Translating Qi Baishi's Flower-and-Bird Paintings into Interactive Images

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Abstract

As exhibitions of digital Chinese painting have grown in number, the production of such large-scale, interactive works has become not only costly but also has had undue influence on the traditional ink form, leading to a loss in the aesthetic value and cultural tradition of the display and transition of Chinese paintings. In this research, which centres on the creative practice of individual artists, I explore how to retain the original style of Chinese paintings as well as the practical methods that can be used to create interactive Chinese paintings and convert them into digital artworks.

Qi Baishi's flower-and-bird paintings, especially those featuring shrimp, have been recognised by academics for their artistic value. Three flower-and-bird paintings by Qi Baishi were selected to create two interactive digital works. The characteristics of Qi Baishi's art were analysed, and the dynamic bases of the depicted objects were studied to identify a reasonable interaction method that would respect traditional aesthetics and retain the unique stylistic value of his craft.

The aesthetic changes in Qi Baishi's flower-and-bird paintings that took place as a result of the media transformation were examined using criteria typically applied to the aesthetic analysis of traditional Chinese paintings. My exploratory practice confirms that it is possible to design interactive media based on digital Chinese paintings. The newly created works have retained the aesthetic characteristics and cultural value found in this art form. The study of Qi Baishi, his flower-and-bird paintings, and object motion rules provided a foundation for the dynamic transformation. Thus, the research methods, theoretical framework, and design process proposed in this thesis provide a model for the future exploration of interactive Chinese paintings.

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Declaration

I declare that this thesis is a presentation of original work, conducted in accordance with the regulations of the University of York, and I am its sole author. This work has not previously been presented for an award at this or any other University and no part of this thesis has been published elsewhere. All sources are acknowledged as References.

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1. Introduction

1.1 Research overview

This PhD. project involves research through creative practice. The research project explores interactive design grounded in the traditional aesthetics of Chinese painting, analyses the feasibility of using various genres of Chinese painting in this design, and discusses aesthetic theory, design theory and process.

This project thereby explores the aesthetics and cultural connotations of traditional Chinese painting as well as the artistic spirit of its practitioners. This body of knowledge was used to consider how best to transform digital Chinese paintings into interactive artworks. By speaking with experts and soliciting their professional feedback at multiple points, I was able to develop my research direction and ideas, conceptualise a research project framework and reflect on the research process and critical comments I had received.

Using digital images of Qi Baishi's flower-and-bird paintings as a starting point, static forms were transformed into dynamic, interactive objects. The aesthetic tradition of the original artworks was preserved, along with the artistic spirit of their creator, making the display of Chinese culture possible through interactive digital media.

As an artist/designer, I formulated templates and made significant findings for future research based on the perspectives, issues, opportunities, and pitfalls that I have discovered through conducting this project. This research project provides research and practical methods for designers and artists exploring the interactive field of digital Chinese painting and offers guidance on the viability of producing future work in this area.

1.2 Research background and motivation

As an artist with bachelor's and master's degrees in Fine Arts, my practice has focused on the feasibility of media transformation. However, in this context, the term "media transformation" does not refer to how media technologies have altered social, cultural, and political processes (Thompson, 1995). Instead, in this project, media transformation describes the movement between artistic forms and materials, such as pivoting from Chinese ink painting to printmaking, converting traditional paper-based paintings into digital form, and transferring digital images into interactive media.

I have studied and developed an understanding of the aesthetic tradition of ink painting. My artworks primarily rely on Chinese culture and historical aesthetics to explore the possibilities of media transformation in Chinese painting. Through this practice, I have discovered different artistic

perspectives and artworks. The inspiration for my research thus originated in the vitality and historical data embedded in traditional Chinese painting.

In 2011, when I obtained my master's degree, I held a solo exhibition at the Art Museum of Hubei Academy of Fine Arts. One of my pieces, *Explaining Art to the World* (Figure 1), was related to traditional culture, media transformation and cultural communication. In this work, the definitions of art in 50 languages from around the world (obtained from Wikipedia) were silkscreened onto A3 (297 mm x 420 mm) Chinese art paper. An explanation of the work was placed alongside it to facilitate the viewer's understanding. Because languages represent a wide range of national cultures, they take on a variety of forms (Figure 2). I unified these diverse cultural symbols by depicting them using a single medium – Chinese art paper and ink – and displaying them through a mode of communication characteristic of Chinese culture, with the ink serving as the background for the characters. This mode of presentation was meant to contribute to their mutual reconfiguration and harmonious development. Wherever the work is displayed, literate viewers can understand at least one of the languages included and therefore comprehend its meaning. However, it is difficult to understand all of the words, which gives rise to an interesting phenomenon: almost everyone can understand some of the words, but almost no one can understand all of them. This is the charm of culture and symbols. Different languages and contents reflect differences between world cultures. Media and symbols are cultural carriers and embody communication, shaping the experiences that inspired *Explaining Art to the World*.

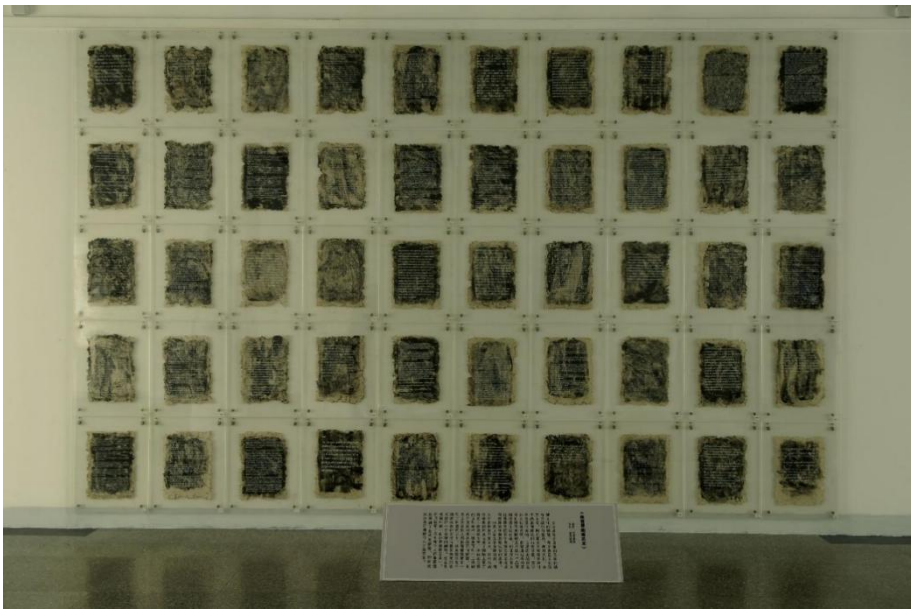


Figure 1. Hao Hong, *Explaining Art to the World*, 2011. Fifty silkscreen prints on Chinese art paper, 480 x 300 cm. Copyright reserved by Hao Hong, exhibition photos by Hubei Academy of Fine Arts Museum.

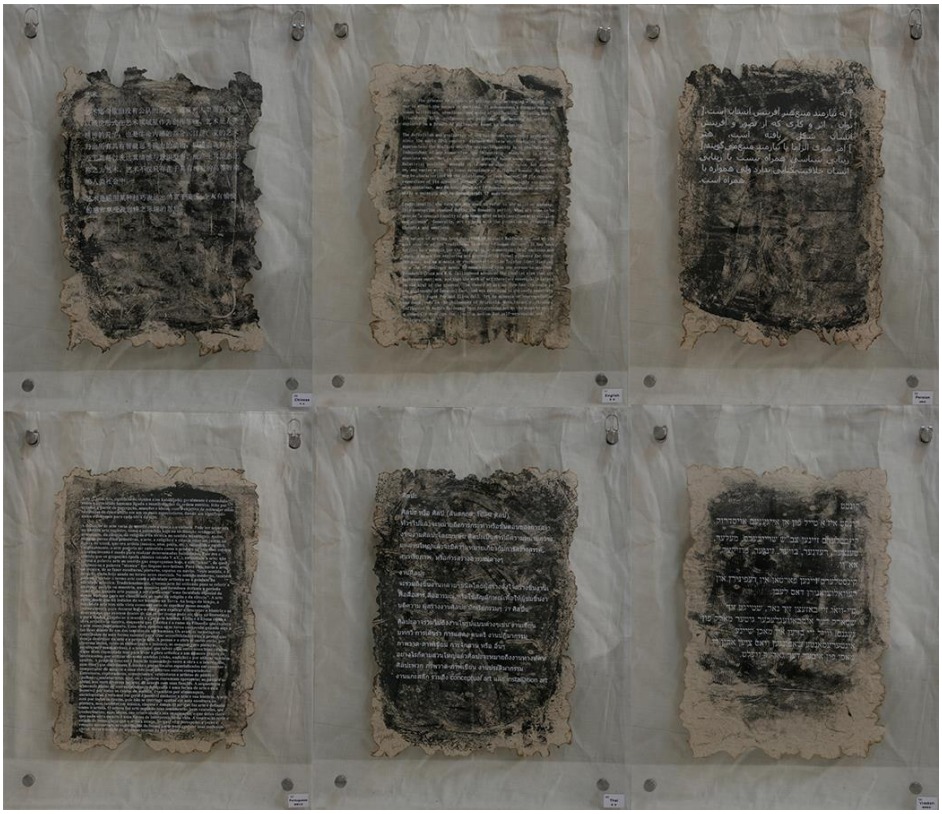


Figure 2. Hao Hong, Detail of *Explaining Art to the World*, Chinese (upper left), English (upper centre), Persian (upper right), Portuguese (lower left), Thai (lower centre), Yiddish (lower right), 2011. Silkscreen prints on Chinese art paper, 48 x 59 cm. Copyright reserved by Hao Hong.

My work demonstrated my passion for researching traditional Chinese culture and aesthetics. I was dedicated to investigating transformations of media, adept at identifying the fusion of cultural elements, and inspired to showcase and discuss traditional Chinese culture in the context of global patterns. Traditional Chinese culture has influenced my life and growth, becoming deeply ingrained in my soul. As Chinese scholar and writer Wang (1985) observed, "Chinese people are inevitably influenced by traditional Chinese culture and thought, and once immersed in a particular culture, the tradition cannot be eliminated."

Given the fast pace of contemporary society and the availability of many forms of media, traditional ways of appreciating Chinese paintings are inadequate for disseminating knowledge and understanding about these artworks. Adopting digital technologies will thus promote education about and development of Chinese painting. The integration of science, technology and art promotes artistic evolution and innovations in form. Digital technology in particular provides opportunities for artists to communicate socially and spiritually (Li and Wu, 2018). Traditional Chinese art and culture need to be combined with modern digital technology for effective diffusion.

This project therefore aims to explore possibilities and research perspectives based in the amalgamation of traditional Chinese culture and interactive media, as grounded in my previous experience and

skillsets. Having acquired knowledge and skills in interactive media, I conceived the topic of this project: an exploration of interactive Chinese painting from the perspective of traditional Chinese aesthetics and culture. This project was designed to leverage digital image design and interactive technology to bring digitised Chinese paintings and Chinese culture to modern audiences while retaining the effects conveyed by traditional forms. The research framework focused on a practical exploration of the media transformation of Chinese painting to devise a method of transformation that would retain the characteristics of Chinese culture and aesthetic tradition.

1.3 Research questions and aims

With the aim of preserving the traditional aesthetic style of Chinese paintings, this project transforms images of these artworks into interactive digital media, causing the static objects depicted in the paintings to become dynamic. The actions of the audience will trigger this dynamism, causing the depicted objects to move in a manner that conforms with the laws of physical motion.

The research examines whether the movement of depicted objects within a historical context violates Chinese moral and ethical standards, presents a practicable method for transforming the Chinese painting genre into interactive media, analyses the aesthetic characteristics of works by Chinese artists and explores media transformation methods combining aesthetic features and interactive technologies. The research project addressed two main questions:

• How can Chinese paintings be made dynamic and interactive while preserving the aesthetic tradition in which they participate?

To answer this question, I examined how the traditional form of Chinese painting could be preserved by identifying its characteristics, analysing the artistic style and pursuit of Qi Baishi and designing the motion graphics and media transformation accordingly.

• How can Chinese cultural elements be embodied by the interactive design of objects in digital Chinese paintings?

To answer this question, I explored how certain elements representative of Chinese culture could be integrated into the interactive design in a way that preserved their traditional aesthetic form.

1.4 Thesis outline

Chapter 2 introduces artistic transcription and appropriation of media and themes, a common phenomenon in artistic creation. It provides a review of existing research on media transformation in Chinese painting, including preservation and re-creation of aesthetic traditions and critiques of

traditional art forms. It identifies directions for future research and aspects of previous research to be emulated or avoided. This chapter defines the key terms “Chinese painting” and “Chinese culture”. It elucidates the Chinese aesthetic tradition that this project seeks to preserve as well as the significance of retaining the aesthetics of Chinese painting and ink brushwork. The chapter also delves into the art form’s historical status and connection to the traditional philosophy of Xie He’s “Six Laws” (谢赫六法). I also analyse the genres of Chinese painting within a historical context for dynamic displacement.

Chapter 3, which outlines the project’s methodology, introduces the research methods derived from practice and establishes the research process outline and design steps. It includes the historical context analysis and employs Xie He’s “Six Laws” to guide and assess practice. Research through design (RtD) is the main method used to answer research questions. The design methods include the use of motion graphics and interface design. Additionally, this chapter presents the chronology of data collection from experts’ interviews and comments. Thematic analysis is the method used to analyse the data, while self-reflection is the approach employed for iterative development process.

Chapter 4 introduces the themes, style and aesthetic pursuits of renowned Chinese artist Qi Baishi. It presents a detailed study of Qi Baishi’s shrimp, mantis, and cicada-themed paintings, the body of work from which three paintings were selected for dynamic and interactive practice.

Chapter 5 provides a detailed account of the production process and the software and tools used in the artwork *Two Movable Shrimps*. It also discusses the object motion methods and the interactive and narrative logic deployed in the two practice works, *Two Movable Shrimps* and *Mantis Catching Cicada*.

Chapter 6 employs Xie He’s “Six Laws” to evaluate the critical aesthetic changes that occur before and after the media transformation of *Two Movable Shrimps* and how *Mantis Catching Cicada* uses the storytelling with space of proverbs to reflect Chinese culture. The chapter discusses changes brought about by interactive media for traditional Chinese painting and deliberates on the intended destinations and display methods for the exhibition, along with the role of text and sound. Finally, I reflected on the experts’ comments by the method of thematic analysis.

Chapter 7 summarises the design considerations and guidelines and reflects on the methodology and design techniques employed in the project. It concludes the limitations and inconclusive findings of this research project. Based on these limitations, it presents potential directions for further research.

2. Exploration of the Reproduction of Chinese Painting

2.1 Introduction

Artistic transcription and appropriation are commonly used techniques, as artists often incorporate their own style and ideas into previous painting genres and classic illustrations. The transformation I performed by transferring images of Chinese paintings into interactive media was inspired by this tendency.

I divided my predecessors' exploration into four aspects: algorithm design, interactive and dynamic digital Chinese painting, critical tradition, and critical ink painting. Through the algorithm design, I summarised how researchers have analysed the aesthetic characteristics of Chinese painting and developed forms of display. I also teased out how works of art developed by national art museums and artists bring audiences into the historical context of the artworks and encourage them to interact cognitively and physically with the pictures. A vivid, dynamic version of a long scroll Chinese painting (Animated version of *Along the River During the Qingming Festival*) has attracted many viewers and showed that the ink style of Chinese painting can be transformed by using digital techniques. Admittedly, the works of some artists diverges from, and even resists, historical traditions. Their art is significantly different from the works I created in this project. Under the influence of art world trends, many other scholars have also discussed Chinese and Western art and philosophy. By analysing their views, I have clearly expounded my own artistic philosophy.

This chapter discusses the aesthetic traditions of Chinese painting. Understanding these traditions requires an analysis of the ink and brushwork of the painting genre itself as well as its theoretical underpinnings. I discuss the cultural connotations of Chinese painting, styles of ink brushwork, and the relationship between traditional aesthetic evaluation methods and broader Chinese cultural philosophy. The discussion is to provide a basis for design practice and aesthetic discussion.

Making depicted objects based on Chinese paintings dynamic will change their positions. Based on my historical and philosophical analysis, not all genres of Chinese painting can be put into motion. If historical context is disregarded, the works would deviate from the Chinese aesthetic tradition, which is not the intention of this project. Therefore, out of respect for traditional Chinese philosophy and morality, this chapter analyses which genres of Chinese painting are suitable for dynamic displacement.

2.2 Fine art transcription and appropriation

Artistic transcription and appropriation are approaches widely used by contemporary artists. Nowadays, many classical masterpieces have been adapted through digital transcription of images for the creation of secondary art pieces (Ma and Chen, 2015). Artists have re-presented numerous classical images and

cultural characters, endowing them with new meaning and ideas. In a conceptual sense, these artworks can be considered derivative works or reproductions. They are not, however, forgeries of previous artists' creations. Irvini (2005) believed that forgers tend to turn art into instruments for personal gain, while, conversely, artists create their works to consider and contribute to the world.

Crowther (2008) asserted that physical characteristics tend to limit the development of novel structural features in paintings. Arguably, artistic creativity lies in devising innovative ways to employ existing media rather than exploring the structural features of paintings. Bolter and Grusin (2000) claimed that the relationship between different forms of media consists not only in the application of one medium to another but in borrowing, merging or presenting different media alongside one another. They also referred to the transfer of one medium into another as "remediation" and considered it one of the defining characteristics of digital media. They identified the crucial role of borrowing and the ways in which new media supplement older formats. Presumably, the new medium has merely "borrowed" content from the old. Indeed, McLuhan (1964) contended that "the *content* of any medium was always another medium". For example, the content of a book is writing and the content of writing is words; words are the content of printing and printing becomes the content of a book (McLuhan, 1964). It can be seen from this example that a medium is the content bearer of the medium that precedes it; one medium is transferred to the next, which in turn borrows its content. My practice thus utilises interactive media to borrow the image content of Chinese paintings in a complex way, ultimately presenting them as digital artworks.

In *Sleeping Venus* (Figure 3a), Giorgione, a renowned Venetian painter, combines natural elements with human figures. This work expanded on the motif of Venus resting in a pastoral landscape, inspiring subsequent artists (Meiss, 1966). Titian's Venus of Urbino (Figure 3b) is likewise a famous reinterpretation of the Venus myth. However, rather than functioning as a symbol of sensual beauty, the Venus motif in this painting came to be seen as an allegory of marital love (Grabski, 1999). In Manet's *Olympia* (Figure 3c), the dog and the female figure of the *Venus of Urbino* are replaced by a black cat and a servant. In the 19th century, Édouard Manet famously subverted the image of the beautiful Venus, which had long served as a traditional subject of academic art. His style of painting differed from that of earlier artists; using more intense colour contrasts and more distinct contour lines, he depicted figures without shadows, relying instead on planes of colour. Moreover, Manet placed the figure of Olympia in a modern bedroom instead of a pastoral landscape and imbued her with the qualities of a prostitute, giving her the direct, unapologetic gaze of a sex worker being offered a bouquet of flowers (Brody, 2001). Manet's *Olympia* therefore stood in stark contrast to traditional academic artworks of its time. In 1988, Yasumasa Morimura, a contemporary Japanese artist, transformed the image of Manet's model into himself dressed as a woman (Figure 3d) staring openly at the audience. The maid in the background was also changed to have the facial features of a Japanese person. The

symbolism of Western art history was thus reinterpreted through an Asian lens (Exley, 2013). The medium of oil painting was transformed into the format of a staged photograph. This is only one example of how artists have adapted and repurposed earlier works throughout the history of art. Many modern and postmodern artists continually subvert their predecessors, even changing art forms and media, making art more diverse as a result.

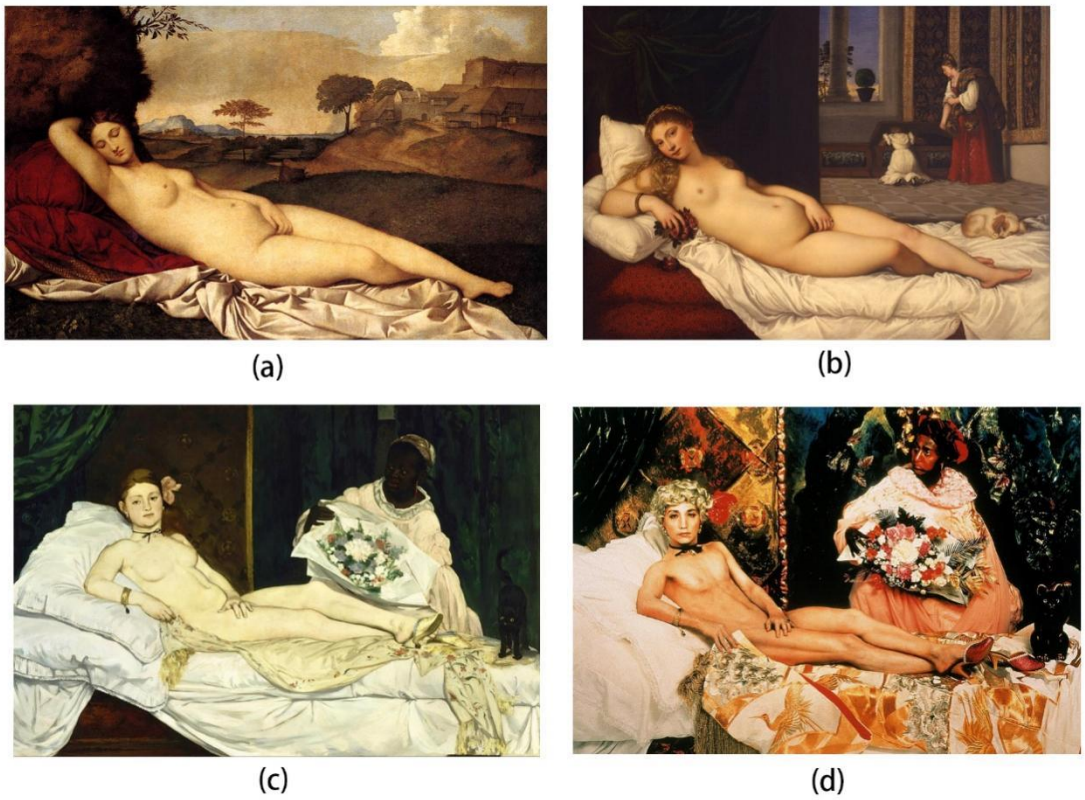


Figure 3. Artistic transcription and appropriation of Venus theme

(a) Giorgione, *Sleeping Venus*, 1510. Oil on canvas, 108x175cm. Web Gallery of Art, source: https://www.wga.hu/html_m/g/giorgion/various/venus.html.

(b) Titian Vecelli, *Venus of Urbino*, 1538. Oil on canvas, 119x165cm. Web Gallery of Art, source: https://www.wga.hu/frames-e.html?/html/t/tiziano/08/08urbin.html.

(c) Eduoard Manet, *Olympia*, 1863. Oil on canvas, 130x191cm. Musee d'Orsay, source: http://www.musee-orsay.fr/en/artworks/olympia-712.

(d) Yasumasa Morimura, *Portrait (Futago)*, 1988. Colour photograph, 82x118 inches. Copyright: Yasumasa Morimura, source: https://www.sartle.com/artwork/portrait-fugato-yasumasa-morimura.

Like Morimura, Chinese painter Zeng Fanzhi is an Asian artist who has adapted classic Western paintings, incorporating his own artistic concepts and style. Zeng transcribed Eugène Delacroix's *Liberty Leading the People* (Figure 4a) into his own artwork, *From 1830 till now No.4* (Figure 4b), which was exhibited alongside the original painting at the Musée du Louvre in Paris (Figure 4c). Zeng depicted the figure of Liberty as a neglected monument in a thicket of overgrown weeds (Gagosian

Gallery, 2015). The simultaneous display of modern artists' distinctive pieces and historical masterpieces in well-known museums provides a new perspective for the display of art.

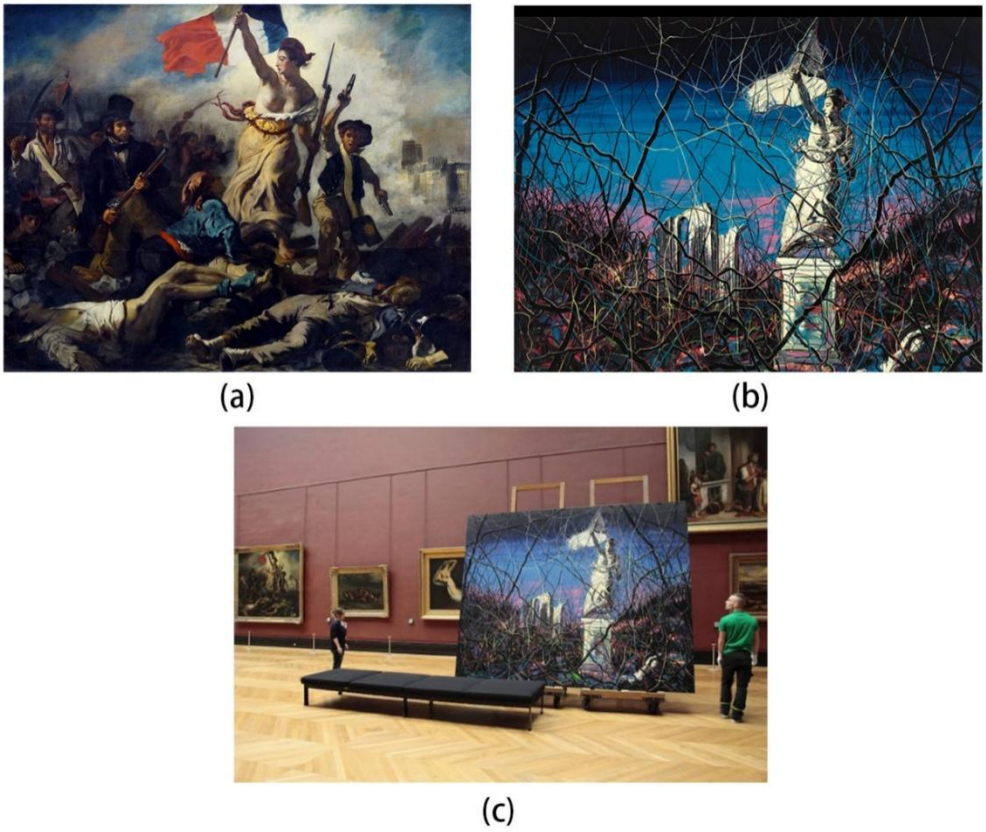


Figure 4. Chinese artist Zheng Fanzhi

(a) Eugène Delacroix, *Liberty leading the people*, 1830. Oil on canvas, 260 x 325cm. Musée du Louvre, source: https://smarthistory.org/delacroix-liberty-leading-the-people.

(b) Zeng Fanzhi, *From 1830 till now No.4*, 2014. Oil on canvas, 297 x 370cm. Shangh ART, source: https://shanghartgallery.com/galleryarchive/simpleWork.htm?workId=21519.

(c) Mounting Zeng Fanzhi's *From 1830 till Now* in the Louvre. Musée du Louvre, source: https://news.artnet.com/art-world/zeng-fanzhi-and-delacroix-face-off-at-the-louvre-141706.

The transcription and appropriation of art can bring about ground-breaking changes to its style and the presentation of its subject matter and can also alter viewers' preconceptions about the classical artworks found within exhibition spaces, provoking a sense of collision between modern and traditional art. Artistic transcription and appropriation are widely used and explored by artists and provide the foundation for the following discussion of the media transformation of Chinese painting.

2.3 Media transformation of Chinese Painting

2.3.1 Digital Chinese painting by algorithm design

Some scholars are currently using algorithm-based design and research to change the way that traditional Chinese paintings are viewed and appreciated. Algorithm-based design cannot be considered

an appropriation of art, as it fosters technological development rather than artistic creation. However, it still participates in the medial transformation of Chinese painting.

Li and Wang (2004) have developed an algorithmic model for image analysis that can be used in artificial intelligence training. The characteristics of different types of brushstrokes and brush shading can be analysed to help researchers compare and classify paintings. Their study could help identify the unique characteristics of, and similarities between, complex images. Both the classification of artworks and the comparison of the characteristics of different paintings by a single artist are important components of aesthetic analysis. Unlike the authors of this research project, who analysed images algorithmically, I examine the aesthetic features of paintings from the perspective of their creators' emotional states and culture.

Chu and Tai (2001) have presented a method for panoramically displaying Chinese paintings. Using their technique, Tour into the Picture (TIP), two-dimensional paintings are viewed from multiple perspectives but retain the aesthetic qualities of the originals. Horry et al. (1997) first proposed the TIP method in 1997, applying it to Western paintings. By dividing the objects in the painting into front, middle and back sections to determine the viewing angle needed to switch between them, audiences were given the illusion of being placed inside the picture.

Using an algorithm that mapped depth in paintings, Ma et al. (2011) produced binocular stereo images of traditional Chinese paintings. This image-processing algorithm was used to isolate shadowed surfaces such that the paintings could be viewed through red-cyan glasses. However, modifications would need to be made to convey the full aesthetic quality of Chinese paintings. The results achieved by this algorithm are shown in Figure 5, which displays (a) the original image of the Chinese painting, (b) the depth map generated by the algorithm and (c) the diagram on two levels viewed through glasses. According to the Figure 5 in the Ma et al.'s literature, it is difficult to experience the impact of the stereoscopic images.

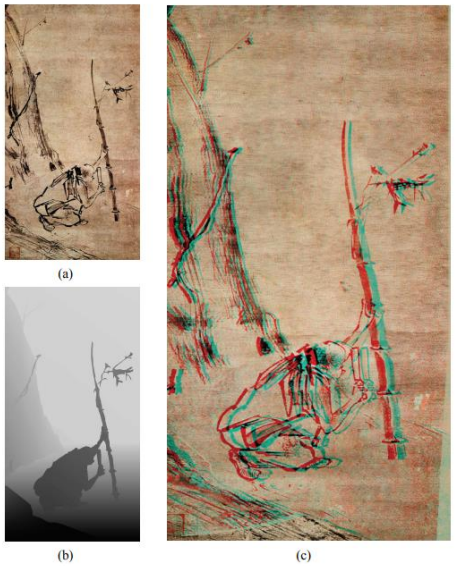


Figure 5. Wei Ma et al., Binocular stereo images of traditional Chinese paintings. (a) Liang Kai (Song Dynasty), *Six Chan Patriarch Chopping Bamboo*, early 13th century. Hanging scroll, 73 x 31.8cm. Tokyo National Museum. (b) depth map; (c) anaglyph. This picture is published in *Binocular stereopsis of traditional Chinese paintings*.

Wang et al. (2019) have created an interactive image of a famous, multi-figure Chinese scroll painting. This allowed the audience to enter scenes that were illustrated in the long scroll. They could also activate the viewing area using a handle, enjoying the work in an exploratory manner. However, two problems are inherent to this practice. First, Wang et al. added shadows to the figures – shadows that did not exist in the original painting – to make the picture plane appear three-dimensional. This altered the original ink and brush style, causing the audience to appreciate the three-dimensional modelling of the traditional figures, rather than the original painting itself. Thus, it could be argued that the Chinese artistic spirit found in the painting was dimmed by the modelling. Second, although the exploratory viewing mode proposed in the research project might have aroused the audience's curiosity about and interest in Chinese paintings, this was not demonstrated in detail in the authors' thesis.

Hsieh et al. (2013) designed an interactive desktop, which was made available to viewers so that they could obtain information about paintings, such as the date, style and name of the artist (Figure 6). The use of science in museal displays of paintings might expand viewers' knowledge about Chinese art, but this particular mode of interactive design is unlikely to evoke surprise and wonder in the audience.

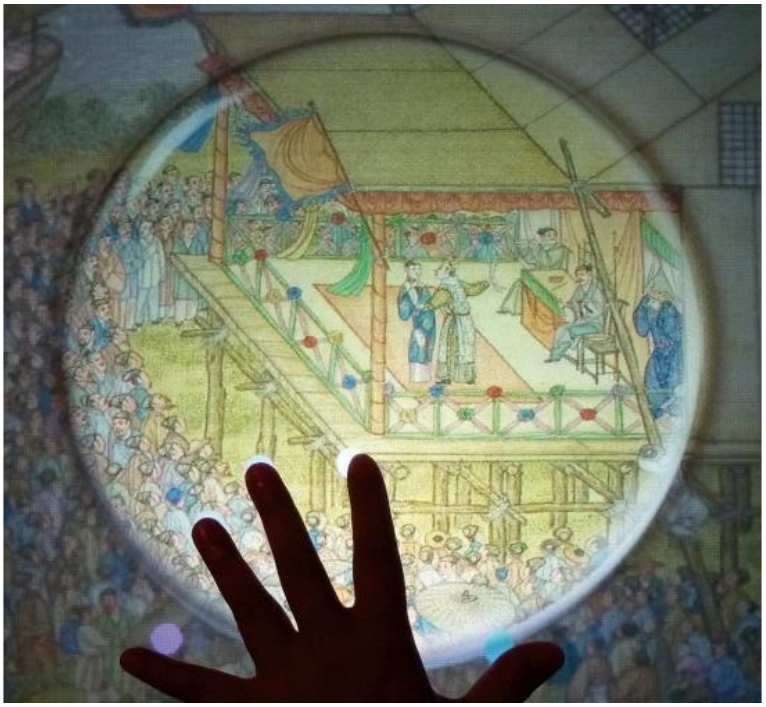


Figure 6. Hsieh et al., Magnification showing the details of the theatrical performance depicted in *Along the River during the Ching Ming Festival*, 2013. Interactive desktop installation. This image is published in *Viewing Chinese art on an interactive tabletop*.

2.3.2 Artworks containing interactive and dynamic digital Chinese painting

The Palace Museum in Beijing has spent two years refining an application version of the *Han Xizai Evening Banquet* (Figure 7), making it interactive, adding rich media content and academic materials and engaging in participatory research and development. Gu Hongzhong, a famous court painter during the Southern Tang Dynasty, snuck into the residence of Han Xizai, an important minister of the Southern Court, and created this masterpiece of ancient figure painting (Palace Museum, 2021). During the COVID-19 pandemic, the Palace Museum was closed to visitors and viewers could not see the original paintings. Therefore, the mobile application of *Han Xizai Evening Banquet Map* was developed by the museum in 2021 to meet the needs of ordinary people, helping them to recognise, learn about, and appreciate Chinese paintings. As shown in the mobile phone screenshot in Figure 7, the entire work (in the form of a long scroll) can be enjoyed by swiping from left to right. For users' convenience, the screen is subdivided into multiple sections. When a user clicks on any part of the screen, the element of the picture they select will be enlarged and everything surrounding it will darken (Figure 8). The experience becomes more immersive than the image shown in Figure 7 and may therefore better elicit the user's intellectual interest in painting. Figure 8a shows a group of figures that include Han Xizai, the protagonist of the picture. When the icon in Figure 8a (the icon is the name of the object in the picture) is clicked, a corresponding textual explanation of the object appears (Figure 8b and 8c). More information about almost every object in the picture can be obtained by users in this way. Additionally,

three clickable icons are situated below the image (as shown in Figure 7). If the icon on the left is selected, a detailed explanation of the relationship between each group of figures in the painting will appear on the screen (Figure 9a). While clicking within the image provides information about specific pictorial elements, this function promotes a more global understanding of the painting. Clicking the middle button beneath the painting generates the option of watching a video (Figure 9b1). In the videos, experts provide detailed explanations of the historical and aesthetic value of the painting (Figure 9b2). The icon on the right highlights the lifestyles, entertainment, clothing, and activities of historical people like those found in the scroll (Figure 9c1 and 9c2). This function provides viewers with vivid pictures of traditional cultural forms and modes of leisure.

Figure 7. Mobile phone screenshot of the *Han Xizai Evening Banquet Map*, 2021. The Palace Museum, Source: https://www.dpm.org.cn/Creative.html#app.

Figure 8. Screenshots from the *Han Xizai Evening Banquet Map*, (a) image index, (b, c) textual explanations of people and objects.

Figure 9. The *Han Xizai Evening Banquet Map* after interaction with the icons, (a) an example of left icon interaction, (b) examples of middle icon interaction, (c) examples of right icon interaction.

The downloadable application developed and disseminated by the Palace Museum leveraged the speed and interactivity of the mobile phone format, enabling the audience not only to appreciate a Chinese painting but also to learn about traditional aesthetics and historical culture through text, sound and videos.

Dwelling in the Fuchun Mountains (Figure 10) is a famous painting created by Chinese artist Huang Gongwang during the Yuan Dynasty. It occupies a central position in the history of Chinese art and has great political significance. A new media art exhibition inspired by this work was mounted by Taiwanese artist Lin Junting at the National Palace Museum in Taipei. (Figure 10 is a screenshot of painting collections housed in The National Palace Museum.) Five artworks by Lin Junting, including *Picturesque Landscape* (Figure 11), were displayed in the exhibition. The presentation of this work particularly captured my attention because its interactive features came alive when sound triggered a motion graphic, as if the sound had caused the image to change. Lin based the interactive motion graphic on *Dwelling in the Fuchun Mountains*, preserving the aesthetic qualities of the original. His process was thus very similar to my own. To interact with the digital *Dwelling in the Fuchun Mountains*, viewers could simply speak loudly in its direction (Figure 11a), setting off the motion graphic. Following this action, the fisherman in the painting would wave to the viewer (Figure 11b) and then return to fishing (Figure 11c). The entire sequence took place in only a few seconds. The appearance of the fisherman in the motion graphic was almost identical to that of the figure in the original painting.

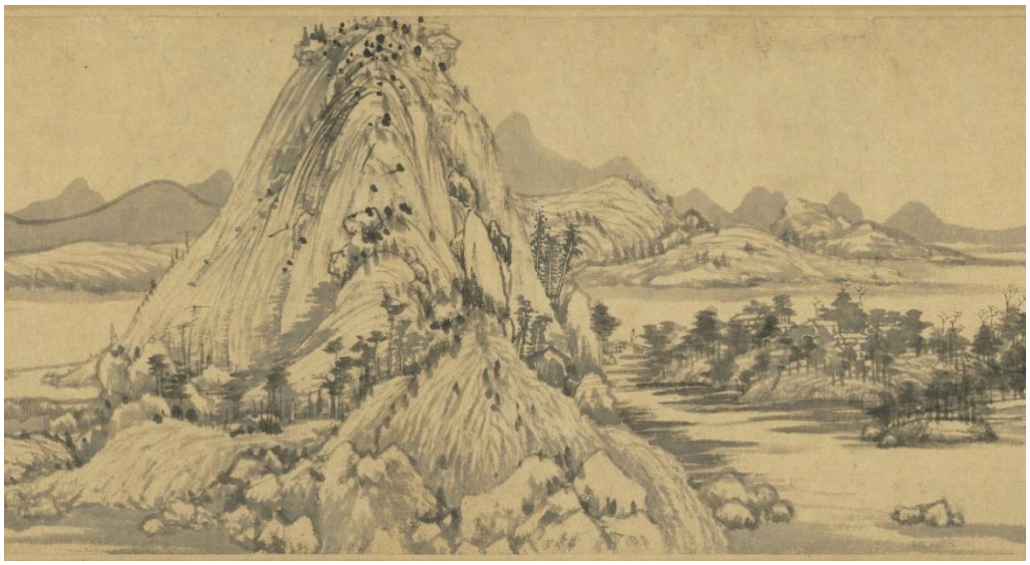


Figure 10. Huang Gongwang (Yuan Dynasty), *Dwelling in the Fuchun Mountains*, 1347-1350. Ink wash painting, 33 x 690cm. The National Palace Museum, Taipei, source: https://theme.npm.edu.tw/selection/Article.aspx?sNo=04000975.

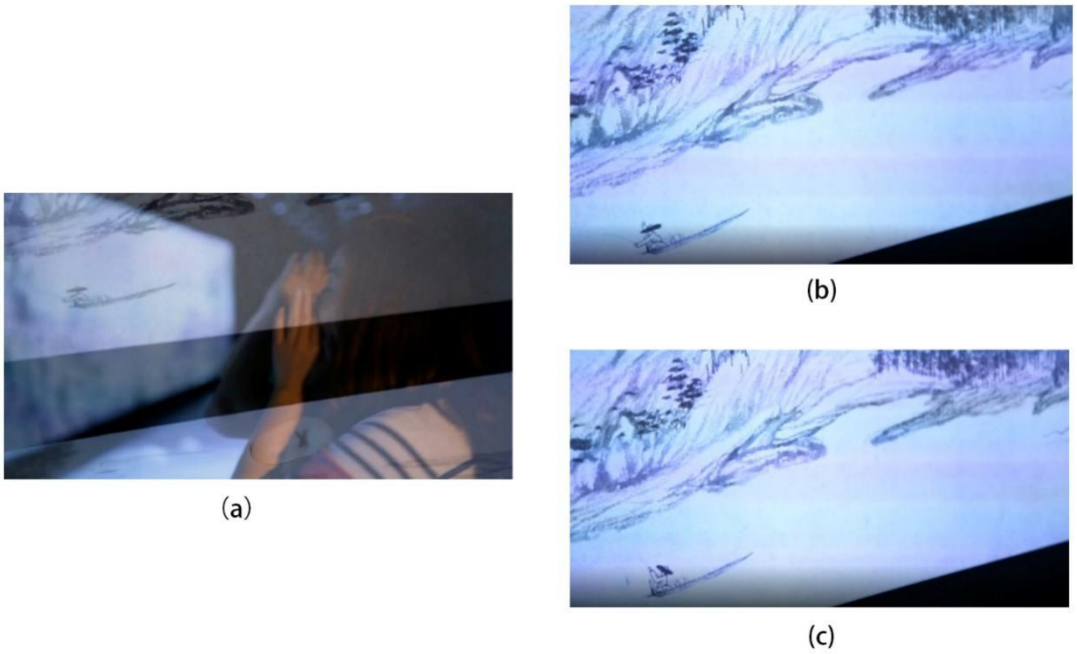


Figure 11. Lin Junting, *Picturesque Landscape*, 2011. Interactive visual projection. Copyright: Lin Junting, source: https://m.manamana.net/video/detail/277#!zh.

Another digital painting that has been exhibited in a museum context, *A Panorama of Rivers and Mountains*, offered a live experience. The exhibition centred around an immersive experience, which was produced through interactive design. *A Panorama of Rivers and Mountains* (Figure 12) is the only surviving work of Wang Ximeng, an artist who was active during the Northern Song Dynasty. It is the finest known example of monumentally scaled Chinese landscape painting, with a colour palette dominated by azurite blue and malachite green. The immersive mapping of *A Panorama of Rivers and Mountains* (Figure 13a), created by Singularity Art Technology (2018), was exhibited as a three-dimensional painting. This display was produced by using computer software to convert the two-dimensional brushstrokes of the original painting into a three-dimensional model of points, lines and planes. The three-dimensional version captured the undulating mountains portrayed in the original painting as well as all of the bridges and houses. It was played as a three-dimensional animation on three projection screens, surrounding the viewer on multiple sides. A visitor could walk into the work to interact with it, touching the wall to see an animated image of a flying crane (Figure 13b). The images of cranes created by the designers appeared every time the wall was touched, then disappeared. The images fit into the overall atmosphere of the painting but were not originally part of it, and thus did not form part of the media transformation. Singularity Art Technology remodelled the relevant object and made animated videos as a participatory element that can be triggered by the actions of the viewers. Such interactive design is common but detracts from the aesthetic value of the original painting.

Figure 12. Wang Ximeng (Song Dynasty), *A Panorama of Rivers and Mountains*, 1113. Filling colour on silk scroll, 52 x 1192cm. The Palace Museum, source: https://www.dpm.org.cn/collection/paint/228354.html?hl=%E4%B8%87%E9%87%8C%E6%B1%9F%E5%B1%B1.

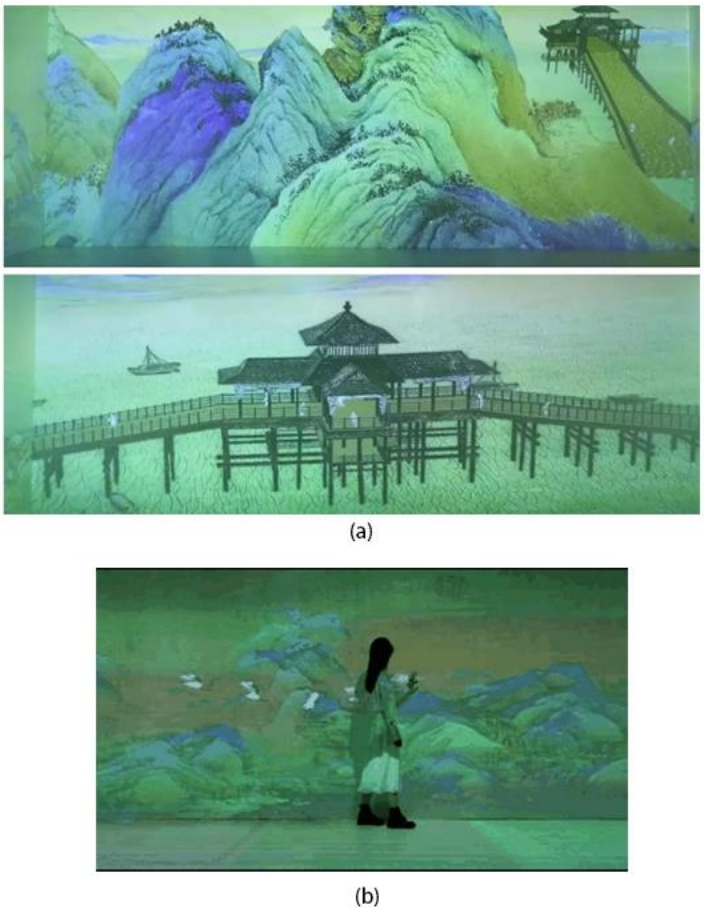


Figure 13. Singularity Art Technology, Immersive mapping of *A Panorama of Rivers and Mountains*, 2018. Interactive visual projection. Copyright: MANA, source: https://www.manamana.net/video/detail?id=3628#!zh.

At the Shanghai World Expo 2010, the animated version of the painting *Along the River During the Qingming Festival* made by Crystal Stone Media (Figure 14) was unveiled. At 130 metres long and 6.5

metres high, it is nearly 30 times larger than the original painting (China Travel, 2021). The original version of *Along the River During the Qingming Festival* (Figure 15), which was created by the Song Dynasty painter Zhang Zeduan, captured the daily life of the people and the landscape of the capital, Bianjing (present-day Kaifeng in Henan Province), during the Northern Song period (Chen, 2010). This painting has great aesthetic, cultural and historical value in the history of Chinese art. Appropriately, a three-dimensional animated version of the work was exhibited in the Chinese Pavilion during the Shanghai Expo. In the animated version, media transformation once again made it possible to break through the static boundaries of traditional Chinese painting. An analysis of the design suggests that the painting's characters and scenes were digitised with the aim of preserving the aesthetic appeal of the original. The new and dynamic image that resulted integrated independent storylines, welcoming the viewers into a dreamlike Northern Song Dynasty and offering a markedly different experience from that of viewing static images (Ouyang, 2019).

Figure 14. Crystal Stone Media, Animated version of *Along the River During the Qingming Festival*, 2010. Projection, 130 x 6.5m. BBC News Chinese, source: https://www.bbc.com/zhongwen/trad/multimedia/2010/11/101111_gal_hk_riverside_scene.

Figure 15. Zhang Zeduan (Song Dynasty), *Along the River During the Qingming Festival*, 1085-1145. Filling colour on silk scroll, 25 x 529cm. The Palace Museum, source: https://www.dpm.org.cn/collection/paint/228226.html.

Crystal Digital Technology Co., Ltd., a leading digital animation company in China, developed this version of the object. Starting from the original painting, as provided by the Palace Museum, the company's technical team scanned the work to create a digital image, segmenting it, refining each animated character, and separating static (buildings, trees, bridges, etc.) and dynamic elements (humans, animals, boats, etc.) (Hu and Liu, 2010). Three-dimensional character models were made that reflected the relative scale of those figures in Zhang Zeduan's painting. Soliciting advice from historical experts, the team also conducted systematic research on the characters' costumes and hairstyles, as well as the architecture, street layout, and other details. They not only reproduced the original appearance of the painting but also created an animated narrative for the characters based on this research. For example, the team incorporated relationships between the characters into their storylines and specified their travel routes and behaviours so that viewers could imagine what the figures were doing (e.g. going out for shopping or returning from the market). In this way, the intentions of Zhang were highlighted. Images from different parts of the painting were integrated into a complete three-dimensional animated scene that was based on the sequences of time and space found in the original painting.

In addition to the interactive and animated media transformation of Chinese painting, some artists simulate the ink painting style by collaging photographic images. Chinese artist Yang Yongliang photographs the architecture of modern industrial cities in a manner inspired by Chinese landscape painting. He thereby mixes traditional Chinese painting with modern elements. The visual language of traditional Chinese painting is used in his digital works which serve as reflections on the modern process of urbanisation. One such work using this method is *Artificial Wonderland 2 – Travellers Amid Mountains and Streams* (Figure 16), which Yang produced in 2014. It is based on Fan Kuan's *Travellers Amid Mountains and Streams* (Figure 17), a historically significant Chinese landscape painting. The iconographic similarities between the two works can be recognised immediately despite the differences in medium, as Yang imitates elements of *Cun fa* (皴法), or the texture method, a technique commonly

used in Chinese landscape painting. According to Xu Shen's (1989) *Shuowen Jiezi* (lit. "discussing writing and explaining characters"), the term *Cun* (皴) means chapped or cracked skin. *Cun fa* (皴法) can thus be understood as a type of brushwork used to capture the structure and texture of mountains. According to Gu Zheng (2008), a professor at Fudan University, Yang uses photographs to simulate the texture method in composing a picture. He re-arranges parts of the image to imitate ancient landscape paintings through careful planning and precise digital processing. Thus, his texture method has nothing to do with brushwork. Instead, it has everything to do with media transformation, which is represented in this case by photography, a form of modern technology for producing digitally synthesised images. Yang's works are typically based in the aesthetic style of traditional Chinese painting, effecting a creative medium transformation.

Figure 16 (left). Yang Yongliang, *Artificial Wonderland 2 – Travellers Amid Mountains and Streams*, 2014. Photograph, 200 x 97cm. Copyright: Yang Yongliang, source: https://www.yangyongliang.com.

Figure 17 (right). Fan Kuan (Song Dynasty), *Travellers Amid Mountains and Streams*, late 10th century – early 11th century. Ink wash painting, 206 x 103cm. National Palace Museum, source: https://theme.npm.edu.tw/selection/Article.aspx?sNo=04000959.

2.3.3 Artworks of critical tradition

Other artists have created works that question the tradition of Chinese painting. By doing so, they critically examine the ideas expressed by works made in that mode.

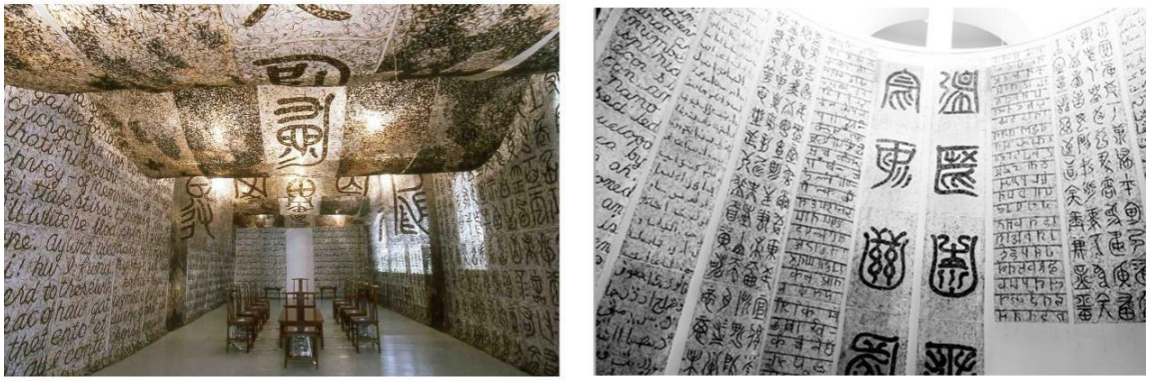
In Yang Yongliang's later works, he did not continue with his meticulous transformation of the texture method into modern photographs. In 2019, he created *The Day of Perpetual Night* (Figure 18), which represented another advance in his exploration of media transformation. Whereas Yang's previous works were photography-based conversions of modern urban landscapes into classic Chinese landscape paintings, *The Day of Perpetual Night* is an original video work that reflects his own ideas and involves the exploration of mediation and conversion in and of themselves. Made using video synthesis technology, this work consists of a monumental, dynamic image rather than a still picture. It thus boldly plays into the possibilities of modern media. The work is grand in stature and replete with details. For example, some of the photographs for the dynamic image were taken in Shanghai, where Yang has long resided, and others were taken in different cities across China.

