merger of the Digital and the Kinetic. In the 2015 Acm International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2015 Acm International Symposium on Wearable Computers (Pp. 229-232). Doi:10.1145/2800835.2808084."
"Popper, F. (1968). Origins and Development of Kinetic Art. Studio Vista."
"Popper, F. (1968). Origins and Development of Kinetic Art. Studio Vista Limited."
"Popper, F. (2007). "Origins and Development of Kinetic Art." Leonardo, 40(4), 360-367. Doi:10.1162/Leon.2007.40.4.360."

"Pritchard, F. (2017). Sculpture and the Vitrine: Displaying the Art of Movement. In Moving Sculpture (Pp. 71-89). Routledge."

"Qiu, X. (2000). Chinese Writing. University of Washington Press."

"Rawson, J. (2007). The Written Image: Chinese Literati Painting. British Museum Press."

"Scherer, M. (2018). Spectacle and Symbolism: The Phoenix in Contemporary Art. In "Beyond the Horizon: Essays on Myth, History, Travel, and Society" (Pp. 101-117). Cambridge Scholars Publishing."

"Scollon, R., & S. W. Scollon. (2003). Discourses in Place: Language in the Material World. London: Https://Www.Researchgate.Net/Publication/290857050_Discourses_in_Place_Language_in_the_Material_World."

"Sichuan Provincial Research Institute of Cultural Relics and Archaeology, Sanxingdui Museum, Sanxingdui Research Institute. (2009). The Whole Collection of the Relics Excavated in Sanxingdui. Chengdu: Tiandi Publishing House."

"Sullivan, M. (1999). The Arts of China. University of California Press."

"Taylor, E. (2015). Resilience and Renewal: The Phoenix Motif in Modern Art. International Journal of Art and Culture, 7(2), 85-101."

"Theaster Gates. (2021). Theaster Gates: Amalgam. Gagosian Gallery. Retrieved from Https://Gagosian.Com/Exhibitions/2021/Theaster-Gates-Amalgam/."

"Thompson, A. B. (2021). Mythical Symbols and Contemporary Art: Unveiling the Meaning of the Phoenix. Journal of Modern Art Studies, 28(4), 589-603."

"Thompson, E. L. (2021). Wings of Fire: Depictions of the Phoenix in Contemporary Fantasy Art and Media. Fantasy Art Review, 44(3), 215-232."

"Turner, G. (1996). The Mechanical Gaze: Modernity, Nature, and the Parallel Sciences of Motion. University of California Press."

"Wands, B. (2006). Art of the Digital Age. Thames & Hudson."

"Wang, H., & Liu, X. (2020). A Study on the Teaching Strategies of Chinese Characters in International Chinese Education. Proceedings of the 5th International Conference on Education, Language, Art and Inter-Cultural Communication (Icelaic 2020), 97-101."

"Wang, J. (2007). A Study on the Transmission of Ancient Chinese Civilization in the World. Journal of Sichuan International Studies University, 23(1), 27-32."

"Wang, J., Wang, X., & Ma, M. (2015). Chinese Character Representation and Processing: A Review of Computational Methods. Acm Computing Surveys (Csur), 48(2), 1-32."

"Wang, X., & Liu, Q. (2017). Study on Technology and Application of Chinese Character Input Method. Computer Era, 8, 18-22."

"Wang, Y. (2013). From Wubi 86 to Wubi 98: A Learning-Based Approach. Proceedings of the International Conference on Natural Computation, Fuzzy Systems and Knowledge Discovery (Icnc-Fskd), 3115-3121."

"Wilkinson, R. H. (2003). The Complete Gods and Goddesses of Ancient Egypt. Thames & Hudson."

"Wilson, S. (2013). Information Arts: Intersections of Art, Science, and Technology. Mit Press."

"Yan, S. (2015). Research on the Impact of Chinese Character Laser Phototypesetting on the Printing Industry. Packaging Engineering, 36(11), 89-91."

"Yi, Q. (2017). A Study on the Input and Display Technology of Chinese Characters in Early Computers. Proceedings of the 2017 International Conference on Computer Technology and Management Science, 273-276."

"Zanker, P. (1995). The Power of Images in the Age of Augustus. University of Michigan Press."

"Zhang, X., Wang, C., & Li, Q. (2021). Kinetic Sculpture Design Based on Chinese Characters. In Proceedings of the 5th International Conference on Culture, Education and Economic Development of Modern Society (Iccese 2021) (Pp. 336-339)."

"Zhao, D. (2018). On the Origin and Development of Kinetic Art. Art, 3, 76-77."

"Zheng, J., & Liu, Z. (2018). A Study on the Application of Chinese Characters in Modern Art Design. Art and Design Research, (4), 133-135."

"Zheng, Y. (2020). A Study on the Chinese Character Culture and Modern Art Design. China New Publishing House."

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