Figure 18. Yang Yongliang, *The Day of Perpetual Night*, 2019. Video. Copyright: Yang Yongliang, source:https://www.youtube.com/watch?v=BXEjy4dxeVY&list=PLpQznIys8FEgQ9ftgMb0vSC1E5v6hpqr&index=5&ab_channel=PARIS-B.

The work is more an exploration of a Chinese painting style than a conversion of a traditional Chinese painting into another medium. Yang has adopted a different language of painting than the one he used previously, which drew on the style and composition of traditional Chinese painting. In this work, Yang drew inspiration from his surroundings to present an illusory world comprised of processed images, industrial elements, and even some surreal material. (A UFO can be seen in the red box that I drew on Figure 18.) Exotic objects inconsistent with the picture's setting are inserted into the video, which subverts the traditional order of Chinese painting but can also be seen as Yang's means of artistic expression during this period. Viewed from a distance, the work is a beautiful, harmonious "landscape painting" (albeit without the aesthetic attributes of traditional landscape painting); viewed more closely,

however, it is a world of cement, featuring modern industries and well-spaced houses. This modern urban landscape reveals well-designed contrasts between tradition and modernity and between reality and virtuality, as well as elements from classic landscape paintings, although the landscape it represents belongs to a virtual world (Gu, 2008).

Famous Chinese artist Gu Wenda is a typical example of a practitioner who works in critical traditional forms. He specialised in Chinese painting during his postgraduate study at the China Academy of Art. However, he did not continue to use this style in his work. Instead, in the early 1990s, he turned to completely different media seemingly unrelated to Chinese art and culture to explore deeper issues. His controversial series, *The United Nations,* has been exhibited in various forms in many countries and regions (Figure 19). He made extensive use of language in this work. Words rely on written forms of language in different cultures, but words are unreadable and created by artist himself. His artworks were used in a game-like way to encourage people to think of cultural differences instead of emphasising multicultural exchange and interaction (Gu, 2012). However, *The United Nations* had a frightening quality, as Gu replaced the traditional ink medium with the hair of people from different ethnic groups when creating the words. Pasted on transparent colloid suspended in the air, the hair was translucent and resembles ink. Against the background light of the venue, strands of black, dark brown, and golden hair formed abstract patterns similar to the brushstrokes of Chinese painting. Italian critic Monique Sartor (Levin, 1994) suggested that he chose human hair as a medium because it shows people's social status and social roles on a symbolic level and contains legible information about history, society, politics, religion, culture, race and ideology. *The United Nations* series has been displayed in many Western countries and regions since the 1990s, but each exhibition has been different, employing real hair from locals and integrating regional culture and history. Gu highlighted the identities and cultures of each country and region where an exhibition was held by referencing landmark events relating to the location. Gu (2012) hoped that his works are inclusive of different cultures, such that he would not only act a spokesperson for Chinese culture but also have a two-way impact by focusing on the interplay between Chinese culture and Western contemporary art.



(a) (b)

Figure 19. Gu Wenda, The United Nations Series. Installation

(a) *The United Nations Series——The Temple of Heaven, a Chinese monument*, 1998. Collection of the Art Museum of Hong Kong, source: https://www.sohu.com/a/380278064_650774.

(b) *The United Nations Series——The Tower of Babylon of the Millennium*, 1999. Collection of the San Francisco Museum of Modern Art, source: https://zh.unesco.org/courier/2018-4/ru-jia-ren-quan-zhi-dao.

2.3.4 Critical ink paintings

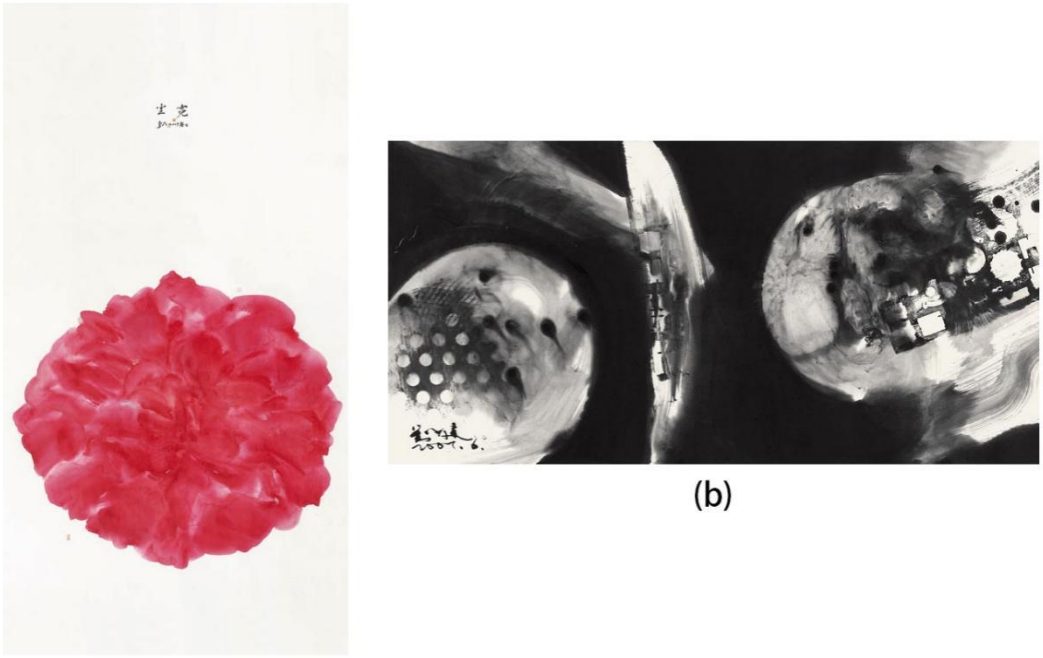
The examples discussed in the previous section, despite drawing on elements of traditional Chinese art, have fundamentally diverged from the materials of traditional Chinese painting. There is yet another group of Chinese artists who still use these materials while not adhering to the traditional aesthetic forms of Chinese painting.

In the 1980s, China's reform and opening up led to an influx of liberal Western ideas and art that influenced Chinese artists. The movement surrounding this development is referred to by critics as 85 New Wave (Wu, 2012; Richard, 2008; Fei and Huang, 2007). Huang Zhuan (2008), a critic and professor from Guangzhou Academy of Fine Arts, viewed 85 New Wave not only as a local visual revolution but also as the signal of a major ideological shift, arguing that its non-mainstream, folk-oriented, and critical nature was essential to the "enlightenment movement" that occurred among Chinese painters in the 1990s.

The arrival of 85 New Wave affected artists such as Gu Wenda, who had previously produced traditional art but later changed their creative trajectories. It not only revolutionised Chinese thought but also prompted reflection in the art world. However, some curators, art historians, and critics voiced wariness about 85 New Wave. Lu Hong (2013), an art historian and director of Shenzhen Art Museum, felt that the anti-traditional and Western cultural strategy enlightened many artists but resulted in serious deracination, causing Chinese contemporary art to gradually lose its native context under modern Western influences. Lu (2013) argued that it is deleterious to refuse to learn from foreign cultures in

the name of preserving tradition – this tendency comes close to constituting a form of fundamentalism – but individuals should not learn to despise themselves and copy foreign cultures wholesale. Lu recommended learning from foreign cultures while maintaining characteristics of one's traditional culture. This suggestion is reasonable, but Lu did not anticipate the way that Chinese art would develop under the influence of this trend. Sun Zhenhua (Lu and Sun, 2003), president of the Shenzhen Sculpture Academy, remarked that 85 New Wave's greatest impact on ink art was elevating the ancient form to an international reference system. He thought that the alignment of Chinese art with trends in international art was generally a positive tendency. He also believed that ink painting can evolve like contemporary culture or be practised traditionally in the manner of Chinese opera and folk crafts; both modes of practice could be meaningful and generative (Lu and Sun, 2003). Lu took the stance that ink painting could either retain its cultural heritage or develop by facing the world and adopting contemporary elements. From Sun's opinion, ink painting could be considered analogous to folk art, which develops cultural forms based on the current situation. In contrast to Lu, Sun stressed the role played by artistic methods and creation. Sun (Lu and Sun, 2003) also asserted that if a painter was not trained in ink painting, he or she could still create works by leveraging the ink, materials, media and ideas of Chinese painting as a resource. What matters is how the painter uses the tool (i.e. ink painting) to create a work that is culturally relevant, naturalistic and imbued with contemporary wisdom. This argument coincides with my own thinking, as well as my previous practice and the concepts mentioned in my literature review. In this thesis, I selected the medium of Chinese painting and combined it with current digital technology to create works with cultural significance.

Against the historical backdrop of the collision of Eastern and Western cultures, Chinese painters began to explore critical ink painting styles. Xu Yongmin, former president of the Hubei Academy of Fine Arts, reconstructed the patterns on lacquerware (Figure 20a). The form of a red flower was suggested by overlapping colour blocks and matching brushstrokes (Lu, 2014). Artists engaged in the exploration of critical ink painting styles regard the medium as a form of spiritual expression that can be developed in the context of traditional Chinese culture through the recombination of materials or drawings expressing their inner worlds (Yin, 2003). Liu Zijian also works in this mode (Figure 20b). He proposed that this artistic path was grounded on the technical operation of the selected medium, with the medium itself merely serving as a material substrate. The medium does not have to dictate artistic norms; rather, being able to freely select and deploy media gives artists an innovative way to represent their rich spiritual worlds (Liu, 1993). Therefore, the material is not only the substance of an artwork but also reflects the artist's spirituality and culture.



(a) (b)

Figure 20. Critical ink painting

(a). Xu Yongmin. *Clouding*, 2008. Ink painting, 136 x 68 cm. National Art Museum of China, source: http://www.namoc.org/xwzx/zt/dqcy/dqcyhnh/xym/201403/t20140316_274593.htm.

(b). Liu Zijian. *Ink Painting Space*, 2007. Ink painting, 68 x 137cm. Copyright: Zhuoke Arts, source: http://auction.zhuokearts.com/art/27466063.shtml.

Various scholars have commented on the similarities and differences between traditional ink painting and the critical ink painting. Lang Shaojun (1994), a researcher at the China National Academy of Painting, believed that the use of ink was important aspect of the traditional language of ink painting and noted that it took a hundred years for the ink idiom to form and mature. Ink language includes two components. One consists of the characteristics and handling of the materials and tools; the other is the effect of the culture on the ink form. The former is related to the material nature of ink painting, while the latter is related to the spiritual tradition of ink painting. Chinese art historian and researcher Liu Xiaochun (1993) pointed out that the soul of modern painting, regardless of its theme, style, and spiritual aims, can only exist in light, colour, points, lines, surface, and aspect, as well as in the conflict and fusion of painting and ink movement. This outlook is in many respects similar to the formal aesthetics emphasised in Western abstract painting. The two viewpoints grew, respectively, from the language of Chinese painting and the abstract language of Western art, reflecting the differences between the traditional and critical ink styles. Like the critical tradition described in the previous section, critical ink painting, which is also non-traditional, has its own proponents and theorists.

Many Chinese painters are following this path of artistic exploration. Lu (2009) expressed concern that it would be difficult to reform ink painting. He felt that it would be challenging for artists to develop

new forms of expression while using the traditional formulas and value system of ink and brush; he also felt that it would be difficult for artists to learn effectively from the experience of modern Western art. At most, artists could make only slight adjustments if they honoured the traditional expressive framework. Artists who tried to reform the traditional formulas and value system of ink and brush, Lu (2009) wrote, might diverge from the foundation on which the system rests. As a result, modern ink artists faced two choices: they could reform symbols, graphs and compositions based on the inherent artistic style or deviate from the inherent artistic style and turn to a new style and outlet. The critical ink painting artists described above chose the first path, whereas Gu Wenda and Yang Yongliang in his later career took the second. Since the reform of Chinese painting has objective and unbreakable constraints, it is unclear whether there exists a third possibility – that suggested by Lu – of changing only the medium used but retaining the tradition. It is a question of the direction in which contemporary culture will develop, as suggested by Sun.

An awareness of the mainstream trajectories of Eastern and Western art clarifies the reasons for the emergence of critical ink painting and helped determine my research direction. The critic Li Xiaoshan (2002), a professor at Nanjing University of the Arts, explained that Chinese painting has traditionally focused on continuity and inheritance rather than experimentation. Experimentation was thus a bold challenge to tradition, especially because it arrived from the West. Traditional aesthetics and universal standards of evaluation in the West were gradually replaced by individualism and revolution over the course of the 20th century. Numerous new styles of art emerged over the course of the century, and many artists earned fame through rebellion and challenges to the status quo. In modern art, stylistic norms are divergent and disunified. A single standard of perfection is no longer the goal. The production of experimental ink painting was catalysed by modern Western art. Artists practising this style aimed at transforming and reforming traditional Chinese painting, much as the pioneering artists of Western modernism wanted to transform art in their own countries (Li, 2002). Under the influence of 85 New Wave, Eastern and Western culture and art were thereby reconsidered in China. The influence of modernism in the 20th century led to many different styles of Western painting, whereas Chinese painting initially focused on the continuation of traditions during the same period. But eventually, 85 New Wave led to the critical ink or experimental ink movement.

The critical ink painting form came into being at a specific moment in history. It led to shifts in the collective understanding about the development of ink painting, triggering a discussion of artistic and cultural conflicts between East and West that has clarified my research objectives and encouraged me to explore the concepts and significance of practitioners who have followed different paths. My own artistic purpose is to connect people with traditional Chinese culture rather than reflect on and question it. Therefore, I have focused my research on mainstream Chinese painting while adopting some new

ideas based on historical ideas and forms. This trajectory informs my transformation of Chinese painting into other forms of media.

2.3.5 Conclusion

The aforementioned examples of artistic transcription and appropriation demonstrate that Western painting also has a history of transforming artistic genres and media. European artists, as well as their Japanese and Chinese counterparts, recreate forms within the oil painting genre, demonstrating that this mode of artistic creation is not dependent on regionality. Artistic transformation is very common, and art exhibitions can also change people's general perceptions about media.

The application version of the *Han Xizai Evening Banquet* developed by the Palace Museum is highly relevant in this context. It uses mobile terminals to provide information about Chinese painting and culture, enabling users to better understand the history and culture of Chinese painting. However, the painting itself, as displayed in the application, retains static rather than dynamic figures. It functions in essentially the same way as a scientific exhibition, acts in alignment with the typical operations of the Palace Museum, and is not enriched by the ideas of designers. In contrast, *Picturesque Landscape* by Lin Junting, has adopted interaction and audience participation to convey the aesthetic style and fascinations of a traditional Chinese painting. Lin's ideas are worth learning from, but the interaction in the work involves only a very small fisherman, an insignificant figure in the grand scheme of the painting. The immersive mapping of *A Panorama of Rivers and Mountains*, another digital artwork drawing on a traditional Chinese painting, was redesigned to convey three, rather than two, dimensions. Although the simulated three-dimensional scene was close enough to the original to be recognisable, the charm of the original's brushwork vanished, and the animation triggered by visitor interaction did not represent elements from the original painting.

Chinese painting is at once two-dimensional and static, but the animated version of *Along the River During the Qingming Festival* changed that by animating the figures from the original painting. The audience could enjoy the representation of ancient Chinese society presented in the scene. The exhibition of this work in the China Pavilion at the World Expo attracted many viewers and vividly presented Chinese painting. This dynamic form of expression is worth learning from. Nevertheless, it is unfortunate that the work did not include interactive components to attract audience participation. Moreover, the original work, including its lighting, was redesigned to allow the inclusion of three-dimensional animated characters, making the digital picture somewhat different from the original. Another artist, Yang Yongliang, aesthetically analysed the texturing method of brush and ink painting and created modern versions of famous paintings. His novel forms have established his fame in the art

world. As these examples demonstrate, every designer and artist must consider how to use tradition in conveying their artistic ideas.

However, some of the artists discussed do not follow the aesthetic formulas of traditional Chinese painting. Yang Yongliang's later works derive from this art form but depict a world of industrial illusions disconnected from the traditional aesthetic formulas. Artists are also constantly growing and thinking. It is not unusual for an artist to both take advantage of tradition and break away from it. Gu Wenda's work focuses on cultural and national conflicts, diverging from traditional culture and aesthetics. However, as Cheng (1987) noted, Gu's art is comparatively obscure, so following his example would go against my primary aim of encouraging a broader appreciation of Chinese painting and culture.

Historical and cultural background led to the emergence of the critical ink style. The arrival of 85 New Wave from more than 30 years ago influenced the development of critical ink painting and affirmed the value of the new form in art historical narratives. Exploring the developmental patterns of Eastern and Western art clarified my research objectives and questions and allowed me to distinguish my practice from those of artists who produced experimental works in the critical ink style. I chose to follow the mainstream path of Chinese painting, but this does not mean perpetuating traditional formulas without questioning them, as Sun (Lu and Sun, 2003) remarked about contemporary, culturally targeted, and realistic works. By taking this path, I was able to address Lu's (Lu and Sun, 2003) concern about the loss of cultural content and focus on the media transformation of graphs and compositions in ways that would produce results rooted in Chinese culture (Lu, 2009).

2.4 The aesthetic tradition of Chinese painting

2.4.1 Chinese painting and culture

The term "Chinese painting" tends to conceptualise the historical evolution of the genre in a way that emphasises the development of contemporary China (Chen, 2006). It is used to refer to certain types of painting, such as ink painting and rock painting and it focuses on the inheritance and development of a national culture of painting (Chen, 2006). From a semantic analysis of "Chinese painting", it becomes apparent that the art form represents the cultural spirit of the nation. An Dingwen (2021), a professor at Lingnan Normal University, has observed that Chinese painting includes both ink painting techniques and ideological systems. It is not only an artistic language but also a cultural paradigm. Chinese paintings embody national aesthetics and cultural spirit, as well as the aesthetic and cultural literacy of their creators. An also proposed that in an era of national confidence that is nevertheless lacking in spiritual and cultural content, drawing on the meaning and aesthetics embodied in traditional Chinese painting could provide an important developmental path (An, 2021). If Chinese culture is reflected in

traditional Chinese paintings, the cultural connotations of Chinese painting should be embodied in the objects themselves, including aesthetics, cultural background and the artistic characteristics of the creators.

Zhou Jiyin, a scholar and professor from Nanjing University of the Arts, has defined Chinese painting as follows (Fan, 2017):

> 'Chinese painting' generally refers to traditional Chinese painting, including scroll painting, murals, New Year's paintings and so on. It is one of the few types of painting named after a country. Matteo Ricci, an Italian missionary in the late Ming Dynasty, was the first to use the term 'Chinese painting'. By the first half of the 20th century, this term was in use among Chinese painters, scholars, critics and others.

There are various definitions and versions of culture and people usually understand the concept of culture in both a broad and a narrow sense. Chinese traditional culture in particular is identified with a specific historical period. As Zi (1987) wrote:

> There seemed to be a tacit general understanding that culture, in its broad sense, implies both material and spiritual civilisation, including ways of life, ways of thinking, social customs, generally accepted criteria for behaviour, etc., as perceived by the man in the street; and in its narrow sense, implies mainly intellectual creations such as art, literature, religion, philosophy, ethics, etc., with philosophy as its core. Chinese traditional culture means, in general, the culture that prevailed in China from the pre-Qin Shi Huang days until the Opium War, a culture with Confucianism at its core, mixed first with Taoism and later with Buddhism.

Chinese culture in a narrow sense encompasses art, literature, ethics and traditional Confucianism, all of which were employed as research methods or media in this research project. In a broader sense, culture is the material and spiritual form of civilisation as expressed through lifestyle, social customs and ways of thinking. Chinese proverbs are considered the embodiment of traditional culture. According to Herzberg, Q. X. and Herzberg, L. (2012), proverbs from all countries and cultures symbolise the wisdom of the nations from which they originate. Chinese culture, which has existed for thousands of years, is replete with literary idioms, and proverbs permeate every aspect of human experience. People use proverbs to express the rich literary background of their language. These tales are witty and ingenious ways of employing that common cultural background. From the perspective of Herzberg Q.X. and Herzberg L., proverbs are the essence of the culture passed down by ancient Chinese people and reflect their life experiences and social environments. Proverbs also have social attributes that can be transmitted and recognised by others. Because they reflect identity and cultural attributes, I

felt that it was worthwhile to intelligently integrate proverbs into my interactive artworks of Chinese painting.

2.4.2 Ink brushwork of Chinese painting

The aesthetic tradition of Chinese painting is chiefly manifested in its special ink form. The varying degrees of opacity allowed by the ink, together with the absorptive and permeable quality of Chinese art paper, contribute to a unique aesthetic style of brushwork (Zhou, 2006). The brushwork of Chinese paintings is an important embodiment of their aesthetic quality. This brushwork originates from an individual painter's generalisation, simplification, vivification and formalisation of objects (Lang, 1999). Its development can be regarded as a comprehensive process of evolution that involves both compositional structure and stylistic taste (Chen, 1998). It can be understood as the rhythmic quality of the marks made by the artist.

Modelling and brushwork are represented graphically, but the profound artistic accomplishment and character that they reveal need to be carried forward and passed down over generations. Dr Zheng elaborated on the styles of brushwork used in Chinese painting and the moral ideals expressed by artists as follows (see Appendix 2):

> As far as the expressive form is concerned, ink and water are the main materials used in creating a Chinese painting. With the combination of dots and strokes, Chinese painting looks both impressionistic and realistic, reflecting the concept of *Yin* (阴) and *Yang* (阳) in ancient Chinese philosophy. With regard to style, the physical shapes depicted in a Chinese painting are not accurate replicas of objects. Instead, they are cognitive expressions based on their understanding of objects. Moreover, with feelings channelled into creation, Chinese painting artists present the images of objects as an organic whole in the painting… Such a method of expression naturally changes the characteristics of the physical shapes of objects, representing the freehand brushwork in Chinese painting.

The expression "freehand brushwork" used by Dr Zheng refers to a particular style of brush handling. The "modelling" he mentions also relates to the style of brushwork chosen by the artist. Speaking of artists' feelings, he observes (see Appendix 2), "Chinese painters tend to associate their moral ideals with the natural objects they observe and express their moral values through freehand brushwork." The aesthetic tradition I am attempting to preserve in media transformation is the unique modelling, brushwork and artists' feelings that characterise Chinese painting.

2.4.3 Xie He's "Six Laws"

It is worth discussing whether, given the diverse themes and long history of traditional Chinese paintings, there exists an immutable aesthetic standard that remains applicable today. The answer to this question can be found in the aesthetic theory of ancient Chinese traditional paintings. The "Six Laws" put forward by Xie He (Siren, 1956; Egan, 2015), a famous painter and historian during the Southern Qi Dynasty, can serve as guidelines in this context. Liu Xiulin (see Appendix 4) explains that after the "Six Laws" were proposed, ancient Chinese painting developed a theoretical framework and painters became aware of theories about their chosen medium. The "Six Laws" have evolved over time to become one of the most stable and inclusive theoretical frameworks applied to ancient Chinese art. Liu (see Appendix 4) remarked that ancient painters included them among the criteria for judging the success of their paintings. Guo (2001), writing during the Northern Song Dynasty, praised Xie He's "Six Laws" significance as eternal in his book *Painting vision.*

Xie He (479–502) wrote one of the most famous books in Chinese art history: *Classification of painters* (古画品录). In this book, he identified the "Six Laws" as "rhythmic vitality" (气韵生动), "anatomical structure" (骨法用笔), "conformity with nature" (应物象形), "suitability of colouring" (随类赋彩), "artistic composition and grouping" (经营位置) and "copying of classical masterpieces" (传移模写) (Herbt, 1918). Cahill (1961), a noted historian of Chinese art, interprets these laws as follows: "1. engender a sense of movement through spirit consonance; 2. use the brush with the "bone method"; 3. responding to things, imagine (depict) their forms; 4. according to kind, set forth (describe) colours (appearances); 5. dividing and planning, and positioning and arranging; 6. transmitting earlier models through copying and transcribing". The "Six Laws" have had a profound impact on the appreciation of Chinese ink paintings for centuries.

As mentioned, the "Six Laws" has a long history. Whether read in the original Chinese or English translation, it is abstract, profound and difficult to interpret explicitly, especially the references to "rhythmic vitality" and "anatomical structure". Liu (see Appendix 4) inferred that "rhythmic vitality" means that a painting (or any object depicted in it) should have rhythm and be full of vitality. Li (2009) attempted to explain "rhythmic vitality" in a simple way: as the painting method used to depict beautiful ladies. If that interpretation is accepted, then "rhythmic vitality" can be understood as the vividness and liveliness of the character's posture. "气" and "韵" (characters that are combined to mean "rhythm") are widely used to describe a person's manners and bearing; "韵" was once a musical term but later was used to describe human (Ronald, 2015). Mapping in interactive flower-and-bird paintings can be understood as the perception of movement in the actual flowers and birds, as well as the impression of movement given by their static representations. The "anatomical structure" of figures refers to the

structure and texture of their bodies and the coherence and structural support of brushwork in ink painting (Ronald, 2015).

Li and Liu (1999) argue that Xie He's "Six Laws" were greatly influenced by the "Six Views of Literary Criticism" mentioned in the book *The Literary mind and the carving of dragons* by Liu Xie, a literary critic in the Southern Dynasty. This theory suggests that the "Six Laws" and literary criticism are closely related. Both sets of principles have six elements and were among the early aesthetic evaluation methods in China. Moreover, in his research on the historical background of the emergence of the "Six Laws", Han Gang, a professor from Sichuan University, found (Han, 2010) that the "Six Laws" were linked to, and in one-to-one correspondence with, the "Six Laws" in the *Grand Nirvana Sutra* (empathy, sex, emotion, action, thought and knowledge), which were well known at that time. Drawing on the "Six Laws" of the Nirvana Buddha, Xie He established the "Six Laws" with Buddhist empathy replaced by rhythm, sex by anatomy, thought by conformity and suitability, action by composition and knowledge by copying. These comparisons indicate that Xie He's "Six Laws" are closely related to literature and Buddhism in their historical context. Additionally, Chinese philosophy, like Lao Tzu's *Tao* (道) (the unity of virtuality and reality), the philosophical view of the invisible world (Wang, 2010), "the appreciation of the aesthetic image of natural landscapes with a vague and empty mind" (Zhou and Wang, 2018) formulated by Xie He's contemporary, aesthetic theorist Zong Bing, and the influence of some "气" naturalism (all rooted in and unified by "气") in this period (Ye, 2013) helped give birth to the aesthetic principles of rhythm and the "Six Laws".

Xie He's "Six Laws" were initially used to appraise figure painting (Ronald, 2015; Guo, 2001; Shao, 1997; Li, 2009). Li (2009) believed that these laws were applied to portraiture because Xie He himself painted portraits. Guo Ruoxu (2001), a theorist of the history of painting in the Northern Song Dynasty, observed that the "Six Laws" have, since their origin, been the yardstick for critiquing and appraising traditional Chinese figure paintings and have gradually evolved into a kind of creative standard for this genre. Guo (2001) also believed figure painters, traditionally regarded the "Six Laws" as the highest criteria for the composition of paintings. Shao (1997), judging from the functionality of Xie He's book, *Classification of painters,* believed that it was not designed for evaluating paintings but rather was a technical standard for evaluating painters. Shao (1997) noted that only the first law of Xie He's "Six Laws", "rhythmic vitality", is divorced from technical concepts and has no explicit connection with the other five laws, which are all about technical methods and form a single technical standard. Xie He himself thought that these laws could be applied in isolation and indicated that not all of the criteria had to be met. As he wrote (Xie and Yao, 2015), "Although there are six rules for paintings, few paintings can meet the requirements of all the laws. Paintings from ancient times are desirable even if only one of the rules is followed." Therefore, the "Six Laws" were originally designed to evaluate figure painting

and judge artists' technical skills rather than the quality of their works, and each law is independent of the others and addresses a particular technique.

In a commentary on landscape paintings written during the Five Dynasties period, Jing Hao, the great master of the northern landscape painting school, drew lessons from the "Six Laws" and modified them. Later, he put forward the "Six Requirements": vitality, rhythm, thought, scene, brush, and ink (Jing, 2016). This was an important extension of Chinese landscape painting theory, in that the creative and aesthetic standards of figure paintings were applied to landscapes (Jing, 2016). The "Six Laws" thereby influenced the aesthetic standards applied to both figure and landscape paintings in different historical and cultural contexts. A sustainable aesthetic standard has been developed for traditional Chinese figure paintings and landscape paintings. In this manner, the "Six Laws" have exerted a more profound influence on the aesthetic evaluation of figure and landscape paintings than that of flower-and-bird paintings. Given that there are no well-established aesthetic criteria for flower-and-bird paintings, the "Six Laws" can be used as a reference point, albeit one that is not perfectly adapted to the task. I therefore considered which criteria were acceptable for analysing my practice and which were not applicable.

2.5 Discussion of the genre of Chinese painting

2.5.1 The categories of Chinese painting

Professor Cheng of City University of Hong Kong (Cheng and Huang, 2018) noted that "Chinese painting can be divided into different categories based on subject matter, medium, professional group, purpose, instrument used, genre, and in many other ways depending on the purpose of the classification." More broadly speaking, Chinese painting can be divided into three categories: flower-and-bird painting, landscape painting and figure painting (Wang and Hu, 2008), with figure painting being the first form to develop. During the Han Dynasty (206 BCE to 220 CE), figure painting began to flourish as an independent genre in Chinese art (Cahill, 1960). Figures were often accompanied by scenes and aesthetically connected to them through form, spirit and rhythm (Fan, 2008). Wang Huangsheng, a professor at the Central Academy of Fine Arts and curator of its Art Museum, remarked that "landscape painting is a carrier of Chinese humanistic spirit, recording and expressing the relationship between man and nature, and reflecting humans' complex psychological disposition toward nature." Flower-and-bird painting is a Chinese art form devoted to the depiction of "flowers, birds, insects, and fish" (Kong, 2008). Kong Liuqing (2008), a professor at the Nanjing University of the Arts, specified that "Flowers generally refer to plants, birds generally refer to animals, and the paintings that represent them alone or in combination are flower-and-bird paintings." In addition to the three broad categories of Chinese painting defined above, there is another genre that encompasses grand scenes combining

figures, landscapes and architecture. In the field of art history, such works are classified as “genre paintings” or “social custom paintings” (Jiang, 2015). The long scroll painting *Along the River During the Qingming Festival* (see Section 2.3.2 Figure 15) is a famous example of the form. The term “genre painting” first appeared in the Tang Dynasty to describe paintings of folk customs and social reality (Zhu, 2016).

2.5.2 Context and history of figure painting and landscape painting

Figure painting was the first form to come of age and become an independent genre. It developed between the fourth and eighth centuries, during the Jin and Tang dynasties (Zhang, 2019). Landscape and flower-and-bird painting matured later, becoming independent branches of artistic practice after the tenth century (Fan and Shen, 2018; Wang, X., 2018).

My selection of flower-and-bird paintings for interactive design and media transformation might seem puzzling, given the longer history of figure painting and the great importance attributed to landscape subjects. To resolve the confusion, it is necessary to return to the historical and cultural background of traditional China, examining the context from which the question arises. Professor Wu Hong (University of Chicago) has referred to context as a core concept and method of Chinese art history (See Appendix 3, in which Prof. Hu made a similar comment). In 2005, Wu published *Art in its ritual context: Essays on ancient Chinese art*, in which he interpreted the fine arts in the Middle Ancient Ages of China from the perspective of etiquette (Wu, 2005). This method can also be applied to the above question.

Traditional Chinese society is heavily influenced by Confucianism, whose guiding concept is benevolence. Confucius, the eponymous founder of the belief system, believed that benevolence consisted in self-abnegation and conformity to propriety (Wang, Z., 2018). Therefore, conformity to propriety is an effective way to construct an ethical Confucian society. “Propriety” as defined by Confucius consisted not in the etiquette of daily life but rather in “the Formalities of the Zhou Dynasty”, which guaranteed the preservation of the social and ethical order during the Western Zhou Dynasty (B.C.1046 – B.C.771), a society known for its hierarchical class divisions. Confucius and later Confucian scholars wanted to establish a harmonious, well-organised and moral society, like that of the Western Zhou era. Morality and power determine the functioning of such societies. This feature of Confucian thought had a far-reaching influence on traditional Chinese society and also affected the ideologies expressed in literary and artistic works. In landscapes and figure paintings, the positioning of the elements, especially the figures, was constrained by considerations of power and morality. The reason why I selected flower-and-bird painting for interactive design rather than landscape or figure painting will therefore be explained using the examples of *Playing chess behind the double screens*

(Figure 21) by Zhou Wenju and *Traveling amid mountains and streams* (Figure 17 in Section 2.3.2) by Fan Kuan.

In ancient Chinese figure paintings, especially those portraying members of the royal and noble classes as their main subjects, these figures often occupy a central pictorial position due to their identity and power. If their position is changed, their status and power are no longer apparent. Such works are regarded as failures. Artists could be punished for such depictions, especially when the subjects were Chinese dignitaries or dynastic rulers. *Playing chess behind the double screens* by Zhou Wenju, a court painter of the Southern Tang Dynasty (Figure 21), depicts Li Jing, the second emperor of the Southern Tang, playing chess with his younger brother. The man wearing a top hat and holding a tray and box is Li Jing, who occupies the centre of the image. Although he is in a seated position, his height and gentle bearing distinguish him from the other three figures. He is the supreme dynastic ruler as well as the master of the supreme power. Therefore, he must occupy the central position of the painting. If he was not in this location, his identity as emperor would not be apparent to the viewer. The work would not have survived, and its creator would have been severely punished, as the painting would not have conformed to royal etiquette. Therefore, if dynamic displacements were added and the central position of the emperor could be changed, the resulting object would be inconsistent with the historical and cultural context of the original painting. Even today, it would be regarded as an invalid form of meaning-making.

Figure 21. Zhou Wenju (Southern Tang Dynasty), *Playing Chess Behind the Double Screens*. Colour on silk, 70 x 40cm. Palace Museum, source: https://www.dpm.org.cn/collection/paint/230460.html.

The same issue arises if we contemplate adding interactive features to traditional Chinese landscape paintings. Consider the example of *Traveling Amid Mountains and Streams* by Fan Kuan (Figure 17 in Section 2.3.2). The oracle bone inscriptions of the modern Chinese character "山" (mountain) consist of three peaks, with the main one in the middle and the secondary peaks on either side, denoting a form

of order at the time of the word's origin (Wieger, 1915). *Traveling amid mountains and streams* is a historical extension of that interest in mountainous terrain. Guo Xi described it clearly in his book, *The elegance of the bamboo and spring*: "Towering mountains dominate the mountains, so they are surrounded by princes according to the relation of primary and secondary importance: mountains, hills, woods, ravines, etc. In this kind of composition, it is as if the son of Heaven is in the *Yang* (阳) position, receiving the worship of various princes without difficulty or the potential of betrayal." (Zhou, 2011). In this short paragraph, "the son of Heaven in the *Yang* (阳) position" means that he is sitting facing south due to his supreme power and prestige. (In ancient China, the southern side of a mountain was the "*Yang* (阳) position", an orientation respected by the people). "Son of Heaven" refers to the king or emperor, the supreme ruler in real life and the person possessing the highest form of social power. Based on these definitions, the symbolic meaning of *Traveling amid mountains and streams* is self-evident. The late sinologist Fang Wen (1993) of Princeton University wrote that Fan Kuan's painting leaves a unique, sublime impression which reflects "attaining knowledge through studying the essence of things", (i.e., the philosophy of the social order). Therefore, the order of the mountains and rivers portrayed in Fan Kuan's paintings is a metaphor for the ethical order imposed by rulers during the early Northern Song Dynasty. If the location of the main peak is changed, the historical context of the painting is lost.

Landscape painting, called "shan shui hua" (山水画) in Chinese, is more than a simple depiction of scenery; it highlights mountains and rivers (i.e. "shan" 山 & "shui" 水 in Chinese, collectively referred to as "landscape" in English), the defining features of China's topography. Most Chinese landscape paintings are very large in scale and focus on the aforementioned topographical features. Mountains are inherently stationary and are thus not suitable for dynamic transformation. However, landscape paintings may also include a few buildings and human figures that serve to highlight the mountains and rivers. The technique of dynamic displacement can be applied to a limited number of movable characters or boats, as exemplified in the *Picturesque Landscape* discussed in the literature review. In addition, the adoption of dynamic features such as leaves, waterfalls, insects and birds is recommended for creating dynamic displacement in landscape paintings.

However, dynamic displacement is less effective in landscape painting than in figure painting because landscape elements such as mountains cannot be moved, whereas figures can. While changing the emperor's central position in *Playing Chess Behind the Double Screens* would be regarded as a mockery of tradition, a tableau with less easily identifiable characters could be painted in a manner similar to the long scroll painting *Han Xizai's Evening Banquet Map* (Figure 7 in Section 2.3.2), which depicts several characters and intricate relationships to show the protagonist's corrupt lifestyle. The dynamic displacement of the singers, dancers, instrumentalists and maids does not alter their traditional meaning,

making it a viable option for media transformation. Han Xizai, the protagonist of the painting, is not especially prominent, as much of his body is obscured by objects, diminishing his impact on the composition. However, if parts of a figure are hidden, creatively filling them in when moving the character to a different position will compromise the visual consistency of the original artwork and the overall principle of preserving the aesthetic tradition.

The same issues apply to paintings combining figures with landscapes, even relatively recent works. For example, *Moving the Battlefield to Northern Shanxi* (Figure 22) is an ink and paper painting created by Shi Lu, a famous Chinese painter in 1959. The work displays the story of the Communists led by Mao Zedong moving from Yanan to Northern Shanxi in the first half of the 20th century during the civil war between the Kuomintang and the Communist Party (Editorial Committee of Historical Paintings of the Communist Party of China, 2012). Shi placed the leading figures in a landscape. Due to the historical significance of these figures, it is difficult to determine whether the picture should be classed as a landscape or a figure painting. In any case, the relative position of the figures and landscape should remain fixed. In the 1960s, when China was in the midst of the Cultural Revolution, Shi was punished for this work because he had positioned the back of Mao Zedong between mountains and rivers, which was considered a symbol of anti-revolution (Han, 2019). Therefore, when a painting depicts a figure with a special identity, such as an emperor or leader, conventions regarding their pictorial placement must be respected. Accordingly, such figure paintings are not suitable sources for dynamic displacement.

Figure 22. Shi Lu, *Moving the Battlefield to Northern Shanxi*, 1959. Ink and wash, 216 x 233cm. National Museum of China, source: https://www.chnmuseum.cn/zp/zpml/ysp/202008/t20200821_247069.shtml.

However, this does not mean that all ancient Chinese figure paintings are unsuitable for interactive design. In ancient China, especially in the 11th and 12th centuries of the Northern Song Dynasty, certain figure paintings displayed social life, customs and practices. These were dubbed “genre paintings” or “social custom paintings” (Jiang, 2015). Since the figures in genre paintings are mostly unknown civilians with little symbolic significance or power, these works are also appropriate for dynamic displacement interaction. The animated version of *Along the River During the Qingming Festival* (Figure 14) mentioned in the Section 2.3.2 is a typical example of the media transformation of genre painting (Xing, 2018). However, genre and figure paintings of this kind were not selected for the present project because they feature complex plots and narratives. Consequently, they contain numerous characters placed in complex settings featuring landscapes, architecture and livestock. It would not be possible to add interactivity to such large narrative works in the limited time available for this project.

To sum up, whether the main character in a painting can be repositioned depends on the painting’s historical context. There are some notable differences in this regard between figure painting and genre painting. In genre painting, the size of the figures and objects in the scenes are rendered in proportion to one another, and local conditions and customs are represented realistically. Moreover, the humans depicted are primarily ordinary people, while the settings are typically expansive and contain many buildings. In comparison, figure painting tends to place less emphasis on architectural details than it does on props. The physical features of the figures are important due to the need to make key characters identifiable. To determine whether the figures or other movable objects depicted in a painting can be dynamically transformed, it is necessary to examine the artwork’s historical context and consider whether clear physical information about these objects is provided and the range of their movement is defined.

2.5.3 The feasibility of flower-and-bird painting

Flower-and-bird paintings became an independent genre during the Eastern Jin and Southern Song Dynasties (4th and 5th centuries) (Dou, 2018). The main subjects of flower-and-bird paintings are flowers, plants and birds, but they often depict other creatures and objects. Historically, many other elements, such as bamboo, stones, fish, and livestock (horses and cattle), have also been included (Dou, 2018). In short, animals and plants serve as the main subject matter of Chinese flower-and-bird paintings.

Unlike some landscape and figure paintings, Chinese flower-and-bird paintings can be used unproblematically as the basis for dynamic displacement. In this section, the rationale for the transformation of flower-and-bird paintings into interactive media is deduced from the earliest appearance of the flower-and-bird metaphor to the climax of its use in the Song Dynasty. I will also consider the introduction of the flower-and-bird motif as a symbol of morality and social status, the ideological principle of analogy, and ethical aesthetics.

In the framework of "analogy to ethical aesthetics", "analogy" denotes association, imagination, and contrast, whereas "ethics" refers to politics and morality. In ancient China, political ethics and morality were associated with objects in nature (Zhou, 2017). For example, ancient Chinese people often used the phrase "nature and man in one". This phrase refers to connecting and comparing individual moral qualities with the attributes of natural objects to identify commonalities and differences (Xie, 2018). Dr Zheng (see Appendix 2) has noted that Chinese artists made freehand paintings to promote their moral sentiments and express their inner worlds. Prof. Hu (see Appendix 3) observed that Chinese painters expressed their spirituality in response to social expectations. Mr Liu (see Appendix 4) maintained that every drop of ink is an emotional symbol carefully selected by its artist. All of these observations point to the integration of objects with feelings found in such paintings. In short, when a moral quality is projected onto a natural object, the object is assigned the attributes of that quality. Therefore, there is no strict logic or requirement for positioning elements in this kind of picture. Artists focus on using the symbolism of (for instance) plants to express their feelings rather than on the visual presentation of the plants themselves.

Based on the principle of analogy to ethical aesthetics in Chinese art discussed above, it is sensible to apply interactive design to Chinese flower-and-bird paintings. For example, elements such as golden pheasants, hibiscus, butterflies and chrysanthemums are depicted in the painting *A Golden Pheasant Resting on Hibiscus Branch* (Figure 23) (Yin, 2020). In traditional Chinese culture, golden pheasants are considered virtuous. A saying found in a book called *The unauthorised biography of Han Poem* states that the golden pheasant has five virtues (Wang, Y., 2018). First, golden pheasant have crowns on their heads, which are very similar to the hats worn by ancient men after their coming-of-age ceremonies. For that reason, golden pheasants are referred to as civilised. Secondly, golden pheasants are combative, as evidenced by cockfights. The fork behind their claws resembles an ancient weapon, leading to the characterisation of golden pheasants as martial. Thirdly, they are considered brave. Fourthly, golden pheasants do not eat alone. After their master throws them food, they always call out to their flock-mates and eat together. For this reason, they are regarded as benevolent. Finally, they keep their promise to awaken people in the morning and so are considered faithful (Wang, Y., 2018). Artists therefore use the golden pheasant to signify these five virtues. The birds were also symbolic of high status and rank. According to the seal and inscription on *A Golden Pheasant Resting on Hibiscus Branch*, the painting's creator was Zhao Ji, then the supreme ruler of the Northern Song Dynasty, who also possessed superb artistic talent. Because emperor Zhao Ji painted the golden pheasant, which symbolises the five virtues, a natural association between the artist and subject – the noblest status symbol in the world – was formed.

Figure 23. Zhao Ji (Emperor Huizong of Song Dynasty), *A Golden Pheasant Resting on Hibiscus Branch*, Northern Song Dynasty. Colour on silk, 53.6 x 81.5cm. The Palace Museum, source: https://www.dpm.org.cn/collection/paint/230125.html.

If *A Golden Pheasant Resting on Hibiscus Branch* is taken as the base for interaction design, the movement of golden pheasant in the picture exerts no influence on the reference to the emperor in the image. The painting's symbolic meaning remains conventional. No matter how the position of the golden pheasant changes, it always appears as the subject. Therefore, unlike the displacement of features in most landscape and figure paintings, the displacement of objects in flower-and-bird paintings does not violate the ethical aesthetics.

The celebrated "luxuriance of the Huang School and tranquility of Xu Xi" (also known as "luxurious Huang Quan and quiescent Xu Xi") represent a peak in the history of flower-and-bird painting (Kong, 2008; Wang, X., 2018; Ye, 2015). Huang Quan was a flower-and-bird painter during the Five Dynasties and Later Shu Dynasty period (934-966), and Xu Xi was active during the Five Dynasties and Southern Tang Dynasty period (937-975). Opinions of their work expressed by subsequent generations were shaped by their different painting techniques and subjects (Kong, 2008). Huang used a court style, and his flower-and-bird paintings emanate a regal aura. This "luxuriance" style is characterised by a sense of harmony and solemnity, conveyed through the brushwork and colouring (Kong, 2008). For example, Huang's masterpiece *The Sketching of Rare Birds* (Figure 24), contains accurate, naturalistic depictions of objects that accord with the "conformity with nature" principle of Xie He's "Six Laws". The brushstrokes are neat and precise, as are the forms depicted. The colours are deep but vibrant. Meanwhile, Xu's paintings tend to feature subjects such as vegetables, fruit, fish and algae in bucolic surroundings. Compared with Huang's paintings, Xu's works are more reflective of people's daily lives and are therefore described as "tranquil" (Kong, 2008).

Figure 24. Huang Quan, *The Sketching of Rare Birds*, The Five Dynasties. Ink and colour on silk, 70.8 x 41.5cm. The Palace Museum, source: https://www.dpm.org.cn/collection/paint/228361.html.

Huang and Xu were pioneers in flower-and-bird painting. However, as their compositions are crowded, I did not select them for media transformation. *The Sketching of Rare Birds,* for instance, shows many animals close together. Huang did not focus on a specific bird, but rather aimed to capture the natural appearance of a number of different avians, producing a form of animal group portrait. Dynamic transformation of the birds' feathers and limbs is feasible, but if the birds are all put in motion, they may overlap unless their positions are arranged carefully. When choosing flower-and-bird paintings for dynamic transformation, it is essential to consider the range of the object's movement and the harmony of the composition.

2.5.4 Conclusion

This investigation of classical Chinese figure paintings and landscape paintings shows that it is nearly impossible to change them without also altering their historical context. The meaning-making paradigm of figure painting has been immobilised by its historical background. If the positional relationship of the main characters in the picture is changed, these main characters would be retained, but the work as a whole would be divorced from its traditional cultural and historical context, violating moral and ethical taboos. If missing information about the figures has been filled in by a contemporary artist, the original form and style of the work are not maintained. Adding displacement to figure paintings would not only be an ineffective way to reproduce traditional forms but would also deviate from the intended purpose of maintaining the original appearance. Likewise, in landscape painting, the positions of mountains will be changed if the works are made displacement. The alterations will make the works

produced from the originals contextually meaningless. Thus, the reproductions would be ineffective, failing to capture the meaning of the originals. In landscape paintings, there are few movable objects, such as leaves, waterfalls and rowers. These objects occupy a relatively small area of dynamic displacement compared to the mountains.

In some paintings in which human figures and landscapes are combined (but the figures are the focal point), neither the landscape nor the figures are suitable for dynamic displacement. But if many individuals are depicted in a figure painting, the relative position of the non-focal figures can be changed through movement. Genre painting typically lacks a focal figure, allowing a multitude of civilians to be designed as dynamic and mobile and allowed to move through a narrative. However, genre paintings typically lack a structured narrative. Instead of telling a story with a beginning, middle and end, these works show ordinary people going about their daily business. This lack of shared direction among the figures can create a daunting task for a designer or an artist working alone.

Flower-and-bird painting is, by contrast with these genres, well-suited to dynamic displacement. Unlike figure painting, in which one figure may be partially hidden behind another, the objects depicted in flower-and-bird paintings are generally fully visible. While the historical context of key personages in figure paintings must be carefully analysed, in flower-and-bird painting, the designer or artist must establish a connection between the moral qualities and physical attributes of natural objects. Dynamic displacement will not affect the imagery or metaphors of a flower-and-bird painting.

3. Methodology

3.1 Research process outline

To answer the two research questions, I produced a logical flowchart of the project (Chart 1). My first research question addressed how depicted objects in Chinese paintings could be made dynamic and interactive while preserving the aesthetic traditions. To answer this question, it was necessary to analyse the aesthetic tradition of Chinese painting and the aesthetic value of Qi Baishi's flower-and-bird paintings. Through this process, I generated a foundation from which to establish an interactive and dynamic design and methods to evaluate the key aesthetic changes. To answer the second question of how elements of Chinese culture could be embodied in the interactive design of objects in digital paintings, I applied the findings from the first research question. I connected the objects in the two Chinese paintings metaphorically to create an artwork that would represent the storytelling found in a Chinese proverb.

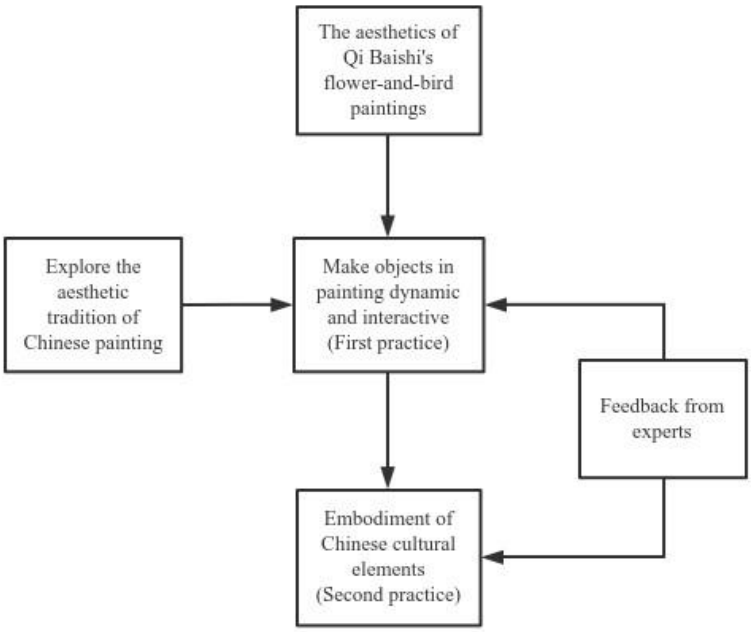


Chart 1. Research process

The focus of the first research question was to develop an understanding of the Chinese aesthetic tradition and learn how to make Chinese paintings dynamic and interactive. The interactive and dynamic practical design had to be based on the Chinese aesthetic tradition. I examined how the philosophical theory of Chinese painting influenced the aesthetic tradition to align my research with the historical and cultural contents of Chinese painting. I connected my artworks with broader ethical considerations and philosophical ideas that influenced the aesthetics of Chinese painting, analysing how they affected the positioning of subjects within the composition. This allowed me to infer which genres

of Chinese painting would be suitable for dynamic displacement (see Section 2.5). Based on this analysis, it was possible to extend the practice and research experience to the entire category of Chinese painting and apply the method to other types of Chinese artworks. For example, in the current research, I explored the artistic value of flower-and-bird paintings by Qi Baishi but did so following the aesthetic tradition in which he worked. In this way, the analysis of aesthetic tradition from two perspectives – the historical context and the style of the original author – guided my practice as I created dynamic interactive objects.

The focus of the second research question was how characteristics of Chinese culture were embodied. Based on the answers to the first research question, I added a feature to my practice: the narration of an allegorical story found in Chinese paintings. This approach differentiated my research from other work on digital interactive Chinese painting and demonstrated the unique value of this project. When my interactive paintings are displayed, the audience plays a role by modifying their appearance, and the mode of expression embodies cultural characteristics. Therefore, my work involves both cultural narrative and forms of display.

3.2 Historical context analysis and dynamic displacement

I analysed the historical context of Chinese painting to identify suitable genres and works for dynamic displacement. The philosophical theories of Li Zehou, a Chinese philosopher, aesthetician, and historian of Chinese thought, demonstrated the importance of analysing Chinese paintings within their historical context. The aesthetic tradition of Chinese painting discussed in the first research question and the Chinese cultural elements considered in the second question were explored in the context of the development of Chinese aesthetics. The focus of my research was not on the audience's aesthetic evaluation of Chinese paintings, nor their assessment of the method of interactive media design. As a result, I did not conduct a quantitative analysis of audience responses but rather performed content analysis to explore methods for transmitting traditional Chinese culture through modern interactive media.

In *The Chinese aesthetic tradition*, Li (2017) proposed that culture and psychology accumulate over time in a way that resembles the geological process of sedimentation. He explained that human culture and psychological structures were established through the accumulation of material and cultural experience, as well as the aesthetic value of ritual activities, and that further developments in aesthetics renew this process. In examining the ideological history of Chinese aesthetic development, Li wrote that the emergence of Confucian humanism led to the development of human self-awareness, resulting in the ideal of "the unity of heaven and humans" that endures in Chinese aesthetics and artistic creation. Although Chinese art was once strictly an expression of Confucianism, scholars such as Chuang Tzu

expanded the Confucian aesthetic to encompass freedom of nature and spirit. Art was thus liberated from serving as a tool of traditional Confucian theory.

It could be argued that aesthetic developments resemble the history of human development, which also involves the evolution of cognition and objects created by humans and nature and the continual accretion of cultural and psychological artefacts. Li Zehou summarises how social, psychological, and natural changes accumulate in historical and cultural activities. The aesthetics and cultural traditions of each Chinese painting are shaped by a different context and the influence of different forms of thought and social ideologies. Paintings need to be analysed in their historical context to identify the aesthetic and cultural traditions that shaped them.

The principles for selecting genres for dynamic interactive painting are as follows. First, the dynamic displacement should retain the cultural traditions and ideas that underlie the painting. Second, if parts of the painted object are obscured by props, dynamic displacement is not appropriate. Creating the obscured parts would require intervention, which does not align with my principle of preserving aesthetic traditions. Finally, the number of objects to be dynamically displaced must be considered to ensure that repositioning the objects does not conflict with the overall composition of the painting.

3.3 The usefulness of Xie He's "Six Laws"

Traditional Chinese methods of aesthetic evaluation were discussed in Section 2.4 in reference to Chinese culture and philosophy. In researching the meaning of each rule in Xie He's "Six Laws" and searching for ways to connect them to my project, I discovered that four of the laws were related to aesthetic analysis (Table 1). Of the four, the law of "rhythmic vitality" was the most challenging to comprehend. I attempted to convey the rhythm expressed by "气" and "韵" by using the dynamic trend of objects in paintings. As the size of the interactive interface corresponds to different rhythms, my discussion of rhythm was limited to the context of tests on mobile interfaces (see Section 6.2). When dynamic displacement occurs, it inevitably alters the original rhythm of an image. Therefore, a comparative analysis was conducted to examine the variations in rhythmic patterns between the static and dynamic states of the composition. The transition from static to dynamic also affects the composition of the image, which led me to discuss the law of "artistic composition and grouping" alongside that of "rhythmic vitality".

I decided to use the notion of "anatomical structure" referenced in the "Six Laws" to study the brushstrokes of Qi Baishi's flower-and-bird paintings. By obtaining a deep understanding of Qi Baishi's brushstrokes, an effective design can be achieved while preserving the distinctive ink characteristics of his paintings.

The lifelike depictions of animals found in Qi Baishi's flower-and-bird paintings are well known. However, he did not simply copy his subjects from nature. Rather, he applied artistic techniques that aligned with the "conformity with nature" principle of the "Six Laws". Using this law, I analysed the stylistic character of Qi Baishi's works and designed animated simulations of the real objects' movements accordingly. Because I used real objects, the dynamic displacement was based on the actual animal's movements rather than Qi Baishi's paintings.

The "suitability of colouring" in the "Six Laws" refers to the use of colours. The three works by Qi Baishi that I chose are all drawn in ink, without the addition of colours; therefore, this law is outside the scope of the present discussion. The historical inheritance of Qi Baishi's art is likewise not a focus of this project and so the law on the "copying of classical masterpieces" was excluded from my methodology.

	Usefulness	**Aesthetic analysis and discussion**
Rhythmic vitality	Positive	Used to analyse the trend of "气" in the static image and the embodiment of "韵" in the original painting and how moving images change relative to static images
Anatomical structure	Positive	Used in research on the characteristics of Qi Baishi's painting and analysis of the subjective body structure of the objects that correspond to each brushstroke in the painting Used in animation design to assess binding bones to brushwork
Conformity with nature	Positive	Used to study the artistic characteristics of objects in Qi Baishi's paintings and analyse how objects can be depicted in a way that is similar in spirit but dissimilar in form to the actual object Used in animation design to study and imitate the physical movements of real animals and artistically exaggerate them through metaphorical representation
Suitability of colouring	Negative	There are no colour changes involved in the media transformation.
Artistic composition and grouping	Positive	Used in combination with "rhythmic vitality" to analyse the aesthetic changes in the composition of dynamic objects within the designed interactive area

Copying of classical masterpieces	Negative	This law is used to evaluate inheritance and development in art. The differences between the art of Qi Baishi and works by other flower-and-bird painters are analysed in the discussion on the selection of the paintings, rather than in the media transformation section.

Table 1. Reflection on the use of Xie He's "Six Laws" in this project

3.4 The analysis of Qi Baishi's works

Through an analysis of art historical context, I demonstrated that flower-and-bird painting is a genre that has the potential to be successfully converted to a dynamic and interactive format. Qi Baishi's flower-and-bird paintings were created with an artistic understanding that drew upon Huang Quan's realistic, meticulous painting style and Xu Xi's focus on ordinary animals, plants. Qi Baishi's flower-and-bird paintings, which depict fewer objects and have a more open composition than works by these earlier practitioners of the genre, are especially suitable for dynamic displacement, interaction, and exploration.

The next chapter provides an analysis of Qi Baishi's artistic characteristics and the spirit of his flower-and-bird paintings. In it, I discuss why Qi Baishi's works have been widely acclaimed and accepted by the public. Chinese painting closely reflects the artist's spirit and Qi Baishi, as a folk artist, had a passion for nature. I explore Qi Baishi's artistic spirit in Chapter 4 and connect these findings to my design process.

In this portion of the project, I examine historical documents, with special emphasis on the memoirs of Qi Baishi's disciples. I also review specialist literature on the artist's oeuvre to find information about the subjects of Qi Baishi's famous paintings and analyse their distinctive characteristics. I then demonstrate the use of various artworks from representative periods of Qi's career for the design project.

I use Qi Baishi's famous theory of "the artistic harmony between likeness and unlikeness" to understand his artistic style, which became a method for interpreting his works. I incorporate this artistic concept into the design of simulations of the physical motion of objects. Additionally, I analyse Qi Baishi's brushwork and forms through Xie He's "Six Laws". In animation design, the structure of objects and the brushstrokes that form them are affected by the weight between each bone. This is reflected in the method of binding the bones, which required a detailed analysis of Qi Baishi's brushwork.

3.5 Research through design (RtD)

This project follows the principles of research through design (RtD) (Frayling, 1993; Zimmerman et al., 2007; Gaver, 2012). I used RtD as the main method to understand and answer the two research questions throughout this project. As this is a reflective creative practice project, the generated outcomes and knowledge are reflections and analyses of the practice (artworks).

Zhao (2019) used the RtD approach to explore how interactive technologies can facilitate cross-cultural appreciation of Chinese painting, utilising the theoretical foundation and framework provided by RtD to link various research methods. This included conducting field visits and interviews, designing a colour appreciation scheme for Chinese painting, and testing and surveying individuals from different countries. He identified barriers to cross-cultural appreciation, created a sustainable development approach, and presented his insights and research findings. His research methodology, combining the study of interactive technologies and Chinese painting aesthetics, provided insights that were useful for my project. I leveraged the theoretical foundation and framework of RtD to employ diverse methods to accomplish research aims and critically reflect on my research findings.

RtD is usually based on current and recent technological applications, so the knowledge it generates can have a constructive impact (Zimmerman et al., 2011). Zimmerman and Forlizzi (2014) have observed that in RtD, researchers focus on how design can generate new and valuable knowledge. The practice in RtD is generated within a thematic and theoretical framework in which the design is seen as a potential situation and a predictive judgement; practitioners apply design methods to problems and then reflect on the results (Gaver, 2012). I analysed the connection between traditional aesthetics, digital Chinese painting media, and practical explorations in the literature review. I also clarified the intended direction and contributions of my practice, as well as potential problems I might encounter. I discussed this project with experts, analysed the new theoretical perspectives and themes generated in practice, and gradually refined the design and theory.

A designer or artist must describe the entire design process, its expected impact, and their reflections on it to gain knowledge (Zimmerman and Forlizzi, 2014). Therefore, I have fully documented my design process (see Chapter 5) and analysed the theoretical perspectives that emerged from it. The entire process is the final and effective method that I arrived at after repeated testing and research. It can be modified and iterated as technological methods evolve. The design process and theoretical perspectives can be harnessed to form an analytical and practical method to explore the transformation of Chinese painting into interactive media.

Both final artworks need to be exhibited, with the first work displayed in an interactive interface and the second on screens. The first work is currently being tested on mobile phones and tablets for the sake of convenience. If tests conducted on mobile devices prove successful, the work should be relatively

easy to showcase in an exhibition hall. In terms of both principles and technologies, the interactive interface in an exhibition hall is similar to a mobile interface. However, there is also a significant difference between the behaviour and activities of audience members in an exhibition setting and those of mobile phone users, particularly given the portability of mobile devices, which can be used anytime and anywhere. Therefore, a mobile device cannot replace the completed artwork. Nevertheless, the project focused on discussing the design within the test scope, without addressing theories of mobile interaction. User-centred design and user experience are not the current focus of this project.

3.6 Design steps for translating Chinese painting into interactive images

By prototyping, building, and creating as part of RtD practice, my design achieves unique results; little design research has been performed on the media transformation of Chinese painting. However, design methods similar to those I used have been employed in the field of cultural heritage preservation. Therefore, I drew a comparison by referencing one of those methods.

Tosa et al. (2005) put forward the concept of cultural computing, which refers to the application of computer technology in the preservation, restoration, modelling, reproduction, display, and dissemination of culture. Cultural computing includes the protection, display, and dissemination of cultural heritage and the employment of computer technology. Based on the methods formulated by Tosa et al, Li et al. (2022) proposed a research framework used in Chinese cultural heritage computing. I created design steps for translating Chinese paintings into interactive images using that framework (Table 2).

The design required explicit, phased steps to reach the goals. Li et al. (2022) divided the Chinese cultural heritage computing framework into three steps: digital preservation, digital inheritance, and presentation and promotion. Each step represented a process and a result. In the same vein, I roughly divided my design structure into three steps. After extracting the ideas and theories behind a Chinese painting and its painter, the first step was to maintain the images found in the original painting. The analysis of the brushstrokes and the structure of the object in the picture and the extraction of the structure of each part of the original painting corresponded to the collection and construction of data. The second step was to analyse the aesthetic tradition and historical production of art in that tradition. Adding the physical movement of an object to a static image and designing an interactive process respected the artistic concepts of the original authors but also expressed my design ideal. This process corresponded to the data analysis and cultural products phases of the Chinese cultural heritage computing framework. The third step was to design interfaces to exhibit my works. My design can be deployed when computer software is used to reproduce digital versions of Chinese paintings in a manner

that retains the traditional style of these objects. Digital media exhibitions can thus be conducive to the interactive display of Chinese painting.

Chinese cultural heritage computing framework	**Design steps for translating Chinese painting into interactive images**
1. Digital preservation Method: Data acquisition and processing Process: Classification, coding and labelling Result: Metadata construction	**1. Preservation of images of original paintings** Method: Image extraction via image design software Process: Digital Chinese painting selection; analysis of the structure of the objects in the painting Result: The preservation of each part of the original image
2. Digital inheritance Method: Digital modelling and database construction Process: Data modelling, data construction, and data analysis Result: Cultural products	**2. Aesthetic analysis and design** Method: Work analysis; observation of nature and game engine design Process: Analysis of the characteristics of Qi Baishi's painting to make the objects in the painting move in ways that simulate physical movement; engage in dynamic object design, interactive program design, and interactive coding design Result: Development of a design process and the preservation of artistic and cultural traditions
3. Presentation and promotion Method: User-oriented application Process: Multimedia, cross-platform promotion Result: Cultural evolution	**3. Interactive media communication** Method: Interface interaction; Kinect gesture interaction Process: Analysis of display mode Result: Transmission of Chinese painting aesthetics and culture to the audience

Table 2. Framework analogy

3.7 Design methods: Interface and motion graphics

Two artworks of digital Chinese painting introduced in the literature review can be re-examined here. The interface interaction mode of the Palace Museum's *Han Xizai's Evening Banquet Map* mobile phone app and the interactive version of Lin Junting's *Picturesque Landscape* were in line with this project's research objectives and my expectations for its design. Both initiatives retained the imagery of the traditional Chinese paintings that they adapted. However, the *Evening Banquet Map* app does not

include motion graphics in its interactive features, thus missing an opportunity to pique user interest. Instead, it merely provides historical context for the painting. The adaptation of the *Picturesque Landscape* allows for interaction, but the interactive element is too limited; given the large surface area of the image, it cannot engage the viewer with the entire picture.

Accordingly, I made some changes to achieve my research aims when designing my two artworks. For the first artwork, I developed an interface program. As both the interface and Chinese paintings have flat, two-dimensional structures, the digital images of Chinese paintings could be seamlessly displayed on the interface, creating a harmonious atmosphere in the exhibition hall. The conversion of digital images into an interactive program left no trace, and the original brushwork of the paintings was preserved. However, the objective of this project was not to provide information about Chinese paintings to audiences. Although the interaction method I chose was similar to that of the *Evening Banquet Map* app, the results were different. The animals in the original flower-and-bird paintings and the objects portrayed by Qi Baishi were vibrant and thus lent themselves to being brought to life through animated simulation. In the second artwork, I incorporated two Chinese paintings and employed media technology that enabled interaction across two screens. I used the animals depicted in Qi Baishi's flower-and-bird paintings to metaphorically represent two creatures from a traditional Chinese proverb, narrating the story through my digital artwork and conveying its meaning to audiences. This practice explored the expanded possibilities made possible through the utilisation of media technology and embodied elements of Chinese culture in the metaphorical representation of objects found in the flower-and-bird paintings.

There are many methods for designing dynamic images. I used frame-by-frame animations. Such animations allow for the transformation of static images into moving pictures. Traditional and digital techniques can be combined in this format to enrich the content and customise the style (Krasner, 2013). Frame-by-frame animations can incorporate interaction into a game engine by connecting each set of animations with scripts. Interactions can trigger animation, creating the effect of motion graphics. In this way, two-dimensional images can be converted into interactive media.

Krasner (2013) discussed motion graphic design and introduced a variety of methods for its creation. I used the parenting and mobile framing animation processes described in Krasner's text, along with masks in motion graphics compositing, for transparency and multi-layer composition. The graphic design software Adobe Photoshop can be used in this way to extract the images in paintings without altering them. Parenting can be used to establish hierarchies to exercise control. For example, the parent has many subsets whose movement does not affect but will be affected by the parent. The method, shown in Figure 25, is to stratify each part of the object so that the movement of the shrimp's head in the picture leads to the movement of its eyes and antennae. Frame-by-frame animations can be combined with parenting to create highly effective simulations of the physical motion of objects.

Mobile framing involves inserting a camera object into a composition to capture a variety of perspectives. In creating my second artwork, I used two monitors to display the two two-dimensional images. Connecting the Qi Baishi flower-and-bird paintings (*Mantis and Rice* and *Autumn Cicada on a Branch*) required the use of two cameras (see Section 4.4.3 for details of the two paintings). The viewing angle and focal length convey the proportions of and perspectival relationship between the two paintings and the objects in them that can be moved.

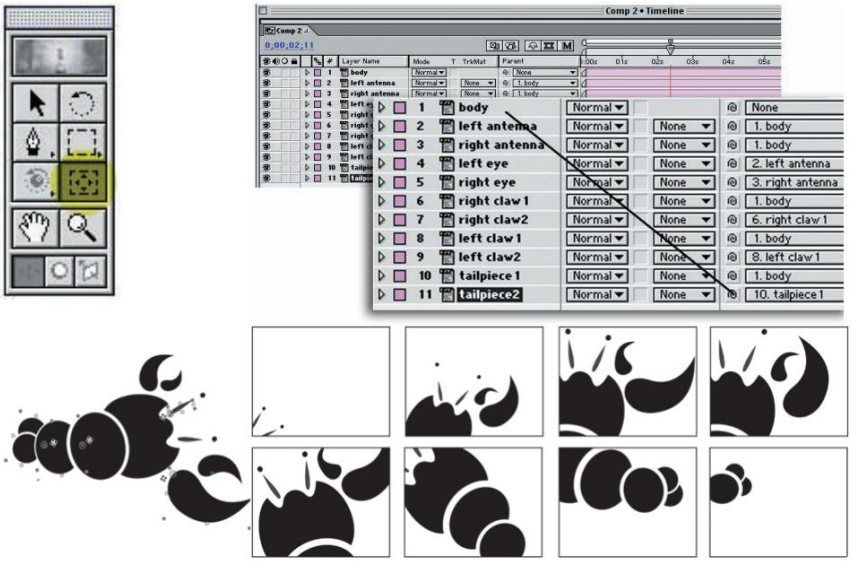


Figure 25. Jon Krasner. A parental hierarchy for coordinating the motions of the main "body" and its smaller parts. The screenshot is reproduced from Krasner's *Motion graphic design: Applied history and aesthetics*, page 337.

The key component of the second research question is the phrase "Chinese cultural elements". The aesthetic theory of Chinese painting is a significant part of Chinese culture, as I discussed above. Additionally, as mentioned in the literature review, stories that feature proverbs are a part of this culture. The second research question was answered by using dynamic objects to refer to the narrative of a Chinese proverb, so I had to explore methods of interactive narration.

Lebowitz and Klug (2011) identified six major types of narrative approaches to game-player interaction. From these six, I selected interactive traditional storytelling, which combines the strict narrative control of traditional stories with a certain degree of interactivity. The main plot cannot be changed, or at least not significantly, and the result is the same no matter how many times the player plays the game. These characteristics suited my research aims. Although players cannot change the plot, traditional interactive stories can be written in many ways, much like novels or screenplays (Lebowitz and Klug, 2011). The story I invented could be told in a way that was grounded explicitly in proverbs. Although the players' actions may not have a significant impact on the main plot, my approach enables them to feel at least somewhat in charge of the character's progression (Lebowitz and Klug, 2011). Therefore, I needed to

subtly envelop players in the proverb's storyline and ensure that the other characters in the narrative (the dynamic objects) correspond to the proverb's plot.

Although I borrowed from the game narrative approach, my practice cannot be evaluated entirely from the perspective of game research as game design involves multiple levels and narrative scenes. The players interacting with my project do not move from one level of achievement to another, as they would in a game. Instead, I designed a story based on a proverb, in which participants play a role but only within the bounds of a pre-set interactive process. The goal was to illustrate a story using only one scene. This story is a proverb, enacted by members of the audience, using the objects painted by Qi Baishi.

3.8 Experts' review

The evaluation data for this project was derived primarily from expert reviews and semi-structured interviews. Solicited before the final public exhibition of the artwork, the experts' opinions were meant to provide different, more professional perspectives compared to those of non-experts, allowing for the discovery of important knowledge that might have been overlooked. According to Muller, Robertson, and Edmonds (2006), experts' training and specialised knowledge enable them to quickly translate their experience into evaluative opinions and materials. Gathering various types of expertise related to this artwork helped to support the creation of meaningful outcomes as opposed to the simple generation of raw data. Gray and Malins (2004) suggest that a completed design can be analysed by treating the artwork as a case study, inviting critical evaluation and analysis from expert designers and users.

Costello's (2009) PhD project, like my own, involved inviting experts for feedback; thus, it is a useful example. His project focused on designing and evaluating ludic interactive art to evoke play experiences in audiences. He proposed a game framework and used it to study two instances of interactive art. During this process, he recruited eight experts who were familiar with the norms and conventions of interactive art. The experts participated in surveys and interviews and provided retrospective reports on their experiences, aiming to improve Costello's game framework and share interpretations and insights. Costello (2009) concluded that "The use of expert participants did, as expected, produce some very useful data, particularly in terms of design suggestions for future iterations."

In the early stages of my research project, discussions of the value of the research and the design approaches were needed, such as whether the research topic of exploring media transformation in Qi Baishi's flower-and-bird paintings was valuable, what research perspectives were relevant, and how the design methods should be refined. Since my research project combined traditional Chinese art with interactive media, I sought an expert with experience in the integration of art and technology to assess its value. Mr Zhang Xiaohua, a researcher at the Chinese Academy of Art, Science and Technology, is

committed to combining computer technology with traditional Chinese art to explore intermedial artworks through science and technology. The questions that I set for my interview with him addressed the preservation of Qi Baishi's painting aesthetics and encouraged an evaluation of the rationality, significance, and value of my practice to ensure the appropriateness of the research topic. I also sought advice on design techniques and ideas from a senior designer. Mr Huang Guixing, an interactive media designer, has worked for more than a decade in the production of interactive media art and has rich practical experience. He responded to questions about the practical methods I used and the feasibility of the technical transformation of Qi Baishi's flower-and-bird paintings. Due to the impact of COVID-19, I had to communicate with two experts online via Zoom. Each expert was interviewed for one hour. The experts confirmed the research value of the project, and I gained some new perspectives on research and design. The semi-structured online interviews achieved the expected results (Table 3).

Timeline	Experts	Content	Summary
20 Sep 2020 Online interview	Mr Zhang Xiaohua, researcher, China Art, Science and Technology Research Institute	Evaluation of the significance of the design of the work, whether the design of the work retained the original's aesthetic value, and the rationality of interactive media	Significance of Xie He's "Six Laws", aesthetic differences after adding interactivity, direction of the development of Chinese painting, communicating via contemporary media, and application of the design scenario
21 Sep 2020 Online interview	Mr Huang Guixing, a senior designer	The significance of the design of the work, the method and subject selection, and the participants' enthusiasm	The media transformation of traditional painting, philosophical and cultural ideas in design, artists' ideas in interactive design, and rich interaction forms such as virtual reality

Table 3. Online interviews with two experts

However, Costello (2009) offered some caveats about this approach. He believed that there might be potential compromises and dishonest responses if the experts knew the researchers. To minimise such issues, I prepared research questions in advance that were related to the experts' knowledge in their respective fields and asked them to provide responses that were as critical as possible. After thorough communication with the experts and making sure they understood my artworks, I did not immediately seek their feedback. Instead, I asked them to take the time to think deeply about my research. After sufficient time to reflect and gather information, they each completed their written response. This approach ensured that their thoughts were carefully considered and helped avoid the compromises that might occur in face-to-face interviews.

Aside from the addition of the techniques used here to avoid some potential compromises, the use of such written commentaries is common in traditional art criticism. Art critics often write articles and books as their research output, which facilitates the formation of concepts and ideological systems. Fried (1998) believes that written criticism can help explain the intrinsic meaning and value of artworks, thereby promoting a deeper understanding of artworks among audiences. Berger (2008) suggested that written commentary can provide different interpretive perspectives and viewpoints, enriching the understanding of artworks. Therefore, I proceeded to engage in in-depth face-to-face discussions with five more experts. Following the interviews, I collected data through written commentaries that they supplied.

After the first round of interviews, I completed the second artwork. I had decided whom to consult in advance and met with five experts for in-depth discussions, showing them the works that I had created (Table 4). At this point, the purpose was to invite the experts to experience my work and explore my research more directly. The data collection in the first stage helped me to evaluate the first work and design the second, but the semi-structured, online interview format made it difficult for the experts to experience the works. In contrast, the five experts in the second stage experienced the works and commented on them, drawing on their knowledge and expertise. To ensure that the feedbacks were objective, truthful, and pertinent, experts were not given a deadline for providing their responses but rather allowed to consider their answers at their leisure.

The five experts had different research and professional backgrounds. They comprehensively reviewed my research from several dimensions, pointing out problems and offering advice. Dr Cao Xingang, a graduate of the Chinese National Academy of Art, who specialises in the history of the fine arts, is proficient in Eastern and Western philosophy, so he offered his opinions on and raised questions relating to Chinese cultural communication and cultural differences between the East and West. Dr Zheng Weikun, a graduate of the China Academy of Art, specialises in Chinese painting and its philosophy; he assessed the extent to which the spirit of the freehand brushwork of Chinese painting was captured in my project. Prof. Hu Shaozong is a senior expert in literary criticism and art. He evaluated my research objectives, analysed the significance of the research, and suggested alternative interpretations and aesthetic approaches to the transformation of Chinese culture and art. Mr Liu Xiulin is a Chinese painter. He provided significant guidance on different aspects of the “Six Laws” and the concept of rhythmic vitality. The fifth expert, Prof. Gong Lin, helped me with the data collection for the second research question, focusing on media transformation and the communication of Chinese culture. He evaluated my second work, helped me to understand the insights offered by proverbs, reflected on the importance of audience participation for both virtual and real Chinese painting and narrative proverbs, and considered the function of the exhibition site and the appearance and content of the labels. The

advice provided by these experts was of great significance to the theoretical framework of this research (see Appendix 1-5).

Timeline	Experts	Content	Summary
2 Nov 2020 Met with Dr Cao and Dr Zheng for discussion 10 Jan 2021 Comment received	Dr Cao Xingang, PhD, member of the Chinese National Academy of Arts, associate professor of Shandong Normal University, and art historian with proficiency in Eastern and Western philosophy	Eastern and Western philosophy Cultural transmission Art criticism	Actuality and virtuality, subject and object Stillness in motion and motion in stillness The re-creation of the original Chinese painting can reactivate the traditional value of Chinese painting. The dynamic artistic image can encourage deep thought and cognitive interest among viewers. Differences in cultural context can explain why works can be similar in spirit and dissimilar in form. My artworks have features of contemporary art. With the help of the interactive elements, the second work reproduces the appearance of traditional Chinese paintings more closely than the first work. Will this new interpretation and cognition reduce or obscure the beauty of traditional Chinese painting?
2 Nov 2020 Met with Dr Cao and Dr Zheng for discussion 20 Feb 2021 Comment received	Dr Zheng Weikun, PhD, member of the China Academy of Art, associate professor at Hubei Normal University, and specialist in art theory and the history of Chinese painting	Chinese painting aesthetics and Chinese artistic spirit The significance of media transformation	The freehand characteristics of Chinese painting The moral sentiments and inner feelings of the original author Understanding how works can be similar in spirit but dissimilar in form to Qi Baishi's paintings How the transformation from static to dynamic activated the connections with Chinese culture and Qi Baishi's improvisational style of painting?
18 Feb 2021	Prof. Hu Shaozong, postdoctoral fellow and head	Research framework	The selection of Qi Baishi as the painter is a good choice for exploring issues of cultural

Met with Prof. Hu for discussion 3 Mar 2021 Comment received	of the School of Fine Arts at Huanggang Normal University and senior expert in literary criticism and art	Research status analysis Suggestions related to the research theme Evaluation of the artworks	transmission and the inheritance of traditions. During the interaction, participants have interesting and unexpected experiences. The second artwork opens a sensory channel for the participants, and the cultural translation is presented and elaborated effectively. Prof. Hu suggests analysing Chinese painting from social, historical, and cultural perspectives. He suggests putting the spiritual meaning of the work in context. There is a spatial contradiction between the visual expression of a static plane and that of a three-dimensional movement. Whether the goal is to disseminate knowledge of Chinese painting in foreign cultural contexts or create paintings based on the preservation, development and absorption of art should be explored further.
6 Feb 2021 Met with Mr Liu for discussion 10 Apr 2021 Comment received	Liu Xiulin, national artist of the second class, director of the Chinese Painting Studio at Hubei Academy of Fine Arts, traditional Chinese painter	Criteria for evaluating traditional aesthetics	Xie He's "Six Laws" "Brushwork should evolve with time". "Rhythmic vitality" is an evaluation criterion suitable for figure painting. Exploration of the origins and development of Chinese traditional culture
8 Apr 2021 Met with Prof. Gong for discussion 28 Apr 2021 Comment received	Prof. Gong Lin, PhD, professor at the Fine Arts College at Beijing Film Academy and practitioner and scholar of digital media art	Evaluation of the work *Mantis Catching Cicada* Cultural narrative and display forms Media transmission of Chinese culture and	Conveying the meaning of the proverb "Mantis catching the cicada without awareness of the insect-eating siskin behind it" The "siskin behind it" part of the proverb is not depicted, and the audience fills in the missing parts of the story. The employment of sound drives the story.

	proverb exchange	The interpretation of the works is effective because Chinese painting and calligraphy are inseparable. When displayed on specific occasions, *Mantis Catching Cicada* can inspire cultural consciousness.

Table 4. Face-to-face interviews with five experts

3.9 Thematic analysis

When the subject matter of a work and how to assess it are uncertain, thematic analysis of experts' reviews can help to determine the topic and ensure the validity of the research. Braun and Clarke (2006) define thematic analysis as "a method for analysing qualitative data that entails searching across a data set to identify, analyse, and report repeated patterns". Thematic analysis attempts to understand experiences, thoughts, and behaviours through a set of data (Braun and Clarke, 2012). During my research, I collected expert reviews before and after creating two artworks that were discussed within a practice framework. Theoretical research and the evaluation of practice need additional information obtained through induction and deduction to meet certain thematic objectives.

There are two main approaches to thematic analysis: inductive and deductive (Braun and Clarke 2006, 2012). Braun and Clarke (2012) explained that "An inductive approach to data coding and analysis is a bottom-up approach and is driven by what is in the data. A deductive approach to data coding and analysis is a top-down approach, where the researcher brings to the data a series of concepts, ideas, or topics that they use to code and interpret the data." The inductive and deductive methods are complementary, and I used both in my research.

The inductive analysis of experts' data proceeded in this way. The themes discussed included the aesthetic tradition, digital Chinese painting, interactive design, and media transformation. I and the experts considered whether interactive components added to Qi Baishi's flower-and-bird paintings, if they were selected to be digital images transformed by media, would convey the appearance and aesthetic tradition of original Chinese paintings. The experts and I also considered whether the selection of Qi Baishi's flower-and-bird paintings was apposite to the project, and we pondered issues such as the value of media transformation and the embodiment of Chinese culture. The experts criticised my project and expressed their opinions. The thematic framework was developed through criticism focused on traditional Chinese aesthetic standards. During this process, the experts suggested content that had not occurred to me to complement the themes and consolidate the argument.

The inductive method, used alone, was insufficient to complete the development of my research framework, so the deductive method was also employed. The experts proposed using historical context

analysis: they recommended that I consider Xie He's "Six Laws" and analyse the artistic spirit of Qi Baishi. These are the existing theoretical systems and methods that influenced the formation of the themes. Through them, the usefulness of Xie He's "Six Laws" was considered and Qi Baishi's artistic traditions were revealed. My contribution was to embed the physical movement of real objects into static painted objects through digital technology, accompanied by interactive logic settings and narratives. Throughout this process, the deductive method was used; it guided the use of existing theories to select Chinese painting genres and design and evaluate the artwork.

3.10 Self-reflection

Through self-reflection, I discovered creative paths and solutions, enhancing the innovation and theoretical depth of my artistic practice (Sullivan, 2010). Schon (2017) introduced two forms of self-reflection for artists: "reflection-in-action" and "reflection-on-action". The former occurs during the creative process, while the latter involves reviewing and analysing after a creation is completed. I applied his methods, conducting semi-structured online interviews with two experts during the creation process and receiving written commentaries from five experts after the artworks were completed. Through the experts' reviews, I reflected on the feedbacks and their relationship to my research theme, which led to the iteration of the designs, the evaluation of the works, the conceptualization of exhibitions, and the construction of theoretical knowledge. I adopted the experts' suggestions and refined them, engaging in theoretical exploration and reflection to see how they could be applied to my work as an artist and reflect on the project as a whole. I discussed and analysed the information relevant to the research themes and questions, as detailed in Section 6.5. Nelson (2013) posited that self-reflection is the core of practice-based research, allowing artists to transform their experiences into theoretical knowledge. I summarised my experiences and formulated theoretical knowledge. The experts' analyses, along with existing theories, guided my practice. Yet I was able to integrate some knowledge discovered through the process of practice into my design guidelines and include it in my considerations (see Section 7.1). Nelson (2013) believed that self-reflection not only enhanced the artist's creative ability but also promoted the development of art theory and knowledge production. I reflected on the methodology and design process in Section 7.2.

Self-reflection employs a deductive approach. I used two principles from Xie He's "Six Laws" to reflect on the first artwork, analysing the aesthetic experience of the artwork in its dynamic form. For the second artwork, I reflected on the use of Chinese adages and the theory of "negative space", comparing the artwork to a previous work, as detailed in Sections 6.2 and 6.3.

The theory of replicas and originals in art criticism is relevant to the media transformation performed in my project. The differences between the original images and my artworks are almost imperceptible.

The consideration of replicas and originals from the perspective of media theory is a deductive process. Additionally, I explored the characteristics of "incompleteness" and "openness" raised by Dr Cao (see Appendix 1) relative to my work, which was an inductive process, as detailed in Section 6.4.1.

Reflecting on how to exhibit the works involved hypotheses. As I had no precedents to work from, I used an inductive process. I considered the exhibition venue and environment, the media used for display, and the target audiences, led in Section 6.4.2. In addition to the visual interface, my works included text and sound. I analysed their functionality, as detailed in Section 6.4.3.

3.11 Conclusion

I created a flowchart to link the first and second research questions, outlining key stages that influenced the research process. In these research stages, I used the following research methods. First, in Chapter 2, I analysed the context of Chinese painting genres from the era of Confucianism to the present to explore the influence of ancient Chinese philosophy and history on paintings. My aim was to seek suitable genres and paintings for dynamic displacement. Second, I selected representative flower-and-bird paintings by Qi Baishi for media transformation. I conducted an in-depth artwork analysis focusing on the themes and spirit of his art. His artistic concept of "the artistic harmony between likeness and unlikeness" and Xie He's "Six Laws" guided my creative practice. Third, I employed RtD methodology in refining the two artworks. My exploratory practice process was a key part of the research. Xie He's "Six Laws" were the key criteria through which I continuously aimed to understand whether I was preserving Qi Baishi's spirit and concept. During the creative process, the Chinese cultural heritage computing framework helped guide my design steps. The design methods that I used were interface design, motion graphics, and narrative game development.

I used a combination of deductive and inductive thematic analysis to interpret the data from semi-structured interviews and the written commentaries of seven experts. Self-reflection played a crucial role in the iterative development process. I reflected on the written commentaries supplied by the five experts and on which of the "Six Laws" I would use to guide my works. I refined design considerations and guidelines and reflected on the methodology and design process.

4. Qi Baishi's Flower-and-bird Painting

4.1 Introduction

This chapter introduces the reasons why Qi Baishi's flower-and-bird paintings have been chosen as the starting point for exploring the transformation of the Chinese painting medium into a digital format. The meaning of "artistic harmony between likeness and unlikeness" is described. The themes and spiritual resonances of his art is analysed. The application of the principles of "conformity with nature" and "anatomical structure" described in Xie He's "Six Laws" in his paintings is demonstrated.

The signature subject of Qi Baishi's flower-and-bird paintings is the shrimp. Selecting paintings from the peak period of his artistic career is suitable for creating a design with dynamic displacement, allowing me to study and depict the shrimp found in his works. Similarly, in adapting his works featuring mantises and cicadas, I have adopted a naturalistic style to make these creatures easily identifiable for viewers. The two paintings should also allow for the movement of the praying mantis towards the cicada. I selected this motif due to the insects' role in the proverb I chose to depict in the project. The origin and significance of the proverbial story are accordingly elaborated upon in detail.

4.2 Qi Baishi's art

4.2.1 Overview

Qi Baishi (1864–1957), one of the world's most renowned painters, remains widely known in China even after his passing over half a century ago. It is rare to see such sustained prestige in the field of painting (Hu, 1999). His influence abroad is also far-reaching. As early as the 1920s, he was recognised in Japan. On 22 April 1922, when the Second Sino-Japanese Joint Painting Exhibition was held at Tokyo Prefecture Crafts Museum, Qi Baishi's works were showcased and caused a great sensation (Zhu, 2013). Later, his works were brought to Europe by Karel Chytil, a Czech painter (Pejcochova, 2010). He was valued in Chinese academic circles for his great charm and remains an important figure in Chinese art history (Liu, 2010). Qi Baishi was noted for his artistic production in both the East and West. From this perspective, Qi is not only a Chinese painter, but an artist respected across the world.

4.2.2 The artistic harmony between likeness and unlikeness

"The artistic harmony between likeness and unlikeness" can be explained by Xie He's law of "conformity with nature". As Qi Baishi (Qi and Zhang, 2009) remarked, "The shrimps I painted are different from those commonly seen. What I pursue is similarity in spirit rather than similarity in form, so the shrimps I painted look alive." In this context, "different from those commonly seen" means that Qi's shrimp paintings do not copy "real" shrimp but rather display artistic license in their approach to

the subject matter. In other words, his painting is characterised by similarity in spirit rather than form. The drive to capture the spirit of the original object is also reflected in Qi Baishi's artistic process.

Fine brushwork (also called meticulous brushwork) is realistic or similar in form to the texture of its subject, whereas freehand brushwork is dissimilar in form and may permit better expression of the artist's spirit in the medium of Chinese painting (Han, 2015). Qi pursued the perfect combination of these two styles. He inscribed one of his paintings as follows (Huang, 2014): "The beauty of painting lies in between likeness and unlikeness. Too much similarity in form is vulgar while excessive dissimilarity in form is deceptive". With his superb technical skills, his shrimp paintings achieve a balance between similarity in spirit and dissimilarity in form. Although Qi recognised that art was closely related to life, he considered it vulgar for artworks to reproduce nature exactly. The results of doing so would be untruthful and distorted (Zheng, see Appendix 2). Reality and expression correspond to the two expressive traditions of Chinese classical painting: fine brushwork and freehand brushwork. The two words can also be interpreted more broadly as reproduction and representation or realism and expressionism (Jiang, 2015). Qi Baishi's artistic goal was to give full play to both fine and freehand brushwork techniques, striking a subtle balance between the two.

4.2.3 Artistic themes of Qi Baishi

Qi Baishi's paintings focus on nature and his realistic style makes the subjects he depicts appear highly recognisable. The theme of Qi Baishi's flower-and-bird paintings resonated among people of different cultural backgrounds, a circumstance which was in turn conducive to the recognition and development of his painting. Therefore, it is important to adopt his flower-and-bird paintings as the basis for media transformation.

There are two key historical factors through which Qi Baishi can be evaluated (Wu, 1956). The first is his attitude towards labouring people. Qi took the standpoint of the working people in his paintings because he was born into the peasant class himself and possessed virtues of the working people, such as diligence and simplicity. The second lens through which his works can be evaluated is artistic realism. Qi respected objective facts. He did not draw the unseen but instead carefully observed shrimp, crabs and plants. While absorbing the essence of paintings by Huang Quan, Xu Xi, Bada Shanren, Wu Changshuo and other masters for their imagery and skilful use of brush and ink, Qi Baishi painted works that uniquely celebrate folk art, craftsmanship, simplicity, fortitude, authenticity and love for life (Lang, 2016). In art, Qi Baishi opposed blindly imitating the ancients and rectified the deficiencies of painters in the Ming and Qing dynasties who ignored reality and took a subjective point of view. People recognise that Qi Baishi's works are realistic because he used empirical observations as the source of his art (Li, 1958).

His observations of his surroundings were the source of inspiration for his painting. The objects that he painted, including plants, shrimp, fish and crabs, are commonplace, but he made them appear vivid and lively, as if they were naturally jumping, crawling or swimming on the paper. Qi Baishi's paintings stand out from other artworks in this way, reflecting his proximity to nature and connection to the world (Lang, 2016). It is because his art is based in the experiences of the common people that his paintings can be considered realistic (Li, 1958).

4.2.4 Artistic spirit of Qi Baishi

Qi Baishi poured his heart and soul into his flower-and-bird paintings. He imbued them with a simple and naturalistic spirit, making the rigid language of ink painting more intriguing and approachable to ordinary people. Chen Suixiang, a research fellow at the Chinese National Academy of Arts (Zi, 2007), commented that the value of Qi Baishi's paintings lies in the fact that they capture the spirit of what is represented rather than mechanically reproducing what is seen. They are similar in spirit but dissimilar in form and so are readily acceptable to the people at large. Qi Baishi extended the subject matter of Chinese painting to secular and peasant themes as well as other popularly legible motifs, helping to make highbrow Chinese painting more approachable. As a folk artisan, Qi Baishi strove to adapt Chinese folklore to the standards and taste of the literati and worked to develop a systematic, highbrow form of art that ordinary people could understand. What Chen Suixiang said of Qi Baishi suggests that Qi was trying to popularise Chinese painting while elevating the aesthetic taste of the common people. By achieving a balance between popularisation and the elevation of the aesthetic taste of the common people, he made Chinese flower-and-bird painting more approachable and thus more readily accepted and appreciated by the public. In this way, the elegance of ink paintings and the roughness of folk art are perfectly integrated to create an aesthetic balance.

Qi Baishi's painting was, as previously noted, firmly rooted in folk art. His unpretentious nature and insight into and love for life were expressed through his use of brush and ink. The preservation of his brushwork would thus be conducive to the effective continuation and communication of his artistic sentiments. Qi Baishi's paintings not only echo his stances as a scholar but also mirror Chinese culture, the historical context in which Qi worked and regional characteristics of the places in which he lived. Therefore, his flower-and-bird paintings are perhaps particularly well understood and accepted by people from a variety of cultural backgrounds and could play a positive role in cultural communication after media transformation.

4.3 Qi Baishi's shrimp paintings

4.3.1 Analysis of the shrimp paintings

From the body of Qi Baishi's flower-and-bird paintings, I have chosen works featuring shrimp, his best-known motif, as the subject matter for media transformation. The shrimp painted by Qi Baishi were signature elements in his works, and he painted them in a way that captured both their spirit and form, demonstrating his superb technical skills and mental acuity. As Qi Baishi's disciples, Hu Tuo and Hu Peiheng, noted (1959): "Qi's paintings are best known for three subjects: shrimp, crab and chicken, of which shrimp is painted most marvellously." In his study of the development of Chinese flower-and-bird painting, Jiang Jin (2001), a professor at the Guangzhou Academy of Fine Arts, said that, "Qi Baishi's originality lies in the painting of shrimp, given his superior ability in conveying the animal's transparent bodies in spite of the difficulty of handling watery ink. His shrimp paintings are thus of great value in the history of Chinese art."

When applying Xie He's law of "conformity with nature," careful observation of the subject is crucial to its effective representation. When Qi Baishi began to observe shrimp and draw them in a naturalistic manner, he had long kept a few river shrimp in a bowl of water on his painting table. Qi would look at them closely several times a day, examining their shape and the way they swam and touched them with the handle of a painting brush to make them jump (Hu and Hu, 1959). As Hu Peiheng and Hu Tuo have pointed out (1959), the shrimp painted by Qi are known as white shrimp (Figure 26) and live in rivers rather than the sea. Indeed, based on Qi Baishi's place of residence, he would have seen shrimp more often in rivers than in the sea. Qi preferred painting white shrimp because of their transparent bodies, whose translucency was easier to convey with light ink. After decades of practice, he finally succeeded in making white shrimp appear "real" in his paintings.

Figure 26. White Shrimp, Copyright: Chinese Quora, Source: https://zhuanlan.zhihu.com/p/437551597

Analysing Qi Baishi's shrimp paintings to understand their unique qualities requires an application of "anatomical structure." According to the description of Qi Baishi's disciples (Hu and Hu, 1959), while painting shrimp, Qi first delineated the shrimp's cephalothorax and abdomen with light ink, followed

by the head with dark ink. As the dark ink wash diffused into the light ink, the shrimp's head became more transparent. Qi painted the shrimp's abdomen with five interconnected brushstrokes, with the third stroke forming the arching abdominal segment. He painted the shrimp's body with a single stroke, and the watered ink gradually spread over the surface of the rice paper, highlighting the shrimp's transparency. Before painting the shrimp's legs, chelae and antennae, Qi would pause for a moment, considering once again how they should be arranged in a painting. Most importantly, he would decide whether the painting would present swimming or motionless shrimp, as that decision would have a direct bearing on the painting of these parts. In Chinese painting, once a brushstroke is made, it cannot be modified, so a pause for consideration can prove helpful. The pause, however, should not last too long. A painting's spiritual liveliness is what Chinese painters pursue. The shrimp's swimmerets should be painted with connected brushstrokes, and the swimmerets and tail should contain inks of differing densities to create a sense of continuous movement. The shrimp's chelae and arms are the main parts related to its movement. When a shrimp is swimming quickly, its arms straighten, its chelae are tightly closed and its antennae curve backwards; when it is swimming slowly, its arms bend, its chelae open as if to hold something and its antennae are either motionless or move in small arcs. Its long antennae should be in constant motion. My design of the shrimp's movement in my artworks will thus reflect the issues that Qi Baishi had to consider when painting them.

4.3.2 The digital image of selected shrimp painting

In study of Qi Baishi's unique style of shrimp paintings, Qi Fu (2016) observed that Qi Baishi's shrimp paintings evolved through six stages: copying (1912–1920), naturalistic drawing (1921–1929), refinement (1930–1938), maturity (1939–1948), apotheosis (1949–1953) and back-to-basics creation (1954–1957). I have chosen a representative painting of Qi Baishi's apotheosis period titled *Two Shrimps* (Figure 27). This painting, containing only two shrimps surrounded by ample open space, allows for a clear and effective analysis of the aesthetic changes in Xie He's laws of "rhythmic vitality" and "artistic composition and grouping" after dynamic displacement by the two shrimps. The brushstroke of dark ink reveals the shrimp's head and its body is represented by a line made with a single brushstroke. In this way, the shrimp was given a full appearance, with the edges of its abdominal segments blurred and its abdomen arching slightly in the middle as if it was moving. The number of the shrimp's abdominal segments was reduced to five and the number of its swimmerets was fixed at five. From this point onwards, the number of abdominal segments and swimmerets in Qi Baishi's shrimp paintings did not change.

Figure 27. Qi Baishi, *Two Shrimps*, late 1940s. Ink wash, 18 x 28cm. This picture is published in: *Album of paintings.* Beijing: Rong Bao Zhai Collection.

4.4 Qi Baishi's mantis and cicada painting

4.4.1 Overview

In Qi Baishi's paintings, insects were mainly depicted using fine brushwork (meticulous brushwork), whereas plants were generally rendered in freehand brushwork, thus capturing the physical characteristics of different objects while conveying their spirit. Most of Qi's mantis and cicada paintings feature meticulous brushwork and highly detailed shapes (Liu, 2015). Jiang (2001) believes that compared with the brushwork of the shrimp paintings, the brushstrokes used in the mantis and cicada works tend to be more elaborate. From the perspective of technique, the meticulous flower-and-bird paintings were painted in a detailed style and featured contours sketched in lines. The use of ink was different in the freehand flower-and-bird paintings. The technique of the meticulous mantis and cicada paintings generally involved line drawing and constituted the basis of form and the starting point, whereas the shrimp have less restrained brushwork.

4.4.2 The story of the proverb

I chose Qi Baishi's mantis and cicada paintings for my practice from the many meticulous insect works in his oeuvre. I primarily selected these paintings for their relationship to a well-known story about a mantis and a cicada. A story of a mantis stalking a cicada is found in the ninth volume, *Zhengjian* (Correct Remonstrance) of *Shuo Yuan* (the Garden of Stories), and was written during the Western Han Dynasty (Wu, 2006). The story begins with a cicada on a big tree in a garden, chirping away and drinking the dew, unaware that there is a praying mantis behind it. The praying mantis is trying to catch the cicada, equally unaware that there is a siskin beside it. The siskin is about to peck at the praying

mantis, unaware that someone is aiming a catapult at it. The three small creatures are so eager to profit from something directly in front of them that they fail to recognise the dangers behind them. This story is used to warn people not to focus exclusively on immediate gains. The story is set in China's Spring and Autumn Period (approximately 770–476 BC), when one of the stewards of the king of Wu State used it to warn the king against being so intent upon immediate gains that he ignores the hidden dangers behind him. Cleverly using this metaphor, the steward managed to dissuade the king of Wu State from attacking the state of Chu, thus avoiding a perilous war.[1] The story of the mantis stalking the cicada spread across the country and even found its way into Chinese primary school textbooks. Almost everyone in China knows the meaning of this proverb, referred to as "Mantis Catching Cicada, Siskin Behind" (螳螂捕蝉，黄雀在后). Today, people tend to say, "the mantis catches the cicada, unaware of the siskin lurking behind it". This well-known proverb is a standard admonishment in traditional Chinese culture. My work therefore explores the Chinese culture embodiment through narration by using Qi Baishi's paintings as a vehicle.

4.4.3 Two digital images of selected mantis and cicada

Viewing Qi Baishi's mantis and cicada paintings from different periods, I find that the images of the insects vary little, while the plants are painted in different ways. For example, when looking at *Mantis and Rice* (Figure 28) and *Mantis on Peepul Leaf* (

Figure 29) (1908–1909) as well as *Mantis on Maple Leaves* (Figure 30) (1942), it can be seen that the mantises are portrayed in different postures and from different angles, but their form and brushwork barely change. Viewing four cicada pictures painted by Qi Baishi at different times – *Autumn Cicada on a Branch* (Figure 31) (1908–1909), *Autumn Cicada on Chinese Honey Locust* (Figure 33) (1924), *Autumn Cicada on a Green Willow* (Figure 34) (late 1930s) and *Chirping Cicada on Autumn Leaves* (Figure 35) (1952), there is little variation in the cicada images. All of the paintings are realistic and characterised by meticulous brushwork, although the earliest of the four paintings looks slightly different from the other three works, as the plant in it is painted realistically, with meticulous brushwork,

1 During the Spring and Autumn Period in China, the vassals were divided. The king of Wu intended to attack the neighbouring state of Chu. His ministers were worried, but the king was so determined that no one dared raise any objection directly. However, a young steward of the king hoped to impress on him the risk involved in attacking Chu. On a rainy day in the king's garden, the steward was carefully examining a large tree. Confused, the king asked the steward what he was doing, and the steward replied: "I see a cicada drinking the dew, not knowing that there is a praying mantis leaning forward to catch it. And the praying mantis is unaware that there is a siskin beside it. The siskin, again, does not know that I'm holding a catapult aimed at it." Having heard this, the king had a moment of enlightenment and gave up his plan of invasion. As the period was not a peaceful one, if the king waged an all-out war against another state, his state would be in danger of being attacked by others. As a result, such a war might cost the king his kingdom.

Source: https://zhidao.baidu.com/question/48257604.html

while the plants in the other three paintings were depicted using relatively freehand brushwork. There are some similarities between the *Mantis on Peepul Leaf* (

Figure 29) painted by Qi Baishi at the age of 45 and the *Insects and Peepul Leaves* (Figure 36) painted by the artist at 80. The similarity is that both the mantis and cicada rest on the peepul leaf.[2] Qi created a representative subject – "peepul leaf and meticulous insects"– to use in both paintings. Lang (2016) observed that the special combination of painting peepul leaves and insects in meticulous brushwork and painting branches in freehand brushwork is different from the combination of painting insects in meticulous brushwork and painting flowers in freehand brushwork. Neither the paintings with freehand style of plants such as *Mantis on Maple Leaves* (Figure 30), *Autumn Cicada on Chinese Honey Locust* (Figure 33), *Autumn Cicada on a Green Willow* (Figure 34) and *Chirping Cicada on Autumn Leaves* (Figure 35), nor the meticulous paintings *Autumn Cicada on a Branch* (Figure 31) and *Mantis and Rice* (Figure 28) display the combination of painting insects in meticulous brushwork and painting flowers in freehand brushwork; the *Mantis on Peepul Leaf* (

Figure 29) and the *Insects and Peepul Leaves* (Figure 36) are in the style of "peepul leaf and meticulous insects". These two paintings were produced at different times. From middle through old age, Qi Baishi used the special combination that characterised his paintings with the insect on peepul leaf subject. While both works share the defining traits of the meticulous insect on peepul leaf paintings, the tree leaves and branches in the *Insects and Peepul Leaves* (Figure 36) are painted more spontaneously than those in the *Mantis on Peepul Leaf* (Figure 29).

2 Peepul leaves are the leaves of Bodhi tree. "Bodhi" is a Sanskrit term meaning "awakening." It is a Buddhist concept that refers to the understanding of truth.

Figure 28 (left). Qi Baishi, *Mantis and Rice*, 1908-1909. Ink and colour on paper, 33.5 x 32.5cm. This picture is published in: *The Collected Works of Qi Baishi*, Vol. I, p.96. Hunan Fine Arts Publishing House.

Figure 29 (right). Qi Baishi, *Mantis on Peepul Leaf*, 1908-1909. Ink and colour on paper, 33.5 x 32.5cm. This picture is published in: T*he Collected Works of Qi Baishi*, Vol. I, p.101. Hunan Fine Arts Publishing House.

Figure 30 (left). Qi Baishi, *Mantis on Maple Leaves*, 1942. Ink and colour on paper, 31.5 x 25.5cm. This picture is published in: *The Collected Works of Qi Baishi*, Vol. V, p.151. Hunan Fine Arts Publishing House.

Figure 31 (middle). Qi Baishi, *Autumn Cicada on a Branch*, 1908-1909. Ink and colour on paper, 33.5 x 32.5cm. This picture is published in: *The Collected Works of Qi Baishi*, Vol. I, p.93. Hunan Fine Arts Publishing House.

Figure 32 (right). Huang Quan, *The Sketching of Rare Birds* (detail), the Five Dynasties. Ink and colour on silk. The Palace Museum.

Figure 33 (left). Qi Baishi, *Autumn Cicada on Chinese Honey Locust*, 1924. Ink and colour on paper, 33.5 x 34cm. This picture is published in: *The Collected Works of Qi Baishi*, Vol. II, p.233. Hunan Fine Arts Publishing House.

Figure 34 (right). Qi Baishi, *Autumn Cicada on a Green Willow*, late 1930s. Ink and colour on paper, 26.5 x 20.3cm. This picture is published in: *The Collected Works of Qi Baishi*, Vol. IV, p.310. Hunan Fine Arts Publishing House.

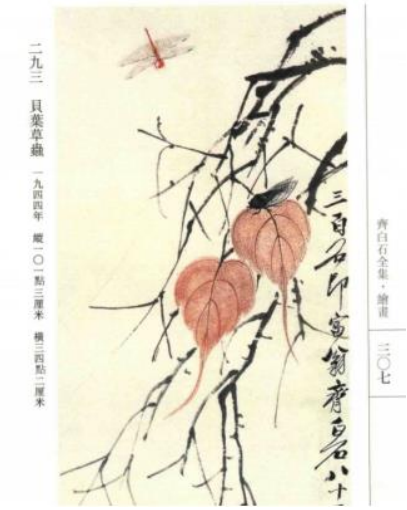


Figure 35 (left). Qi Baishi, *Chirping Cicada on Autumn Leaves*, 1952. Ink and colour on paper, 31.5 x 25.5cm. This picture is published in: *The Collected Works of Qi Baishi*, Vol. VII, p.141. Hunan Fine Arts Publishing House.

Figure 36 (right). Qi Baishi, *Insects and Peepul Leaves*, 1944. Ink and colour on paper, 101.3 x 34.2cm. This picture is published in: *The Collected Works of Qi Baishi*, Vol. V, p.307. Hunan Fine Arts Publishing House.

An enlarged detail of the cicada depicted by Huang Quan in *The Sketching of Rare Birds* (Figure 32) can be compared with the cicada drawn by Qi Baishi (Figure 31). Qi's approach is similar in many respects to Huang's mode of realistic painting. Qi Baishi seems to have inherited the essence of his predecessors' styles, and his paintings exude a luxurious aura. This aspect of his work is representative of the "copying of classical masterpieces" (one of Xie He's "Six Laws").

I selected two of Qi's paintings, *Mantis and Rice* (Figure 28) and *Autumn Cicada on a Branch,* (Figure 31) as the base images of my interactive work for four reasons. Firstly, both paintings were completed in the same style in the same year, so the viewer would not sense incongruities between them. Secondly, both insects are characterised by meticulous brushwork. They are relatively realistic and their subjects are easy to recognise. Therefore, their style is not a barrier to understanding for people of different educational backgrounds and ages. Thirdly, the design goals of the two paintings are clear. The trunks and leaves in meticulous plant paintings were painted similarly. The goal of the design of this interactive work was not to appreciate Qi Baishi's paintings but to focus on his paintings as vehicles for narrating and shedding light on a proverb rooted in traditional Chinese culture. Finally, the compositions of *Mantis and Rice* and *Autumn Cicada on a Branch* made setting the movement trajectory for the mantis easier.

4.5 Conclusion

Qi Baishi is widely recognised by the public as a great modern artist. In his flower-and-bird paintings, he drew on the strengths of his predecessors, developing a realistic style and depicting approachable subject matter. These two features facilitate the public's acceptance of Qi's works, which can appeal to those who have an otherwise limited knowledge of Chinese painting and have only just begun to appreciate it. If ink-wash paintings are overly abstract or have subjects that are unfamiliar to most people, viewers may not relate to them.

This chapter details why I select three works by Qi Baishi for my practice. It analyses the characteristics of the shrimp depicted in Qi Baishi's paintings in terms of his brushwork, painting process, and aesthetic development. This analysis facilitates a better understanding of his style, particularly his forceful brushstrokes and realistic imagery, while providing a basis for the practice detailed in the next chapter. Subsequently, I will explore how to combine Qi's brushwork and lifelike imagery to create dynamic objects. The distinctive brushwork in Qi's shrimp paintings and their vivid depiction of animals make them suitable for dynamic displacements that enhance the dynamics of static images. In Chapter 6, changes in the "rhythmic vitality" and "artistic composition and grouping" of Qi's paintings are detailed. This chapter also differentiates the meticulous brushwork used in Qi's mantis and cicada subjects from the more painterly style of his freehand brushwork paintings of shrimps, provides a detailed explanation of the cultural context and moral of a proverb suggested in his works and sheds light on their significance as a foundation for narrative art.

I chose three works by Qi Baishi for this project and produced two interactive works. Specific flower-and-bird paintings that are suitable for dynamic displacement can be identified based on the analytical logic and methodology presented in this chapter.

5. Practice of Two Movable Shrimps and Mantis Catching Cicada

5.1 Introduction

This chapter presents the design of *Two Movable Shrimps* and *Mantis Catching Cicada*, two interactive works I created based on three of Qi Baishi's paintings – *Two Shrimps, Mantis and Rice*, and *Autumn Cicada on a Branch* – which were discussed in the previous chapter. It outlines the process and methodology of media transformation and explains how the practice adheres to traditional concepts and standards. *Two Movable Shrimps* responds to first research question (How can Chinese paintings be made dynamic and interactive while preserving the aesthetic tradition in which they participate?) and *Mantis Catching Cicada* reflects second research question (How can Chinese cultural elements be embodied by the interactive design of objects in digital Chinese paintings?).

For both works, I employed the same method of analysing the use of brushworks, obtaining images, rigging (bone binding), and weighting. Therefore, I decided to use the more challenging work, *Two Movable Shrimps*, as an example in this chapter and have described its design process in detail. While using the same design process, *Two Movable Shrimps* and *Mantis Catching Cicada* differ in their interaction logic and presentation, so the creative thinking and concept behind each work is elaborated. Additionally, the scripts resulting from the primary interaction logic are provided in Appendix 7.

The design process can be divided into three steps. The first step is to accurately extract every brushstroke from the digital image. The second step involves binding the bone structure information obtained from the anatomical analysis of Qi Baishi's flower-and-bird paintings and observations of the real movement patterns of shrimp to produce an artistic imitation. Artistic imitation here refers to the representation of real objects in planar images. Artists and designers should showcase their artistic creativity and imagination, drawing inspiration from Qi Baishi's concept of "the artistic harmony between likeness and unlikeness". Lastly, the interaction logic is designed such that *Two Movable Shrimps* focuses on moving the objects to interface touched positions while *Mantis Catching Cicada* aims for a clear narrative expression.

5.2 Two Movable Shrimps

5.2.1 Overview

I completed the entire media transformation process using Adobe Photoshop (any version) and Unity (version 2019.3 or later) software. Photoshop is a highly practical graphic design program that ascertains the accuracy of image acquisition, while Unity can ensure that the interaction logic I set can be effectively communicated through the programming. Photoshop was used primarily for image matting. With mask matting in Photoshop, every part of the shrimp image can be preserved as

authentically as possible. The re-created version can therefore resemble its counterpart in the original painting as closely as possible, and the quality of the original painting can be preserved. Unity was used primarily for animation and the writing of interactive script code. The project was eventually exported through Unity to a mobile terminal.

The requirements for rigging and weighting are particularly precise. For example, when dealing with a multiline drawing with an intertwined structure, any problem in rigging or weighting during the two-dimensional animation process can result in a fragmented or torn appearance. A Unity plug-in called 2D Animation was used to solve this problem. This plug-in enables its users to apply rigging to the PSB files with layers and channels that were exported from Photoshop, make keyframes through rigging in Unity 2D, and write code to string all the actions into a logical animator process to achieve interaction.

Viewers can interact with *Two Movable Shrimps* by clicking the mouse on a computer equipped with the Unity program. To facilitate media communication, the program should be exported to the media terminal. Unity was installed using the Android and Apple iOS SDKs to export to Android or Apple phones or export exe files to tablets to achieve screen interactions with media terminals.

5.2.2 Matting

To achieve the design goal, I had to ensure that every part of the depicted object in the picture was captured without any loss to provide a reliable foundation for the subsequent rigging. To do this, I analysed the structure represented by each brushstroke. Compared to Qi Baishi's paintings with meticulous brushwork, such as *Mantis and Rice* or *Autumn Cicada on a Branch*, in which the objects depicted have a relatively clear structure, *Two Shrimps* is freehand brushwork and more challenging to analyse. This is because it contains more water in the ink; this ink spreads across the surface of the work because of the unique characteristics of the painting's rice paper support. Additionally, analysing the density of the ink, the amount of the surface covered by brushstrokes, and how the forms are distributed requires some background knowledge of the art of Chinese ink wash painting. This analysis involved the application of the law of "anatomical structure" described in Xie He's "Six Laws". The technique used to create *Mantis Catching Cicada* was comparable to that used in producing *Two Movable Shrimps*. However, due to its higher complexity,

In Qi Baishi's paintings of shrimp, each brushstroke has a refined artistic structure. Notably, the stroke that corresponds to the shrimp's tentacles is subtly elongated. When digitally capturing the tentacles using graphic design software, it is necessary to exercise caution. Whether a mask or marquee is used, some information may be lost, resulting in the incomplete capture of the tentacle. Figure 37 shows the result of image matting using a mask in Photoshop; a) is a screenshot of the mask, and b) exhibits the captured image. It is essential to separately capture each structure represented by each part of the

brushstroke. The independent existence of each form/structure is the prerequisite for their dynamic transformation.

(a) (b)

Figure 37. Screenshots in Photoshop, (a) a screenshot of the mask, (b) the captured image

There are 25 parts of a shrimp that need to be extracted separately. The upper shrimp's abdomen needs to be extracted in five pieces (each corresponding to a layer) which are then combined to form the picture of a complete abdomen (Figure 38a). Qi Baishi painted the abdomens of shrimp in five brushstrokes from the maturity stage onwards, with every brushstroke representing a joint in the shrimp's abdomen (Qi, 2016). The abdomen therefore needs to be extracted in five pieces to reflect this stylistic choice. The space between the joints is darker in colour because of the fusion of ink. This space reveals not only the link between the joints, but also the position where the joints turn according to the forceful brushstrokes in Xie He's law of "anatomical structure". Based on the joint between the brushstrokes, the abdomen can be clearly divided into five segments (Figure 38a). It should be noted that each selected part should be as saturated in colour as possible. Otherwise, the underlying transparent layer will show through between the joints.

The body of the shrimp painted by Qi Baishi is divided into two main parts (Figure 38b): the front elevation of the shrimp's body and the part connected to the abdomen. It should be noted that there is an overlap between two brushstrokes on the animal's cephalothorax, based on the marks made by Qi's brush. To give the cephalothorax an appearance of fullness, the overlap should be retained. His painting shrimp has eight legs in total, including three walking legs and five swimmerets (Figure 38c), which again correspond to eight different layers. Other parts (Figure 38d) include six small antennae, two chelae, and two eyes. Through careful observation, a few overlapping structures require differentiation. One may find that in the picture the upper shrimp's part in red overlaps with the lower shrimp's abdomen, so this part should be kept when extracting the antenna. The shrimp consists of 25 pieces in

total. To avoid confusion, the 25 layers can be named after the corresponding parts of the shrimp. The lower shrimp likewise contains 25 pieces. As required for interaction, the two shrimps should be exported separately. By hiding layers, these 50 pieces of two shrimps are exported as a PSB file instead of a PSD file.

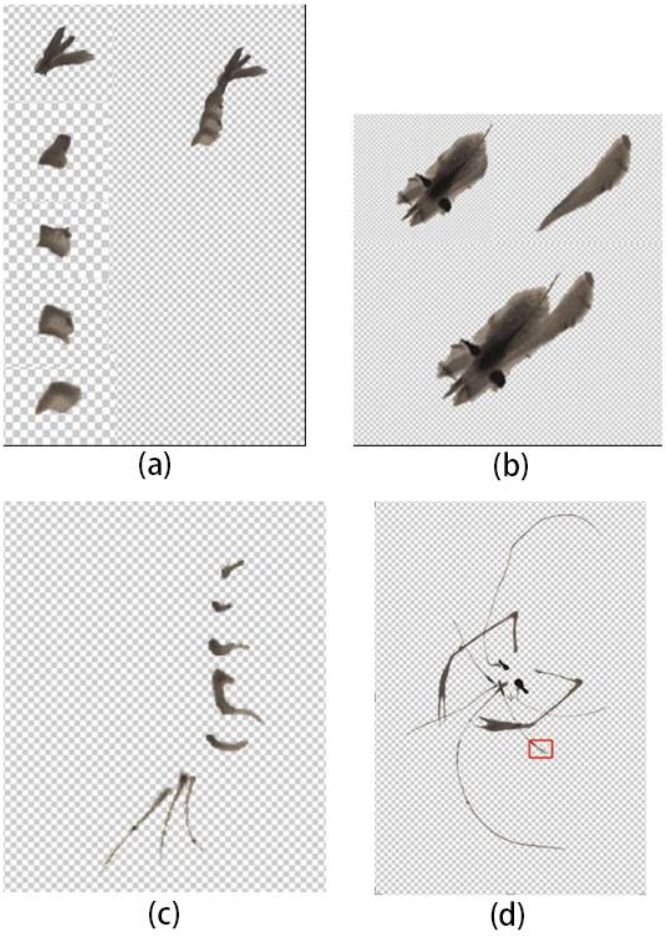


Figure 38. Screenshots in Photoshop, (a) abdominal segments and abdomen, (b) cephalothorax, (c) swimmerets and walking legs, (d) tentacles and chela

5.2.3 Bone binding and weights

The PSB file imported into Unity will be automatically converted into sprite meshes – in the state of sprite meshes can be bound with bones (or skeletons). The main rigging editing menu includes Bones, Geometry, and Weights. The upper shrimp is used here as an example. In the Bones column, the Preview Pose function shows the preview state. Clicking on Create Bones, we can design the first main bone, which serves as the parent of all other bones. In other words, all the remaining bones are subsets of this bone, much like the branches of a family tree. This first bone should be placed in the main part of the shrimp's body. After the first main bone is created, it will automatically connect to the second bone, which should be placed on the shrimp's head. We can click on the start and end points of the main bone

to randomly pull out a bone and bind the nearby eyes to it. If the bone is pulled out from the start and end points of the main bone, there will be a hint of connection in the middle. Only by connection can we ensure that every bone is derived from a hierarchical set. In this way, bones for the entire shrimp are bound to the rig, and the number of bones is not fixed. However, to enable the shrimp's body parts, such as the delicate antennae, to turn and move, multiple bones are needed. The positioning and joints of the bones should be designed with artistry and imagination. In terms of imagination, the growth of the shrimp's body parts as painted by Qi Baishi can be kept in mind. As far as artistic quality is concerned, some understanding of the anatomy of the shrimp's body parts is required. For example, the number of segments in the structure of the lower shrimp's abdomen can be inferred from Qi Baishi's brushstrokes. As shown in Figure 39, the shrimp's abdomen consists of five parts from black number one to five. Each part needs to be bound to a separated bone. The red line segments (A, B, C and D) represent the vivid depiction of the abdomen's physical contortions by the Xie He's law of "anatomical structure", helping one to imagine the movement of each segment.

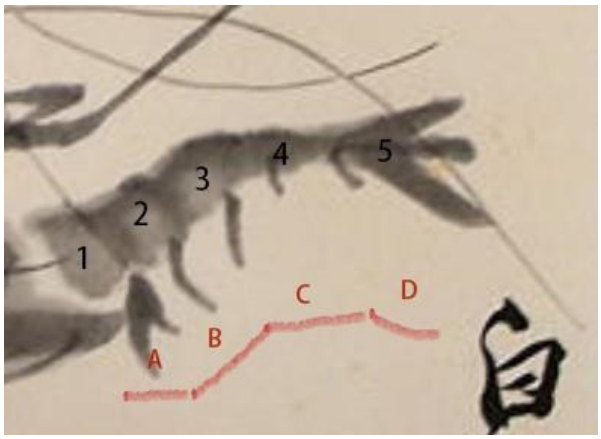


Figure 39. The structure and contortions of the abdomen

The upper and lower shrimp are shown with their bones bound in Figure 40a and 40b. In this way, a parent-child hierarchy is established for all of the bones and can be controlled by the parenting hierarchy of the motion graphic design outlined in Section 3.7. Bones are bound to each part of the body of the shrimp, allowing it to be dynamically transformed. Bones in certain areas, such as the abdominal segments, correspond to structures represented by single brushstrokes; for other body parts, such as tentacles, multiple bones are required.

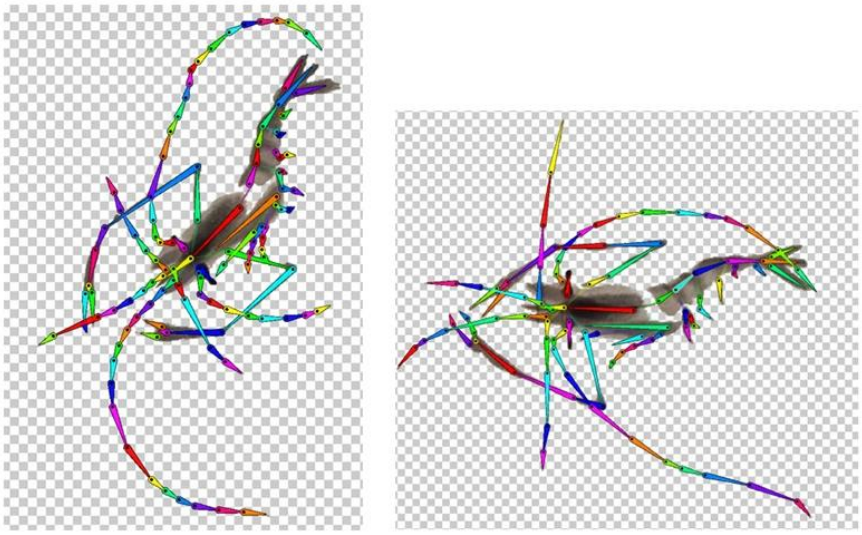


Figure 40. Bone binding, (a) upper shrimp with bones bound, (b) lower shrimp with bones bound

Subsequently, the parent-child hierarchy of the skeleton is analysed with a focus on identifying the level of the skeleton that can affect the dynamic transformation. For the dynamic transformation of an object, weights must be assigned to bones in such a way that when the bones are in motion, the structures associated with them will move in tandem. The plug-in 2D Animation in Unity has an automatic weighting function (Figure 41a). The result of the automatic weighting was not satisfactory, so it was necessary to manually modify each structural part. For example, one chela of the shrimp in Figure 41b is affected by several other bones. As computers can only identify the bones covered by each of the 50 sprite meshes extracted in Photoshop, it is necessary to remove the impact of these bones, or the resulting form will be torn. The impact of the bones covered by each sprite mesh is addressed in this way. In addition, the extent of the weights' impact largely depends on the number and area of vertices on the skin. As shown in Figure 41c, the vertex enclosed in the red box is automatically detected as an error by the computer, and these vertices must be adjusted manually.

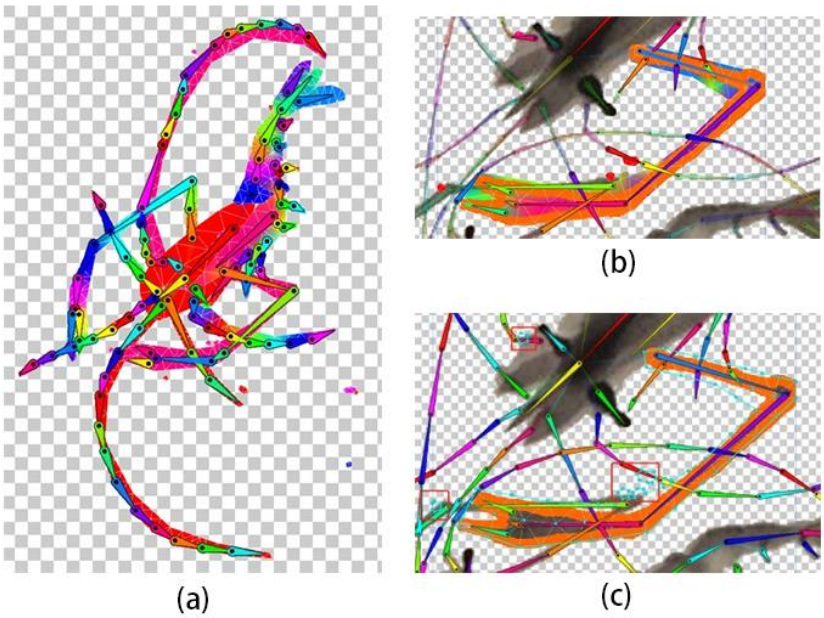


Figure 41. Bone weights, (a) automatic bone weights, (b) an automatic bone weight of chela, (c) some incorrect vertex information

5.2.4 The way of movement

To adhere to the traditions of Chinese painting, the concepts and standards outlined in Xie He's "Six Laws" are implemented as design guidelines. The preceding chapter analyses Qi Baishi's painting style and process to guide the extraction of information from Qi's paintings and the process of bone binding. The analysis of his paintings draws on the concept of "anatomical structure" found in the "Six Laws". Moreover, the dynamic transformation of the object requires the use of the "conformity with nature" method of creation outlined in the "Six Laws". This method involves the dynamic simulation of movement based on the objective laws of motion.

To observe the swimming patterns of shrimp, I kept a few river shrimps and watched slowed-down online videos of the animals. After a period of observation, I found that shrimp generally rely on sequential movements of their swimmerets to control how they swim forward; their abdomens bend slightly while they swim. Other parts of the body have little effect on swimming ability. Sometimes the shrimp jump up suddenly, with their abdomens bending, an ability that is helpful when they try to escape from danger. Normally, they keep their bodies slightly bent while moving their swimmerets.

Designing movements based on the way real shrimp swim was very important to the design of the overall movement pattern. Qi Baishi kept shrimp for a long time to observe and learn how to paint them, sometimes providing outside stimuli to observe their habits. By studying real shrimp, honing his painting skills for decades and channelling his emotions into his work, Qi finally achieved a resemblance in spirit between his artworks and the objects he depicted. Painting shrimp based only on

a mental image, rather than on the movement of actual shrimp, would be considered deceptive, but copying their appearance without any changes would be deemed kitschy (an illustrative example of Qi Baishi's "the artistic harmony between likeness and unlikeness"). Therefore, the movements I designed were based on the movement patterns of real shrimp, in accordance with Qi Baishi's artistic intentions and practice.

An example of simulating one of the crucial links in the law of physical motion is provided. The swimmerets of a swimming shrimp move very quickly, so I made them the primary focus for dynamic transformation. To understand their movement, I filmed a video of shrimp swimming and watched it in slow motion. Each group of swimmerets moved rhythmically in sequential order. In Unity, motion graphics are designed by adding keyframes to the timeline (see 5.2.6 Figure 43b). I used Animator in Unity to simulate those movements. I started by pulling the timeline to move the first swimmeret, and then pulled the timeline to move the second one. However, the first swimmeret had to move again in response to the movement of the second; when the third swimmeret was moved, the first and second swimmerets moved again, and this process was repeated until all five swimmerets had moved one round. After that, I pulled the timeline to move the swimmerets (starting with the first one) back to their original positions, following the same process, thereby completing a sequence of the swimmerets' movements in swimming. The movements that I designed in this way reflected the appearance of motion in real shrimp. Because shrimp move very rapidly, the dynamic timeline of this round could be compressed, and I was able to copy a few parts of the timeline to make the movements faster. Eventually, the movement of a real shrimp's swimmerets was simulated.

5.2.5 Interaction logic

The interaction was designed to allow the shrimp to swim to a point on the screen touched by the participants. During this interaction, the speed with which the shrimp moves was reflected by changes in the actions of its swimmerets and antennae. The interface presented the original image authentically, allowing it to retain the traditional value of the original painting. People can interact with masterpieces by using interactive interfaces.

Qi Baishi used a painting brush to stimulate the shrimp he kept and observe their habits. This was a type of interaction, as touching shrimp with a brush or finger startles them. But if we treat shrimp as pets, touching them would draw them closer. This action would highlight Qi Baishi's love for life and elicit a similar feeling in participants encountering the interactive artwork. After each interaction, the shrimp automatically returned to their original positions, as though mirroring Qi Baishi's life or the memories underpinning his painting. Each interaction could feel like an exploration of the relationship

between Qi Baishi and the shrimp he painted, though different people would have different interactive experiences.

Section 4.3.1 provides a detailed description of Qi Baishi's process of painting shrimp. He drew some parts of shrimp quickly and others slowly, with pauses for thought and observation. Through interaction logic, it is possible to simulate Qi Baishi's rapid style of painting as well as his intermittent pauses. The fast and slow movements resemble the speed changes that take place when shrimp move, while the pauses represent the intervals when participants interact with the shrimps. I created a finite state machine for cyclic interaction (Chart 2). The first set of actions, Up/Down Original (Up/Down denotes the shrimp on top and bottom), represented the start and end states for the interaction logic to be concatenated. There were five steps: original state, activation, movement, left and right turning, and automatic initialisation (back to original state again). What was initially presented was a digital picture of Qi Baishi's *Two Shrimps* in its original state. When a shrimp's body was touched, Up/Down Alive was triggered and the shrimp would only shake its body. When one clicked on an area other than a shrimp's body, Up/Down Move was activated, and a random number of shrimp would move to the point that was touched. At the same time, the body or bodies of the shrimp would automatically turn left and right in accordance with the orientation of the touched point, which was Turn Left/Right. After moving to the point that was touched, the shrimp would be in the Alive state, waiting for the next command. If the touch was repeated, the foregoing process recurred. If no interface touch was recognised, both of the shrimp would automatically shift into the Move state and return to their original position, which was the initial state of the original image.

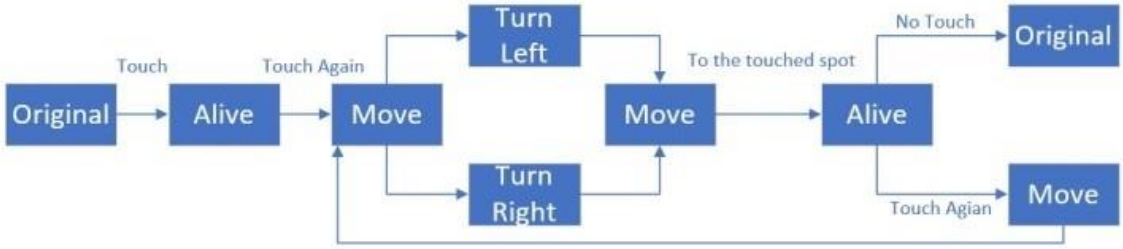


Chart 2. A cyclic finite state machine

In the five states corresponding to the interaction logic, the first state, Up/Down Original, did not require any editing and should remain unchanged. In the second state, Up/Down Alive, the shrimp was active (Figure 42a) (i.e. swimming). In motion graphics, the shrimp moved slowly, and the movements of its swimmerets looked natural to the naked eye. I edited the process so that it would complete a single swimming sequence within a second. To make the shrimp look alive, I added some dynamic effects to other parts of the shrimp. As a result, the shrimp's long arms looked like they were converging slightly, which corresponded to Qi Baishi's intentions (to make the shrimp in his paintings look as if they were slowly swimming with their arms bending). Moreover, the shrimp's chelae were open, so it looked as

if it was foraging, and its antennae quivered, echoing the constant opening and closing of the antennae of real shrimp. In the third stage, Up/Down Move, the shrimp was moving (Figure 42b). In this state, its swimmerets moved faster. I made these movements occur at twice the speed of the swimmerets' movements in the Alive state. Qi believed that other parts of the shrimp's body were key to distinguishing between movement and stillness (Hu and Hu, 1959). To echo his attempt to make the shrimp in his painting look as if they are swimming quickly, with their arms straightened and long antennae bent backwards, I designed the shrimp's antennae to bend backwards to create a sense of water-flow resistance and designed its arms to open outward. The fourth stage were Up/Down Original and fifth stage were TurnLeft/TurnRight. Here, the upper shrimp turning right was used as an example (Figure 42c). Real shrimp rarely turn. Instead, they make rapid vertical jumps. The jump of a real shrimp is an instantaneous movement and so is the turning of the shrimp in motion graphics. In a two-dimensional painting, it is difficult to simulate the jumps of real shrimp, but the movement of a shrimp in a two-dimensional painting towards a target point will inevitably be accompanied by coordinate rotation, so converting the movement in real space into the left and right shifting of the target point in the two-dimensional computer image would result in left and right turns in the motion graphics. The arching of the shrimp's abdomen expressed similarity in form, while the bending of its body, including the discontinuation of brushstrokes between its cephalothorax and abdomen, and the form of its long arms and antennae, cannot be found in real life and thus express Qi Baishi's pursuit of similarity in spirit rather than likeness in form.

Figure 42. Three states of upper shrimp, (a) Alive, (b) Move, (c) TurnRight

The Alive state (Figure 42a) set in the interaction logic was the condition before and after the move command was given to the shrimp. Whenever someone clicked on the body of the shrimp, it would discover that it was "alive", which was an interactive process in itself. This interactive process came before the further interaction and corresponded to the regular state of a shrimp before its rapid movement began. The regular state echoed the normal state of real shrimp, a resting position where swimmerets are moving, but the body remain still. In addition, this interactive process echoed Qi

Baishi's pause during the process of painting the shrimp. Qi thought about how to complete the next phase of an artwork during the pause (see Section 4.3.1); the pause before the next interaction therefore corresponds to this moment of artistic contemplation. Although Qi had stopped painting, his mind was still working. Keeping the pause short was necessary to maintaining the coherence of the freehand brushwork painting. The Alive state likewise served to maintain coherence in the interaction process. The Move state (Figure 42b) was based on the Alive state, but in the Move state, the movements of the shrimp's swimmerets accelerated, appearing more lifelike. Moreover, the shrimp's outward spreading antennae, including its long, outstretched arms, also made its movement appear more lifelike, according with Qi's desire to make his shrimp paintings dynamic. The TurnRight (or TurnLeft) state (Figure 42c) was my subjective design, meant to mimic the jumping motion of real shrimp. The abdomen, body and other parts of the shrimp were set in accordance with the direction of its turning, making the shrimp look as if it were pivoting its body in an instant.

People's understanding of the balance between similarity of spirit and dissimilarity in form may vary, and the states of the shrimp could be designed to reflect different people's levels of understanding. Therefore, in the interactive interface, others could re-create Qi Baishi's paintings differently to express different intentions. My own re-creation of Qi's painting could serve as a reference. In the re-creation process, I tried to tap into Qi Baishi's intentions and highlight them, while studying the movement of real shrimp and integrating my imaginative flourishes into the process.

5.2.6 Animator

The creation of motion graphics requires the use of animation design and interaction logic. For the interaction logic setting that I used, the dynamic transformation of a shrimp involved five sets of actions, requiring the editing of five sets of animation states. Figure 43a shows the relationship between these five sets. From the green Entry to the red Exit, the five animation states are: Original, Alive, Move, TurnLeft and TurnRight. The designer or artist should create animation states corresponding to four sets of actions (Original is the initial state). Accordingly, the dynamic transformation of two shrimps involves ten sets of animation states. Referencing the method of frame-by-frame animations described in 3.5.3, as shown in Figure 43b, a dynamic pair on the corresponding timeline appears with a diamond-shaped icon, symbolising that the keyframes are recorded for the movement standards in 5.2.4. The names of animation states can be customised, but the names of the upper and lower shrimp must be differentiated. Moreover, the scripting for said animation states should correspond to their respective names for the interaction logic to be effective.

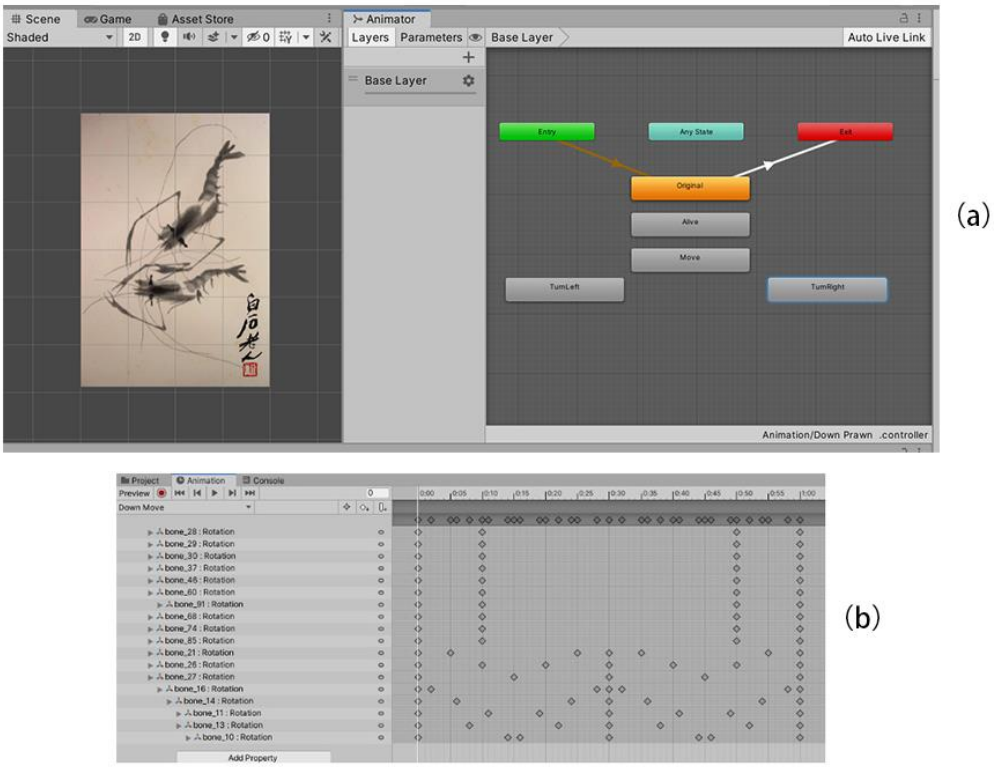


Figure 43. Animator, (a) five animators, (b) action editing in one animator

5.2.7 Script analysis

I wrote two scripts: CMovement for control logic and CInputer for screen interaction judgment (see Appendix 7). The main function of CMovement was to calculate the displacement vector and rotation between the target points when the computer obtained the displacement coordinates. The gap between the current position and the target point was filled by each frame interpolation to achieve the movement effect, while the remaining four states (i.e. the states other than the Original state) were activated to achieve the overall movement of the shrimps. For example, *public EnAnmState m_CurrentState* represented the animation currently playing; *m_Animator.CrossFade(m_Dic[value], 0.1f)* indicated toggling between states of animation in the state machine within 0.1 seconds; and *Quaternion.AngleAxis(m_HeadAngleDegree, Vector3.back) * Vector3.up* was the vector of head direction that was obtained through rotation by the *Unit quaternion* method.

According to the interaction setup, CMovement was responsible for judging and activating the four action states of shrimp. The shrimps not only responded to screen interaction but would also automatically return to their original positions when no interaction occurred – that is, when the screen no longer transmitted coordinate changes. For this function, I adopted the concept of *Coroutine*, which allowed each shrimp to follow the relevant instructions or maintain its original standby state. When the screen was no longer touched, the *Coroutine* was executed in sequence, which would eventually enable

the shrimps to return to their original positions. For example, *StartCoroutine(MActiveIter())* was the code that activates *Coroutine*. In this case, *Coroutine* worked in waiting for three seconds while the shrimps moved to the target point (three seconds for smoothness, which can be modified). The Alive state takes place in this three-second wait. If any change in the coordinates of the target point was detected within the three seconds, the shrimps would convert to Move state and move to the target point; otherwise, they would move to the coordinate position of the original image. *Coroutine* here played the role of waiting after splitting.

I set the following steps in CInputer to create gameplay and uncertainty: if the player touched the screen, the target point would appear; a random number of shrimps (either the upper or lower shrimps, or the two shrimps together) would then move to the touched point. Moreover, when the touched point is on the shrimp's body, the Alive state was activated, and the position coordinates would not be moved. Only when the touched point was greater than a certain distance, would the shrimps turn into Move state and move from point A to point B. The advantage of such a setting was that the interaction would become coherent and randomised and therefore more entertaining.

5.2.8 Adjustment and testing

Once the scripts are edited, CInputer should be added to Main camera and CMovement should be added to the two shrimps. In CInputer, there was Public Variable, which referred to Controllers and served to control the two-script set (Figure 44a). It was necessary to set the Size at 2, as there were two shrimps. We can then drag the Game Object corresponding to the two shrimps from Hierarchy into Element and invoke its corresponding CMovement script (Figure 44b). Next, we can adjust the default Perspective state of Projection in the Inspector of Main camera to Orthographic (an orthographic map projection). After the code was added, it was necessary to Add Component (i.e. Polygon Collider 2D) (Figure 44c) to the two shrimps. At this point, the interaction logic was complete. If we click the mouse in Game mode, Animator will shift to the corresponding state, displaying the correct signal output and input.

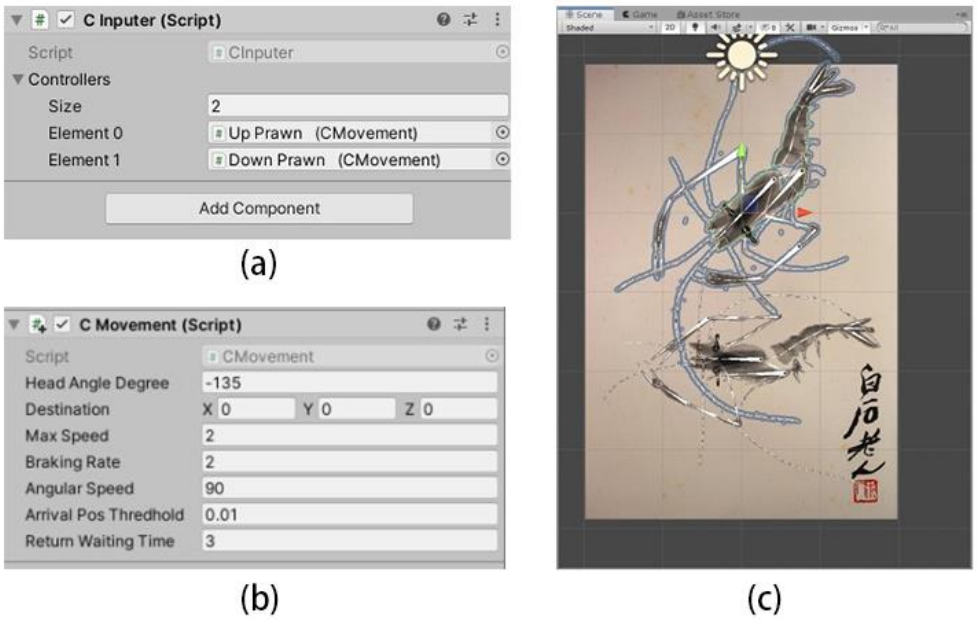


Figure 44. Script settings and touch range, (a) CInputer script settings (b) CMovement script settings (c) touch range perception

At this point, the movement direction of the shrimps and their centre point were still disordered. It thus became necessary to set the correct angle of the shrimps' heads as the original image so that the turning angle would not be incorrectly calculated when code was running. As Figure 44b shows, Head Angle Degree can be modified in the public variable of CMovement. Unlike the usual right-handed coordinate system in three-dimensional software, Unity's default coordinate system is left-handed. This rendered the tilt angle of the upper shrimp's head at roughly -135 degrees and that of the lower shrimp's head at -90 degrees. Destination was target coordinates. When a touched point was generated, the number would correspond to the coordinate position information. Arrival Pos Threshold was the threshold for reaching the target point, and 0.01 represents 1 cm. Max Speed, Braking Rate, and Return Waiting Time were easy to understand. Angular speed refers to the speed of turning, and 90 means 90°/s – 90 degrees per second. In Unity, the unit of measure used was the meter while the unit of time was the second.

Before the work is exported, the position of the centre point of the shrimps should first be adjusted. By default, the centre point was the centre of the entire shrimp. However, according to vector calculation, this point should be somewhere between the two eyes of the shrimp, as shown in the coordinate symbol in Figure 44c. Otherwise, the turning angle and movement of the shrimps would deviate from the natural law of motion. Second, the area of the effect of the activated Alive state, which was the area of the shrimp's body, should be outlined, as shown in the green wireframe, which can be adjusted by Edit Collider in Polygon Collider 2D. At this point, the whole interaction logic can be completed with a click of the mouse in Game mode. If the work needs to be exported to a mobile phone, Android Build Support should be selected when installing Unity. With Android SDK & NDK Tools and Open JDK, the work can be successfully exported to a phone and interacted with using the Android interface.

5.3 Mantis Catching Cicada

5.3.1 Overview

The process of matting, bone binding and weighting, animation creation, adjustment and testing for *Mantis Catching Cicada* follows the same design approach as *Two Movable Shrimps*. The difference in the latter work lies in the fact that the interaction logic must be presented with the purpose of narrating the proverb. During the interactive experience, the viewer should be immersed in the narrative. Unlike the interface interaction design of *Two Movable Shrimps*, *Mantis Catching Cicada* was shown on two display devices without touch functionality. This design is aimed at better showcasing the two Qi Baishi's paintings, *Mantis and Rice* and *Autumn Cicada on a Branch*. Regarding the interaction design, it is difficult to estimate the number of viewers approaching the display, and the hardware devices struggle to identify multiple nearby individuals. Therefore, individuals with distinct behavioural characteristics will be easier to recognise.

I have set up motion recognition to trigger the actions of the mantis and cicada. Using a Kinect camera to capture the motions has proven to be highly effective and cost-saving. At first glance, the two paintings look like still pictures, but when a participant waves one hand, the still images transform into interactive digital storytelling media. The original images of the paintings were captured using mask in Photoshop. Then, the bones were bound and animated in Unity, and motion graphics were strung together logically through scripts.

5.3.2 Narrative

The well-known Chinese proverb "the mantis catches the cicada, unaware of the siskin lurking behind" forms a narrative relationship among the mantis, cicada, and siskin. Therefore, I chose the viewer to represent the "siskin" in the interactive work rather than acting as the human figure with a slingshot found in the original story, forming a narrative relationship among the viewer and the two paintings by Qi Baishi. In the proverb, the mantis wants to catch the cicada but is unaware that the insect-eating siskin is right behind it. The cicada does not know the danger that lurks behind it, nor do the mantis and siskin. If the cicada were aware of the mantis behind it and the mantis were aware of the siskin behind it, the tragic ending implied by the proverb would not happen. Therefore, I devised a storyline that reverses the proverb's narrative sequence. Specifically, the person, symbolised by the siskin in the proverb, poses a danger to the mantis, yet the mantis, unaware of this danger, tries to catch the cicada. In this way, the three figures were linked to create a story. The story reaches its climax when the mantis is about to capture the cicada. At this point, the reversal occurs: the mantis jumps back into its own picture, evading the imminent danger. In my version of the narrative, as the cicada notices the mantis,

it acts in a way that prevents the mantis from preying on it, while the mantis jumps back into its original picture, implying that it has also noticed the "siskin" – that is, the person behind it. Through these actions, the story returned to its initial state to highlight the moral of the proverb. I reversed the storyline by letting the cicada be aware of the mantis all along so that the purpose of the proverb can be achieved: to remain aware of the potential dangers when focusing on something. The revised narrative structure turned the viewer into character in the story; through that process, viewer can acquire knowledge of the proverb.

The mantis and the cicada were designed to give visitors the opportunity to experience the fun of interacting with Chinese paintings and to attain some degree of enlightenment about Chinese culture. Viewers play the role of the person standing next to the mantis and cicada, giving them a sense of personally significant involvement in the process. This work is not as unpredictable as *Two Movable Shrimps* nor can it be interacted with on a mobile phone. It simply presents a storyline that invites participants into its world.

5.3.3 Movement

The movement of the cicada was designed to be simple, as real cicadas exhibit a limited range of motion. I therefore only bound bones for the cicada's wings, allowing them to be slightly fluttered and thus create the vibration needed for the cicada to chirp. To make the scene more lifelike, I added motion to the plant parts, mimicking the way leaves sway in the wind. As a result, the rice in *Mantis and Rice* and the leaves in *Autumn Cicada on a Branch* swayed slightly with the movement of the mantis, while the branches remained motionless. If the branches moved, the cicada's position would shift, causing visual dissonance.

The work's motion is concentrated in the mantis. The mantis has three main movements: crawling, preying and jumping. When sensing that a person is approaching and waving his or her hands, Kinect sends the signal to the computer. The computer then activates the slow crawling of the mantis in *Mantis and Rice*. Only the motion of the antennae and limbs of the mantis are simulated, while its body remains unchanged. In other words, the work mimics the movement of a real mantis secretly and slowly crawling towards its prey. When the mantis crawls into the cicada picture, the cicada flutters its wings and chirps. Then, the mantis stops at a random position in the lower left corner of the cicada picture. It is placed in this portion of the image to balance the composition and to effectively simulate the predation behaviour of a real animal. The mantis, which faces right, pauses in the lower left corner to make clear that its target is the cicada located on the righthand side. When the mantis stops, the cicada's chirping reaches the upper threshold of the display's volume settings. At this point, the pose of the mantis changes, with its upper body rising and its forearms tightened in imitation of the predation state of a real mantis. After

a few seconds, the mantis turns around and jumps, then leaps back to its original position (a movement likewise based on the jumping behaviour of a real mantis).

5.3.4 Kinect camera

Technically speaking, *Mantis Catching Cicada* involved interaction between two paintings linked through a storyline. Different scripts should be added for the mantis and cicada to account for the differences in the way they move and their logical connections to one another. CMantisController was the mantis behaviour script, CToWaringArea was the cicada logic script and CMultiDisplay was the split screen script (see Appendix 7). Compared with *Two Movable Shrimps*, this work represents an exploration in its adoption of Kinect's signal transmission technology, which involves a motion capture of the human body which can trigger interaction.

I chose Kinect as the medium for the interaction between the two paintings because the proposed venue for the exhibition of this work was an art gallery, museum, organiser of children's exhibitions, or another public space. Based on the venue layout, an output screen of appropriate size can be selected. In a relatively large space, or one that can accommodate multiple people, Kinect can sense the first person's motion with relative accuracy, which is convenient and cost-effective. For the time being, Kinect can generally meet my demands and achieve the intended technological goals.

Kinect is a motion sensing camera device and *Mantis Catching Cicada* was completed using Kinect 2 products. First need is to download the Kinect driver from Microsoft's website and write a script in Unity to activate the program. The script written specially for Kinect was CkinectGesture (see Appendix 7), which included the following: the speed of triggering the script (i.e. the recognition of hand waving speed); obtaining hand joint coordinates; selecting the body coordinates for the first person in close proximity; turning on the reader for the body coordinates; obtaining body joint coordinates; requesting the latest raw value of the previous frame on the monitor; and requesting – calculating – refreshing – obtaining the data on body joint coordinates.

5.3.5 Interaction

The specific interaction is shown in Figure 45. As Kinect recognises real-time gestures, when a participant waves one hand, Kinect will register the motion and transmit the signal to the computer shown in the lower right corner of Figure 45. The signal-receiving device for Kinect is in the middle of the picture, and the two devices behind it are the display output devices. The two displays in the picture can be turned into LED screens or projectors. They can also be adapted for use in exhibitions. When a viewer waves one hand and approaches the Kinect camera, the signal will be transferred to the computer,

the output digital pictures of *Mantis and Rice* and the *Autumn Cicada on a Branch* will display the pre-set motion graphics, and the mantis will move to the cicada picture on the right.

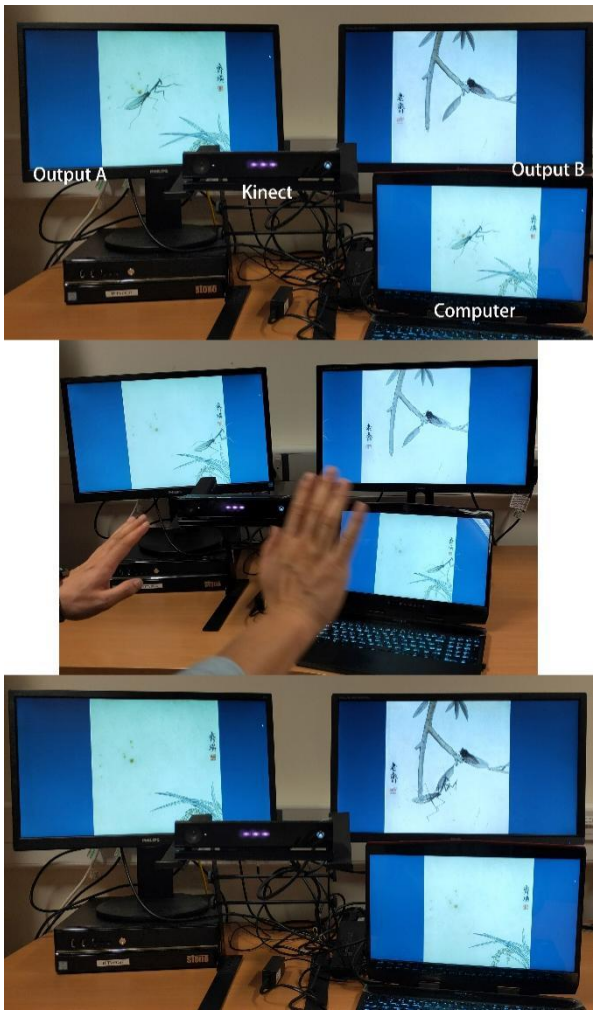


Figure 45. The method of interaction

Figure 46 displays the entire interactive process, which takes place in a loop. Details of the entire movement trajectory can be seen. When the hand waving is captured by Kinect, the interaction between the two paintings is triggered. The first and last images in Figure 46 are the two original images (i.e. the two complete pictures are shown before and after the interaction). The middle pictures show the process of how the praying mantis in the left picture climbs into the picture on the right and attempts to catch the cicada, and then jumps back to its original position.

Figure 46. The movement trajectory

In the interaction, a person approaches the two paintings, which can be identified through the presence of the mantis and cicada, then walks into the paintings and is perceived by Kinect. When the person waves one of his/her hand, he/she is signalling to the insects that he/she has approached and made a movement, and this movement can be interpreted by the insects as capture or intrusion. Usually, when a person approaches an animal, the animal fixes its eyes on him/her and guesses at his/her next move. If the person makes the next move, he or she is often interpreted as dangerous by the animal, but if no next move is made, the animal may not consider the person a threat (Dugatkin, 2020). Thus, when the mantis is preparing to catch the cicada and a person standing next to them makes a move that affects them, it constitutes a link between the three figures (the mantis, cicada and person), recreating the scenario in which “the mantis stalks the cicada, unaware of the siskin lurking behind”. At this point, the person can be interpreted as the “siskin”, intending to prey on the mantis.

5.4 Conclusion

Qi Baishi's brushstrokes as well as the features of his paintings and artistic concepts were analysed and discussed in the previous chapter, serving as my guide in this chapter. The analysis of his brushstrokes was reflected in the image matting (first step), which was carried out in a way that complied with the concept of "anatomical structure" described in Xie He's "Six Laws". In this process, a comparison was made between each brushstroke and the corresponding form of the real object, and the characteristics of the form and structure were analysed to facilitate understanding of the bone position and weight range. The features of Qi's paintings were reflected in the creation of motion graphics (second step) following the method of "conformity with nature" outlined in the "Six Laws". Qi's paintings also show a sense of harmony between spirit and form that served as a reference point for the simulation of physical movement. As a two-dimensional image cannot fully replicate the physical movement of an object, the design decision involved a trade-off between the object and its two-dimensional image to achieve similarity in spirit rather than a complete similarity in form. Qi's artistic concept is manifested in the interaction logic (third step). The three movement patterns (Alive, Move and TurnLeft/TurnRight states) in *Two Movable Shrimps*, the three movements of the mantis (Crawl, Predation and Jumping states) in *Mantis Catching Cicada* and the waiting state of the mantis and the shrimps correspond to the pause, re-consideration, and coherent drawing phases in Qi's painting process. Through interaction, I aim to provide viewers with the opportunity to engage with the objects in motion, allowing them to experience how Qi conveyed the appearance of life and remained close to nature. According to experts, these are the most important features of Qi Baishi's paintings. (Cao, Appendix 1; Zheng, Appendix 2). They also inspired my practice (Liu, Appendix 4).

I combined two paintings by Qi Baishi to design the interactive *Mantis Catching Cicada*. My goal was to reflect Chinese culture through the aesthetics of Chinese painting (Hu, Appendix 3; Gong, Appendix 5). This work also functions as a practical exploration of the second research question. Staying true to Qi Baishi's aesthetics, I used a proverb-based story as the narrative thread to connect the two paintings, immersing the participants in the narrative but also in a cyclical interaction in which the work is changed and then returns to its original state. My goal was to create an interaction that engages viewers and goes beyond the visual narrative of the mantis catching the cicada to convey the message of the Chinese proverb: "the mantis stalks the cicada, unaware of the siskin lurking behind". As the proverb-based story threaded through this interactive work may be obscure to participants unfamiliar with Chinese culture, I address it in the next chapter in discussing the exhibition of the work.

6. Reflections on and Analysis of Two Artworks

6.1 Introduction

This chapter contains reflections on and analyses of the two artworks discussed in the previous chapter. In it, I conduct an aesthetic analysis of *Two Movable Shrimps* using Xie He's "Six Laws", examining the changes in rhythm and composition during dynamic displacement. *Mantis Catching Cicada* revolves around storytelling, so I analyse it from the perspective of "negative space" in the narrative but also explore its connection with other theories.

I discuss the properties of the medium used for the two artworks, the conceptualization of the exhibition methods, and the functions of the text and sound settings. These elements influence the viewer's understanding of the artworks and expectations for their display.

I also present the results of a thematic analysis of expert commentaries. Seven themes from the experts' opinions are discussed and analysed to identify relevant insights. The research contributions identified in this analysis are summarised in the next chapter, in Section 7.1.

6.2 The key aesthetic changes in *Two Movable Shrimps*

Chapter 5 provides a detailed explanation for how to approach the interactive design based on Xie He's "Six Laws", focusing on "anatomical structure" and "conformity with nature". The dynamic format of *Two Movable Shrimps* inevitably brings changes to the static work of *Two Shrimps*. From the perspective of traditional aesthetics to evaluate, the two laws of "rhythmic vitality" and "artistic composition and grouping" are utilised.

In the original painting, I marked the overall shape and motion trend of the two shrimps with differently coloured arrows, with one red arrow pointing downward and one blue arrow pointing to the left (Figure 47). The concept of "气" and "韵" (rhythm) in Chinese painting was integrated into the work (see Section 2.4.3), and its meaning was interpreted. Mu and Guo (2012) believed that the ancients combined rhythm with art from the time of the Southern and Northern Dynasties and proposed that rhythm was the original category of art. It was the force expressing the dynamics of creation and the source of artistic vitality. It was obvious that if the perception of rhythm caused by the motion signalled by the red and blue arrows was introduced into the two shrimps, most of the rhythm of the original work would be concentrated near the heads of the two shrimps, following the relationship between the two shrimps and the picture. The picture was artificially changed through the method of interaction and alterations to the shape and dynamic force of the shrimp.

Figure 47. The motion trend of the shrimp

After the interaction, there were many positions that the two shrimps could take. The following groups of typical pictures were analysed to display the changes in rhythm before and after the interaction. For this work, I employed a mobile app interface with a pixel ratio 1080x2340 for testing. Because of the discrepancies in the length and width ratios between mobile phones and the original painting, black background areas were inserted at the top and bottom of the image.

The first group of four pictures displays an asymmetric composition of two shrimps that are moving irregularly. The lower shrimp is located almost in the middle of the picture, dividing it transversely. Therefore, the first situation presented up-down segmentation: the lower shrimp remained motionless as the segmentation point, while the upper shrimp swam downward. In Figure 48a, b and c, the rhythm of the shrimp marked with the blue arrow was unchanged, while the shrimp marked with a red arrow moved downward in three ways: to the bottom left, middle, and bottom right. In Figure 48d, the two shrimps marked with the blue and red arrows moved down the screen in the form of the Chinese character "/\". In this way, the rhythm was highlighted at the bottom of the picture in the form of radiation or dispersion, and vice versa if the shrimp marked with the red arrow moved upward. The positioning of the two shrimps in the first group disturbs the rhythmic and compositional balance found in the previous pictures. The two shrimps are positioned at one end of the picture, which appears too crowded in the overall display, thus failing to showcase the sense of rhythm that characterises traditional Chinese art.

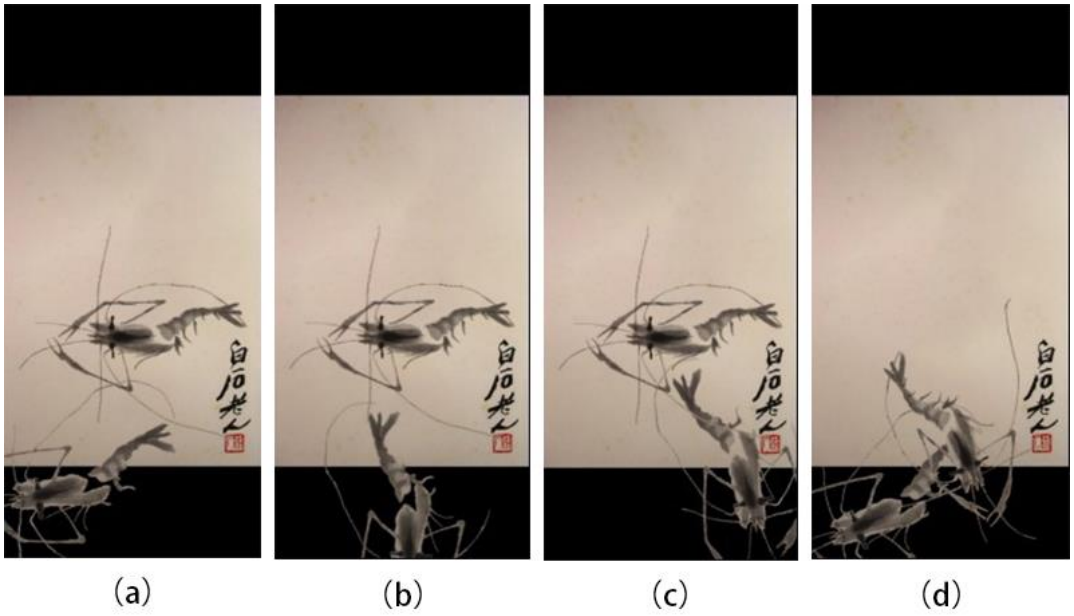


Figure 48. The first group of changes

The four pictures in the second group show different arrangements of the two shrimps – for example, the lower shrimp remaining motionless and the upper shrimp moving. In Figure 49a, b and c, the lower shrimp moved according to the direction of the upper shrimp, as the rhythmic tendency of the upper shrimp pushed it towards the lower-left corner. The dynamic movement of the lower shrimp in the picture towards the lower-left corner is shown. The overall rhythm changed from the top right to the bottom left. The three pictures were captured during the movements to display the downward motion of their rhythm. Figure 49b was in the position subsequently occupied by Figure 49a. Figure 49c has the same relationship to one another because the lower shrimp was launched from where the upper shrimp remained. Thus, through interactive changes, it was possible to strengthen the rhythm of the painting in a certain direction. The change of rhythm was a dynamic process, constantly in flux. In Figure 49d, the movement of the upper shrimp strengthened that of the lower shrimp. No space was available in front of the lower shrimp, and the rhythms created after the interaction did not disperse across the picture and even hindered its dynamic. However, changes of rhythm appeared in the third group of images (Figure 50a-d), which show how the two shrimps approached each other and then separated.

Figure 49. The second group of changes

The third group of pictures shows the two shrimps in an assembled or discrete state after the movement triggered by interaction ended. Figure 50a depicts a discrete situation. One shrimp moved upwards and the other moved downwards. The lower shrimp moved to the black, out-of-frame area, while the upper shrimp remained in the frame. As the upper shrimp was slightly larger than the lower shrimp, the downward trend of the lower shrimp did not scatter the overall rhythm of the picture too much after it was placed in the centre of the picture. On the contrary, when the two shrimps gathered in the upper right corner in Figure 50b, all rhythm was concentrated in that corner, which made the lower left portion of the picture seem empty. If the two shrimps gathered together, their bodies would overlap as shown in Figure 50c: the rhythm was kept in the centre of the picture, but the shapes of the shrimps became indistinguishable. The two shrimps in Figure 50d lock the rhythm of the painting into a ring like the ever-changing trigram (the trigram was added by me; it did not exist in the original picture). In this image, the shrimp are interdependent, reminding people of the rhythmic changes and conservation of energy in *Yin* (阴) and *Yang* (阳).

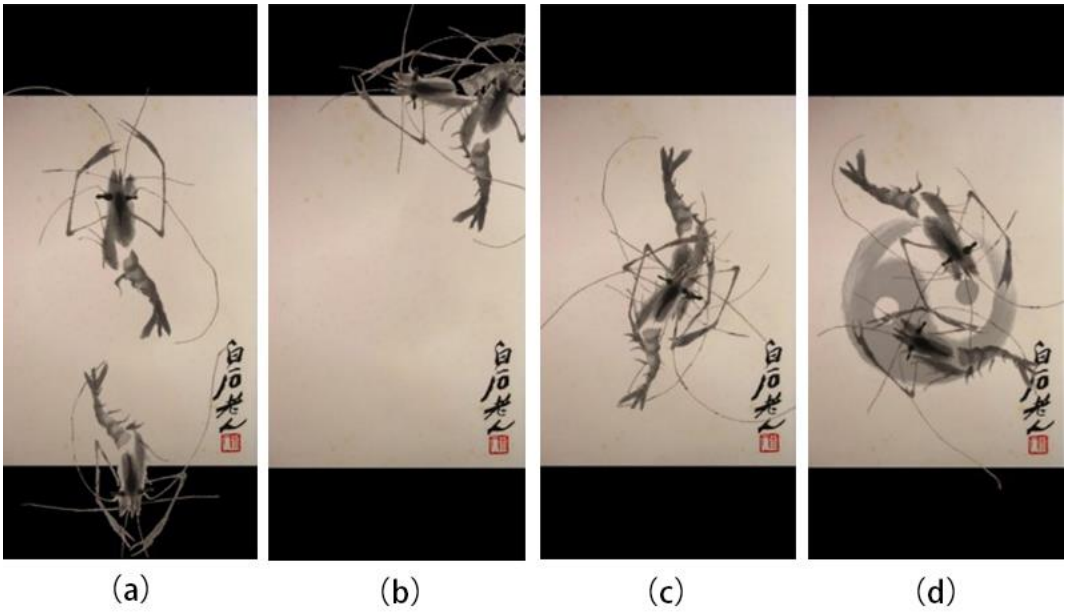


Figure 50. The third group of changes

6.3 The storytelling with space of *Mantis Catching Cicada*

In *Mantis Catching Cicada*, I borrowed the mantis from Qi Baishi's painting *Mantis and Rice* and the cicada from *Autumn Cicada on a Branch* to represent the roles of the mantis and cicada in the traditional Chinese proverb, "Mantis Catching Cicada, Siskin Behind" (螳螂捕蝉，黄雀在后). The viewers in the interactive piece metaphorically assume the role of the siskin in the story.

Chinese proverbs originate from folk settings and became an integral part of the culture through generations of oral transmission. These stories are meant to impart knowledge and moral education (Ding, 2017), conferring an enlightening function on their contents. Moreover, as articulated in the summary of Section 2.4.1, proverbial stories encapsulate the essence of lived experience and the cultural environments from which they emerged. The logic behind their transmission from generation to generation consists in the maintenance of cultural identity. People acknowledge the truths contained within these stories and perceive their underlying cultural values. "Mantis Catching Cicada, Siskin Behind" is a widely known proverb in China. Chinese idioms typically comprise four characters and "Mantis Catching Cicada," (螳螂捕蝉) conforms to this pattern. People are thus accustomed to its four-character expression and can understand it without adding "Siskin Behind" (黄雀在后), meaning that "Siskin Behind" is concealed in the idiomatic formulation. This form of concealment is referred to as the process and performance of "virtualisation" and "blank-leaving" (留白) by Prof. Gong (see Appendix 5). These two terms are direct translations from the terminology of Chinese painting. These concepts can be roughly equated with the more common painterly terms "positive space" (for "virtualisation") and "negative space" (for "blank-leaving").

The interaction between the audience and my work similarly enriches the meaning of the negative space. The concealed/virtual role in the second half of the proverb, "Siskin Behind" (黄雀在后), is taken on by the viewers, creating a fill-in-the-blank storytelling experience. Due to the four-character habit of writing Chinese idioms, the latter part of the proverb is often concealed, while its meaning remains intact. This concealment is subtly represented in my work. Therefore, the cultural tradition of negative space and the logical coherence of the narrative are well substantiated and effectively illustrated in this work.

The use of negative space is integral to the tradition of Chinese painting and is also a longstanding element of Chinese philosophy and aesthetics. Zong (2003) believes that the concept of "negative space" profoundly embodies the cultural spirit of *Tao* (道) in traditional Chinese philosophy and is also one of the core aspects of traditional Chinese culture. Negative space is a creative technique used in traditional Chinese calligraphy and painting. It refers to artists' treatment of blank spaces, providing viewers with a certain degree of room for imagination (Li, 2018; Yang and Xu, 2011). The negative space is a part of virtuality, used in contrast with the depiction of reality to enhance the artistic sensibility of the work (Liu, 2019). The use of "negative space" in Chinese painting is not limited to areas devoid of ink marks; it also forms an integral part of the image's content, allowing for viewers' imaginative associations. This practice is known as "use white as black" (计白当黑) (Yang and Xu, 2011; Zhu, 2014). Here, "black" literally refers to the blackness of the ink, as Chinese ink painting is a "black-and-white segmentation" of the white rice paper with ink. "Use white as black" implies that Chinese painting artists seek to shape the viewers' conception of the "black" part (positive space) through the "white" part (negative space) in paintings. Whether in Chinese calligraphy, painting, or poetry, creators scrutinise the composition and harmony of the entire piece, managing the interplay between virtuality, blank-leaving, actuality, and expression. Critic and Professor Li Huizhao of Jiangsu University of Technology (Li, 2018) believed that the unpainted, virtual areas are meticulously arranged by artists to coexist in harmony with the painted, "actual" areas. The viewers' aesthetic experience fills the blank and virtual areas.

Aside from its use in Chinese painting, the technique of negative space is also frequently employed in the narratives of films and novels. For instance, the narrative focus might be placed on dialogue, scenes, and secondary plot points concerning supporting characters, rather than directly depicting the protagonist and primary plot. By not showing the more significant parts of the narrative, the film or book effectively encourages audiences to picture and infer the personality traits and character of the protagonist. Such a technique provides audiences with more scope for discussion and thought (Gong, see Appendix 5), which form the meaning of negative space.

In comparison to ink animated film, my work delves deeper. Prof. Gong (see Appendix 5) praised how I artfully incorporated digital interactive technology to show traditional Chinese culture and philosophical thought, allowing the audience's interactive behaviour to influence the narrative structure of the work and distinguishing it from works that lack an appreciation of this philosophical layer and tend towards a more straightforward mode of representation. In his critique, he referenced the 1988 ink animated film Mantis Catching Cicada (Figure 51a), directed by Hu Jinqing and produced by the Shanghai Art Film Studio. An examination of this animated film reveals several significant differences from my work. Firstly, the proverbial story merely describes the interwoven fate of three animals and has no results, but it can still serve as a warning. The final shot of the animated film (Figure 51a) reflects the result, whereas my work dose not. Secondly, the animated film uses ink painting for its backgrounds, including static objects such as leaves and branches. By contrast, the background plants in my work move, simulating the sensation of swaying in the wind. The three main characters in the animated film – mantis, cicada, and siskin – are coloured using computer graphics, which lack the texture and transparency of original ink painting that I chose for my work. Moreover, the animated film introduces several unrelated animals and storylines, only arriving at the mantis catching the cicada and the appearance of the siskin in the last shot, when the animated film comes to an abrupt end. My narrative stretches (Figure 51b) across two scenes instead of one and can be interpreted as existing in an alternate form of negative space, as it only materialises in response to audience interaction. The last scene does not depict the mantis catching the cicada. Instead, alerted by the cicada's chirping, the mantis leaps back to its original frame, which is the starting point position and waiting for the next interaction trigger. Lastly, I have subtly concealed the role of the siskin, necessitating deeper reflection and discussion from the audience for its discovery. Prof. Gong and I agree on our interpretation of Hu Jinqing's animated film: its narrative expression is unequivocally straightforward (see Appendix 5). This kind of animated film does not prompt the thoughtful audience engagement that the inclusion of negative space and participatory elements tend to encourage.

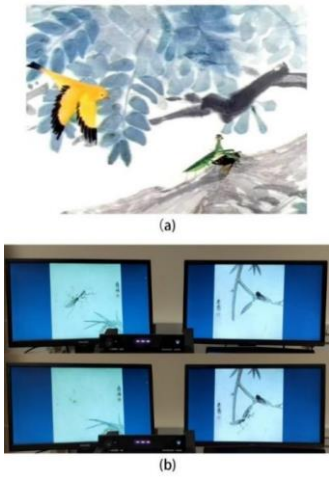


Figure 51. Animated film Mantis Catching Cicada and My Work

(a) Animated film Mantis Catching Cicada by Hu Jinqing, Ink animation, 1988. Copyright: Shanghai Animation Film Studio, Source: https://www.bilibili.com/video/av17073469/?vd_source=ffb73d9ab3515e54b96c8deaa28742de

(b) My work, *Mantis Catching Cicada*.

6.4 Discussion of media and display

6.4.1 Discussion of media

The structural form of traditional Chinese painting is limited to what can be expressed using writing, rice paper and ink sticks. Traditional Chinese paintings are considered tangible because they are painted using these palpable materials. However, most publicly displayed artworks can be found in museums or galleries and the people who see them cannot touch the originals, making art seem difficult to access and understand. Museums will not permit visitors to physically touch cultural relics and paintings can only be closely observed at a remove. Although digital artworks lack texture and the other tangible characteristics associated with traditional paintings, they can transfer pictures to interfaces (*Two Movable Shrimps*) and change dynamic perceptions (*Mantis Catching Cicada*). While *Two Movable Shrimps* and *Mantis Catching Cicada* do not allow audiences to interact with the original materials, they simulate a sense of contact and play between people and the paintings. Interactivity itself has a more accessible character than mere observation, which offers audiences an enhanced opportunity to approach Chinese painting.

Most original Chinese paintings are owned by museums or private collectors. Digital images are copies of the original paintings, and my works are, in turn, copies of the digital copies. There is no denying that the final works, which have been duplicated twice, will be somewhat different from the original paintings. Digital images can be obtained from printed books or the Internet. However, the resolution and colour correction of printed books is often not high enough for the colour and pixel restoration of their images to be completely accurate. The resemblance of pictures downloaded from the Internet to the paintings that they reproduce is even more uncertain. Original artworks are unique and so are characterised by scarcity (Newman and Bloom, 2012). Therefore, the digital artworks I have created are replicas, regardless of whether the purpose is to preserve the original image or not.

Since original ink paintings exist as unique and irreplaceable objects in the real world, it is worth thinking about the value of digital artworks that replicate them. Newman and Bloom (2012) from Yale University invited participants to conduct a series of experiments which showed that it is not the author of the original, but the creator of a replica, that determines the value of a duplicate relative to the original. The ultimate value of my practice thus needs to be reflected by my design intention. In my creation, I have developed the characteristics of Qi Baishi's vivid flower-and-bird paintings and, more importantly,

reflected on and clarified the purpose of the design and the emotion inherent in it. For example, I brought together two works by Qi Baishi to narrate a traditional Chinese proverb.

The graphic contents of traditional Chinese paintings have been integrated into digital media. To ensure that the content is accurately borrowed, the transformation of the media should be imperceptible, which is the transparency attribute of media that acts in the role of an intermediary. Bolter and Grusin (2000) believed that computers acquire old media as if it were simply injected into the new media. The process is intended to be transparent. The computer program acts as an intermediary between the digital image and the audience. Transparency can be understood as preventing the audience from perceiving the existence of the intermediary. Therefore, the two works that I have created attempt to achieve this form of transparency. The digital images of Chinese paintings are output to the audience through computer programs, trying to eliminate the sense that an intervention has occurred and engender an interactive experience without any mediation between the works and the audience.

The chief difference between the aesthetic forms of traditional art and digital media lies in interaction (Paul, 2003). As interactive programs are applied to digital images, the interaction of the audience modifies the viewing of traditional art, with the audience acting to complete the work. User participation also helps to complete the work of designers or artists. The unique aesthetic form of digital media is interactive, participatory, dynamic and customised (Paul, 2003). Thus, the participation of the audience is integrated into the analysis of my two works, and the scope of the interaction is set for the audience (i.e. the customisability). Both of the works that I created are designed on the basis of original Chinese paintings. Before audience interaction, it is almost impossible to distinguish them from the original digital paintings. Indeed, without interaction, my design achievements cannot be reflected, which is referred to as "incompleteness" by Dr Cao (see Appendix 1). I also added a degree of spontaneity into my designs. For instance, in *Two Movable Shrimps*, it is uncertain which shrimp will move towards the touchpoint when the screen is touched. Similarly, in *Mantis Catching Cicada*, although there is only a single narrative, I designed a random position in the lower left corner of the scene where the mantis moves to the cicada. This position could not be located elsewhere because it would involve designing the mantis to turn around (as the mantis is catching the cicada, it must face the direction of the cicada). Otherwise, it might seem odd or redundant to the audience. The timing of the cicada's chirping is also randomised; designers or artists can modify the code to set a random range of time. The purpose of this randomisation is to ensure a unique experience with each interaction. The randomisation into the two designs is referred to as "openness" by Dr Cao (see Appendix 1). Such a setting allows audiences to become "creators" who, in a sense, help to complete my artworks. This gives it a sense of "contemporaneity" in Dr Cao's appraisal (see Appendix 1). The work is set apart by effects that cannot be achieved in traditional media.

6.4.2 Discussion of display

Two Movable Shrimps and *Mantis Catching Cicada* are meant to be displayed in an exhibition space such as a museum or gallery. The purpose of showcasing these works in an exhibition hall is to provide more possibilities to appreciate and experience traditional Chinese painting. Haywood and Cairns (2006) believed that the objective of a museum is to generate exhibits that promote learning and engagement. Museums already possess these functions, so if interactive Chinese painting is exhibited alongside traditional Chinese painting, people will discover that traditional painting not only allows for close appreciation but also offers the opportunity for touch and interaction. This can stimulate discussions among the audience, such as whether the interactive elements align with the original work and why the design might operate in the way it does. It will provide museums with more interesting exhibition possibilities. The act of visiting a museum is typically driven by the expectation to engage in learning and cultural appreciation. Visitors who arrive with this expectation are the target audience of this work. Interactive exhibits also have an entertaining function and a showcase setting would highlight this aspect of the artworks.

The difference between the two works in terms of media and presentation is significant. *Two Movable Shrimps* is a form of interface interaction. It can be exhibited on a mobile device such as a tablet or smartphone, or it can be featured on a large touch-sensitive screen in a museum. These two display methods have significant differences; smartphones and tablets, with their inherent affordance, are perceived as portable and convenient tools. Exhibiting them in a museum changes the functionality of these portable tools, as affordance possesses environmental attributes (Greeno, 1994; Hartson, 2003). Unlike mobile devices, people are likely to assume that a work displayed on a large, museum-based screen is a part of the institution's collection. Once the expected relationship between the audience and the design can be determined, affordance can meet expectations (Zhao et al., 2020). Conversely, if I designed the work as a mobile application, the inherent affordance of smartphones and tablets would allow the general public to view the work anytime, anywhere. In this way, the definition of the work as a piece of art would be largely erased, while potentially enhancing its dissemination among users. Considering the design purpose of *Two Movable Shrimps*, exhibiting it on mobile devices is not the ultimate goal of this research project but rather a test result of my current design. The exhibition of *Mantis Catching Cicada* requires a Kinect camera and two screens, which can be easily set up in museums and exhibition halls. The functionality of feeling like interactive Chinese painting is highlighted. While *Mantis Catching Cicada* utilises game design techniques, if it is classified as a game product, the research perspective will be converted to the game, and the work will lose its role of cultural enlightenment. Conversely, exhibiting this work in a museum would give it cultural weight. Although the research perspective is not focused on the gaming field, the work's game-like qualities can bring a different experiential function to museums and galleries. Therefore, the positioning of the work and the

location where it is discovered can influence the design itself. The exhibition context determines the significance and attributes of the work.

According to *The collected works of Qi Baishi* (Lang and Guo, 2017), Qi Baishi's *Autumn Cicada on a Branch* and *Mantis and Rice* are both 33.5 x 32.5 cm. These paintings are not large in size, consistent with flower-and-bird paintings that focus on individual objects. My test for *Mantis Catching Cicada* in the display screen is almost the same size as the original painting (see Section 5.3.5 Figure 45), allowing the audience to experience the sensation of interacting with the original piece. Naturally, due to the characteristics of the digital work, the size can be adjusted proportionally depending on the exhibition venue and the number of visitors. Currently, *Mantis Catching Cicada* can only be interacted with by one person at a time; interaction cannot be triggered if multiple people wave their hands, and multiple "siskins" do not fit the proverb's narrative. Therefore, *Mantis Catching Cicada* is better suited to a smaller space, where visitor flow can be controlled to avoid multi-person interactions. Moreover, it should not be placed in a noisy environment to ensure the audience can hear the sound of the work. The size of the painting should also not be too large to avoid misleading the audience.

6.4.3 Text and sound

Two Movable Shrimps does not incorporate sound, while *Mantis Catching Cicada* features the distinctive chirping of the cicada. The use of sound in my work has a functional role. If sound were to be integrated into *Two Movable Shrimps*, it seems the only plausible choice would be to simulate the noise of water currents generated when shrimp swim. However, the actual noise made by shrimp moving through water is virtually non-existent. By contrast, the chirping of the cicada is a prominent characteristic of the insect itself. In the narrative development of *Mantis Catching Cicada*, the cicada's chirping serves as a signal. In the work, the chirping of the cicada can be heard the moment when the mantis enters the cicada's scene, indicating that the cicada has detected its predator. During this period, the sound gradually intensifies, allowing the audience to slowly perceive the rising tension and understand the ominous intent behind the mantis' approach of the cicada. The chirping reaches its crescendo when the mantis stages its attack, marking the peak of the suspense. When the mantis retreats to its own scene, the chirping of the cicada subsides, signifying the completion of its role in the narrative cycle.

Before participants trigger the interaction, my works present images that are almost identical to the original paintings. Unless the audience is explicitly informed that these are interactive pieces, they might find it difficult to discover the interactive features on their own. To achieve my design objectives, I need audiences to understand my setup, necessitating explanatory text. Figure 52 shows a layout of *Two Movable Shrimps* during an exhibition at a university. I used a tablet for testing and printed the introduction about the work and interaction methods on the label next to the tablet, encouraging

everyone to interact with the piece. Such explanatory text is essential, especially for *Mantis Catching Cicada*. It is crucial to introduce the audience to the key points of the proverbial story of "Mantis Catching Cicada, Siskin Behind". Without understanding the storyline and their role within it, the audience might struggle to comprehend the reason behind such a design. The interactive behaviour that arises after allowing the audience to understand the story offers a different experience compared to merely relying on textual inspiration or participation in the work without comprehension of its context. Presenting explanatory text alongside the work also aligns with the characteristics of Chinese painting, which integrates poetry, calligraphy, painting, and seal cutting (see Appendix 5). Chinese painters often compose poems, write allusions, or elucidate the meaning of their depiction on paintings, which represent a unique art form that unites painting and calligraphy. Therefore, adding essential explanatory text will not negatively impact the work, but rather assist the audience in understanding it.

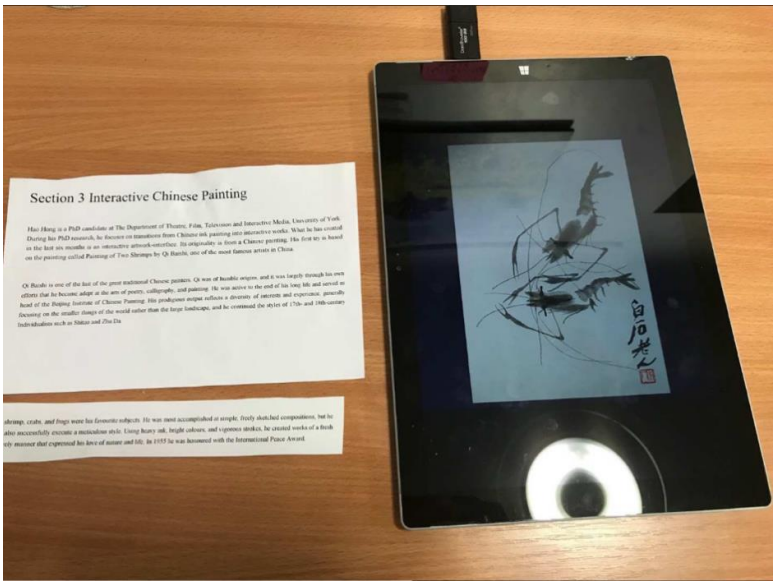


Figure 52. The test of *Two Movable Shrimps*

6.5 Discussion of experts' comments

6.5.1 Overview

The thematic analysis, conducted in four steps, was used to analyse the data. The first step was to transcribe the audio of the dialogue with the two experts who participated in the first phase of the data collection and familiarise myself with other five experts' reviews in the second phase of the data collection, so I could reflect on deeper questions about the data rather than passively taking in information. The second step was to identify categories and subcategories of information and extract key points and core concepts. The third step was to summarise the theme and use small and meaningful coding discoveries to gradually develop a larger theme. The fourth step was to apply this theme to the

original data for iterative analysis to review information that might relate to the theme (Clarke and Braun, 2021). The data was characterized into seven aspects, which are discussed in this chapter.

6.5.2 Re-creations of original paintings

Mr Liu (see Appendix 4) commented that the exploration of my artworks reflects the adage that "Brushwork should evolve with time". These words come from an annotation that Shi Tao wrote on a scroll in 1703 (Wang and Ren, 2002). This statement can be interpreted as advice to make "the past serve for the present", prompting artists to use brushwork representative of their era (Dong, 1984). Mr Liu remarked:

> I think Hao Hong has not only completed the transformation technologically, but also internalised the traditional Chinese culture in his mind while externalising the culture into practice, which he himself might not be fully aware of. However, it is at this time that he needs to tap into the traditional Chinese culture internalised in his mind.

In my artistic practice and research, I have long contemplated how to draw inspiration from traditional culture and art to create artworks that seamlessly combine modern technology with earlier forms. This has been my inner motivation. As time passes, individuals' understanding of the world around them deepens, and the technology through which they express that understanding should evolve likewise. Paintings need to reflect their times; they would be less valuable if they did not reflect the atmosphere or spirit of the era in which they were created (Li, 1987). The basic conception of innovation in traditional Chinese culture is "renewal built on traditions", meaning that renewal is achieved by returning to the old traditions, respecting and learning from them to produce further innovations (Han, 2013). From this perspective, it is easy to understand the purpose of this research project: to adapt Qi Baishi's flower-and-bird paintings through media transformation to incorporate new aesthetic perceptions that have resulted from the development of modern technology.

With the requirement of "renewal built on traditions", the main focus of my project was to conduct research on the re-creation of images in Chinese painting. However, transformation was not the end goal; the aim was to assist in the development of traditional Chinese painting. This aligned with the concept of "reactivate" proposed by Dr Cao (see Appendix 1). He mentioned that the term "reactivate" refers to fostering growth and advancement in this context:

> It would be worthwhile to add digital interaction to traditional Chinese painting via media transformation. This [referring to my first artwork] is a re-creation of original Chinese paintings that can reactivate the traditional value of Chinese painting by making static paintings dynamic.

Traditional paintings, including Chinese paintings, are static images. But when I animated static images, making them dynamic, the insects in the flower-and-bird paintings acquired characteristics of life insects. From this perspective, I brought the objects in the painting to life. Dr Zheng (see Appendix 2) made an observation that was similar to that of Dr Cao: "In a sense, the conversion of static paintings into dynamic ones is an 'activation' of the traditional Chinese culture, and also inspires viewers to look at Chinese painting from new perspectives, which is of great significance".

While static flower-and-bird paintings by Qi have been widely recognised by the public and art historians, their dynamic aspects have not been explored until now. Therefore, it is worth discussing whether the dynamic approach can reveal the beauty of Qi Baishi's art more intuitively than a static approach. Dr Zheng believes that dynamic flower-and-bird paintings convey information more intuitively than static ones, showcasing the natural authenticity of animals and the artistic spirit of Qi Baishi:

> Hao Hong studied Qi Baishi's representative works 'Shrimp', 'Mantis' and 'Cicada', and converted static images on rice paper into dynamic images by means of new media, visually conveying the spirit of Qi Baishi's freehand brushwork and awakening the authenticity and natural beauty beneath his works.

6.5.3 Reflection on Xie He's "Six Laws"

Xie He's "Six Laws" has been widely recognized from ancient times to the present as a traditional framework for the aesthetic evaluation of Chinese painting. Because I conducted my research from a traditional perspective, selecting Xie He's "Six Laws" as the framework for aesthetic analysis and practice was valid. As stated by Mr Liu (see Appendix 4),

> After the 'Six Laws' were proposed, ancient Chinese painting began to have a theoretical framework and painters began to be aware of theories about painting. Since then, painters have always regarded the 'Six Laws' as the standard for measuring the success or failure of painting… From the Southern Dynasties on, the 'Six Laws' have been used and enriched while evolving with time, thus becoming one of the most stable and inclusive theoretical frameworks of ancient Chinese art.

However, Xie He's "Six Laws", especially the first law, "rhythmic vitality", were initially used to evaluate figure painting in Chinese art. As explained by Mr Liu,

> 'Rhythmic vitality' means that a painting or any image depicted in the painting should have rhythm and be full of vitality. 'Rhythm', a term originally used in the appraisal of others as a popular conversational topic among the people in the Wei

and Jin dynasties, refers to the temperament, sentiment, and charm exuded from a person's postures and expressions. The term is often used together with other Chinese words to mean ‘graceful charm’ and ‘vigorous appeal’.

In Section 2.4.3, I discussed the concept of “rhythmic vitality”. I acknowledged that Xie He’s “Six Laws” were not originally intended as a framework for evaluating flower-and-bird paintings. However, these laws provide a perspective on the aesthetics of Chinese painting and can be dissected into individual criteria rather than being criteria for judging the technical skill of a painting. Additionally, I utilized four principles of Xie He’s “Six Laws” as guidelines in the practice and evaluation of *Two Movable Shrimps* in response to a crucial comment made by Mr Liu: “The key to Hao Hong’s research lies in the answer to the question: how to apply the aesthetic value of Chinese painting to digital interactive technology”.

Mr. Liu does not elaborate on how I achieved this goal. After reflecting on the “Six Laws”, learning from Qi Baishi, and self-reflection, I utilized the principles of the imitation of nature and ink structure to design dynamics. Working from the characteristics of flower-and-bird paintings, I conducted an analysis, interpreting “气” and “韵” (rhythm) as impressions of movement, to evaluate the changes between the static and dynamic states of *Two Movable Shrimps*. This approach expanded the use of traditional art evaluation frameworks by employing them in the dynamic interactive design of Chinese flower-and-bird paintings.

6.5.4 Analysis in historical context

Prof. Hu (see Appendix 3) offered an important research recommendation: that I bring Qi Baishi’s art into conversation with the fields of sociology and history. This suggestion prompted me to contemplate the analysis of Chinese genres and themes, the relationship between Qi Baishi’s flower-and-bird paintings and society, and the origins of Xie He’s “Six Laws”. All of these topics required analysis within a historical context, connecting them to Chinese culture and philosophy. In the summary of Section 2.4.3, I discussed the origins of Xie He’s “Six Laws” and their connection to Buddhism, tracing their evolution from commentaries on figure painting to landscape painting. These analyses demonstrated the broad connections between Xie He’s “Six Laws” and Chinese historical philosophy. As Prof. Hu commented, “What Qi Baishi and his artworks reveal is not only about art and art history, but also about sociology of art, historiography and culturology”.

I considered Chinese painting in its historical context to analyse which genres of Chinese painting were suitable for dynamic displacement. For example, in Confucian thought, the principle of “benevolence” required emperors to being depicted in central positions. Also, the way landscapes were ordered in

traditional Chinese paintings reflected the societal order, so the mountains in landscape paintings should not exhibit dynamism. However, the symbolic significance contained in flower-and-bird paintings would not be negatively affected by dynamic displacement.

6.5.5 Learning from Qi Baishi's creative vision

Prof. Hu (see Appendix 3) believes that the interpretation of the spiritual aspects of artworks is crucial and should be considered within Qi Baishi's living context: "The interpretation of the artistic spirit behind paintings should be contextualized". I analysed the style and subject matter of works by Qi Baishi, and investigated his artistic vision, seeking clues from his disciples, critics, and literature. I discovered that Qi Baishi's focus on nature and his penchant for depicting life forms in the natural world around him stemmed from his life experiences and upbringing. I analysed works from different periods of his career, detailing how he distilled physical objects into subject matter. I examined the proverbial origins of *Mantis Catching Cicada*, which, like many Chinese idiomatic stories, has strong roots in Chinese history. Qi Baishi's painting process influenced my design of the interactive flow of *Two Movable Shrimps*.

Dr Zheng (see Appendix 2) believes that "the artistic harmony between likeness and unlikeness" aligns with the concept of form in Chinese painting. The harmonious resolution of this tension was part of Qi Baishi's unique style and was appreciated by the public. Therefore, to understand Qi Baishi's paintings and to design animations that imitate the laws of physical motion, it is necessary to provide a clear explanation of the concept of "the artistic harmony between likeness and unlikeness". Per Dr Zheng (see Appendix 2), "The ideal depiction of shapes in Chinese painting is underpinned by 'the aesthetic harmony between likeness and unlikeness' ".

6.5.6 Ingenious design

I found a feasible design process that could preserve the aesthetic tradition of Chinese painting during media transformation. I utilized Chinese aesthetic theory frameworks to guide the design process. I studied Qi Baishi's art and incorporated his artistic concepts into the design. I expressed elements of Chinese culture through narrative in the artwork. The design process is elaborated in detail in Chapter 5. Prof. Hu (see Appendix 3) summarised my research process:

> Hao Hong recorded the interesting process where the expression of a theme was transferred from one medium to another, and the challenges he encountered in exploring the application of interactive technology to paintings. Moreover, he

> presented interactive technology through methods and theories he adopted to tackle the challenges in creative practice.

One of the challenges encountered during the design process was the contradiction between imitating a flat space and the spatial dynamics of real animal movement. Real shrimp movements seldom involve turning, yet the shrimp are always turning in the flat space of *Two Movable Shrimps*. Therefore, I designed exaggerated movements so that the shrimp appear to be rotating to the left and right. This design follows Qi Baishi's principle of "the artistic harmony between likeness and unlikeness." Prof. Hu evaluated my design approach regarding the imitation of real displacement in a planar space. He believed that it was an effective and naturalistic visual expression:

> There seems to be a spatial contradiction between the visual expression of a static plane and that of a three-dimensional movement. When the plane and three-dimensional movement translate into each other, it is interesting and necessary to make formal compensation in their correlative visual link.

My ideas and modes of expression for capturing the liveliness of motion dynamics do not simply imitate the forms of objects but convey interesting visual effects through exaggeration and deformation. This subjective form of creation adds unique personality and artistic value to my work. Prof. Hu commented on the appropriateness of using exaggerated motions based on the law of "conformity with nature" and praised the visual appeal of the movements I designed:

> Hao Hong further presented Qi Baishi's paintings in a dynamic version. To do so, he simulated the movements of real animals such as the shrimp, mantis, and cicada, and subjectively exaggerated the movement and turning of these animals to make them appear more vivid in the dynamic paintings.

I included randomness in the interactive logic, such as the random movement of shrimp in varying quantities. This was to ensure that the audiences who participated in the interaction would encounter a range of results. As Prof. Hu observed: "Hao Hong hoped to give participants an interesting experience and an unpredictable outcome when they interacted with the paintings, thus enhancing their cognitive interest in Chinese painting".

6.5.7 The discussion of *Mantis Catching Cicada*

Mantis Catching Cicada is an artwork that creates an interaction between two paintings. A praying mantis moves into the painting of a cicada. After the cicada chirps, the praying mantis returns to its original setting. The connection between the two paintings is considered a "dialogue" by Dr Cao (see Appendix 1).

> With regard to cultural exportation, such interactive design is obviously more attractive and will intrigue viewers in different cultural contexts more than traditional, static visual modelling. What is more interesting is that the 'dialogue' between 'artistic images' caused by changes in movements can also trigger deeper thinking among viewers, allowing them to discover the deeper meaning of Chinese culture.

This "dialogue" arises from a narrative. Narrative roles are represented by visual images in the artwork. I incorporated elements of Chinese culture – a proverbial story – into this work. Dr Cao believes that this approach can prompt audiences to engage in deep reflection.

> *Mantis Catching Cicada* is meaningful and valuable because, on the one hand, it enables audiences to appreciate the aesthetic taste of visual imagery in traditional Chinese painting and, on the other, with the help of this transformed and dynamic visual image, it allows the viewer to delve deeply into traditional Chinese culture and appreciate it with the senses, which is different from experiencing it cognitively.

Not only is the visual world represented in the artwork but also viewers are metaphorically portrayed as characters in a story that functions as a hidden clue. In Section 6.3, I discussed the significance of "negative space" in Chinese-language stories, film scripts, novels, Chinese philosophy, and aesthetics. The "negative space" I employed is intended to provide space for audience contemplation. Prof. Gong (see Appendix 5) noted that I "processed and represented the story content of 'siskin behind' artistically with virtualisation and blank-leaving [negative space]", adding that "This method of expression provides ample room for thought and discussion for those familiar with the story behind the idiom".

The use of sound, textual explanations, and waving gestures in *Mantis Catching Cicada* enhances the aesthetic experience through multisensory design. Multisensory expression is not just visual but tactile and acoustic. Such interactive elements change the way viewers approach paintings. Participants should feel an emotional connection with the work when they make the objects in the painting move. These emotions are generated when they attempt to glean meaning and understanding from the interactions. Subjective expectations (as expressed in the interactions) will be affected by the participants' emotions. The participants' emotions will contribute to the development of their aesthetic sensibility (Xenakis and Arnellos, 2014). Prof. Hu noted that:

> I experimented with the design of an interactive Chinese painting such that when people waved their arms, the still images of the painting would turn into an interactive digital storytelling interface. Interactive media creates a new aesthetic approach to Chinese painting. Narrative and interaction via multimedia forms tend to enable multiple sense organs of participants to function in front of an interactive painting, which, combined with aesthetic reception, will have a far-reaching impact.

This multisensory design also includes auditory elements. To create a sense of urgency during the narrative climax, the sound increases rapidly to the threshold. Prof. Gong wrote that "Hao Hong did not limit himself to just visual and tactile aspects; he also incorporated sound into his interactive design, adding an auditory, sensory component".

However, the unfamiliarity of non-Chinese audiences with the Chinese proverbial story poses an obstacle to understanding the artwork and narrative. Therefore, in the exhibition design, I considered displaying textual explanations alongside the artwork; I discussed the text and sound in detail in Section 6.4.3. Prof. Gong mentioned the role of text:

> For one thing, the audience can better understand the content and meaning of the proverb within the work. And for another, having an intriguing piece of text onsite that complements the interactive imagery also serves as a method of disseminating traditional Chinese culture.

The final site of display for my work will be in a specific exhibition hall. Its presentation in an exhibition hall will ensure the implementation of multifunctional sensory experiences that will enhance the work's meaning. For example, it will make audiences perceive it as an artwork rather than a game design. Prof. Gong discussed the exhibition function of museums:

> A significant aspect of modern museums is their focus on early childhood education and inspiration. Interactive works like this, when displayed in a museum, are more likely to spark interest among young children and teenagers than the original paintings by Qi Baishi. Regardless of the audience's familiarity with Chinese culture, they can gain cultural insights from the piece. Therefore, this work necessitates a specific space for exhibition.

6.5.8 The influence of media transformation

Two questions raised by two experts were related to the impact of media transformation, which altered the form of traditional Chinese paintings. Dr Cao (see Appendix 1) asked, "Will this new interpretation and cognition reduce or obscure the beauty of the typical visual images created in traditional Chinese painting?"

To answer this question, the aesthetic value of the images created in Chinese paintings must be clarified. This project contains a detailed discussion of three works by Qi Baishi (*Two Shrimps, Mantis and Rice*, and *Autumn Cicada on a Branch*). However, current research indicates that changing any of the criteria mandated by the "Six Laws" may reduce or obscure an artwork's beauty, and there are obstacles to assessing the extent of this reduction. The transition from a static to a dynamic form will inevitably

influence the original image and its aesthetic reception. The extent of this influence is difficult to evaluate. I used the “Six Laws” to evaluate and guide the practice; they helped me to determine which key aesthetic factors had changed. I interpreted the aesthetic tradition in terms of brushwork, style, and the spirit of the artist, instead of “the beauty of the typical visual images”.

During my conversation with Prof. Hu, I was not yet clear about my research aims. Therefore, he raised a question about a research aim in his comment, attempting to help me determine my purpose: was my goal “to disseminate Chinese painting in a foreign cultural context or to create paintings based on the preservation, development, and absorption of art”? As the project progressed, my research gradually focused on the relationship between aesthetic traditions and practice, exploring media transformation based on Qi Baishi’s artworks and my personal creative practice and reflection. My project, and my creative practice as a whole, are based above all on the absorption of traditional art and the process of re-creating it. My research perspective was based on traditional Chinese painting and culture, which, combined with RtD, resulted in a novel research approach. If the research aim were the dissemination of Chinese painting in cross-cultural contexts, the research perspective and methods would have to change and would lead to different research outcomes.

7. Discussion and Conclusions

7.1 Design considerations and guidelines

7.1.1 Overview

I have pioneered a new form of art transcription for traditional Chinese paintings. It preserves their traditional aesthetics and philosophical qualities, and was made possible by interactive digital technologies. The knowledge is not only captured explicitly in the thesis in the documentation of my thought processes and the process of creation but also captured implicitly in the two artworks I created. I have refined a set of guidelines that could be used to translate Chinese paintings into interactive media while retaining their aesthetic value and communicating cultural characteristics. The guidelines contain four elements: how to select paintings for media transformation, how to learn from the original artist, how to use a traditional aesthetic framework to guide practice, and how to include cultural elements via storytelling.

7.1.2 Selection of paintings for media transformation

The close connection between historical and cultural aesthetic traditions and philosophy should be considered when selecting Chinese paintings for media transformation. Understanding Chinese painting genres in their historical context and analysing the influence of traditional Chinese aesthetics on historical, ethical, moral, and philosophical thoughts are crucial to understanding the technical concepts and meanings of Chinese paintings. The consideration of such context also aligns with the principle upheld by this research of respecting tradition.

Section 2.5, in which I discussed the genre of Chinese painting, elaborated on the methods and experiences of selecting a genre for media transformation in Chinese painting. The principal characters in Chinese figure painting have specific symbolic meanings. When using them to create dynamic characters, it is necessary to handle them cautiously and situationally. If the main figure in the centre of the picture underwent displacement, it would have a negative impact on the ethical philosophy behind the figure painting, so dynamic displacement is not recommended. In a painting with numerous figures, displacement can be carried out as long as there are no historically significant figures with symbolic meanings. However, there is no evidence on how to deal with the parts of the figures' bodies that are obscured by objects as they were not depicted by the original author. In landscape paintings, vast mountain ranges cannot be made dynamic; however, dynamic design can be applied to small elements such as birds, rocks and boats in these works. Flower-and-bird paintings are more suitable than the aforementioned genres for dynamic displacement. Flower-and-bird painting artists express their emotions and virtues through the flora and fauna they depict. The design of dynamic displacement does not have any impact on this artistic aim. However, what needs to be considered is the range of dynamic

displacement of objects in the picture, that is, predicting the amount of residual space in the picture to calculate the distance that the objects should move.

7.1.3 Learning from the artist

I thus used the flower-and-bird paintings of Qi Baishi in my initial attempt at the digital conversion of Chinese painting. There were advantages to selecting Qi Baishi's flower-and-bird paintings, especially the realism of his style, which appeals to an audience unfamiliar with Chinese painting (Lang, 2016). His subjects – familiar animals and plants – are also approachable, evoking associations for viewers. Other flower-and-bird paintings could also be used for digital conversions, but their size and the interactive logic required should be considered to ensure that digital transformation would be feasible. To understand the spiritual expressions of artists, it is necessary to analyse their artistic development, the formation of their styles, and the painting methods they used. Choosing the most representative artworks for research can make it possible to display their achievements at the highest level. I selected three paintings – *Two Shrimps, Mantis and Rice*, and *Autumn Cicada on a Branch* – to transform into two interactive artworks, *Two Movable Shrimps* and *Mantis Catching Cicada* (see Section 4.3.2 and Section 4.4.3).

Brushwork and artistic spirit must be considered to preserve the aesthetic tradition of Chinese painting. All the design methods and research themes in this project were formulated to show respect for tradition in the media transformation. Section 2.4 provided a detailed explanation of the brushwork and creative spirit that characterize traditional Chinese painting. The subsequent research centred on these two points. Qi Baishi's brushwork techniques and artistic spirit are discussed in detail in Chapter 4 and guided my design. I preserved the brushwork of the Chinese paintings during the media transformation process and did not deviate from the original artist's concept, following my aim to preserve the aesthetic tradition of Chinese painting.

7.1.4 Use of Xie He's "Six Laws" to guide practice

Xie He's "Six Laws" is a traditional framework for the critique and appreciation of Chinese painting art that has been passed down through the ages. To preserve traditional aesthetics and cultural philosophy, I used Xie He's "Six Laws" to contemplate and examine my practice. In exploring the effectiveness of using Xie He's "Six Laws" to direct design practice, I extracted some useful rules to guide and evaluate the practice. I also reflected on the use of Xie He's "Six Laws" in reference to flower-and-bird painting as they are mainly targeted at figural compositions and have no specific principles that can be applied to flower-and-bird painting. I view Xie He's "Six Laws" dialectically; while the laws are not uniquely designed for or suited to my practice, they may be the most fitting

paradigm that can be found in traditional aesthetics at present. Applying Xie He's "Six Laws" to the aesthetic critique of flower-and-bird paintings and my creative practice was an innovation, and it received recognition from an expert, Mr Liu. Since Xie He believed that his "Six Laws" could be applied in isolation (Xie and Yao, 2015), I regarded them as individual principles, which was also innovative, and used four of them to assist my practice.

The connection between Xie He's "Six Laws" and broader Chinese culture and philosophy is discussed in Section 2.4.3. I explained the difficult but important law of "rhythmic vitality" in Xie He's "Six Laws" and how the "Six Laws" relate to Buddhism and Chinese literature. The description of how I applied it was presented in Section 3.3. I utilised the law relating to "anatomical structure" to analyse Qi Baishi's paintings and the law of "conformity with nature" to design the objects in my painting and simulate the movement of real objects. I used the laws of "rhythmic vitality" and "artistic composition and grouping" to analyse the aesthetic transition from a static to a dynamic representation, accompanying the discussion with a demonstration in Section 6.2.

To achieve a successful design, I had to become knowledgeable about the aesthetics of Chinese painting to understand concepts such as the "anatomical structure" of Chinese brushwork. The animation design also involved careful observation of the rules of motion of the real object and patient testing of "conformity with nature" using animation simulation. The exploratory process of using Xie He's "Six Laws" to guide practice and the creation of the first work, *Two Movable Shrimps*, addressed the first research question: How can Chinese paintings be made dynamic and interactive while preserving the aesthetic tradition in which they participate?

7.1.5 Incorporating cultural content through storytelling

The second work, *Mantis Catching Cicada*, is an exploration of the media transformation of two of Qi Baishi's flower-and-bird paintings. Xie He's "Six Laws" provides aesthetic evaluation guidelines for one type of Chinese painting but no aesthetic framework for evaluating the two paintings that I chose. Therefore, I sought narrative techniques to connect the two Chinese paintings and analysed the clues they contained by using storytelling and space.

The Chinese cultural elements that were incorporated into the interaction design included traditional Chinese proverbs, storytelling, and characters. The narrative originated in a traditional Chinese proverb – "Mantis Catching Cicada, Siskin Behind" (螳螂捕蝉，黄雀在后), and the detailed statement of the proverbial story was summarized in Section 4.4.2. This proverb has been used through the ages because it expresses a philosophy of life. I imbued the characters from this story into the media transformation, forming a narrative structure connecting the two paintings.

During the narrative process, I also made effective use of the method of leaving empty areas in the composition to provide audiences with room for their thoughts and interpretations. Someone who interacts with the artwork will take on a role (that of the siskin) hidden in the story. It is precisely because of the intervention of the participant that the narrative unfolds and embodies the proverb. However, the role of the participant is hidden, as it is in Chinese paintings that employ empty space (see Section 6.3).

Section 2.4.1 explained that Chinese culture is multifaceted, with traditional proverbial stories forming one of these facets. However, Chinese culture is a broad field and proverbs are simply the cultural element that best serves my artistic ends; cultural concepts can be expressed through a particular element that is suitable for one's design and research. Borrowing from the narrative of proverbial stories is not the only possible approach, and future designs could consider the possibility of employing other aspects of culture.

By completing and evaluating the artwork *Mantis Catching Cicad*a, I answered the second research question, which asked how Chinese cultural elements could be embodied by the interactive design of objects in digital Chinese paintings. *Mantis Catching Cicad*a confirms that the practice of media transformation in Chinese painting can embed Chinese cultural elements via storytelling.

7.1.6 Conclusion

A further research contribution is in the formulation of my practice in relation to the work. It differs from the other research and practice methods discussed in the literature review in Chapter 2. I have drawn ideas from different historical contexts and have been guided by tradition. Although I have had to be critical about traditions at certain times, my approach is consistent with the principles of the artist Qi Baishi, such as his dedication to studying and learning from masters; he spent much time learning to paint shrimp. My approach also resembles that of an apprentice, upholding the continuity of the tradition of Chinese painting. This aligns with the last principle of Xie He's "Six Laws", the "copying of classical masterpieces".

Before drawing on the four design considerations and guidelines mentioned above, not only is a certain level of computer technology required but also the development of a sensitivity to the aesthetics of Chinese painting through familiarity with and research into the background of Chinese painting and an understanding of originality. The requirement for sensitivity to the aesthetics of Chinese painting may limit or challenge designers or artists who are not familiar with the Chinese painting tradition. The main challenges lie in the understanding of traditional aesthetics and the analysis of the philosophies that have influenced the development of Chinese aesthetics for thousands of years, as well as the need to develop knowledge of traditional Chinese storytelling and an understanding of Chinese culture.

However, given the long-standing and continued research in the academic field of Chinese painting, the barriers to accessibility are not particularly significant. There are diverse ways for people to approach Chinese painting and traditional philosophy, including cultural exchange activities and self-directed learning in museums, Confucius Institutes, and institutions that disseminate culture. People enhance their sensitivity to the aesthetics of Chinese painting by using this sensitivity to engage in further exploration.

If designers or artists experiment with media transformation for other genres of Chinese painting while aiming to respect traditional Chinese aesthetics, my approach and practice principles could be influential. This project provides a way of thinking and exploration that could be applied to diversified paths of exploration. Researchers can follow and develop my research. When different designers or artists employ it, they will generate distinct outcomes. Therefore, more perspectives and methods will emerge.

7.2 Reflections on methodology and design process

In the literature review section of Chapter 2, it is made clear that re-creation of traditional art pieces, artistic transcription, and appropriation are common phenomena in the artistic practices of various cultures. Thus, the media transformation of Chinese painting is a reasonable pursuit. In analysing the digital, explorative, and/or interactive works based on Chinese painting created by predecessors, I noted the ways in which these projects deviate from traditional aesthetics. I integrated some useful methods from these practices and found a direction that had not been attempted before and that accorded with my own innermost views (Liu, Appendix 4). Additionally, I have dialectically cited examples that broke through traditional Chinese aesthetics. Traditional aesthetics is not, however, the only approach to artistic exploration. There is no denying the value of artworks that reflect on and question the Chinese aesthetic tradition. They can also provide inspiration and promote the development of Chinese painting from a different perspective.

The literature review discusses some practical artworks that deploy methods different from my own. My method involves creating replicas of Qi Baishi's flower-and-bird paintings, which differs from the use of traditional Chinese paintings in the artworks of artist Yang Yongliang (see Section 2.3.2 Figure 16 and Section 2.3.3 Figure 18) or the animated version of *Along the River During the Qingming Festival* (see Section 2.3.2 Figure 14). They all changed the original artworks and the style of Chinese painting. However, these works have amazed the public when exhibited. It is currently unknown whether my design method, incorporating elements from landscape painting and figures from genre painting, would achieve the same effect.

Through an analysis of historical context, it became apparent which Chinese painting genres and styles are most suitable for the design methods used in this project. Chapter 2 analyses the symbolic meanings of different genres of Chinese painting to this end. We can also reasonably infer which subjects of painting can be personally undertaken and tested by designers or artists according to their respective workloads. Chinese flower-and-bird painting is not the only potential theme, Qi Baishi's paintings are not the only possible choice, and not all of Qi Baishi's flower-and-bird paintings are suitable for media transformation. Factors such as the integrity of the depicted object, the size of the artwork, and the number of painted objects also need to be considered.

I used two principles from Xie He's "Six Laws" to guide the design practice: "anatomical structure" and "conformity with nature". To achieve superior design results, a background in the aesthetics of Chinese painting is necessary, allowing one to comprehend concepts like the "anatomical structure" of Chinese painting brushwork. The animation design also involved careful observation of the real object's physical motion rules and patient testing of "conformity with nature" using animation simulation. I view Xie He's "Six Laws" dialectically; while the Laws are not uniquely designed for or suited to my practice, they may be the most fitting paradigm that can be found in traditional aesthetics at present.

I deeply analysed the artistic characteristics and painting techniques of Qi Baishi, preserved the features of his art in my design, and extended his artistic concept, aiming to find a suitable object motion mode located "the artistic harmony between likeness and unlikeness". In Section 4.3.1, the analysis of Qi Baishi's ink paintings and his disciples' description of his painting process reveal how Qi Baishi used his hands to control the brush, the speed with which he worked, and the pauses he took. These observations were obtained through an in-depth analysis of the original paintings and years of research on Qi Baishi. Just by observing the Chinese painting images, non-professionals could not grasp the mystery, and a digital replica could hardly restore the original physical record. Although the physical movement of the original artist controlling the brush has not been reflected in the artworks I created, the morphological characteristics of each brushstroke are displayed. I analysed each painted object's structure as represented by each of Qi Baishi's refined brushstrokes, and then bound bones to the body structure represented by each stroke after understanding the physical form of the painted object. This process involves studying the natural movement of living organisms and incorporating animation techniques to bring the objects to life, aiming to add a sense of motion and vitality to the objects depicted in the artworks.

The research process for the design is analogous to the constructive framework for Chinese culture heritage computing, divided into three stages: extraction of the original image, aesthetic analysis and design, and display and dissemination. RtD can generate valuable knowledge and objects that predecessors may not have considered. Therefore, there is no specific design framework or design evaluation method that must be followed (I chose Xie He's "Six Laws" for this purpose). The goal of

protecting digital cultural heritage aligns well with protecting Chinese aesthetic traditions. Thus, the design steps were analogous to existing methods (see Section 3.6 Table 2). For practicality and convenience, output devices, such as mobile phones, tablets, and monitors, are used in two artworks for testing. However, the final exhibition needs to be displayed in an art gallery or museum setting.

To preserve the traditional brushwork of the original pieces, I used Adobe Photoshop to extract each part of the objects, and then added animations and wrote scripts for interaction logic in the Unity engine. I used the Parenting motion method from motion graphics to create frame-by-frame animations, interface interaction and external device interaction while also incorporating the narrative methods found in game design. This process needs to be repeatedly verified and tested, and constantly modified and iterated. For example, I consulted with experts Dr Cao and Dr Zheng about my design results. Their questions about the shrimps' movements led me to revise the first artwork and seek further advice. After several rounds of iteration, the final, more appropriate and effective, method was meticulously recorded. This also constitutes the method of documenting the iterative design process. The design process described in Chapter 5 is highly detailed. However, when different designers or artists employ this method, they will generate distinct outcomes. Utilising this approach necessitates a certain level of expertise in Chinese painting, which may result in knowledge gaps for certain designers or artists.

I utilised game design methods to create the narrative of *Mantis Catching Cicada* and added sound to drive the development of the plot. I analysed and assessed the part where the viewer engages and plays a role. As this part is expressed subtly, explanatory text on the proverbial story and the interactive method must be included in the exhibition. The explanatory text may make it easier for Chinese audiences to understand, but it may not necessarily be understood by all non-Chinese audiences due to a lack of familiarity with the culture. The use of interactive technology in this project aims to allow the public to experience the traditional aesthetics of Chinese painting in a variety of ways. However, the accompanying textual descriptions still follow a standard didactic approach. Therefore, this method does not fundamentally address the issue of fostering the appreciation of traditional aesthetics, which will remain a topic that requires continuous reflection, research, and practice in future work.

Research data were obtained from online interviews with two experts and written commentaries following face-to-face interviews with five other experts. The timeline was as follows: after the completion of *Two Movable Shrimps*, I consulted two experts online and received positive feedback. I then began to create *Mantis Catching Cicada*. Next, I met with five experts, asking each of them to write critical reviews for the research. These reviews included discussion of research themes, the philosophy of Chinese painting, aesthetic traditions, cultural cognition, media transformation, exhibition methods, as well as assessments of the two works. As my research perspective is based on the aesthetics of Chinese painting and traditional Chinese culture, all the experts involved were Chinese. If the focus of research were on the field of human computer interaction (HCI) or the cultural cognition

of non-Chinese viewers, the object of data collection would change. I used the deductive and inductive approaches of thematic analysis, searching for thematic information in the expert data, returning to the original data for iteration and filtering, and gradually developing, refining, and defining the relevance of each piece of information to the theme. Some information related to the theme and evaluation methods was used, such as Xie He's "Six Laws" (Liu, Appendix 4), historical context analysis (Hu, Appendix 3), the spirit of the artist (Zheng, Appendix 2), and negative space (blank-leaving) (Gong, Appendix 5). In addition, the issues of cultural cognition and aesthetic appreciation mentioned by Cao (Appendix 1) will be included in future research, but are not included in the present stage of this project. Experts have given positive evaluations on the scope and openness of the interactive design, as well as the interactive objective of enhancing the audience's intellectual interest in the topic of traditional Chinese painting. However, these evaluations cannot be treated as conclusions or contributions and the subject requires further research.

Media discussion demonstrates how modern media methods have borrowed content from traditional Chinese painting (see Section 6.4.1) in a transparent way that seamlessly integrates with the media without the audience being aware of any manipulation or interference. Media transformation also involves a discussion on the issue of image replication. Even though both works are re-creations based on Chinese painting images, they are also replications in essence.

Design methods and research perspectives are constantly updated and iterated with the development of digital technology and academic trends. The emergence of new technologies may change established design processes and shifting perspectives may overturn current research methods. Therefore, artists, designers, and scholars need to constantly innovate and experiment to adapt to this changing environment. Continuous innovation and experimentation are important driving forces for the development of the art and design fields. They are necessary for promoting, understanding and conveying aesthetic traditions of Chinese painting. By constantly exploring new perspectives and methods, we can expand our understanding of aesthetic traditions and provide audiences with richer and more diverse experiences.

7.3 Limitations

To date, the two practical artworks, *Two Movable Shrimps* and *Mantis Catching Cicada,* have been tested. The outcomes from this practical testing can provide experts with a relatively straightforward basis for feedback. Unfortunately, the two practical works have not yet been publicly exhibited due to the COVID-19 pandemic. I did not have sufficient data on audience responses to perform quantitative data analysis, so an in-depth study of participant responses has not been conducted. It is not clear whether audiences will develop an intellectual interest in Qi Baishi, Chinese painting, or Chinese culture

after their interest is aroused, nor whether responses will differ between those familiar with Chinese culture and those who are not.

While the research from the perspective of aesthetic analysis is quite comprehensive, the proposed enhancement of aesthetic cognition lacks data support. Most of my research focuses on analysis of historical context, examination of the aesthetic tradition of Chinese painting, and aesthetic assessment. I conducted the data analysis in the view of Chinese experts. From the HCI research perspective, there is a lack of corresponding data, such as: preliminary user requirement surveys, later user feedback data, and the invitation of HCI experts for interviews. Based on the current research findings, it cannot be definitively concluded that the practical designs have led to an improved understanding of Chinese aesthetics in its audiences. This needs to be further refined in the next step.

The creative practice changed the static contents of Chinese paintings into dynamic objects, with interaction triggering the motion graphics. Because the objects move, there is dynamic displacement. The compositions of the original Chinese paintings change with dynamic displacement. Only when the displacement of the object does not destroy the artistic meaning of the painting is this method valid. As such, this practical method cannot be applied to all types of Chinese paintings.

Simulating the motion of real-life organisms in two-dimensional images can result in some visual biases. For instance, actions like the left and right turns of a shrimp, or the spinning leap of a mantis, are challenging to depict in a two-dimensional plane. Therefore, many designers utilise three-dimensional models to simulate real physical movements, as the visual simulation in three-dimensional space appears more authentic. However, my artwork is based on images from original paintings. I thus designed the turning of the shrimp and the spinning of the mantis as very rapid, instantaneous movements to avoid causing visual discomfort in viewers during the motion process.

7.4 Future work

In light of the unresolved issues mentioned in the limitations section, further research can progressively delve deeper into user data collection and iterative optimisation of the artworks. Further research can also be conducted on mobile terminals, aesthetic principles suitable for modern interactive media, and the embodiment of cultural elements through this media.

The use of interactive media to promote understanding of another culture (Pujol and Champion, 2012) can be further studied and discussed. Whether audiences can gain a greater interest in Chinese painting through my work forms the focal point of the next stage of research. The enhancement of aesthetic cognition necessitates a comparison of audience cognition data before and after interaction, using preliminary user surveys and later user feedback. The work not only needs to be displayed in various

settings, such as museums, art galleries, showrooms, and workshops. Collecting user survey questionnaires and interview data is also necessary, as user expectations and the degree of immersion and affordance vary by region. Viewers' general level of comprehension of traditional Chinese painting also needs to be evaluated before they interact with the work. Administering user surveys, obtaining user feedback, and contrasting and analysing different user data can facilitate the iterative process of the prototypes. Based on user feedback and test results, designers or artists can quickly make modifications and improvements. This iterative cycle helps to enhance the final product. By collecting feedback from users or potential users and observing how they interact with prototypes, designers or artists can identify usability issues, user preferences, and areas needing improvement. Due to the different personalities of users, Shneiderman et al. (2016) believed that some people enjoy using computers and mobile devices, while others do not. Even those who enjoy such devices may have varying preferences regarding interaction style, interaction speed, and dynamic graphic presentation. Understanding these different personalities and cognitive styles is helpful to the design process. Moreover, because my design is heavily influenced by Chinese culture, I must consider the differences between individuals familiar and unfamiliar with Chinese painting and/or culture. There are significant differences among people from different cultural, linguistic, racial, and life backgrounds. Shneiderman et al. (2016) suggested that choices may differ between users from reflective or traditional cultures and those from action-oriented or novelty-based cultures. Therefore, collecting data from people with different cultural backgrounds and preferences can more accurately reflect the aesthetic cognition of users.

Digital images implement interaction through software programs. The benefit of mobile terminals is that they are not affected by location and environment. Members of the audience can take out their mobile phones anytime and anywhere, transforming them from traditional painting viewers into active participants in interactive digital works. The two practical artworks attract users in a manner similar to a game, giving the sense that they are playing with paintings. The paintings used in this context are Chinese artworks by Qi Baishi, enriched with cultural perceptivity. Mobile terminals enhance the accessibility and convenience of cultural perception as well as the game-like experience. Could the work attract a more extensive user base through mobile terminal dissemination and might this provide an effective method for developing appreciation of Chinese painting? As Prof. Gong noted (see Appendix 5), the playful interaction between the intended audience and the two shrimps depicted in one of the artworks could be presented through mobile terminals. Increasing the audience could promote the work's dissemination. Using mobile terminals, rather than exhibiting in galleries, could be more effective in increasing user numbers and demand. This subject will be a focal point for new research. Therefore, in the subsequent work, further studies will be conducted on interactions through mobile terminals.

Xie He's "Six Laws" serve as an aesthetic evaluation method for traditional Chinese painting but cannot be directly applied to the interactive design field. There is no targeted aesthetic evaluation method for the juxtaposition of interactive media and Chinese painting imagery. Nonetheless, exploration of media technology is increasingly empowering traditional arts like painting and sculpture. These artforms need to continually keep pace with the practical creations and theoretical outputs of contemporary designers or artists to find effective and actionable design frameworks and evaluation methods.

I will continue to study how the arts can reflect Chinese culture. By utilising interactive technology, two paintings of Qi Baishi were used to enact a proverbial story of my own creation. Answering the questions of whether interactive media approaches are an appropriate way to inspire audiences to understand the form of the proverbial story, whether the viewers are aware of their role in the proverbial story, whether they are inspired by the story or the culture it came from, and whether audiences are more concerned about the entertainment value of the game or the enlightenment provided by the story, requires user questionnaires and interview data from more non-expert participants. These data allow for a comparison of new media with traditional forms to discover whether design promotes cultural enlightenment and embodies Chinese culture and what other Chinese cultural elements can be expressed through media transformation. Discovering the answers to these questions will form the basis of subsequent research.

Bibliography

An, D. W. (2021). The status quo of traditional Chinese painting. *Fine Arts, 10*, 17–20. 安鼎文，传统中国画的现代境遇，美术

Berger, J. (2008). *Ways of seeing*. London: Penguin Classics.

Bolter, J. D., and Grusin, R. (2000). *Remediation: Understanding new media*. Cambridge: MIT Press.

Braun V. and Clarke, V. (2012). *Thematic analysis*. Washington, DC: American Psychological Association.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research and Psychology*, 3(2), 77-101.

Brody, J. D. (2001). Black cat fever: manifestations of Manet's Olympia. *Theatre Journal*, 53(1), 95-118.

Cahill, J. (1960). *Chinese painting*. New York: Skira, distributed in the U. S. by World Pub. Co.

Cahill, J. (1961). The Six Laws and how to read them. *Arts Orientalis, 4*, 372-381.

Chen X. X. (1998). Stylization and modelling structure of Chinese contemporary landscape painting creation. *Fine Art, 12*, 18-19. 陈向迅，程式规范与造型结构——中国当代山水画创作谈，美术

Chen, S. X. (2006). *The summary of Chinese painting.* Chengdu, China: Sichuan Fine Arts Publishing House. 陈绶祥，中国画文库，四川美术出版社

Chen, Z. (2010). *Explain along the River During the Qingming Festival.* Shanghai: Shanghai Ancient Books Publishing House. 陈诏，解读清明上河图， 上海古籍出版社

Cheng, M. and Hung, T. W. (2018). *Essential terms of Chinese painting*. Hong Kong: City University of Hong Kong Press.

Cheng, Z. D. (1987). Unintelligible – on Gu Wenda's artistic thought. *Fine Arts, 6*, 13-15. 程至的，看不懂——谈谷文达的艺术思想, 美术

China Travel Agency (2021). Animated version of *Along the River During the Qingming Festival at China Pavilion*. [Online]. Available at: http://www.china.org.cn/travel/2010/10/20/content_21162825.htm#p=1&r=0.8146092850054696. [Accessed 28 Jul. 2021].

Chu, N. H., and Tai, C. L. (2001). Animating Chinese landscape paintings and panorama using multi-perspective modelling. *Proceedings. Computer Graphics International 2001*. IEEE, 107-112.

Clarke, V. and Braun, V. (2021). *Thematic analysis: a practical guide*. London: Sage Publications Ltd.

Costello B. (2009). Play and the experience of interactive art. Unpublished: University of Technology Sydney. PhD.

Crowther, P. (2008). Ontology and aesthetics of digital art. *The Journal of Aesthetics and Art Criticism*, 66(2), 161-170.

Ding, X. H. (2017). Further discussion on the common combination forms of folk stories and proverbs. *Journal of Guizhou University for Nationalities (Philosophy and Social Sciences Edition)*, *2*, 172-182. 丁晓辉，再论民间故事与谚语的常见结合形态，贵州民族大学学报(哲学社会科学版)

Dong, L. (1984). Piety is the artist's soul – an analysis of patriotic spirit in Jian Jiang. *Fine Art, 3*, 60-64. 侗廔，节操是艺术家的灵魂——试析渐江的爱国主义精神，美术

Dou, N. (2018). *All knowledge of sinology*. Beijing: Beijing United Publishing Company. 斗南，国学知识全知道，北京联合出版公司

Dugatkin, L. A. (2020). *Principles of animal behavior*. Chicago: University of Chicago Press.

Egan, R. (2015). Conceptual and qualitative terms in historical perspective. In *A Companion to Chinese Art*, edited by Martin J. and Katherine R. West Sussex: John Wiley & Sons, Inc., 277-292.

Exley, C. (2013). Dress-up: Self-fashioning and performance in the work of Yasumasa Morimura. In *Yasumasa Morimura: Theater of the self*. Pittsburgh: The Andy Warhol Museum, 8-19.

Fan, B. (2008). *Special history of Chinese painting art – figures volume*. Nanchang, China: Jiangxi Fine Arts Publishing House. 樊波，中国画艺术专史人物卷，江西美术出版社

Fan, B. (2017). *The history of Chinese figure painting.* Nanchang, China: Jiangxi Fine Arts Publishing House. 樊波，中国人物画史，江西美术出版社

Fan, J. H., and Shen, H. (2018). *History of Chinese art*. Zhenjiang: Jiangsu University Press. 范建华和沈泓，中国美术史，江苏大学出版社

Fang, W. (1993). *Impression imprinted*. Shanghai: Shanghai Painting and Calligraphy Publishing house. 方闻，心印，上海书画出版社

Fei, D.W. and Huang, Z. (2007). *85 New Wave: The birth of Chinese contemporary art*. Shanghai: Century Publishing Group.

Frayling, C. (1993). Research in art and design. *Royal College of Art Research Papers*, 1(1), 1-5.

Fried, M. (1998). *Art and objecthood: Essays and reviews*. Chicago: University of Chicago Press.

Gagosian Gallery (2015). *Zeng Fanzhi: paintings, drawings, and two sculptures*. [Online]. Available at: https://gagosian.com/exhibitions/2015/zeng-fanzhi-paintings-drawings-and-two-sculptures. [Accessed 9 April 2020].

Gaver, W. (2012). What should we expect from research through design? *Proceedings of the SIGCHI conference on human factors in computing systems.* ACM: 937-946.

Grabski, J. (1999). Victoria amoris: Titian's Venus of Urbino. A commemorative allegory of marital love. *Artibus et Historiae*, 20(40), 9.

Gray, C., and Malins, J. (2004). *Visualizing research: A guide to the research process in art and design*. Hants, England: Ashgate Publishing Limited.

Greeno, J. G. (1994). Gibson's affordances. *Psychological Review*, 101(2), 336-342.

Gu, W. D., et al. (2012). From the pioneer of ink painting to classic pop – a dialogue with Gu Wenda. *Oriental Art, 15*, 96–111. 谷文达，从水墨先锋到经典波普——对话谷文达, 东方艺术

Gu, Z. (2008). You dare to go close to the picture: Yang Yongliang landscape image experiment, *Chip Foto-video Digital, 2*, 34-35. 顾铮，只要你敢走进画面细看——杨泳梁得山水影像实验，数码摄影

Guo, R. X. (2001). *Painting vision*. Shenyang: Liaoning Education Publishing House. 郭若虚，图画见闻志，辽宁教育出版社

Han, G. (2010). On the origin of Xie He's "Six Laws". *Fine Arts Research, 2*, 65-73. 韩刚，谢赫六法渊源考，美术研究

Han, G. (2013). The dialectic innovation of Shi Tao's paintings – centered on brushwork evolving with time and present built on past. *Chinese Culture Forum, 1*, 83-89. 韩刚，石涛画学创新辩证—以笔墨当随时代与借古开今为中心，中华文化论坛

Han, T. H. (2019). *Collection: miscellanea: the story of my collection*. Beijing: Rong Baozhai Publishing House. 韩天衡，藏杂·杂说：我与收藏的故事，荣宝斋出版社

Han, Y. T. (2015). About between likeness and unlikeness, *Studies of Qi Baishi, Vol. III*, 37-41. 韩玉涛，关于似与不似之间，齐白石研究第三辑会议

Hartson, R. (2003). Cognitive, physical, sensory, and functional affordances in interaction design. *Behaviour and Information Technology*, 22(5), 315-338.

Haywood, N. and Cairns, P. (2006). Engagement with an interactive museum exhibit. *People and computers XIX—The bigger picture: Proceedings of HCI 2005*. London: Springer, 113-129.

Herbt, G. (1918). *An introduction to the history of Chinese pictorial art*. London: Bernard Quaritch, Limited.

Herzberg, Q. X. and Herzberg, L. (2012). *Chinese proverbs and popular sayings: With observations on culture and language*. California: Stone Bridge Press.

Horry, Y., Anjyo, K. I., and Arai, K. (1997). Tour into the picture: using a spidery mesh interface to make animation from a single image. *Proceedings of the 24th Annual Conference on Computer Graphics and Interactive Techniques*, 225-232.

Hsieh, C. K., et al. (2013). Viewing Chinese art on an interactive tabletop. *IEEE Computer Graphics and Applications*, 33(3), 16-21.

Hu, M., and Liu, R. (2010). Why Along the River During the Qingming Festival is alive? *China Intellectual Property News, 9*, 1. 胡曼和刘仁，清明上河图为何活起来了？中国知识产权报

Hu, P. H., and Hu, T. (1959). *Brushwork and appreciation of Qi Baishi's painting*. Beijing: People's Fine Arts Publishing House. 胡佩衡和胡橐，齐白石画法与欣赏，人民出版社

Hu, S. (1999). *Zhang Shizhai & Qi Baishi chronicle.* Hefei: Anhui Education Press. 胡适，章实斋年谱和齐白石年谱，安徽教育出版社

Huang, F. S. (2014). *Selected comparison analysis of Chinese paintings (II)*. Shenyang: Liaoning Fine Arts Press. 黄复盛,中国画论对比选解 2，辽宁美术出版社

Huang, Z. (2008). '85 New Wave' as an ideological history movement. *Studies on Literature and Art, 6*, 102-109. 黄专，作为思想史运动的 85 新潮美术，文艺研究

Irvin, S. (2005). Appropriation and authorship in contemporary art. *British Journal of Aesthetics*, 45 (2), 123-137.

Jiang, J. (2001). *History of Chinese bird-and-flower painting*. Nanning: Guangxi Fine Arts Publishing House. 姜今，中国花鸟画发展史，广西美术出版社

Jiang, Y. H. (2015). *Encyclopedia of Chinese paintings.* Nanjing: Southeast University Press. 蒋义海，中国画知识大辞典，东南大学出版社

Jing, H. (2016). *Brushwork records*. Beijing: People Fine Arts Publishing House. 荆浩，笔法记，人们美术出版社

Kong, L. Q. (2008). *Chinese painting art history: Flower-and-bird scrolls*. Shanghai: Shanghai Fine Arts Publishing House. 孔六庆，中国画艺术史：花鸟卷，上海美术出版社

Krasner, J. (2013). *Motion graphic design: applied history and aesthetics*. Oxford: Elsevier Inc.

Lang, S. J. (1994). On exploratory ink painting. In Zhang, Y. (Ed.). *Trend of modern Chinese ink Art in the End of the Century, Series II.*Tianjin: Tianjin Yangliuqing Painting Society, 7. 郎绍君，关于探索性水墨，世纪末中国现代水墨艺术走势第二辑，天津杨柳青画社.

Lang, S. J. (1999). Brushwork manuscript. *Literary Studies*, *3*, 222-232. 郎绍君，笔墨论稿，文艺研究

Lang, S. J. (2016). *The world of Qi Baishi.* Beijing: Beijing Times Chinese Book Company. 郎绍君，齐白石的世界，北京时代华文书局有限公司

Lang, S. J. and Guo, T. M. (2017). *The Collected Works of Qi Baishi Vol.1-10*, Chang Sha: Hunan Fine Arts Publishing House. 郎绍君和郭天民，齐白石全集 1-10 卷，湖南美术出版社

Lebowitz, J. and Klug, C. (2011). *Interactive storytelling for video games: a player-centered approach to creating memorable characters and stories.* Oxford: Elsevier Inc.

Levin, K. (1994). Splitting hairs: Wenda Gu's primal projects and material misunderstandings. In *United Nations—Italian Division Catalogue*, 67-78.

Li, H. Z. (2018). The application of the art of blank-leaving in painting to modern fiction and its Significance. *Theoretical Studies in Literature and Art*, 38(4),138-149.

Li, J., and Wang, J. Z. (2004). Studying digital imagery of ancient paintings by mixtures of stochastic models. *IEEE Transactions on Image Processing*, 13(3), 340-353.

Li, M., et al. (2022). Computing for Chinese cultural heritage. *Visual Informatics*, 6 (1), 1-13.

Li, Q. (1958). *Research on Qi Baishi.* Shanghai: Shanghai People's Fine Arts Publishing House. 力群，齐白石研究，上海人民美术出版社

Li, W. C. (1987). How to evaluate Shi Tao. *Journal of Nanjing University of the Arts*, *6*, 68-73. 李万才，怎样评价石涛，南京艺术学院学报美术与设计版

Li, X. and Wu, Y. H. (2018). Research on the presentation methods of Chinese painting based on digital media technology. Sukmayadi, Y., et al. eds. *Proceedings of the 4th International Conference on Arts, Design and Contemporary Education (ICADCE 2018).* Dordrecht: Atlantis Press, 419-423.

Li, X. S. (2002). From Chinese painting to experimental ink painting. *Journal of Nanjing University of the Arts, Fine Arts and Design Edition*, *2*, 53-56. 李小山，从中国画到实验水墨，南京艺术学院学报美术与设计版

Li, Z. H. (2009). *The course of beauty.* Beijing: Life & Reading & New Knowledge. 李泽厚，美的历程，生活·读书·新知三联书店

Li, Z. H. (2017). *The Chinese aesthetic tradition.* Translated from the Chinese by Maijia Bell Samei. Honolulu: University of Hawaii Press.

Li, Z. H., and Liu, G. J. (1999). *History of Chinese aesthetics*. Hefei: Anhui Literature and Art Publishing House. 李泽厚和刘纲纪，中国美学史，安徽文艺出版社

Liu, F. X. (2010). Qi Baishi's great influence in a century, *Proceedings of Qi Baishi International Symposium*, 2, 446. 刘凤霞，齐白石的百年余馥载齐白石国际研讨会论文集(下)，文化艺术出版社

Liu, J. L. (2015). Appreciation of the Chinese master Qi Baishi's bird-and-flower paintings, *Great Stage*, *7*, 23-24. 刘剑利，国画大师齐白石花鸟作品赏析，大舞台

Liu, X. C. (1993). Foster strengths; address weaknesses. In Zhang, Y. (Ed.). *Trend of modern Chinese ink art in the end of the century, Series I*. Tianjin: Tianjin Yangliuqing Painting Society, 4. 刘晓纯，扬长补短，世纪末中国现代水墨艺术走势第一辑，天津杨柳青画社

Liu, X. Q. (2019). Research on the application of blank art in graphic design. In *2019 1st Asia International Symposium on Arts, Literature, Language and Culture (AISALLC 2019)*, 78-81.

Liu, Z. J. (1993). My artistic orientation. In Zhang, Y. (Ed.). *Trend of modern Chinese ink art in the end of the century, Series I*. Tianjin: Tianjin Yangliuqing Painting Society, 37. 刘子健，我的艺术取向，世纪末中国现代水墨艺术走势第一辑，天津杨柳青画社.

Lu, H. (2009). The development of new ink painting – from modern ink painting to contemporary ink painting. *National Art Museum of China*, *9*, 85-88. 鲁虹，新兴水墨的发展——从现代水墨到当代水墨，《中国美术馆》.

Lu, H. (2013). Chinese painting in Chinese contemporary art. *Chinese Fine Art*, *4*, 18-20. 鲁虹，中国当代艺术中的再中国画问题，中国美术

Lu, H. (2014). Ink painting creation and image turn. *Studies on Literature and Art*, *1*, 152-158. 鲁虹，水墨创作与图像转向，文艺研究

Lu, H. and Sun, Z. H. (2003). The theoretical fallacy of centering on traditional ink. *Chinese Painting and Calligraphy*, *8*, 124-125. 鲁虹和孙振华，传统笔墨中心论的错误，中国书画

Ma, W., et al. (2011). Binocular stereopsis of traditional Chinese paintings. *Proceedings of the 10th International Conference on Virtual Reality Continuum and Its Applications in Industry*, 411-414.

Ma, Z. H. and Chen, L. (2015). *An inconvenient power: New media and youth subculture research*. Beijing: Tsinghua University Press.

McLuhan, M. (1964). *Understanding media: the extensions of man.* New York: New American Library, Times Mirror.

Meiss, M. (1966). Sleep in Venice. Ancient myths and Renaissance proclivities. *Proceedings of the American Philosophical Society*, 110(5), 348-382.

Mu, K. H., and Guo, D. (2012). *Papers on Wei Jin and Southern and Northern Dynasties*, Shanghai: Shanghai Far East Publishing House. 穆克宏和郭丹，魏晋南北朝论文全编，海远东出版社

Muller, E., Robertson, T. J., and Edmonds, E. A. (2006). Experience workshops. *Proceedings of the object of interaction - the role of artefacts in interaction design OZCHI 2006*. ACID. 1-5.

Nelson, R. (2013). *Practice as research in the arts: Principles, protocols, pedagogies, resistances.* New York: Springer.

Newman, G. E. and Bloom, P. (2012). Art and authenticity: the importance of originals in judgments of value. *Journal of Experimental Psychology: General*, 141(3), 558-569.

Ouyang, J. J. (2019). Digitization of ancient Chinese paintings with visual communication design — Taking 3D animated version of Along the River During the Qingming Festival as an example. *Journal of Heihe University*, *4*, 181-183. 欧阳建军，中国古画作品数字化视觉传达设计转化——以 3D 动画清明上河图为例，黑河学院学报

Palace Museum (2021). *Han Xizai Evening Banquet Map*. [Online]. Available at:

https://www.dpm.org.cn/collection/paint/228200.html. [Accessed 10 April 2021].

Paul, C. (2003). *Digital art*. London: Thames & Hudson.

Pejcochova, M. (2010). Qi Baishi's painting collection at the Czech Painter's Gallery, *Proceedings of Qi Baishi International Symposium, 2,* 621. 捷克画家美术馆的齐白石绘画收藏, 齐白石国际研讨会论文集

Pujol, L. and Champion, E. (2012). Evaluating presence in cultural heritage projects. *International Journal of Heritage* Studies, 18(1), 83-102.

Qi, B. S, and Zhang, J. W. (2009). *The reminiscences of Qi Baishi's artistic life.* Changsha: Hunan University Press. 齐白石和张竟无, 齐白石谈艺录, 湖南大学出版社

Qi, F. (2016). Studies of Qi Baishi's paintings of shrimps, *Studies of Qi Baishi IV, 10,* 157-179. 齐驸, 齐白石画虾流变考, 齐白石研究第四辑会议

Richard, V. (2008). *New China new art.* New York: Prestel Publishing.

Ronald, E. (2015). Conceptual and qualitative terms in historical perspective. In Powers, M. J. and Tsiang K. R. (Eds). *A companion to Chinese art.* Sussex: John Wiley & Sons Ltd, 277-292.

Schon, D. A. (2017). *The reflective practitioner: How professionals think in action*. London: Routledge.

Shao, H. (1997). The "laws" of Xie He's "Six Laws" and their explanations. *New Art, 2,* 7-14. 邵宏, 谢赫"六法"之"法"及其断句, 新美术

Shneiderman, B., et al. (2016). *Designing the user interface: strategies for effective human-computer interaction*. Essex: Pearson Education Limited.

Singularity Art Technology (2018). Immersive mapping of *A Panorama of Rivers and Mountain.* [Online]. MANA. Available at: https://www.manamana.net/video/detail?id=3628#!zh. [Accessed 10 April 2021].

Siren, O. (1956). *Chinese painting: Leading masters and principles*. London: Lund Humphries.

Sullivan, G. (2010). *Art practice as research: Inquiry in visual arts.* London: Sage.

The Editorial Board of the Chinese Communist Party History Painting Canon. (2012). *Chinese Communist Party historical painting* canon. Beijing: Communist Party History Publishing House. 中国共产党历史画典编委会, 中国共产党历史画典, 中共党史出版社

Thompson, J. B. (1995). *The media and modernity: A social theory of the media*. Redwood City: Stanford University Press.

Tosa, N., et al. (2005). Cultural computing with context-aware application: ZENetic computer. Kishino, F., et al. eds. *Entertainment Computing-ICEC 2005: 4th International Conference Proceedings.* Berlin/Heidelberg: Springer, 13–23.

Wang, B. M. and Ren, D. B. (2002). *Collection of painting studies (Ming-Qing).* Shijiazhuang: Hebei Fine Arts Publishing House. 王伯敏和仁道斌, 画学集成(明-清)石家庄, 河北美术出版社

Wang, H. S. and Hu, G. H. (2008). *Chinese painting art history: landscape rolls*. Shanghai: Shanghai Fine Arts Publishing House. 王璜生和胡光华, 中国画艺术史: 山水卷, 上海美术出版社

Wang, N., et al. (2019). Encourage self-exploration through an interactive Chinese scroll painting design. *International Conference on Human-Computer Interaction*. Orlando, 26-31 July, 442-452.

Wang, X. (2018). *History of Chinese art*. Beijing: People's Fine Arts Publishing House. 王逊, 中国美术史, 人民美术出版社

Wang, Y. (2018). *Abstract collection of Siku*. Jinan: Qilu Publishing House. 王勇，四库提要丛订，齐鲁书社

Wang, Z. (2018). *Theory on Confucian Gongfu*. Beijing: Chinese Publishing House. 王正，儒家工夫论，华文出版社

Wang, Z. J. (2010). Taoism and the nature of things: a practical examination of Lao Zi's "Taoism of Nature." *Philosophical Research*, *8*, 37-47. 王中江，道与事物的自然:老子"道法自然"实义考论，哲学研究

Wang, Z. Q. (1985). I am a Chinese: thing while walking. In: Beijing Branch of the Chinese Writers Association (Ed.) *The Footprints of the Explorers: The Selections of Beijing Writers' Works*. Beijing: Beijing October Literature and Art Press. 汪曾祺，我是一个中国人:散步随想，探索者的足迹:北京作家作品评论选，中国作协北京分会评论委员会编，北京十月文艺出版社

Wieger, L. (1915). *Chinese characters: Their origin, etymology, history, classification and signification. A thorough study from Chinese documents*. Qingdao: Catholic Mission Press.

Wu, H. (2005). *Art in its ritual context: essays on ancient Chinese art by Wu Hong*. Beijing: Beijing Joint Bookstores: Life & Reading & New Knowledge. 巫鸿，礼仪中的美术——巫鸿中国古代美术史文编，生活·读书·新知三联书店

Wu, H. (2012). *A story of ruins: Presence and absence in Chinese art and visual culture*. New Jersey: Princeton University Press.

Wu, Y. F. (2006). *Oriental wisdom: Chinese classic stories.* Shanghai: Shanghai University Press. 吴义方，东方智慧中国经典故事，上海大学出版社

Wu, Z. G. (1956). *Painter Qi Baishi*. Beijing: Beijing Publishing House. 吴祖光，画家齐白石，北京出版社

Xenakis, I., and Arnellos, A. (2014). Aesthetic perception and its minimal content: a naturalistic perspective. *Frontiers in Psychology*, 1038(5), 1-15.

Xie, H. and Yao, Z. (2015). Paintings and follow-ups. In Luo, S. P., et al. (Eds). *Chinese calligraphy and painting history and record notes*. Taiyuan China: Shanxi Education Press. 谢赫和姚最，画品续画品，罗世平等校注，中国书画史籍校注业典

Xie, Q. (2018). *A Dictionary of sinology*. Chengdu: Sichuan Dictionary Publishing House. 谢谦，国学词典，四川辞书出版社

Xing, H. (2018). *3000 Cultural facts that cannot be forgotten*. Nanchang: Jiangxi Fine Arts Publishing House. 星汉，不可不知的 3000 个文化常识，江西美术出版社

Xu, S. (1989). *Shuowen jiezi*. Beijing: China Bookstore Publishing House. 许慎，说文解字，中国书店

Yang, B. and Xu, D. (2011). Learning to recognize the art style of paintings using multi-cues. *2011 International Conference of Information Technology, Computer Engineering and Management Sciences.* IEEE, Vol. 1, 375-379.

Ye, L. (2013). *Outline of Chinese art history*. Shanghai: Shanghai People's Publishing House. 叶郎，中国美术史大纲，上海人民出版社

Ye, S. Q. (2015). History of Chinese flower-and-bird painting. Hangzhou. Zhejiang People's Fine Arts Publishing House. 叶尚青，中国花鸟画史，浙江人民美术出版社

Yin, S. X. (2003). Pluralism and standardization – the transformation of contemporary art criticism through ink painting art criticism in 1990s. *Studies on Literature and Art*, *5*, 125-131. 殷双喜，多元与规范——从 90 年代水墨艺术批评看当代艺术批评的转型，文艺研究

Yin, W. X. (2020). *Famous Chinese paintings (I)*. Beijing: Central Compilation and Translation Publishing House. 尹维新主编，中国传世名画（上），中央编译出版社

Zhang Yanyuan, Y. (2019). *History of famous paintings*. Hangzhou: Zhejiang Fine Arts Publishing House. 张彦远，历代名画记，浙江美术出版社

Zhao, S. C. (2019). *Designing interactive technology for cross-cultural appreciation of intangible cultural heritage: Chinese traditional painting and puppetry.* Unpublished: Newcastle University. PhD.

Zhao, Y. C., et al. (2020). Affordances for information practices: theorizing engagement among people, technology, and sociocultural environments. *Journal of Documentation*, 77(1), 229-250.

Zhou, B. W., and Wang, Q. Q. (2018). On Zong Bing's ecological aesthetic thought of "Purified thinking and taste in image". *Guangxi Social Sciences*, *3*, 66-70. 周碧琬和王全权，论宗炳"澄怀味象"的生态美学思想，广西社会科学

Zhou, J. Y. (2011). *Collection of Chinese painting theory*. Nanjing: Southeast University Press. 周积寅，中国画论大辞典，东南大学出版社

Zhou, J. Y. (2017). *Intensive reading and analysis of Chinese paintings*. Shanghai: Shanghai People's Fine Arts Publishing House. 周积寅，中国画学精读与析要，上海人民美术出版社

Zhou, W. J. (2006). *From stylization to freedom on tradition and modernity of lines in Chinese water ink figure paintings*. Unpublished: Shandong Normal University. PhD. 周玮佳，从程式走向自由——论中国水墨人物画线条的传统与现代， 山东师范大学(博士论文)

Zhu, G. X. (2016). *Notes on famous paintings of the Tang Dynasty.* Hefei, China: Huangshan Publishing House. 朱景玄(唐)， 唐朝名画录校注，黄山书社

Zhu, L. Y. (2014). *Aesthetics dictionary*. Shanghai: Lexicographical Publishing House. 朱立元，美学大辞典，上海辞书出版社

Zhu, W. Z. (2013). The dissemination of Qi Baishi's art in Japan and something else, *Fine Arts Study*, 1, 56-62. 朱万章，齐白石艺术在日本的传播及其他，美术研究

Zi, R. (2007). A flag-bearer and expert on Chinese culture— Qi Baishi in the eyes of Chen Shouxiang, *Art Observation*, *10*, 35-39. 子仁，中国文化的旗手和巨匠——陈绶祥谈齐白石，美术观察

Zi, Z. Y. (1987). The relationship of Chinese traditional culture to the modernization of China: An introduction to the current discussion. *Asian Survey*, 27(4), 442-458.

Zimmerman, J., and Forlizzi, J. (2014). Research through design in HCI. *Ways of knowing in HCI*, 167-189.

Zimmerman, J., et al. (2007). Research through design as a method for interaction design research in HCI. *Proceedings of the SIGCHI conference on Human factors in computing systems.* ACM: 493-502.

Zimmerman, J., et al. (2011). Field trial of tiramisu: Crowd-sourcing bus arrival times to spur co-design. *Proceedings of Conference on Human Factors in Computing Systems*, ACM: 1677-1686.

Zong, B. H. (2003). *Art scenes*. Beijing: Peking University Press. 宗白华，艺境，北京大学出版社

Appendix 1 Dr Cao Xingang's comment

Timeline

2 Nov 2020, met with Dr Cao and Dr Zheng for discussion. 10 Jan. 2021, comment received.

Expert introduction

Dr Cao Xingang, PhD, member of the Chinese National Academy of Arts, associate professor of Shandong Normal University, and art historian with proficiency in Eastern and Western philosophy

Content

Eastern and Western philosophy, cultural transmission, art criticism

Related key comments

Actuality and virtuality, subject and object

Stillness in motion and motion in stillness

The re-creation of the original Chinese painting can reactivate the traditional value of Chinese painting.

The dynamic artistic image can encourage deep thought and cognitive interest among viewers.

Differences in cultural context can explain why works can be similar in spirit and dissimilar in form.

My artworks have features of contemporary art.

With the help of the interactive elements, the second work reproduces the appearance of traditional Chinese paintings more closely than the first work.

Will this new interpretation and cognition reduce or obscure the beauty of traditional Chinese painting?

Activation, Transformation and Identification

——Reflections on the Thesis by Hao Hong in the Cross-cultural Context

First of all, the topic selected by the author shows unique ingenuity. Qi Baishi, one of world-renowned representative figures of China, gained global reputation as early as the first half of the 20th century. André Claudot, a French serving National Art Academy in Beijing, praised Qi Baishi as the master of modern Chinese painting. It is said that Picasso frankly admitted that Qi Baishi was a world-class artist during the conversation with Chang Dai-Chien who visited Picasso during his exhibitions held in France. It is smart for Hao Hong, an overseas Chinese student, to research Qi Baishi, the world-renowned Chinese representative figure, in his doctoral thesis. As mentioned earlier, Qi Baishi is a master of

Chinese painting in the 20th century. He was good at using ink and wash to depict hundreds of species of animals and plants with strong rural features, including shrimp, crab, fish, chicken, rat, praying mantis, bee, cicada, butterfly, Chinese wisteria, morning glory, persimmon, and cabbage, etc. Qi Baishi was particularly good at organically combining "traditional Chinese realistic painting and freehand brushwork painting", which are two traditional Chinese painting techniques, to portray the image. To be more specific, Qi Baishi used traditional Chinese realistic painting to portray lifelike images of insects in a realistic manner which combined the unity of form and spirit, and applied freehand brushwork, the calligraphic style of drawing and distinctive colors to depict plants with magnificent romantic charm, which represented the highest aesthetic level of Chinese painting. The words "freehand brushwork" in the art of Chinese painting, usually can be defined from two dimensions, i.e. presentation of technique and aesthetic standards. "Shrimp", "Praying Mantis" and "Cicada" and other works selected by Hao Hong are the most representative of the painting style of Qi Baishi and the highest aesthetic standard of Chinese painting. From the perspective of cultural diffusion, as indicated by Martin Powers, culture is fluid rather than static, and the mainstream school of culture may be different from supplementary ones in a specific period of time. The mainstream school of cultural exchanges between the eastern and western countries in the 20th century is featured with "eastward transmission of western sciences". Since the beginning of the 21th century, eastern culture is competing and gaming with western culture. Based on this, the topic selected by Hao Hong needs to be re-evaluated in the context of globalization. From macroscopic aspects, the topic is of great significance and value to the output of Chinese culture. Particularly, the cultural output is realized on the base of media transformation, i.e. the transformation from traditional two-dimensional painting to interactive media. It represents the trial concerning the path of re-activating traditional Chinese culture and enriches the multiple approaches of achieving modern transformation of traditional oriental cultural.

Secondly, the author is also highly ingenious in the application of the narrative strategy in the thesis. At the beginning of the thesis, the author lists classic Chinese and western works such as "Sleeping Venus", "Venus of Urbino", "Olympia" and "Dwelling in the Fuchun Mountains", followed by the discussion of the regeneration and reproduction of the visual image of "motif" in different historical contexts. Different from the "Venus" series which focus on oil painting (the traditional media) and the two-dimensional reconstruction and transformation of the visual image, "Dwelling in the Fuchun Mountains", the painting by Huang Gongwang, represents the transcendence over traditional media. It realizes the change from "rice paper" to "digital animation", giving the rebirth to the thousand-year buried history in the twinkling of an eye. Numerous audiences are attracted and enabled to "immerse" in traditional culture and reflect on the current realities without restrictions from traditional thoughts. Based on the interpretation of classic works of the eastern and western countries, the author establishes the legality of topic selection. Perhaps, during the interpretation of "Dwelling in the Fuchun Mountains",

the author has already identified that the works of Qi Baishi are exactly the cases that can be academically extended and explored.

The international influence of Qi Baishi has already been mentioned in the first paragraph. As a classic symbol of oriental art, Qi Baishi's works present an aesthetic delight, which is described as "between likeness and unlikeness" under an academic context. Judging by historical documentation, this is Maestro Qi Baishi's clear self-orientation of his work with respect to style and aesthetic dimensions. "Likeness and unlikeness" actually cover two levels of creation and appreciation, which is a major feature of classical Chinese art theory. For example, the painter and theorist Xie He of the 5-6th century in China introduced the concept of the "Six Laws" in his prestigious book, The Record of the Classification of Old Painters. Although it was initially perhaps a critical discourse of the work of the 3-4th century painters, the book has served as a basis for the practice of artists of later generations, known as "standards of excellence". "Likeness" and "unlikeness" possess exactly such typical characteristics. As evidenced by history, the practice and aesthetic standards of "likeness" and "unlikeness" are not originated by Qi Baishi, but rather a concept of a long historical standing. Qi Baishi's approach of "between likeness and unlikeness" undoubtedly reveals the connotation of ideas that approximate "the doctrine of the mean" by the Confucian school. It is also based on this, that practice and aesthetic standard became the universal law of traditional Chinese art or classical Chinese art, and constructed the rightfulness of its inheritance.

The question, then, is how to understand "likeness and unlikeness" or "between likeness and unlikeness"? As a matter of fact, the interpretation of this question presents a difference in cross-cultural contexts. That is, in China or in the pan-East Asian cultural circle popular with Han culture, this issue hardly needs to be explained and can be discussed by general public. In other words, it does not constitute a "question" of great significance to be discussed insightfully. In order to clarify the question in an easier way, we can use the phrase "actuality and virtuality" to replace "likeness" and "unlikeness" for better understanding. In fact, actual and virtual are a matter of great value and significance in both eastern and western cultures. A large number of scholars have expounded this issue in different times and regions. Readers interested in this issue may refer to relevant literatures for a deeper understanding and perception. However, under the cultural background and context of the East and the West, there is also a huge difference in the interpretation and cognition of actuality and virtuality. For example, in terms of the understanding of reality, the view of reality in scientific discourse poles apart from the view of reality in artistic discourse. The discovery of "perspective" directly contributes to the way how western Renaissance artists view, perceive, and present the world. The classic paintings created by Da Vinci, Michelangelo, Raphael, etc., which aim to present the true essence of science, have become a model constantly imitated by painters in the west from the Renaissance to the Enlightenment in the 18th century. However, since the middle of the 18th century, with the birth of the Industrial Revolution,

Enlightenment has revisited the value of reason, causing impact on the field of art as well. A series of questions such as “what is the truth” and “how to present reality in the painting” then again become the topic of the focus of artists and theorists. As opposed to what the questions of “reality”, “subjectivity” or “selfhood” highlight, how to express “reality” and “selfhood” in the painting and “which is more important” have become an important criterion in our judgment of whether a painting is a “classical tradition” or “modern art”, and based on the tentative answer to this question, it has shaped the pluralistic trend of thought and diverse genres in the western modern art history. To some extent, the interpretation of the phrase “actual and virtual” actually reflects a philosophical approach to our viewing and cognition of the world, that is, how to understand the relationship between subject and object. The relationship between “subject and object” in the context of Chinese and western cultures is completely different. The western culture emphasizes the “separation of subject from object” while Chinese culture stresses the “integration of subject and object”. More accurately, Chinese culture pays special attention to the reflection of the object (i.e. the world) to the subject (i.e the man), namely the force of the object (world), as a reference, in shaping the subject. At the birth of ancient Chinese philosophy, there was an ideological view which goes like this: “Man follows the earth, the earth follows heaven, heaven follows Dao, and Dao follows nature”. During the Han Dynasty, people emphasized more on the theory of “harmony between man and nature”. As one of the carrier of China’s culture, Chinese paintings are undoubtedly a reflection of China’s ancient philosophical standpoint. The cognitive way of “integration of subject and object” becomes a cultural gene or code which is rooted in Chinese paintings. Therefore, “likeness and unlikeness” emphasized in paintings is not the first or most concerned “theme” of the artists in their creation of Chinese paintings. The artists of Chinese paintings pay more attention to whether the visual image they created can perfectly express what they think, i.e. subjective intention. As a matter of fact, although “likeness and unlikeness” is the supreme aesthetic pursuit of the artists of Chinese paintings with Qi Baishi as representative, it is incomplete and we do not know its full context. Therefore, it is difficult for us to accurately and better understand the artistic viewpoint of Qi Baishi. The complete expression of Qi Baishi is as follows: “the beauty of painting lies in the line between likeness and unlikeness. If the painting is really true to the real object, it is Kitch-art; if it is completely untrue to the real object, it is deception.” To the mind of Qi Baishi, if the visual image created in the paintings is really true to the object, then it will be easy to kill the subjectivity of the artists and is not an elegant art-work. On the contrary, if the visual image created is completely untrue to the object, it becomes a symbol of “deception”, which is also not recognized by the artists. In other words, super actuality and virtuality are not what the artists of Chinese paintings want. Obviously, “standing between the likeness and unlikeness” becomes the key to solve this conflict. It can not only incorporate the both in the same paintings in a harmonious and balanced manner but also echoes with the cognitive relationship between subject and object in China’s ancient philosophy which is greatly different from that of Western culture. In some sense, “standing between likeness and unlikeness” is a real issue faced

by Chinese artists in drawing and the strategic handling of this issue is also stamped with the unique Chinese culture gene.

At the specific operation level, the author selects Qi Baishi's widely known visual images "shrimp", "mantis" and "cicada" for deconstruction and transformation and carries out activation and reproduction of contemporaneity on the "meta-work" (original copy) in the cross-cultural and cross-media context. In the thesis the author selected Qi Baishi's work *Two Shrimps*, which, obviously according to the aforementioned, is the typical work that can reflect the artistic concept and aesthetic taste of "between the likeness and unlikeness" pursued by Qi Baishi as well as the work that can represent the artistic level of traditional Chinese painting. In other words, the visual modeling of the two shrimps is both rooted in the real shrimp in the natural world, and perfectly exhibits the creator's subjective intention, being an intra-subjectivity model work. By virtue of the typical symbol that represents traditional Chinese painting, the author Hao Hong applies "technology" to deconstruct and transform, which is the breakthrough and reproduction of medium at the level of material. The static two-dimensional symbol originally occupying "Xuan paper" becomes an interactive dynamic image. "Interaction" makes this image different from the terminative "animation" and gives this imaging work the ultimate "incomplete" characteristic. The ultimation-based "incompleteness" renders the work some kind of absolute "openness". On the surface, this work is done by the "author" Hao Hong alone, but in fact, due to the "interaction" technology and scene setting, every viewer who participates in the "interaction" becomes the "author" of the work to a certain extent, that is, the work is created by both the "original author" and the "participant". In other words, when we put this work in the scene of the "exhibition", based on the "interactive" design, the work is incomplete and must be interacted by the participants in order to finally achieve the "completion". Based on this, we may think that Hao Hong's *Two Movable Shrimps* has some characteristics of contemporary art. His other work, *Mantis Catching Cicada*, has generated some characteristics of contemporary art because of having similar characteristics to *Two Movable Shrimps*. On account of the design and application based on "interaction" technology, *Two Movable Shrimps* intuitively presents the transformation and reconstruction of medium, while *Mantis Catching Cicada* contains the unique moral of traditional Chinese culture. There is an idiom in the Chinese classical word system: "The mantis stalks the cicada, unaware of the oriole behind." This idiom has a long history and originates from the *Garden of Anecdotes* written by Liu Xiang, an author of the Han Dynasty in China, which shows the wisdom of the ancient Chinese in understanding the world with the help of animal relations. To put it bluntly, when the mantis tries to catch the cicada, it does not find the oriole on top of the food chain staring covetously behind it. In the context of traditional Chinese culture, this idiom implies that people are short-sighted. But if we take the mantis as the cognitive subject, the problem of intersubjectivity is presented among the mantis, the cicada and the oriole, which, from the perspective of psychoanalytic philosophy, is quite similar to the "real" in the "Three Orders" Theory put forward by the French psychoanalyst Lacan. It is worth noting that when the author Hao Hong

deconstructs and transforms Qi Baishi's "Mantis" and "Cicadas"- traditional two-dimensional works into dynamic image works, the metaphor of "The mantis stalks the cicada, unaware of the oriole behind" does not directly occur in the interactive design scene. In other words, when the viewers experience interactively in front of the work, they only play by taking "mantis" and "cicadas" as independent individuals without making the two have a "dialogue" relationship, thus the metaphor of "The mantis stalks the cicada, unaware of the oriole behind" cannot be generated and manifested. However, once a "dialogue" relationship is formed between the two, it is evident that the metaphor of "mantis catching cicadas" takes effect immediately. It is worth pondering that even if the moral of "mantis catching cicadas" works, the metaphor of "oriole behind" may not necessarily be generated. Because "mantis" and "cicadas" are both visible and movable images, while "oriole" is hidden in the minds of the viewers who experience interaction and is thus "invisible". More importantly, not all experiencing viewers have the shadow of "oriole" in their minds, because only those who have a good knowledge of the Chinese idiom "The mantis stalks the cicada, unaware of the oriole behind" will associate with experience and generate this metaphor further. From this point of view, *Mantis Catching Cicada* is meaningful and valuable because, on the one hand, it enables audiences to appreciate the aesthetic taste of visual imagery in traditional Chinese painting and, on the other, with the help of this transformed and dynamic visual image, it allows the viewer to delve deeply into traditional Chinese culture and appreciate it with the senses, which is different from experiencing it cognitively.

In short, neither *Two Movable Shrimps* nor *Mantis Catching Cicada* involves any simple media transformation. What is worthier of our attention behind it is the "reproduction" of aesthetic interest in the cross-cultural context. Although the "shrimp", "mantis" and "cicada" portrayed by Qi Baishi are the still images in two-dimensional paintings, they are perceived as having stillness in motion and motion in stillness in the context of Chinese culture. As China and the West have different cultural genes, western viewers may not be able to identify with such perception. However, when two-dimensional paintings are converted into media works by the author through interactive design, the still images become dynamic visual images. With the interactive exploration by different viewers, the movement of images in paintings takes on many changes. With regard to cultural exportation, such interactive design is obviously more attractive and intrigue viewers in different cultural contexts more than traditional static visual modeling. What is more interesting is that the "dialogue" between "artistic images" caused by changes in movements can also trigger deeper thinking among viewers, allowing them to discover the deeper meaning of Chinese culture, just like the aforementioned interpretation of *Mantis Catching Cicada*, an interactive media work. Therefore, I believe that it would be worthwhile to add digital interaction to traditional Chinese painting via media transformation. This is a re-creation of original Chinese paintings that can reactivate the traditional value of Chinese painting by making static paintings dynamic. However, I have one concern that I need to point out here: the visual images of the shrimp and mantis created by Qi Baishi reveal his lifelong "the artistic harmony between likeness and

unlikeness". These images reflect the essence of traditional Chinese culture and become "universal" and a typical symbol of Chinese culture. When the author converts these images into media works through "interactive design", these images have become a new dynamic visible carrier. However, when viewers in the context of western culture interprets this dynamic visual carrier, they tend to compare this visual image with the real image of fresh shrimp and mantis in the natural world, thus generating new interpretation and cognition. Will this new interpretation and cognition reduce or obscure the beauty of the typical visual images created by traditional Chinese painting? In other words, will such conversion and reproduction, though they have an advantage in cultural exportation, obliterate or reduce the charm and taste of Chinese culture, thus causing western viewers to have a new misinterpretation of Chinese culture? Perhaps this is just my unfounded concern, but it might as well be presented here for the author's reference.

激活、转换与认同

——跨文化语境下对洪浩论文的几点思考

首先，作者的选题颇具匠心。齐白石作为一个具有世界性的中国（东方）符号，早在 20 世纪上半叶就已经具有全球声誉，比如时任北京国立艺术专科学校的法国人安德烈·克罗多（André Claudot）就认为齐白石是中国的现代绘画大师；据说张大千在法国举办展览时，曾拜谒毕加索，毕加索坦承齐白石为世界级的艺术大师。作为一名中国留学生在博士论文的选题中撷取这一世界性的中国符号，是作者智慧性的表现。如前所述，齐白石是 20 世纪中国画大师，擅长以水墨方式描绘具有浓厚乡村生活经验的动植物，诸如虾、蟹、鱼、鸡、鼠、螳螂、蜜蜂、蝉、蝴蝶、紫藤、牵牛花、柿子、白菜等等，据学者统计可达上百种。在图像的塑造方式上，齐白石特别擅长的是"工兼写"。所谓"工兼写"即是工笔和写意两种传统中国画技法的有机混融。呈现于画面中，昆虫的描绘方式是工笔，形神兼备，栩栩如生，写实性极强；植物的呈现方式则为写意，书法用笔，墨色分层，极具神韵，是中国画审美的最高水准。写意二字，在中国画这一艺术门类中，往往具有两层含义：技法呈现与审美标准。作者洪浩选择的《虾》、《螳螂》、《蝉》等作品正是齐白石最为典型的风格，达到了中国画最高妙的审美标准。从文化传播的角度来看，正如包华石(Martin Powers)所言，文化从来不是静止的，是流动的，但在特定时段内有主调和复调之分。如果说 20 世纪东西方之间，文化流动的主调是"西学东渐"，那么进入新千年，东西方在文化之间呈现竞争与博弈的态势，基于此，重新审视洪浩的选题，在全球化的语境下，宏观而言，对于中国文化的输出具有着重要的意义和价值，特别是这一输出的形式，是基于媒

介的转换——传统的二维艺术转换成互动媒体，从某种角度而言，无疑是中国传统文化再“激活”的路径试错，从而也丰富了东方传统文化“当代性”转换的多重路径。

其次，作者在论文的叙事策略上也颇费匠心，文章伊始列举西方和中国的经典作品诸如《睡眠中的维纳斯》、《乌尔宾诺的维纳斯》、《奥林匹亚》、《富春山居图》等，探讨作为“母题”的视觉形象在不同历史语境中的再生产及其呈现。如果说“维纳斯”系列仍聚焦于传统媒介——油画——二维平面中的视觉形象的再造与转换，那么黄公望的《富春山居图》则是对传统媒介的超越——由“宣纸”变成“数字动画”，尘封的千年历史在瞬间被“复活”，吸引无数眼球，使得观者既能在传统的文化中“沉浸”，又能走出传统，观照当下。通过对东西方经典作品的解读，建构了作者论文选题的合法性，或许，在对《富春山居图》的阐释中，作者已然捕获了可以展开、进行学理性探讨的案列——齐白石。

前面已经谈到齐白石所具备的国际性影响力，作为东方艺术的典型符号——齐白石，其作品呈现出审美趣味，在中国学术的脉络中被表述为“似与不似之间”。依据史料可知，这是艺术家齐白石对其作品在风格及审美维度的明确的自我定位。“似”与“不似”，实际上涵盖了创作和鉴赏两个层面，这是中国古典艺术理论的一大特征，比如中国 5-6 世纪的画家、理论家谢赫在其享有盛名的著作《古画品录》中提出了“六法”的概念，这一概念虽然最初或许是对 3-4 世纪画家的作品的批评话语，但在后世的发展中亦成为一种艺术家进行实践的依据、“优秀”的法则标准。“似”与“不似”正是具有这样的典型特征。有史为证，“似”与“不似”的实践和审美标准，并非齐白石的首创，而是历史渊源长久，齐白石取法“似与不似之间”，无疑透露出近似儒家“中庸之道”的思想内涵，亦基于此，这一实践和审美标准才成为中国传统艺术或称之为中国古典艺术的普适性法则，建构了其传承有序的合法性。

那么，问题是如何理解“似与不似”或“似与不似之间”？事实上，对这一问题的解读呈现出一种跨文化语境的差异性。也即，在中国或以汉文化流行的泛东亚文化圈中，这一问题几乎无需阐释、人人即可言说，换句话说，这并不能构成一个具有深刻讨论意义的“问题”。为了更简易的厘清这一问题，我们可以用“真实与虚构”这一话语词组，来代替和理解“似”与“不似”。事实上，真实与虚构，是东西方文化中极具价值和意义的历史问题，不同时代，不同地区，都有大量学者对这一问题进行阐述，有兴趣的读者可以查询相关的著作，进而加深理解和认知。但处于东西方的文化脉络和语境下，对真实与虚构的解读和认知也有着巨大的差异性，比如对于真实的理解，科学话语中的真实观与艺术话语中的真实观截然不同，“透视”的发现直接促进了西方文艺复兴时期艺术家对世界的观看、认知和呈现方式，达芬奇、米开朗基罗、拉斐尔等以科学之

真创造的经典绘画作品，成为西方自文艺复兴以来至 18 世纪启蒙主义之间画家们不断进行模仿的合法性文本，但自 18 世纪中期以后，伴随着工业革命的诞生，启蒙主义对于理性价值的重新探讨，波及到艺术领域，对于“何为真实”、“如何在画面呈现真实”等一系列问题又成为艺术家、理论家再次聚焦的话题，相对于“真实”、“主观”或“自我”问题凸显，如何在画面中表达“真实”与“自我”以及二者之间“孰重孰轻”成为我们判断绘画作品是“古典传统”或“现代艺术”的一个重要标准，并基于此问题的尝试性解答，形塑了西方现代艺术史上多元并举、流派纷呈的思潮与现象。从某种角度而言，对于“真实与虚构”这一话语的解读，实际上反映了我们观看和认知世界的一种哲学方法——如何理解主体与客体的关系问题。中西文化语境中对于“主客”之间的关系截然相对，如果说西方文化中强调的是“主客分离”，那么中国文化则更加强调“主客相融”，确切的说，在中国的文化脉络中，特别看重的是作为客体—世界对于的主体—人的一种反映，也即客体世界作为一种参照物——他者，对于主体的生成所产生的形塑力。中国古代哲学诞生之初即有“人法地，地法天，天法道，道法自然”的思想观，两汉时期更加强调“天人合一”，中国画作为中国文化的载体之一无疑是中国古代哲学思想观的映射，主客相融的认知方式成为一种文化基因或密码内植于中国画中。因而，对于绘画所强调的“似与不似”的问题，并非成为中国画艺术家在进行创作时首先或最关心的“主旨”，中国画的艺术家更加关心的是他所创造的视觉形象是否能够“至善至美”的表达其心中所想——主观意图。事实上，“似与不似之间”虽然是以齐白石为代表的的中国画艺术家至高的审美追求，但这句话并不完整，缺少“上下文”的关系，因而难以更好的理解齐白石的艺术观。齐白石的完整表述如下：“作画妙在似与不似之间，太似为媚俗，不似为欺世。”在齐白石看来，如果在画面中创造的视觉形象，其真实的程度太逼近客观物体，则容易遮蔽或抹杀艺术家的主体性，成为“媚俗”，并非是高雅艺术的呈现与表达；相反，如果创造的视觉形象的真实性完全与客观物体脱离，成为“欺世”的表征，亦非艺术家认同，也即超级真实与完全虚构皆非中国画艺术家之所欲。显然，“似与不似之间”成为解决这一画面矛盾的“药方”，不仅使二者能够和谐、均衡的统一于画面中，而且又呼应了中国古代哲学中所包含的迥异于西方的主客二体的认知关系。从某种角度而言，“似与不似之间”既是中国艺术家在进行绘画实践时所必须面对的现实问题，而对这一问题所采取的的“策略化”处理，又深深的烙印了具有特殊性的中国的文化基因。

具体的操作层面，作者选取了齐白石广为人知的视觉形象“虾”、“螳螂”和“蝉”进行解构和转换，在跨文化、跨媒介的语境中，对“元作品”（母本）进行了具有当代性的激活和再生产。论文中作者选取的是齐白石的作品《两只虾》，显然，根据前述，这是能够反映齐白石所追求的“似与不似之间”——这一艺术观念和审美趣味的典型之作，也是能够代表传统中国画艺术水准的作

品。换句话说，这两只虾的视觉造型，既源自自然界中真实的虾，同时又能完美的表现出创作者的主观意图，是主客相融的典范之作。作者洪浩借助这一代表中国传统绘画的典型符号，运用“技术”进行解构和转换，从物质的层面而言，这首先是媒介的突破与再造，原本占据“宣纸”——静止的二维符号，成为一种可交互的动态的影像，“交互性”使得这一影像区别于终结的“动画”，并赋予这一影像作品具有终极的“未完成性”的特征，基于终极的“未完成性”，更使得作品具有了某种绝对的“开放性”。表面上看，这一作品是所谓的“作者”洪浩一人完成，但实际上，因为“交互”的技术和场景设置，使得每一位参与“交互”的观众在一定程度上都成为作品的“作者”，也即，该作品是由“原始作者”及“参与者共”同创造完成。换句话说，当我们把这一作品置放在“展览”的场景中时，基于“交互”的设计，该作品并未完成，必须由参与者进行互动，才最终达成作品的“完成”。基于此，我们或许可以这样认为，洪浩创作的《两只虾》具有了当代艺术的某些特征。而其另外一幅作品《螳螂和蝉》，因为具有同《两只虾》相类似的特质，从而也生成了当代艺术的某些特征。《两只虾》因基于“交互”技术的设计与运用，直观呈现的是媒介的转换与重构；而《螳螂和蝉》除此之外，更蕴含了独特的中国传统文化的寓意。中国古典语词系统中有一句成语：“螳螂捕蝉，黄雀在后。”这句成语历史悠久，源自中国汉王朝时期作者刘向的《说苑》，表现了古代中国人借助动物关系认知世界的智慧。直白而言，当螳螂欲捕捉蝉时，却未发现居于食物链之上的黄雀在背后虎视眈眈。在中国传统文化的语境中，这一成语寓意人的目光短浅，未有远见。但若我们以螳螂作为认知的主体，那么螳螂、蝉与黄雀之间所呈现的是主体间性的问题，从精神分析哲学的角度而言，与法国精神分析学家拉康所提出的“三界”理论中的“实在界”颇有异曲同工之妙。值得注意的是，当作者洪浩将齐白石的《螳螂》和《蝉》——这一传统的二维作品——解构、并转换为动态的影像作品时，在交互的设计场景中，并未直接发生“螳螂捕蝉，黄雀在后”的隐喻。也即，当观众在作品面前进行交互体验时，仅仅将“螳螂”或“蝉”作为独立个体进行“游戏”，未能使二者发生“对话”关系，那么“螳螂捕蝉，黄雀在后”的隐喻便不可能生成和显现。但是，一旦二者构成“对话”关系，显然“螳螂捕蝉”的隐喻则立刻生效。值得玩味的是，即便“螳螂捕蝉”的寓意生效，但“黄雀在后”的隐喻却不一定能生成。因为“螳螂”和“蝉”均是可见、可动的形象，而“黄雀”则是藏于体验交互的观众的脑海中，是“不可见”的。更为重要的是，并不是所有体验观众的脑海中均有“黄雀”的影子，因为只有通晓“螳螂捕蝉，黄雀在后”这一中国成语知识的观众才会在进行体验式有所联想，进而生成这一隐喻。从这个角度而言，《螳螂和蝉》有意义和价值，因为她一方面能够让~~西方~~观众欣赏到传统中国画视觉形象的审美趣味，另一方面，借助这一转换的、动态的“视觉形象”深入中国传统文化的“内里”，领略完全不同于其自身认知经验的中国文化的味道。

总之，无论是《两只虾》还是《螳螂和蝉》，并非是简单的“媒介转换”，其背后显现的更值得我们注意的是跨文化语境中的美学趣味的“再生产”。齐白石所塑造的“虾”、“螳螂”和“蝉”虽是二维画面中的静止形象，但处于中国文化的语境中，则是静中有动，动中有静，动静相融的认知观念。基于中西方不同文化基因的形塑，西方观众或许未能如此般体验。但通过作者的交互设计转换为媒体作品时，静止的形象成为可视的、动态的影像，且伴随着不同观众的互动体验，其运动也呈现出多种变化。从文化输出的角度而言，这一互动设计显然要比静止的传统视觉造型更具吸引力，更能引起不同文化语境中的观众的认知兴趣，更有意思的是，运动的变化导致的“艺术形象”之间的“对话”，还能引发观众更深入的思考，从而发现中国文化更深层的寓意，如同前述对《螳螂和蝉》这一互动媒体作品的解读。因而，我认为数字交互对传统中国画的媒介转换是一件值得尝试的事情。这是对中国画原作的再创作，重新激活了中国画传统价值。但有一点笔者有所担忧，并在此指出：齐白石所创造的虾、螳螂等视觉形象，是其一生追求“似与不似之间”的艺术观念和趣味的显现，融汇了传统中国文化的精髓，且已具有“世界性”，成为东方文化的典型符号，当作者借助“互动设计”转换为媒体作品后，成为可见、可动的新的视觉载体，但这一动态的视觉载体，当处于西方文化语境中的观众在解读时，容易把这一视觉形象与自然世界中鲜活的虾、螳螂——这一真实形象进行比较，进而产生新的阅读与认知。那么，这种新的阅读与认知是否会降低或遮蔽传统中国画所塑造的典型视觉形象的审美性？或者说，这样一种转换和再生产，虽然在文化输出方面占有优势，但是否会抹杀或降低中国固有文化的魅力和品位，进而让西方观众对中国文化产生新的误读呢？或许这是笔者的杞人忧天，但不妨在此呈现，以供作者参考。

Appendix 2 Dr Zheng Weikun's comment

Timeline

2 Nov 2020, met with Dr Cao and Dr Zheng for discussion. 20 Feb 2021, comment received.

Expert introduction

Dr Zheng Weikun, PhD, member of the China Academy of Art, associate professor at Hubei Normal University, and specialist in art theory and the history of Chinese painting

Content

Chinese painting aesthetics and Chinese artistic spirit, the significance of media transformation

Related key comments

The freehand characteristics of Chinese painting

The moral sentiments and inner feelings of the original author

Understanding how works can be similar in spirit but dissimilar in form to Qi Baishi's paintings

How the transformation from static to dynamic activated the connections with Chinese culture and Qi Baishi's improvisational style of painting?

Dynamic Vision and Expression of the Spirit of Chinese Painting

Dr Hao Hong's research focuses on presenting classic Chinese paintings through interactive animation by using modern media technology, which is pioneeringly helpful for people to understand the spirit of Chinese painting, especially for people who do not understand the aesthetics of Chinese painting, because they tend to view Chinese paintings generally by focusing on the "resemblance in form", which is far from capturing the spirit of the paintings. Chinese painting is fundamentally different from Western painting in terms of its expressive form and stylistic characteristics. As far as the expressive form is concerned, ink and water are the main materials used in creating a Chinese painting. With the combination of dots and strokes, Chinese painting looks both impressionistic and realistic, reflecting the concept of yin and yang in ancient Chinese philosophy. With regard to style, the physical shapes depicted in a Chinese painting are not the accurate replica of objects. Instead, they are cognitive expressions based on the artist's understanding of objects. Moreover, with feelings channeled into creation, the artist presents the images of objects as an organic whole in the painting through variations in lines' thickness and pressure and by creating a harmony between subject and object, the upward and the downward tilts of strokes, the front and the rear views, and the starting and the final strokes. Such method of expression naturally changes the characteristics of the physical shapes of objects,

representing the “freehand brushwork” in Chinese painting. Therefore, it can be said that “freehand brushwork” is a method of brushwork expression of the artist’s emotions based on the careful observation of the objects to be depicted. This method aims not only to present the images of objects themselves, but also to give rein to the artist’s subjective state and mood. In addition, Chinese painters tend to associate their moral ideals with the natural objects they observe, and express their moral values through “freehand brushwork”. For example, Chinese artists like to paint bamboo, because bamboo has the natural qualities to which the characteristics of a gentleman can be attributed, such as uprightness, tenacity, and modesty. So, by painting bamboo, the artist can actually metaphorically praise people who have exhibited these characteristics. In Chinese painting, “freehand brushwork” is a fundamental method of expression. Any painting created with this method is more than just the depiction of the objects and their shapes seen by the artist, because it also reflects the artist’s emotions. Accordingly, many scholars regard Chinese painting as “heart painting”(or “picture of the soul”), where objects are exaggerated, transformed, or reconstructed based on the artist’s subjective understanding and thus look sharply different from their original appearance. Therefore, the ideal depiction of shapes in Chinese painting is underpinned by the pursuit of an aesthetic harmony “between likeness and unlikeness”, which happens to be one of the topics Dr Hao Hong has studied.

In fact, “likeness and unlikeness” is another way of describing the essence of freehand brushwork in Chinese painting. As early as the Northern Song Dynasty, Su Dongpo, one of the most accomplished figures in classical Chinese literature, once argued that “to judge a painting by its fidelity to the real thing is to have an understanding close to those of children”. Obviously, Su Dongpo believed that painting was not about the pursuit of similarity in form. He even showed strong disdain for the paintings presenting the virtual replica of objects in form. So what does he think is the essence of painting? To this question, Su Dongpo answered in another poem about painting, “looking at scholarly paintings is like viewing galloping horses of the world: one must choose only those paintings good in both imagery and verve”. Obviously, Su Dongpo uses the allusion of “Jiufang Gao and the Horse” to illustrate that the key to a good painting lies in its “imagery” and “verve”. “Imagery” is the essence of freehand brushwork, while “verve” implies vitality, functional activity or natural gift. On the one hand, Su Dongpo stressed the importance of “imagery and verve” in Chinese painting. On the other hand, he showed disapproval of painters who are good at copying and only pursue exquisite techniques. Although Su Dongpo showed disapproval of “similarity in form” and emphasized the importance of imagery and verve, he did not probe into the issue of forms in painting. After all, no painting can be created without the depiction of forms. In other words, there is no painting completely free of forms. Therefore, “form” is still an unavoidable issue in Chinese painting. Of course, Su Dongpo did not deny the significance of form. It’s just that he did not elucidate how much weight “form” carries in Chinese painting, leading to the abuse of quotations about Chinese painting from him later on.

Wang Fu, a painter of the Ming Dynasty, was averse to the abuse of the quotation “not seeking similarity in form” from Su Dongpo by many painters with poor painting skills at the time. He criticized such abuse and further explained, “when artists of ancient times said that they did not seek similarity in form, in fact they pursued similarity in spirit”. Wang Fu pointed out the importance of form and advocated that a good Chinese painting should be “between similarity in spirit and dissimilarity in form “. In modern times, Qi Baishi supported Wang Fu’s view from the perspective of appreciation of Chinese painting, arguing that Chinese painting should be between likeness and unlikeness because too much similarity in form is vulgar while excessive dissimilarity in form is deceptive, which is slightly different from the predecessors’ perspective on form. Among all Chinese paintings, “vulgar” ones are most intolerable to Chinese painters and thus have been fiercely criticized throughout history. Qi Baishi associated “vulgar” with “similarity in form”, which may help people better understand Chinese paintings.

Qi Baishi examined “likeness and unlikeness” based on his own experience for the purpose of supporting the truth that genuine Chinese paintings pursue simple and natural beauty while depicting objects and scenes, or directly speaking, genuine Chinese paintings seek to convey a Chinese artistic spirit. However, the spirit of such paintings, which imply the wisdom and sentiments of the East, is “locked” in a relatively static form, making it difficult for many viewers who are unfamiliar with Eastern culture to understand the spirit. Hao Hong studied Qi Baishi’s representative works “Shrimp”, “Mantis” and “Cicada”, and converted static images on rice paper into dynamic images by means of new media, visually conveying the spirit of Qi Baishi’s freehand brushwork and awakening the authenticity and natural beauty beneath his works.

Dr Hao Hong’s explorations and experimentations in Chinese painting, whether it is flower-and-bird painting or landscape painting, can bring different visual experience of static Chinese paintings to their viewers. Visual experience and the dynamic vision of (or the way of change in) the spirit of freehand brushwork in Chinese painting reinforce each other. In a sense, the conversion of static paintings into dynamic ones is an “activation” of the traditional Chinese culture again, and also inspires viewers to look at Chinese painting from new perspectives, which is of great significance.

中国绘画精神的动态视觉与展现

洪浩博士的研究是利用现代媒体技术手段，把中国画一些经典作品以交互动画的形式呈现出来，这对于人们理解中国画的精神有着开创性的意义。因为对不懂中国画审美的人们而言，对于中国画的理解常常停留在“形似”的表面，如何去把握内在精神有着不可逾越的鸿沟。中国画的表现形式及造型特点与西方绘画有着本质的区别，从表现形式而言，水墨为创作过程中使

用的主要元素，通过点、划组合达到虚实相生的效果，是中国文化的阴阳观念下的产物；就造型而言，中国画所刻画的形体并非是对于客观对象的精准描绘，而是在客观对象基础上体悟后的一种认知式表现，并通过作者的情感注入，把所表现的物象进行联系，通过主宾、俯仰、向背、开合、聚散、收放、轻重等手法使得画作中的物象产生联系，这种表现手法必然改变了对象的形态特征，便是中国绘画的“写意”特点。由此，可以这样认为，所谓“写意”，是中国画家对于所描绘对象仔细观察后所获得的内心情感体验，所表现出的不仅是与物象本身，还抒发个人内心的情感世界。另外，中国画家还会把自己的道德理想与所观察的自然物象联系在一起，通过“写意”来宣扬自己的道德情操，比如中国画家喜爱画竹，由于竹子本来是中空、有节，借此作者所传达出的是一种虚怀若谷及君子气节的比拟。中国画把“写意”作为表现的根本，并非完全是视觉形态下的产物，离开情感的表现是很难表达出来，由此，很多学者把中国画称之为“心画”，物象在作者主观理解下，形态被夸张、变形，或是重新解构，就失去原来的样子，所以中国画的形体观念追求“画贵似与不似间”，(翻译的是相似在心，不相似在形，正好可以发展一下这个观点)这也恰好是洪浩博士研究的课题之一。

其实，“似与不似”是表现中国画写意精神的另一种说辞，早在北宋时期，大文豪苏东坡笔下就有着“论画以形似，见与儿童邻”的著名论断。显然，苏东坡强调了绘画的根本不是追求形似，甚至对形似的绘画作品表现出强烈的不屑。那么东坡认为绘画的本体是什么呢？在另外一首题画诗中，东坡有着相对应的回答，“观士人画，如阅天下马，取其意气所到”，很明显东坡以“九方皋相马”的典故说明绘画最为重要的是“意”及“气”二字。“意”便是写意精神，“气”是指生机、气机或者天机等。实际上，苏东坡一方面倡导“意气”在中国画作品中的重要性，另一方面又表现出对于仅追求精湛技巧、擅长描摹这一类画家的不屑。但是，苏东坡表现出对于“形似”的排斥，强调意气的重要，并没有对画面中的形态问题作进一步讨论。毕竟任何绘画形式皆不能离开形态，换言之完全舍去形的绘画作品是不存在的，所以，“形”仍然是中国画绘画中无法回避的问题，当然，苏东坡并未完全否定形的意义，只是未对中国画中形的尺度把握进行说明，导致后人的引用形成滥觞。

明朝画家王绂针对当时很多绘画水平低劣的画家在滥用苏东坡所言“不求形似”的时弊感到非常厌恶，对此进行批评并作进一步阐释，认为“古人所云不求形似者，不似之似也”。王绂所言点出了形的重要，倡导一幅优秀的中国画作品应该“贵在似与不似间”。到了近代，齐白石进一步从鉴赏层面出发，认为之所以中国画要在似与不似间，是因为太似则媚俗，不似又欺骗世人，这与前人对待形的视角略有不同之处。对于中国画作品的品评，“媚俗”是所有历代中国画家最

不能容忍的格调，在历代画论中对此的批评是相当激烈，齐白石把“媚俗”与“形似”联系起来，有助于人们对中国画作品的进一步理解。

齐白石根据自身体会来审视似与不似的问题，其根本目的是传递真正的中国画作品追求的是一种朴素和自然的美，所描绘的是一种真境，一种情境，更为直接地说传递出的是一种中国艺术精神。但是，这种蕴含东方智慧和情思的绘画作品，其精神被锁在相对静态画面形式中，使得很多对东方文化有隔阂的观者难以读出其中的精神。而洪浩博士把齐白石代表性作品《虾》《螳螂》《蝉》等作为研究对象，运用交互技术和新媒体把静态图像转换为动态图像，更直观地传达出齐白石的写意精神，作品中隐藏的本真与自然之美在动态中被唤醒，让人们更具有直观性。

不仅如此，洪浩博士还把这种技术手段运用于山水画中，众所周知，中国山水画与西方的风景画有很大的不同，表现在西方的风景画为眼中山水，受到透视的制约，而中国山水画为心中山水，不受透视的影响。所谓心中山水，古人称之为“真山水”，我理解为“理想山水”，何为理想山水？不仅是画面中可游、可居、可行，还模拟人类社会的组构方式来组构画面，或是把个人的道德理想融入其间，所以从宋元始山水画成为中国画十三科的领头羊，而黄公望《富春山居图》便是最具代表性的作品之一。洪浩博士把《富春山居图》作为交互手段的实验对象，产生更为意想不到的效果。缘于本人博士期间的研究恰好是黄公望及《富春山居图》，对此作有着特殊的情怀。在洪浩的作品中，我似乎感觉自己穿越时空，乘舟富春江上，似乎看到渔隐高士严子陵，以及其隐居的富春山中的耕者打扮的隐士，看到了具有道德寓意的严子陵钓台、七里濑等；还似乎看到乘舟观赏富春山的山水诗鼻祖谢灵运，能够领略其游览中留下的《富春渚》、《七里濑》两首诗中所隐藏的魏晋名士的情怀；还似乎看到仙风道骨般的元代大画家黄公望的隐居之所“小洞天”，感觉到他在所《富春山居图》的时候如同其道教修身时一样，那流动的气机依附在山脉的骨骼中流动运转，升降自若，如同“大周天”一般运行。

洪浩博士所作的探索与尝试还有不少，无论花鸟画还是山水画，能够带给观者对于静态中的中国画作品的另外一种视觉体验，这种体验又恰好与中国画的写意精神的动态或是变化规律相得益彰，从某种程度而言，这种转换方式是对中国传统文化再次“激活”，同时也给观者带来新的思考，是非常有意义的研究。

Appendix 3 Prof. Hu Shaozong's comment

Timeline

18 Feb 2021, met with Prof. Hu for discussion. 3 Mar 2021, comment received.

Expert introduction

Prof. Hu Shaozong, postdoctoral fellow and head of the School of Fine Arts at Huanggang Normal University, and senior expert in literary criticism and art

Content

Research framework, research status analysis, suggestions related to the research theme, evaluation of the artworks

Key related comments

The selection of Qi Baishi as the painter is a good choice for exploring issues of cultural transmission and the inheritance of traditions.

During the interaction, participants have interesting and unexpected experiences.

The second artwork opens a sensory channel for the participants, and the cultural translation is presented and elaborated effectively.

Prof. Hu suggests analysing Chinese painting from social, historical and cultural perspectives. He suggests putting the spiritual meaning of the work in context.

There is a spatial contradiction between the visual expression of a static plane and that of a three-dimensional movement.

Whether the goal is to disseminate knowledge of Chinese painting in foreign cultural contexts or create paintings based on the preservation, development and absorption of art should be explored further.

Personality, Experience, Medium?

——On Hao Hong's Digital Reproduction and Interpretation of Qi Baishi's Flower-and-Bird Paintings

Qi Baishi was not only an artist whose works represented a peak of Chinese art at a time when traditional and modern Chinese art were linked, but also one of the most representative masters of Chinese painting as a model of oriental culture. Undoubtedly, it is very wise to promote the visibility of Qi Baishi's

artworks as a means to cultural dissemination and exchange, and to drive forward the preservation and study of his artworks simply as a way to conserve, carry forward and learn Chinese artistic heritage.

Qi Baishi's artistic concept, artistic style, aesthetic style, and artistic creation experience have always been the highlights of the writing about Chinese art history. The formation of his artistic style served to effectively interpret and deduce the relation between culture and the influence of the times in the process of China's modernization. By studying Qi Baishi and his works, we may understand the relation between traditional and modern cultural institutions, the structural integration of elite culture and grassroots culture, and the relation between art and society in the process of modernization of China, in the country (China) with a long history of civilization. Therefore, what Qi Baishi and his artworks reveal is not only about art and art history, but also about sociology of art, historiography and culturology.

From this point of view, Mr Hao Hong has undoubtedly chosen the right research subject and area, and it is also necessary for him to start research from the angle of modern media. Presenting Qi Baishi's classic Chinese paintings in the form of interactive motion graphics by means of digital media and communication technologies is of great significance. During research, Hao Hong recorded the interesting process where the expression of a theme was transferred from one medium to another, and the challenges he encountered in exploring the application of interactive technology to paintings. Moreover, he presented interactive technology through methods and theories he adopted to tackle the challenges in creative practice. In the process of exploration, Hao Hong hoped to give participants an interesting experience and an unpredictable outcome when they interacted with the paintings, thus enhancing their cognitive interest in Chinese painting. For example, he experimented with the design of an interactive Chinese painting such that when people waved their arms, the still images of the painting would turn into interactive digital storytelling interface. Interactive media creates a new aesthetic approach to Chinese painting. Narrative and interaction via interactive media interface tend to enable multiple sense organs of participants to function in front of an interactive painting, which, combined with aesthetic reception, will have a far-reaching impact.

It is difficult to understand traditional Chinese painting in a foreign cultural context, especially when it comes to the aesthetic appreciation of traditional Chinese painting and the existence of Chinese painting as a plane corresponding to visual experience. Hao Hong has a relatively in-depth explanation of the people-oriented culture implied by traditional Chinese painting. Based on his cultural translation, he has provided an effective interpretation of Chinese painting.

In Mr Hao Hong's research, there are some questions that require further analyses and answers.

The appraisal of traditional Chinese painting is closely related to the personality of the painter, and the sociological implication of traditional Chinese paintings must be revealed in the paintings produced by ancient Chinese scholars and writers, while the artistic spirit is expressed through the painting as

expected by society. First, the interpretations of such artistic spirit behind paintings are to be contextualized.

A verse goes: “What revelation at this view? Words fail me if I try to tell you.” For example, the “Rhythmic Vitality” mentioned by Mr Hao Hong also emphasises the appraisal of the physicality of artwork by the artist. Dynamizing the images in Qi Baishi’s paintings by means of technology so that viewers can interact with the paintings may help, to some extent, conveys the essence of freehand brushwork in Chinese painting and its aesthetic taste. It has also revealed the essence of freehand brushwork in Qi Baishi’s paintings that is characterized by stillness in motion.

However, the expression of physical experience through freehand brushwork is an important part of traditional Chinese painting, and there is not much direct visual presentation of such experience in the painting. It is a process and invisible, and its understanding and aesthetic appreciation is achieved through the viewer’s dialogue with the painting in a specific cultural context. In this regard, the significance of Hao Hong’s creation lies in the borrowing of the medium of Qi Baishi’s paintings. Obviously, if new media are adopted, the imagery concealed in the painting will be filtered.

Of course, Hao Hong further presented Qi Baishi’s paintings in a dynamic version. To do so, he simulated the movements of real animals such as shrimp, mantis, and cicada, and subjectively exaggerated the movement and turning of these animals to make the animals look more vividly in the dynamic paintings. In terms of visual expression, this exploration of artistic translation via new media is effective. There seems to be a spatial contradiction between the visual expression of a static plane and that of a three-dimensional movement. When the plane and three-dimensional movement translate into each other, it is interesting and necessary to make formal compensation in their correlative visual link.

In fact, it is one thing to translate traditional art from various angles for the purpose of art communication, while it is another to preserve, develop, and draw on traditional art for artistic re-creation. There is more difference than connection between the two. Therefore, which one of the two we emphasize hinges on whether the goal is to disseminate Chinese painting in a foreign cultural context or to create paintings based on the preservation, development and absorption of art. This is the part of this thesis that should be further explored.

人格、体验、媒介？

——谈洪浩对齐白石花鸟作品的数字化创作和阐述问题

齐白石是中国传统艺术链接现代的一座高峰，是中国画作为东方文化典范最重要的代表之一。毫无疑问，以齐白石的艺术作为对象，无论是进行文化的传播与交流，还是单纯作为艺术传统的继承与学习都是十分明智的选择。

关于齐白石的艺术观念、艺术样式、审美品格、艺术创作经历一直是中国艺术史写作的精彩章节。他的艺术样式的出现，对于中国现代化过程中关于文化与时代的张力关系的回应做了很好的诠释和演绎。在一个具有悠久历史的文明古国，现代化过程中关于文化体制的传统与现代关系、精英文化与草根文化的结构性融合、艺术与社会等方面的观察，我们都可以从齐白石以及他的作品中读解出来。因此，关于齐白石及他的艺术所展现的不只是艺术和艺术史的事，还是一个艺术社会学、历史文化学等视角的对象。

从这一点上来讲，洪浩先生无疑是选对了研究对象和方向，从现代媒体的角度切入也是十分必要的。利用便捷的数字化媒体技术和传播手段，把齐白石的中国画经典作品采用交互动图的形式呈现出来，很有意义。在研究过程中，他记录了主题和主题从一种媒介转移到另一种媒介的趣味过程，以及面对摸索交互式作品的技术实现方面所遇到的挑战，并根据创意实践中的方法、理论和挑战，用带注释的作品进行展示。在探究过程中，他希望让参与者在交互时获得有趣的体验经历和一个未预知结果性，从而增强对中国画的认知兴趣。譬如他尝试设计当人们挥舞手臂的时候，中国画静止的图像就转化为带有叙事性的数字交互媒体过程，多媒体使中国画产生了新的审美方式。他认为增加了叙事性和多媒体交互后，参与者的感官通道被打开，与多维度的感官结合的审美接受，会产生更深刻的影响。

在一个异文化语境中，理解传统中国画是有一定的难度的，特别是关于传统中国画的审美范畴与国画作为视觉观看对应的平面存在时，更是让人们一头雾水。洪浩关于传统中国画人文化的理论有较深入的解释，结合自己的文化转译，也做了较为有效的阐述。

在洪浩先生的研究中，其实还有一些问题需要进一步深入和回答。

传统中国画的品评与画家的人格密切相连，作品的社会学意涵一定会在文人士大夫画家们自己的作品中透露出来，而精神品格是有表达的，社会是有期许的。在作品背后的这些精神性解读是要语境的，这是其一。

所谓“此中有真意，欲辩已忘言”，而如洪浩先生在文中提到的“气韵生动”，也是强调作者关于身体性体念维度的品评。采用科技手段把齐白石的中国画中形象动态化与观众交互，能够

一定程度上传递中国画的写意精神和审美旨趣，揭示了齐白石绘画追求中寓静于动的写意精神。

但是，中国传统写意画中的关于身体体念表达是一个重要内容，而且在作品中并没有多少直接的视觉呈现。它是一个过程性的，隐形的，对它的理解和审美获得靠的是观者在具体的文化语境中与作品对话完成。就这点而言，洪浩的创作的意义在于对于齐白石作品形式的借用，显然在其他媒介的借用时，这些包含在作品中引而未发的意象，在新的媒介中会被过滤掉。

当然，洪浩把齐白石作品中动态动进一步演绎，模仿真实动物虾、螳螂、蝉的动作，并且主观的夸张这些动物的移动和转身等，让动物更加的生动。从视觉表达来讲，这一媒介转译的探索是有效的。平面静止的视觉表达与立体运动的视觉表达，看起来是有空间矛盾的。当两种方式互相转译时，在关联性视觉环节做出形式补偿，是一个有意思的方式，也是必要的。

其实，对传统艺术进行多种角度的转译以达到传播的目的是一回事儿，而继承与吸收传统艺术以进行艺术再创作又是另外一回事儿。二者之间有联系，但是区别是主要的。因此，关于这两个问题，首先要回答是，我们的目标是对于异文化背景下中国画的传播，还是基于艺术传承借鉴吸收的创作。这是本文当前应该深化的部分。

Appendix 4 Mr Liu Xiulin's comment

Timeline

6 Feb 2021, met Mr Liu for discussion. 10 Apr 2021, comment received.

Expert introduction

Liu Xiulin, national artist of the second class, director of the Chinese Painting Studio at Hubei Academy of Fine Arts, a traditional Chinese painter

Content

Criteria for evaluating traditional aesthetics

Related key comments

Xie He's "Six Laws"

"Brushwork should evolve with time"

"Rhythmic vitality" is an evaluation criterion suitable for figure painting.

Exploration of the origins and development of Chinese traditional culture

On the Application of the Idea that "Brushwork Should Evolve with Time" in Hao Hong's Research

Hao Hong's doctoral thesis focuses on the application of digital interactive technology to Chinese painting. How to apply digital interactive technology to Chinese painting while retaining the aesthetic value of Chinese painting? The answer to this question represents both an innovation and a challenge. "Brushwork should evolve with time" is a famous saying by Shi Tao of the early Qing Dynasty. It precisely reflects the core aesthetic value of Hao Hong's research area for his doctoral thesis. With the rapid development of economy, culture, and technology as well as globalization, we begin to emphasize the inheritance-based development of Chinese painting. In other words, we no longer simply treat technological advancement as the only means of driving forward the development of Chinese painting, so that Chinese painting can achieve sustainable development. For the development of Chinese painting, we should "draw from past and foreign achievements". The ancient and modern art treasures at home and abroad should not only be held by museums for exhibition and study. For example, the digital dynamic version of Along the River During the Qingming Festival, a painting created by Zhang Zeduan of the Song Dynasty, was adopted in the China Pavilion at the Shanghai World Expo and was well received by Chinese and foreign viewers. For another example, Wassily Kandinsky's application of

cold abstraction and warm abstraction in architectural design, package design, and fashion design has achieved perfect results. Such examples abound at home and abroad. Hao Hong treats flowers and birds in traditional Chinese painting as critical details, for which he especially takes modern and contemporary master Qi Baishi's works "Shrimp" and "Mantis Catching Cicadas" as examples. These details seem simple, but they represent in microcosm the big picture and other examples of Chinese painting. They may also reveal the aesthetic value of Hao Hong's thesis from a broad perspective.

Under the idea that "brushwork should evolve with time", I will now discuss the application of Xie He's "Six Laws of Chinese Painting" (hereinafter referred to as the "Six Laws") in Hao Hong's research. First found in the book Classification of Old Paintings by Xie He, a painter of the Southern Qi and Liang dynasties, the "Six Laws" were the standards and major aesthetic principles for evaluating ancient Chinese paintings. The Six Laws, namely, 1. Rhythmic Vitality 2. Anatomical Structure 3. Conformity with Nature 4. Suitability of Colouring 5. Artistic composition and Grouping 6. Copying of Classical Masterpieces, established a preliminarily complete a theoretical framework for traditional painting -- from manifesting the spirit of the depicted object and expressing the painter's emotions towards and view on the object, to depicting the form, structure and colour of the object, as well as composition and the copying of models. In short, all aspects of painting creation and circulation are summarized in the Six Laws. Then the question arises as to how Qi Baishi painted "Shrimp" and "Mantis Catching Cicadas" with mastery of inner coherence? I believe this is also a challenge in the research of Qi Baishi's paintings. The key to Hao Hong's research lies in the answer to the question -- how to apply the aesthetic value of Chinese painting to the digital interactive technology, yet the answer cannot simply be understood as the conversion of Chinese painting from static state into dynamic state. Take Qi Baishi's "Shrimp" for example, my understanding is that the combination of the spirit of Chinese painting and the spirit of the times is rooted in real life yet transcends real life. Naturally, composition for painting corresponds to the "Artistic composition and Grouping" in the "Six Laws". Shrimp whiskers in the painting look so real that they seem to be moving, so how to transform objects into painting involves the pursuit of the "Conformity with Nature" in the "Six Laws". The painting "Shrimp" bears a living resemblance to real shrimps, so the shrimps in the painting look alive; if lines of the shapes of shrimps were painted rigidly, the shrimps in the painting would look lifeless. This exemplifies the "Copying of Classical Masterpieces" in the "Six Laws". Naturally, Qi Baishi's attainments in Chinese calligraphy, seal cutting, and literature were also blended into the painting. The lines of shrimp whiskers seem soft but are essentially hard, look broken but are actually solid, with curves looming in the straight and the orderly in the seemingly disorderly, which exemplify the "Anatomical Structure" in the "Six Laws". Shrimps in the painting seem to be playing and swimming in the water, looking real. Although three colours, namely, black, white, and grey are seen in the painting, it is still alive, because white area is still useful, and the ink has five shades. These techniques correspond to the "Suitability of Colouring" in the "Six Laws". Hao Hong's research for his thesis focuses on finding a harmony between such

seeming movement and actual stillness. To this end, he has been looking for the best balance between them. Such balance implies the "Rhythmic Vitality" in the "Six Laws". Although spirit resonance is hard to achieve, I still hope he can make a breakthrough himself.

After the "Six Laws" were proposed, ancient Chinese painting began to have a theoretical framework and painters began to be aware of theories about painting. Since then, painters have always regarded the Six Laws as the standard for measuring the success or failure of painting. Guo Ruoxu, an art historian of the Song Dynasty, said: "the Six Laws of painting are succinct and essential and will stand the test of time" (Experiences in Painting). From the Southern Dynasties on, the Six Laws have been used and enriched while evolving with time, thus becoming one of the most stable and inclusive theoretical frameworks of ancient Chinese art. The fourth volume of Qian Zhongshu's Limited Views (or Guan Zhui Bian) touches upon the Six Laws. Qian believed that the Six Laws should be read as follows in order to correctly understand Xie He's original intention and conform to Classical Chinese grammar: "What are the Six Laws of Chinese painting? First, Rhythmic Vitality, which implies vitality; Second, Anatomical Structure, which indicates a way of using the brush; Third, Conformity with Nature, which requires the vivid depicting of form; Fourth, Suitability of Colouring, which is the application of colour based on the characteristics of the depicted object; Fifth, Artistic composition and Grouping, which involves division and planning; Sixth, Copying of Classical Masterpieces, which is the copying of models." "Rhythmic Vitality" means that a painting or any image depicted in the painting should have rhythm and be full of vitality. "Rhythm", a term originally used in the appraisal of others as a popular conversational topic among the people in the Wei and Jin dynasties, refers to the temperament, sentiment, and charm exuded from a person's postures and expressions. The term is often used together with other Chinese words to mean "graceful charm" and "vigorous appeal". So, what about Hao Hong's research on the application of digital interactive technology to Chinese painting? Naturally, he has incorporated "human" mind into the transformation of still images into dynamic ones. I think Hao Hong has not only completed the transformation technologically, but also internalized the traditional Chinese culture in his mind while externalizing the culture into practice, which he himself might not be fully aware of. However, it is at this time that he needs to tap into the traditional Chinese culture internalized in his mind.

In the verse "the rising moon startles birds to fly away" or the verse-based picture, it is not birds, but rather the painter's mind and the poet's emotions, that are startled. A shape, a line, a touch of colour, or a brushstroke of ink in a painting should be internalized in the painter's mind and become a symbol of emotions, such that it may feel as if it were telling stories to you itself. This is no longer Xie He's original intention, but rather the specific application and new development of "Rhythm" by later generations of artists and theorists based on their own experience and knowledge. "Rhythm" and "conveyed spirit" are basically the same when expressing the spiritual world within a character, but

later generations mostly refer to “conveyed spirit” as the inner emotions conveyed through the character’s face, especially his eyes, while “Rhythmic Vitality” usually refers to the inner emotions reflected by the general appearance of the character, especially his posture and style of conversation, or the externalization of inner emotions. However, Hao Hong needs to think deeply about how to properly apply digital interactive technology to Chinese painting. I hope that he tunes out the hubbub from the outside world and follows his inner voice to help keep Chinese painting up with the times while bearing in mind “brushwork should evolve with time”.

浅谈“笔墨当随时代”在洪浩论文研究中在运用

洪浩在博士论文主要是研究数字交互技术运用到中国画中，如何将数字交互技术运用到中国画里且保留中国画在美学价值？是创新也是挑战，"笔墨当随时代"是清初石涛的名言。这恰恰是洪浩博士论文研究方向在核心美学价值所在。随着经济、文化、科技及全球化的高速发展，我们讲究继承式的发展，也就是说我们不再简单的以技术发展为唯一，这样在发展才不会枯竭，应该“古为今用，洋为中用”，中外古今在艺术瑰宝不应该在博物馆里仅供参观学习，比如宋代张择端在《清明上河图》数字动态版在上海世博会中国馆在运用，曾得到中外观众在一致好评。再比如康定斯基冷抽象、热抽象在建筑设计、包装设计、服装设计中在运用就达到了完美在效果，中外这种优秀的案例比比皆是。洪浩以传统中国画中的花鸟作为点，尤其缩小到以近现代大师齐白石在作品《虾》、《螳螂捕蝉》为例，看似简单反倒起到了以小见大、举一反三在作用。这可能也正是大范围角度谈洪浩论文的美学价值。

在笔墨当随时代在框架下再谈一下谢赫“六法”在洪浩论文中在运用。"六法"最早出自南齐谢赫的著作《画品》中，是中国古代美术品评作品的标准和重要美学原则。画有六法:一曰气韵生动，二曰骨法用笔，三曰应物象形，四曰随类赋彩，五曰经营位置，六曰传移摹写。"六法论提出了一个初步完备的绘画理论体系框架--从表现对象的内在精神、表达画家对客体的情感和评价，到用笔刻画对象的外形、结构和色彩，以及构图和摹写作品等，总之创作和流传各方面，都概括进去了。那么问题来了，齐白石在作品《虾》、《螳螂捕蝉》是如何融会贯通的？相信这也是他的研究难点。不能简单地理解这是将中国画的静态转换成动态，如何把中国画艺术在审美价值运用到数字交互技术中才是洪浩研究的关键。以齐白石在《虾》为例，我的理解是中国画精神与当时时代精神结合，是源于生活高于生活，构图自然是“六法”中的“经营位置”;触须也像似动非动，如何转换是“六法”中的“应物象形”,画得活，则虾之生命自出,画僵了，则失去了生命，是“六法”中的“传移摹写”；这里面自然也融入了齐白石对中国书法、篆刻的功夫及文学修

养；虾须的线条似柔实刚，似断实连，直中有曲，乱小有序，是“六法”中的“骨法用笔”；纸上之虾似在水中嬉戏游动，虽然都是黑白灰，但栩栩如生，因为这是计白当黑、墨分五色(这些方法包括:将水墨画的白色部分按照水墨部分的排列方式来排列，所以白色部分也是水墨画的一部分;并调整水与墨的比例，使最终图像在光与暗、湿与干、墨厚与墨薄之间变化，总得可分为 5 种色度)，是“六法”中的“随类赋彩”。洪浩在论文研究点就是在这似动非动之间找寻某种默契，他一直在找寻这种默契在最佳融合度，这也正是“六法”中的“气韵生动”，这个很难，也希望他能突破自我，破茧成蝶。

自六法论提出后，中国古代绘画进入了理论自觉的时期。后来画家们始终把六法作为衡量绘画成败高下的标准。宋代美术史家郭若虚说:"六法精论，万古不移"(《图画见闻志》)从南朝到现代，六法被运用着、充实着、发展着，从而成为中国古代美术理论最具稳定性、最有涵括力的原则之一。今人钱钟书《管锥编》第四册论及这段文字，认为应作如下读法，方才符合谢赫原意与古文法:"六法者何。一、气韵，生动是也;二、骨法，用笔是也;三、应物，象形是也;四、随类，赋彩是也;五、经营，位置是也;六、传移，模写是也。""气韵生动"或"气韵,生动是也",是指作品和作品中刻画的形象具有一种生动的气度韵致，显得富有生命力。气韵，原是魏、晋品藻人物的用词，如"风气韵度"、"风韵遒迈"等，指的是人物从姿态、表情中显示出的精神气质、情味和韵致。那么洪浩论文中研究数字交互技术运用到中国画中?他在静态图像转换为动态图像中，自然融入了“人”的思想这个元素，我想洪浩不仅仅是简单地完成技术的转化，而更是在于“外化于形，内化于心”在对于中国传统文化基因，可能他自己也没有充分感知到这一点，但是这个时候需要他去挖掘这一块属于他基因里自带的这个内因。

月出惊飞鸟，那惊飞的不是鸟，而是画家的心，诗人的情。一线穿动若有声，作品中的一个形，一条线，一块色，每一片墨都应该是经由内心过滤后而生发的不与它同情感符号。虽然这已经不是谢赫原意，而是后代艺术家、理论家根据自己的体验、认识对气韵的具体运用和新的发展。气韵与传神在说明人物形象的精神特质这一根本点上是一致的，但对传神是得解读，后人多指人物的面部尤其是眼睛所传达的内在情性，而气韵则更多的指人物的全体尤其姿致谈吐所传达的内在情性，或者说内在情性的外在化。但是在数字交互技术与中国画如何能恰到好处在运用，需要洪浩更深层次在思考，再次引用“笔墨当随时代”这句话，希望他能挖掘到这一点并且生发出与时俱进的闪光点，摒弃嘈杂浮躁的外部环境，回归自己内心最纯真的声音。

Appendix 5 Prof. Gong Lin's comment

Timeline

8 Apr 2021, met Prof. Gong for discussion. 28 Apr 2021, comment received.

Expert introduction

Prof. Gong Lin, PhD, professor at the Fine Arts College at Beijing Film Academy, and practitioner and scholar of digital media art

Content

Evaluation of the work *Mantis Catching Cicada*, cultural narrative and display forms, media transmission of Chinese culture and proverb exchange

Key related comments

Conveying the meaning of the proverb "The mantis catches the cicada, unaware of the siskin lurking behind it"

The "siskin behind it" part of the proverb is not depicted, and the audience fills in the missing parts of the story.

The employment of sound drives the story.

The interpretation of the works is effective because Chinese painting and calligraphy are inseparable.

When displayed on specific occasions, *Mantis Catching Cicada* can inspire cultural consciousness.

The embodiment of Chinese cultural elements in the interactive artwork *Mantis Catching Cicada*

Hao Hong's interactive design work, *Mantis Catching Cicada*, incorporates two artworks as its original images: *Mantis and Rice* and *Autumn Cicada on a Branch* by Qi Baishi, a renowned modern Chinese ink painter, both of which combine fine-brush technique with spirit expression. Using interactive media technology, the mantis and the cicada in the painting are brought to life. Qi Baishi's ink paintings are known for their "combination of form and spirit" and "between similarity and dissimilarity/likeness and unlikeness in form." The flowers, birds and insects he painted are considered to be vividly lifelike, making them suitable for animation. In the early 1960s, a famous Chinese animated film called *Tadpoles Look for Their Mother* was created based on Qi Baishi's fish and shrimp-themed ink paintings. This film represented the visual cultural images of traditional Chinese art and painting styles. By selecting

Qi Baishi's works as interactive images, Hao Hong created a visually impactful way to promote Chinese culture.

If the purpose were simply to make the adorable insects in Qi Baishi's paintings come to life, then the animation process would seem too straightforward. Hao Hong used Kinect visual sensor signal recognition so that when visitors waved their arms between the two screens, the mantis on the left screen moved towards the cicada on the right screen. After lingering amid the loud cicada chirps for a moment, the bold mantis made a daring escape. The well-known Chinese idiom and story of Mantis Catching Cicada has strong dramatic and philosophical aspects. It emphasises the relationship between the mantis, cicada, and siskin. The steel-clawed mantis wants to catch the cicada singing in the tree but is unaware that the insect-eating siskin is right behind it, ready to eat the mantis. This famous Chinese idiom can be understood and interpreted in two ways. It may refer to people only pursuing immediate interests without considering hidden dangers and consequences. It can also be understood as a person's one-dimensional and simplistic thinking, only seeing the visible aspects while ignoring the invisible, which could be the essential part of a matter. Moreover, the idiom's essence can be explained from the perspective of traditional Chinese Yin and Yang philosophy: every issue and object are composed of two aspects – material and spiritual, Yin and Yang, positive and negative, actual and virtual. The Yang, positive, and actual aspects are the easily visible and tangible material entities, while the Yin, negative, and virtual aspects are the invisible and imperceptible spiritual, psychological, or soul-related intangible factors. The creators of ancient Chinese idioms were great sages, so the title "Mantis Catching Cicada" omits the crucial point of the story "the siskin is behind", leaving it for the storyteller to elaborate. In the last century, there was a Chinese ink-animated film called *Mantis Catching Cicada* (1988, directed by Hu Jinqing, produced by Shanghai Animation Film Studio) that fully showcased the entire story. This effectively served as a visual explanation and narration of the proverbial tale. This approach represented an artistic manifestation of traditional thoughts and concepts, focusing on the depiction and reenactment of objects and storylines. Its advantage lay in its universality – it allows all viewers to understand and comprehend the content.

However, Hao Hong's interactive design work, *Mantis Catching Cicada*, transcended traditional thinking and expression methods. He employed contemporary artistic thinking and digital media techniques, using conceptual expression as the driving force for his creative ideas and applying combination and transformation as methods of verbal expression. On the one hand, Hao Hong used digital image interaction technology to combine two traditional Chinese ink paintings by Qi Baishi, *Mantis and Rice* and *Autumn Cicada on a Branch*, transforming them into an interactive video work as a whole. This demonstrated a creative application of contemporary art "appropriation" and "borrowing" methods by Hao Hong, rather than directly depicting and recreating the story of the idiom. On the other hand, Hao Hong did not depict the latter part of the story with the "siskin behind". He understood the

essence and principles of traditional Chinese philosophical ideas, such as “the harmony of Yin and Yang” and “the interrelations between emptiness and substantiality”. He processed and represented the story content of “siskin behind” artistically with virtualization and blank-leaving. As a result, when the audience moved or waved in front of the dual-screen videos, the clever mantis after catching cicada would turn back and return to its original position in the painting. This method of expression provides ample room for thought and discussion for those familiar with the story behind the idiom. The third aspect is, this approach also allows the audience to play the role of the “siskin”, making the interactive video space more spatially rich by extending it beyond the frame (screen). In addition, Chinese traditional painting incorporates the spatial theory of the viewing space theory of “viewable, explorable, and inhabitable” (from Guo Xi, Northern Song Dynasty). These theories are cleverly applied in Hao Hong’s interactive imagery. When audiences stand in front of Hao Hong’s work, they are not only viewers (viewable) but also participants in the artwork (explorable) and even a part of the content within the piece (inhabitable). As previously mentioned, the “virtual” and “empty” parts of his interactive video work are completed and filled by the audience/participants, making it “real” and “existent”. Thus, this interactive video work embodies the unique thoughts of the author. He has a profound understanding of Chinese traditional culture and philosophical ideas, which he cleverly conveys through digital interactive technology. What’s more, the work communicates and spreads Chinese traditional culture, art, and philosophy through interaction between the work and its audience/participants, rather than explicitly presenting it as other works do. Whether it’s digital image information or the appreciation of traditional paintings in art galleries, people’s enjoyment of traditional art mainly comes through visual senses. For digital art interactive design, sensory information can be obtained through both the eyes and hands, using both visual and tactile senses. Hao Hong’s work effectively reflects the relationship between the two: visual input from the eyes, tactile feedback and gestures from the hands. Hao Hong did not limit himself to just visual and tactile aspects; he also incorporated sound into his interactive design, adding an auditory sensory component. The sound in this work is used appropriately, effectively driving the story in the proverb “Mantis Catching Cicada, Siskin Behind”. In terms of audio interaction, I propose the incorporation of a sound and motion detective device that would emit the chirping sound of the siskin when audience waves their hands. Upon hearing the chirping, the mantis would retreat back to its original position within the painting.

From Hao Hong’s work, it is evident that he places significant emphasis on preserving and transmitting the traditions of Chinese painting and aesthetics. This involves the consideration of the cognition and understanding of the target audience. It seems that Hao Hong does not specifically differentiate between audiences who are familiar with Chinese culture and those who are not, but he does take them into account. For example, he chooses easily recognizable subjects from Qi Baishi’s paintings, such as shrimps, cicadas, and mantises, which do not have cultural distinctions in terms of subject recognition. However, considering that Western audiences (including young people in China today) may have

difficulty understanding and appreciating traditional Chinese philosophical thought, I believe that when this work is exhibited, there should be a clear, easy-to-understand explanatory text. This text could be in the form of a written description or a cartoon-style illustration. This way, for one thing, the audience can better understand the content and meaning of the proverb within the work. And for another, having an intriguing piece of text on-site that complements the interactive imagery also serves as a method of disseminating traditional Chinese culture. For instance, traditional Chinese paintings often consist of not only the painting itself, but also accompanying text with the inscriptions of the poetry and seals, which creates a unique, integrated form of art that combines poetry, calligraphy, painting and seal carving. Hao Hong can use this aspect for effective cultural display, engage the participation and discussion of the audience. The process of discussion is also a method and process of spreading traditional Chinese culture. Therefore, the explanatory text for the work should ideally be integrated with the overall space and environment of the exhibition.

Hao Hong's *Two Movable Shrimps* and *Mantis Catching Cicada* are two works that utilise different media. One is an interactive piece with a touchable interface, while the other requires a computer and an external Kinect device for completion. This means that the presentation locations and environments for both works differ. The former can be used anytime and anywhere on mobile devices, while the latter demands a specific venue. This distinction in media is directly related to his design objectives. *Two Movable Shrimps* is more game-like/gamified, as it features an audience playfully interacting with two shrimps, as if frolicking together. This gameplay can be presented through mobile devices, increasing the audience base and enhancing its reach. In contrast, *Mantis Catching Cicada* conveys cultural elements from a proverbial story, which requires a specific setting much more, such as museums or exhibition halls. A significant aspect of modern museum functions focuses on early childhood education and inspiration. Interactive works like this when displayed in a museum, are more likely to spark interest among young children and teenagers than the original paintings by Qi Baishi. Regardless of the audience's familiarity with Chinese culture, they can gain cultural insights from the piece. Therefore, this work necessitates a specific space for exhibition.

Displaying traditional Chinese cultural elements in digital interactive art is a meaningful topic and requires addressing the issues of cultural media integration. As a Chinese artist, Hao Hong has made his own efforts in promoting and disseminating Chinese culture.

《螳螂捕蝉》交互作品的中国文化元素的体现

洪浩的交互设计作品《螳螂捕蝉》选用了中国现代著名水墨画家齐白石的两幅作品兼工（笔）带写（意）小幅作品《贝叶螳螂》和《树枝秋蝉》作为原图像，运用交互媒体技术将绘画作品中的昆虫螳螂和秋蝉都活动起来。齐白石的水墨绘画作品"形神兼备""妙哉在似与不似之间"，他

画的花鸟昆虫，被认为是“活灵活现”的。因此，很适合制作成动画作品。上世纪六十年代初，中国有一部著名的动画片《小蝌蚪找妈妈》就是根据齐白石的鱼虾题材制作的水墨动画片。它是最能代表中国传统文化和绘画样式的视觉文化图像。洪浩选择齐白石作品作交互图像，对传播中华文化，是很有视觉张力的。

如果仅仅是让齐白石画作中可爱的昆虫活动起来，那么这样的动画过程就显得太简单明了了。洪浩通过 Kinect 视觉传感信号识别，当参观者在两个屏幕之间挥动手臂的时候，左屏视频中的螳螂就会自己走向右屏视频中的秋蝉，在强烈的蝉鸣声中停留了一会之后，大胆的螳螂竟然溜之大吉。螳螂捕蝉这个在中国人皆知的成语故事，具有很强的戏剧性和哲理性，它强调了螳螂、秋蝉和黄雀三者之间的利害关系。钢齿铁爪的螳螂正想要捕捉在树上鸣叫的秋蝉，却不知道专吃昆虫的黄雀在它后面正要吃它。这个著名的中国成语可以有很多理解的角度和阐释的理论。它可以指人只顾追求眼前的利益，而不顾身后隐藏的祸患和后果。也可以理解为，一个人思考问题的维度很简单片面而够不全面和立体，只看到可以看得到的一面，而忽略了看不到的一面，而实际上，看不到的一面可能却是事物的本质部分。还可从中国传统阴阳哲学角度来阐释成语的精髓：任何问题和事物都由阴与阳、正与负、虚与实等物质的和精神的两个方面所组成，阳、实和正的方面容易看到和触摸到的物质实体，而阴、负和虚的方面则是看不到和不被察觉的精神、心理或灵魂等非物质因素。中国古代成语的创作者是伟大的智者，所以螳螂捕蝉这个中国成语的题目省略了“黄雀在后”的故事重点，把它留给讲这个成语故事的人来详细讲述。上个世纪中国有一部《螳螂捕蝉》水墨动画片（1988 年，胡进庆编导，上海美术电影制片厂出品），就把整个故事内容全部表现出来，这样很容易成为图解和说明成语故事。这是传统思想观念的艺术表现方式，它注重对事物和情节故事的描述和再现，它的优点是这样可以让所有观众都可以看懂和理解。

而洪浩的交互设计作品《螳螂捕蝉》没有停留在传统思维和传统表现方式层面上，他运用当代艺术思维和数字媒介的表现方法，以表达观念为创作思想驱动，以组合与转换为语言表达方法。一方面，洪浩运用数字影像互动技术，将中国传统绘画作品，齐白石的两幅水墨画《贝叶螳螂》和《树枝秋蝉》“组合”在一起，使其“转换”成为一个交互影像作品整体，这是洪浩运用当代艺术“借移”和“挪用”方法的一个创造，而不是直接描绘和再现这个成语的故事情节。另一方面，洪浩没有表现“黄雀在后”的后半部分内容，正如前面说到的，他理解到中国传统哲学思想“阴阳相合”、“虚实相生”的原理和精髓，把“黄雀在后”的故事内容，进行了虚化和留白处理与表现。所以，当观众在双屏影像前面移动或挥手时，聪明的螳螂就转回身来，回到原来画作的位置。这样的表现方法，给知道这个成语故事的人带来很多思考的空间和讨论的话题余地。第三

方面，这样的方法，可以让观众扮演了“黄雀”的角色，使交互影像的画面空间，从画框（屏幕）内跳出画框（屏幕）外，空间层次更加丰富。而且，中国传统绘画空间“三远”：平远、深远和高远的运动空间理论，以及“可观、可游、可居”的观看空间理论，巧妙运用到自己的交互影像之中。观众在其作品前，不但只时观赏者（可观），也是作品的参与者（可游），甚至是作品（故事）中的一部分内容（可居）。也就是前面说到的，他交互影像作品中“虚”和“无”的部分，都由观众／参与者来完成了，来填充“实”和“有”了。因此，这个交互影像作品很有作者自己的独特思想，他较为深刻地理解，并用数字交互技术巧妙地表达了对中国传统文化和哲学思想的认知和传达。而且作品对中国传统文化艺术和哲学思想的传达与传播，是通过作品与观众／参与者的交互行为进行的，而不是像其他作品那样，在作品中直白地表现出来的。无论是数字图像信息，还是在美术馆对传统绘画原作的赏析，人们对于传统艺术作品的欣赏主要通过视觉感官来实现。而对于数字艺术交互设计感官信息的获取则可以通过眼和手的视觉与触觉感官，洪浩的作品很好地体现了两者的共关系：眼睛的视觉输入，还有手部的触觉和手势的动作。与此同时，洪浩并没有只停留在视觉和触觉两个方面，他在交互设计作品中还加入了声音，增添了一个听觉的感官作用。声音在此作品里也运用得恰如其分，正好对于“螳螂捕蝉，黄雀在后”谚语故事后半部分内容发出一个很好地推动作用，并以“虚”的鸟鸣声音，代替了“实”的黄雀动作。使得下一个参与者的交互能够从故事的开始进行，有效地形成了可持续交互的循环。因此，在声音互动方面，我建议是否有一个声音和动作感应识别装置，可以当观众挥手时，会发出黄雀的鸣叫声，螳螂一听到黄雀鸣叫声音，它就回退回到原来的画面之内。

从洪浩作品来看，他更多考虑的是对中国画传统、美学传统的保留和传递。这就要涉及目标受众的认知和理解问题。洪浩仿佛在对了解中国文化和不了解中国文化的人群里并没有具体的细分，但有所考虑。比如他选择了较为让人能够辨识的齐白石的虾、蝉和螳螂，这样对于绘画对象的识别不会有地域文化的区分。但是考虑到西方观众（包括现在中国年轻人）对中国传统哲学思想的不了解和难理解，我觉得这个作品在展出时，应该有一个很好的、通俗易懂的解释文案，这个文案可以是文字说明的，也可以是卡通图片式的。这样，一方面，观众可以更好地完整理解这个作品中成语故事的内容和含义；另一方面，现场有一个有意思的文案，与交互影像相得益彰，也是传播中华传统文化的一种方式，比如传统中国画往往不仅只有绘画，基本会有文字的诗词的题跋或者印章，这就成为中国独特的诗书画印一体的艺术形式。洪浩可以利用这一点来进行有效的文化展示，引发观众的参与和讨论，讨论的过程也是传播中华传统文化的方法和过程。所以，作品的解释文案最好与作品的整体空间和环境相结合。

洪浩的《两只可动的虾》和《螳螂捕蝉》两件作品所使用的媒介有所不同，一个是可触摸界面交互的作品，一个是需要通过计算机和外接 kinect 设备完成的作品。这就意味着两者的呈现地域和环境不同，前者可以在可移动终端随时随地的使用，后者则需要在特定的场地。此不同的媒介与他的设计目标直接关联。两只虾更具有游戏性，比如他设定的观众与两只虾仿佛在嬉戏的接触，这种游戏感可以通过手机端呈现，增加了受众基数，从而增加其传播的力度。而《螳螂捕蝉》作品背后传递的是谚语故事的文化元素，则更需要一个特定的场合，比如在博物馆、展览馆等。现在的博物馆的职能有很大一部分在幼儿教育和启迪上，这样的可交互作品在博物馆展出，比齐白石原画的展出更容易引发幼儿或者青少年们的兴趣，无论是对中国文化了解与否的受众们，都能从中受到文化启发，所以这件作品更需要一个特定空间的展出场合。

在数字交互艺术中表现中华传统文化元素，是一个很有意义的课题，也是特别需要解决的文化融合与媒介冲突问题。作为中国人，洪浩在中华文化传播上作出了自己的努力。

Appendix 6 Interviews

Timeline

20 Sep 2020 online interview

Expert introduction

Mr Zhang Xiaohua, researcher, Science and Technology Research Institute

Content

Evaluation of the significance of the design of the work, whether the design of the work retained the original's aesthetic value, and the rationality of interactive media

Key related comments

Significance of Xie He's "Six Laws"

Aesthetic differences after adding interactivity

Direction of the development of Chinese painting

Communicating via contemporary media

Application of the design scenario

The interview with Mr Zhang Xiaohua

A is me

B is Mr Zhang

A： As I know, you (Zhang Xiaohua) are serving as an associate researcher in China Institute of Arts Science & Technology, and I'm wondering whether you have learnt about my two interactive Chinese paintings.

B： Indeed, I have already gained a general understanding of your works.

A: Ok. Let's come to the first question. In your opinion, is it worthwhile to explore the transition from Chinese painting into interactive media?

B: I think the research and attempt concerning the transition from Chinese painting into interactive media are highly worthwhile, because contemporary digital media art, which is representative of new technology, should become a new trend in art development. Chinese classic paintings have been

recognized as China's excellent cultural heritages, and it is a very good and fresh attempt to use new interactive media to disseminate them.

A: Ok. Do you think have my works inherited traditional aesthetics and styles that are unique to Qi Baishi's paintings to the largest extent?

B: In my opinion, in light of the intentions communicated by your works, I think you have learnt about and presented the essence of Qi Baishi's art in general and your works have basically inherited all original artistic features of Qi Baishi. Besides, you may have got your own plan for the subtleties in artistic creation, and you may further tap into it in the future, so as to preserve Mr Qi Baishi's artistic features to the best. That's all.

A: Ok. Do you think Qi Baishi's flower-and-birdpainting is a proper example to be used as the starting point for the research of interactive Chinese painting?

B: Yes, it is. Let me describe reasons. First of all, Qi Baishi is a modern artist familiar to and loved by Chinese people including art workers engaged in painting and the general public. Generally, his works enjoy wide publicity and high prestige among a wide audience in China, and both the uneducated as well as the educated people can appreciate them. Thus, I think it is an interesting attempt to use his flower-and-birdpainting as the starting point to explore interactive Chinese painting.

A: Ok. Do you think it is suitable to use Xie He's Six Laws of Painting as the evaluation criteria of traditional Chinese aesthetics?

B: I think that the value of Xie Hei's Six Laws of Painting should be weighed from two dimensions. On the one hand, Xie Hei' Six Laws of Painting is an age-old approach probably dating back to China's mediaeval times or even earlier period. At that time, the production patterns and artistic expressions were old and ancient, so our understandings of it are more or less static. However, the evolution of science and technology with the passage of time allows us to express art in diversified ways. Interactive media based dissemination is just a new way of artistic expression. Despite that, it is still very meaningful to examine Xie Hei's Six Laws of Painting from new perspectives. For example, the rhythmic vitality mentioned by Xie Hei still applies to the today's artistic expressions because we need to use it to measure the quality of paintings or to judge whether the painting is touching, no matter what techniques we may use. Such key elements embedded in the Six Laws of Painting can be enriched with different connotations. Thus, I think Xie Hei's Six Laws of Painting are valuable and significant both in ancient times and in this new era. Obviously, its cultural connotation is far greater ever before. That's all.

A: Do you think the traditional aesthetic evaluation criteria will be changed after interactive Chinese painting becomes true?

B: This question is a little bit connected to your previous question. I just mentioned that visual art was created and appreciated in a static way in ancient times, which is true for both Chinese classic paintings and Western classic oil paintings. The biggest difference created by today's interactive art is that it makes the painting alive and dynamic so that a connection is established between the painting and the audience. It may be interpreted as the transformation from static art to dynamic art, which is the biggest difference. However, I think some evaluation criteria are universal for both traditional aesthetics and contemporary aesthetics. For example, when we evaluate whether the work, no matter it is static or dynamic, is truly vivid or touching, the criteria applicable to the work created in ancient times and the work created in modern times are similar.

A: You mean the evaluation criteria are the same. However, do you think there will be new aesthetic approaches?

B: In my opinion, a new aesthetic approach will definitely emerge with the change of the times. A simple example is that it has indeed changed from static to dynamic. We often appreciate a static thing or work attentively and quietly in the past. Well, the appreciation of a large number of dynamic arts such as animation, games and other interactive works that are springing up today is more of the interchange of present thoughts with the audiences. This is different from the attentive and quiet appreciation approach in the past. Thus, I think that the aesthetic approaches will be altered, but the specific difference needs to be concretely analysed case by case.

A: Ok. Do you think that the digital interaction-based creation will become a direction for the development of Chinese painting?

B: I think there is a potential for Chinese painting to move towards digital and interactive development. In my opinion, excellent traditional art may develop in two directions: inheritance and extension. Inheritance refers to the total and uncritical acceptance of original features of the art. It suggests that we need to put ourselves in the situational context where it was created to pursue an indistinguishable imitation and reproduce its development process so as to carry out subsequent creation in the same way. Extension, however refers to the further development of original and inherent traditional art by using modern, current or updated technical means and achievements. In brief, we need to use new techniques to inject traditional art with vitality. In addition to interactive art, such techniques also include, among others, currently popular AI technology. What I'm trying to say is that numerous modern techniques can be integrated with the artistic expressions that we are pursuing so as to give birth to brand new art forms. This represents the development of traditional art. That's all.

A: Well, your remarks are pretty enlightening. In the meantime, I'd like to know your comments on my works. Do you think my works have given consideration to the inheritance of good techniques, aesthetic ideas, aesthetic ways or approaches and/or the extension of new things? Which is more obvious?

B: As far as I know, your works have demonstrated both the inheritance and extension. First of all, I realize that you have restored original features that are unique to Qi Baishi's works to the greatest extent, including the control of colours, the mode of composition and the brush stroke. To put it another way, you have preserved the most distinguishing features of Qi Baishi's works. Furthermore, you have applied new technologies to your works. To the best of my knowledge, paintings created by Mr Qi Baishi are not moving and dynamic art. To be more precise, most of his works are static. Your application of interactive techniques makes his works dynamic and interactive, which means you have realized the concept of extension. What's more, I think you may have a preliminary attempt to extend it to a broader range of artistic works, which may be further explored in the future. For example, even though you have incorporated nine works of Qi Baishi as a part of your creation, they are totally different from the original works because the original composition is broken down and recomposed and original elements are recombined on the basis of the interaction with the audiences. This is an interesting conception, and you can definitely make the scenario design more targeted, for example, it may be placed in a museum or a scene open or accessible to children to explore the potential of such interaction. It may be useful to enlighten the children with art and improve their creativity. This is a very humble opinion for your consideration.

A: I really appreciate that. In the end, do you think what I am doing is helpful for the worldwide communication and development of Chinese painting and culture?

B: Yes, indeed. In my opinion, the heritage based on which Chinese culture evolves is different from that of Western culture, and excellent Chinese culture must be spread and flourished. One of the simplest ways is to exhibit the paintings in museums in China or abroad to allow the audiences to appreciate them, which is a traditional approach. However, you may have explored modern communication approaches, i.e. the use of the most popular interactive communication media. This is a delicate and ingenious design which makes the works more interesting and increases the interaction between them and the audiences. In this way, the original static paintings are fully brought to life and become dynamic. These conceptions, if finally realized perfectly, will arouse keen interest of the audiences, and the original works will be greatly extended and become more interesting and aesthetically enjoyable. That's what I thought.

A: Ok, I'm afraid this will be the very end of this interview, and I'd like to express my gratitude and appreciation again.

B: You're welcome. I wish you a final perfect presentation of your works.

A: Thanks. Bye-bye.

B: Bye.

A: 中国艺术科技研究所张小华助理研究员，请问您是否已经了解我的两个中国交互画作品？

B: 是的，我已经对您作品的大体情况有所了解。

A: 好的。我想问您第一个问题是将中国画转换成数字媒体，是否值得去探索？

B: 我认为将中国画转换成数字媒体的艺术方式，这种探索，非常值得去研究和尝试。具体的原因是因为当代的数字媒体艺术作为新科技的代表，应该成为我们艺术发展的一种新趋势。那么中国的古典绘画作为中国的优秀的文化传统，利用新的互动媒介的媒体方式来传播，是一种很好的很新鲜的尝试。

A: Ok，您认为我的作品是否尽可能的已经保留了齐白石绘画的传统美学和风格？

B: 通过我对您的这个作品意图的了解，我觉得您对于齐白石先生的艺术的本质概括和呈现，基本上可以做到原始地保留了他艺术特色的所有的艺术特点，在一些细节的处理上，我认为您现在已经有所考虑，可以在这方面继续的作为一个深挖的点继续探索。这样的话可以使齐白石先生艺术特色得到最完善的一种保留。 我就这个问题就是这样理解的。

A: 好的。您认为齐白石的花鸟画作为交互中国画的研究的最开始的典范，作为范例，您觉得合适吗？

B: 我认为齐白石花鸟画作为交互中国画的这种开始研究是合适的。下面我说一下原因，首先第一点，齐白石是作为近代以来，我们中国人无论是搞绘画艺术的，还是普通的平民大众都非常喜闻乐见的一位艺术家。他的作品基本上做到了雅俗共赏，他的作品的在我们中国的传播力和影响力也是非常广泛的，有着很好的群众基础。所以我认为把齐白石的花鸟画作为中国化交互的这种尝试，是一个不错的起点。

A: Ok，您认为谢赫六法作为中国传统美学的美学批评标准，您觉得合适吗？

B: 我认为理解谢赫的六法论，应该用从两个方向去考虑它的价值。一方面谢赫的六法论产生的年代很久远，大概在中国古代叫做中古期或者是最早的古代的时候已经产生了六法论。那么由于那个时代的这种生产方式以及艺术表现表达的方式，都比较的原始，所以更多的我们是从一种静态的方式去理解六法的。那么随着科技和时代的发展，今天我们能够表达艺术的方式多种多多样了。那么像互动媒介的这种传播模式就是一种新的艺术的表达方式。 那么今天用新的方式我们再去看谢赫的六法论，他依然是十分有意义的。比方说他其中提到了气韵生动，那么我们今天所有的艺术表达，无论你采用什么样的技术，最后我们还是用气韵的方式来衡量品质上的高低，或者是认为它是否做到了能够感动人的一个标准。所以说今天的像六法论其中的这样的一些关键的要素，在今天有着不同的含义。我认为谢赫的六法无论在古代、在新新的时代都有它的价值和意义。在今天当然它的文化内涵还要远远的大于在古代，这是我对这个问题的认识。

A: 当互动发生的时候，跟中国画交互的互动发生之后，您觉得传统的美学的评价标准是否发生了改变？

B: 这个问题跟上一个问题有一点点联系，我刚才谈到了在古代的时候，视觉艺术是通过静态的这种方式来进行创作并且欣赏的。比方说中国的古典绘画和西方的古典油画都是这样去欣赏的。那么最大的不同是我们今天的这种互动艺术，它是让作品动起来，然后在这个基础上通过作品能够变成动态，然后跟观众之间产生某种联系，这是其中最大的改变。所以说我觉得今天把握起来可能用一个词的转换来，就是一个静态到动态的这种转变。这个是最大的不同。但是如果是对这种说是传统的美学也好，还是当代美学的评价也好，我认为有些评判标准还是相同的。比方说我们一部作品出来以后，它是不是真正地做到了传神，或者说真正做到了感人，今天来说，无论是对古代的还是现代的，静态的还是动态的，都是一样的评判标准，我对这个问题是这样理解的。

A: 评标评分标准是一样的。 您觉得会不会产生了一些新的审美呢，用这种方式？

B: 我觉得在时代的变迁中一定会产生一种新的审美的转变，是会有产生的。因为就从简单的静和动来说，它的状态发生了变化。那么我们过去欣赏一幅静态的东西，静态的作品的时候，我们叫做凝神静享式的这种审美。那么今天的大量的动态的艺术的出现，我们能看到的比方说动画类的、游戏类的、甚至互动类的，无论是游戏也好，还是艺术作品也好，他更多的是产生一种跟观众当下的思想的交流。所以说他的这种反应程度跟过去那种凝神静享产生地这种方式是不太一样的，所以我认为在审美上也是会有差别的。具体说确定是某种差别，这还需要我们针对不同的作品来做具体的分析。

A: Ok。您觉得用数字交互这种方式去创作，可以是中国画的发展的一种方向吗，未来的方向？

B: 我认为通过数字交互方式来作为中国画的一种方向，是有可能性的。是这样的，我认为一个传统艺术它的发展，如果是优秀的话，它可以往两个方向去共同发展：一种是作为原汁原味的这种保留的传承。那么我们还回到过去它诞生之初的样子去模仿他，怎么去发生发展的，那么我们用同样的手段来进行接下来的创作，这是一种叫做继承式的发展。另外一种，我认为可以叫做开拓式的发展。利用现时代的、当下的或者利用最新的科技发展的技术手段和成果，来重新拓展已有的、固有的传统艺术。简单的讲，使传统艺术搭载上新的技术，焕发不同的这种生命力。那么其中互动艺术是其中的一种手段，那么我们还可能会有其他的手段，比方说现在时下也比较流行的 AI 技术。我举这两个例子，就是说我们当代有很多的技术，可能跟我们现在所从事的艺术的这种形式都可以进行不同的组合，然后可以生发出不同的新的艺术形式，那么就是对这种传统艺术的一种发展，我对这个问题是这样理解的。

A: 哦，挺好的。您觉得我的作品是否保留了一些传统的、继承的、一些好的东西，比方说技法或者是美学的思想等等，美学的方式，审美的方式，还同时也开拓了一些什么东西没有，您觉得我是保留多还是开拓多，还是说都有？

B: 是这样的，我对您作品现在的了解的程度，我认为在这两方面是兼顾的。首先我通过了解知道您对齐白石作品做到了最大程度度的还原，也就是您保留了尽可能多的齐白石，比方说从它的用色上、构图上、笔触上，您都尽可能的保留了它的原貌，那么这就是保留了它的最大特点。那么同时您采用了这种新科技，让原本。。就是说据我的了解，齐白石先生是没有动过、没有动起来的作品。也就是说他的，应该说大量的作品全部是静态的，那么您的这种手段是从三个方面让他的作品得到了不同的动态化和互动的交互的这种模式产生。 所以我认为您是这

两边应该是都做到了兼顾，并且我觉得在于它经过交互以后，艺术的这种应用方面的设想也做了初步的尝试。我认为在这个尝试上，您还可以继续深挖下去。比方说，您有一部分是大概 9 张左右的一个他的作品。经过观众和他的互动以后，变成了构图重新解构，再重新重构，然后元素也做了重新的搭配，那么必然就会产生跟他原来作品完全不同样的这种新的作品。我认为您的设想很有意思，那么今后您可以完全把应用场景设计的再有针对性，比方他是不是可以放在一个专门在儿童能够参与的一个博物馆，或者是儿童能够进入的一个场景中，去进行这种互动的尝试。向对孩子的艺术的启发，以及对他们的创造能力都是有一个很好的提升。这是我一点小小的想法。

A: 谢谢您。您觉得最后我做这样一个事，它的意义是否能够让中国的绘画和中国的文化能够有一定的传播和发展，对它有一定的帮助吗，在世界范围内？

B: 我觉得是肯定会产生一定的帮助的。因为是这样的，我们中西方的文化是基于不同的底蕴的，作为中国这么优秀的文化，要使它发扬光大。不光是简单的，我认为是从比方说最简单的方式是把这些作为展呈，呈现出来，无论是在中国展出还是在国外展出，那么受众可以去博物馆欣赏这些画，这只是最传统的一种方式来传播。我认为您是从另外一个方向对这种传播模式进行了当代化的思考，也就是利用了我们时下最为流行的、交互式的传播媒介。那么经过精妙的、巧思妙想的这种设计，大大地增加了观众和作品之间的这种互动性和趣味性，那么使原来静态的画完全活了起来，使他能够动态化。我认为您的这几个设想，如果最后最终能完美的呈现的话，观众一定能够产生更加浓厚的兴趣。这样就能够大大地拓展原来的作品，给人们带来的这种美的享受，使它更加放大，更加的有趣有意思。我是这么认为的。

A: Ok，好，谢谢张老师，非常感谢您的这次的采访，我的问题已经问完了。谢谢!

B: 好的，不客气。也祝您能够完美地完善的最终呈现您的作品。

A: 谢谢，拜拜。

B: 拜拜。

Timeline

21 Sep 2020 online interview

Expert introduction

Mr Huang Guixing, a senior designer

Content

The significance of the design of the work, the method and subject selection, and the participants' enthusiasm

Key related comments

The media transformation of traditional painting

Philosophical and cultural ideas in design

Artists' ideas in interactive design

Rich interaction forms such as virtual reality

The interview with Mr Huang Guixing

A is me

B is Mr Huang

A: As I know, you (Huang Guixing) are a teacher of Gengdan Institute of Beijing University of Technology, and I'm wondering whether you have learnt about my two interactive Chinese paintings.

B: I have viewed your works and gained a fair knowledge of the general principles and creativity embedded in them.

A: OK, let's come to the first question. Is it worthwhile to convert traditional Chinese paintings into digital media?

B: Yes, it is a very meaningful attempt. It is of important significance to use current media to inject traditional Chinese paintings with fresh vitality.

A: In your opinion, what kind of interactive Chinese painting will be created by using such design approach?

B: What does the design approach exactly mean?

A: It refers to my approach of using the Photoshop software to remove images from original paintings, importing the images into Unity and transforming them into meshes with C# codes, so as to produce game-like contents. In your opinion, what kinds of interesting Chinese paintings can be made out of such design approach?

B: OK. As far as I see, the man-machine interaction is realized by touching or clicking on the screen, which may also be achieved by using the radar or Kinect to establish interaction with the contents projected on the ground or the wall. Am I right? So you want to know what kinds of interactive Chinese paintings will be created by using these two interactive approaches. In my opinion, freehand brushwork painting focusing on four elements of flowers, birds, fish and insects may be a smart choice for now. You may separate the dynamic portion and transform it into a two-dimensional or three-dimensional animation which may be played via Unity during the interaction.

A: Well, are there any other interactive techniques that can be applied to the practice of Chinese painting?

B: As far as the existing techniques are concerned, the virtual reality-based immersive experience of Chinese painting, which is relatively rare, may be a high-end experience to be utilised and pioneered. In other words, you may transform all traditional Chinese paintings such as two-dimensional ink wash paintings to three-dimensional paintings. To this end, you may present the creative content in the form of ink and wash and use particle visualisation to make the air, clouds, light or insects therein vivid and lifelike, so as to allow viewers to gain immersive experience after they wear the virtual reality (VR) glasses or put themselves into the immersive space, which may be a good approach.

A: How can the original and traditional aesthetics such as the artistic features of Qi Baishi be preserved by using the immersive VR technique?

B: Qi Baishi's paintings have many characteristics, and the uniqueness of his painting style may be the most distinguishing. Thus, the attention should be paid to the creation of models of innovative three-dimensional images in the way that his painting style is highlighted. For example, Qi Baishi has developed fixed techniques or modes concerning the colour control and the drawing of flowers or birds, and you may use image composition software to integrate the images into the concerned models to demonstrate his techniques or modes so as to make the painting style resemble that of Qi Baishi to the largest extent. The composition of pictures will be largely free because they are put in the holographic or truly immersive space where the animals and insects are dynamic. Thus, the scope of control is restricted. However, the composition (e.g. size ratio) of the trees, flowers and other scenes located in a certain corner should follow the golden section ratio or the composition in the bulk of white remaining developed by Qi Baishi.

A: How should the interactive system program development be adapted to the hardware so as to match the features of Chinese paintings?

B: Ok, it is a very good question. First of all, we need to understand the features of Chinese painting. In Chinese painting, thick and heavy ink and colours are mainly applied to important articles, and the painting tends to leave large blank spaces in other portions or purposely make the picture more thought-provoking to highlight realm of art. Thus, in my opinion, in order to adapt to such feature of Chinese painting, you need a larger space and essential main programs and hardware such as Kinect, radar and other similar interactive equipment as well as the server and projector or other means of presentation. Obviously, the programs such as Unity or UE4 may be applied to realize the immersive presentation mentioned above.

A: OK. What are the interactive techniques or approaches that can be used to get the participants more involved?

B: I think the most important objective of the work is to provide the audience immersive experience and enjoyment despite the realization mode. For this purpose, on the one hand, the immersive space must provide the audiences with fabulous aesthetic feeling when they are appreciating or otherwise interacting with the work. The aesthetic feeling should not only be sourced from traditional Chinese paintings, but also be enriched with new features of new media so as to get viewers involved and provide them with fresh experience rather than something outdated. On the other hand, I think the interaction should be philosophical rather than random. The key is to allow people to develop their own ideas during the interaction. With the clear idea of what to express and how to express it in mind instead of accident relation, audience may interact with the corresponding flowers, birds and insects intentionally.

A: Brilliant idea! It's very enlightening.

B: Is that clear?

A: Yes, it inspires me to think and research from a fresh direction. Now, we will come to the sixth question. Which type or style of Chinese painting can be used for interactive applications? Why?

B: The styles of Chinese painting can be broadly divided into landscape painting, meticulous painting and freehand brushwork painting. In fact, all of them are suitable for the application of interactive techniques. However, I think it will be more interesting to apply interactive technique to freehand brushwork painting, which is what you are exactly doing. This is because the freehand brushwork painting of flowers, bird or insects has the fun of drawing and the fun is referred to as "interestingness" which is expressed by the heavier brush ink and colours applied to describe the actions, behaviours and intentions of flowers, birds or insects. In this way, the audiences appreciating the painting will probably be emotionally induced to "guess" what they want to do, thus creating the "interestingness". In contrast,

in general, meticulous painting is mainly biased towards the drawing of flowers, landscape or scenery, fixed objects or neat buildings such as palaces. Even though interactive technique may be applicable to meticulous paintings, a tons of work will be required and not like the small canvas suitable for freehand brushwork painting. For example, the animated version of *Along the River During the Qingming Festival* created in China is accompanied with large space and high difficulty, which makes it intricate to demonstrate the artistic value. There is a high risk that it is only a pure animation without the creator's philosophical thought. Thus, I think that freehand brushwork painting is more suitable.

A: Ok. Would you please provide some examples of freehand brushwork paintings and other Chinese paintings suitable for interaction applications? What are the portions that can be used for the interaction? In addition to the paintings of Qi Baishi that I have explored, are there any other paintings that may generate good interaction effect?

B: Chinese flower-and-bird paintings are diversified. Typically, Qi Baishi was one of the representatives. There are many other artists' works but I won't go through more examples. The flowers, birds, fish and insects, which are four dynamic elements of the original painting, are totally suitable for the interaction design, because they move intentionally and randomly. For example, in addition to intentional movements, the butterfly flying to flowers, dragonfly skimming the surface of the water and fish swimming in the water may be used as contents of interactive animation design. To be more specific, the butterfly lingering on the flower may fly away when you touch it and comes back to gather honey after a while, which is also can be made for small bees or dragonflies. When it comes to the fish swimming in the water, you may design it in the way that the water surface ripples when you touch it with hands. The fish may be scared to hide under the water plants and swim out of the water plants after a while, creating scenes suitable for the interactive animation.

A: OK. Think you.

B: Well, I have nothing to add any more.

A: OK, thank you very much. I really appreciate your cooperation in this interview.

B: You are welcome. It's my honour.

A: Well, goodbye.

B: Bye.

A: 耿丹学院、北京工业大学耿丹学院、黄桂兴老师，请问您了解我的两个交互中国画作品吗？

我看了比较了解大概的原理以及创意都有了一定的程度的了解。

A: 好，我的第一个问题是将传统中国画转换成数字媒体，是否值得去做？

B: 非常值得，这是一件很有意义的事情。让传统的中国画能够在现在的媒体呈现中又重新获得新鲜的活力，这是非常有意义的事情。

A: 您觉得这种设计方法可以创造出怎么样的交互中国画？

B: 这种设计方法指的请明确一下这种设计方法指的是哪一种？

A: 我用 PS 把它的图给抠下来之后，导入到 Unity，然后将它写成代码的形式，做成类似于游戏的方式。这种方式、设计方法您觉得可以怎么样做成有意思的中国画？

B: OK。目前我看到的这个呈现方式，在交互上主要是在屏幕上去点、去接触是吧？然后形成了跟人机交互，也可以用投影的方式把它投在地面或者墙面上，然后用雷达或者 Kinect 去进行一个交互，对吧？我可以理解为这两种交互方式，创作出什么样的中国画的交互的中国画的作品呢？我觉得目前还是以花鸟、鱼、虫这 4 个元素去做，就是这 4 个元素，这一类的中国画，就是写意画、花鸟鱼虫写意画这种形式。然后去把能动的部分，我们可以把它单独的提炼出来，然后给它更改成二维动画或者三维动画，然后通过 Unity 去让它在交互的过程中播放他们的动画，我觉得是这种形式。

A: 您觉得还有哪些交互技术可以运用到中国画的实践当中？

B: 就目前现有的一些技术的话，我觉得沉浸式 VR、VR 沉浸式的那种中国画的体验，目前还是比较少的，我觉得这一个可以作为一个比较高端一点的体验，去可以进行一个转换。就是中传统中国画中，水墨画的二维呈现的那种形式全部转成三维呈现，把我们要制作的那些创意内容全部贴上水墨的材质，然后又用粒子的方式去实现里面的气、云、以及一些光或者是还有一些飞虫之类的，用粒子的形式去实现它们。然后，戴上 VR 眼镜或者是投影成沉浸式的空间，人沉醉在这个空间里面，我觉得这是一个比较好的实现方式。

A: 通过您说的 VR 沉浸的方式，怎么样能使得它的原始的、传统的美学和比方说齐白石的艺术特点能够保留下来？

B: 齐白石的画它有几个特征，就是他画的东西非常有自己的特点，它的画风是独一无二的。所以在在制作 3D 图像创意的时候，要以他画的那种风格去创造模型，然后他善用的几种颜色，以及他喜欢把一些花或者是鸟，他会有固定的那种画法、形式，把这种画法提炼出来之后，用贴图贴到相应的模型上，呈现出来的风格会比较接近齐白石的风格。然后构图，因为咱们已经进入一个全息的，或者是真是一个沉浸式的空间了，这构图会显得非常的非常自由，而且里面的动物昆虫它都是移动的，所以我觉得可控制的不多，但是它里面的场景，比如说树、花之类的，它呈现在某一个角落的话，就是说它的大小比例等等，应该遵循着齐白石的那种黄金分割的构图，或者是大片的那种构图，可以往那方面去思考。

A: 好的。交互系统程序开发和硬件的适配，应该如何适应中国画的特点呢？

B: Ok, 这是一个很好的问题。中国画的特点，首先我们要理解中国画的特点，它是大片的留白，然后他会把重的笔墨放在其中的重要的物体上面，其他地方他会留出很大的一片空白，或者是

故意的去让画面更加的具有思考性,具有明显的那种境界。所以你要适应这种中国画特点的话，你在创作作品的时候，使用到的硬件，主要的程序和硬件，我觉得需要一个相对来说比较大的一个空间，然后硬件刚才也提到了，Kinect 还有雷达类似这样的交互的设备，然后还需要服务器、投影等等，或者是呈现方式也可以包括其他的类型的。我刚才说的就是沉浸式的呈现，程序的话，当然我们可以用 Unity 或者 UE4 去实现它的程序。

A: 好的。您觉得用什么样的交互技术、交互的方法，能够调动参与者们的积极性？

B: 我觉得一个作品它不管怎么去实现，它的最重要的目的还是为了让观众能够沉浸在里面，具有观赏性，对吧？所以观众在参与或者观看这个作品的时候，去玩交互的时候，第一，他所沉浸在的空间肯定是有非常好的美感。这个美感除了能够从传统的中国画里面去提炼之外，还要具有新媒体的一些特点，这样子才会让现代的观赏者能够参与进来，就是感觉很新鲜，而不是那种很过时的东西。 然后第二，交互，我认为它的交互应该有一定的哲学性，而不是随意的交互。让人在交互的过程中能够有自己的思想，而不是说无意的就交互了，而是我想通过什么表达什么，然后这些花鸟鱼虫产生相应的交互。

A: 这个说的特别好，这个挺好的。

B: 我不知道我解释清楚没有。

A: 我觉得这个可以，让我有一个很好的思考方向和研究方向。

A: 然后第六个问题，我想问一下什么类型或者风格的中国画可以使用交互技术，为什么选择此类绘画？

B: 中国画的风格有山水、工笔、还有写意，大致可以分为这三种。其实这三种都可以使用交互技术，但是我认为稍微会有趣一点的，有玩的意味地就是写意，就是您现在做的这种风格。因为花鸟鱼虫这种小写意他有趣，有“画趣”在里面，这个“趣”主要是呈现在会把更多的笔墨表现在花鸟鱼虫的行为动作以及它们的意图，表现在这些方面，在观赏的时候会带动观众的情绪去“猜”，这个花鸟鱼虫它想要做什么？他有“趣”在里面。而工笔相对来说，工笔的它的整体主要是偏向于画一些花或者是主要是表达景物，主要是风景方面的。或者是一些固定下来的一些物体，或者是画一些建筑，一些工笔的建筑，画皇宫那种类型的。这一种也可以做，但是它要求的篇幅会比较大，它不像那种写意一个小篇幅的作品。像我们中国已经有一个清明上河图做成那种动画版的这种风格，它篇幅非常大，而且制作难度非常大，很不好把控它的艺术的价值，有可能只是纯粹的把它呈现出来了，而没有办法去灌输作者的自己的哲学思想。所以我认为写意是比较适合的。

A: Ok。您觉得哪一些中国画可以拿来做交互，比方说您说的写意里面的，然后这个写意里面的哪些画的哪些部分适合做交互，比方说我做了齐白石的，可能还有一些别的，您觉得有哪些好做？

B: 中国的写意花鸟也有很多种风格，齐白石当然是比较典型的，但是也还有其他的画，我目前就不一一列举了。但是你说可以用来做交互的原画部分，我认为花鸟鱼虫 4 个元素肯定是没有问题的，它们是动的，然后它们是有意图的动，而且它们的动也有一定的随意性，比如说除了有目的的去动，比如说蝴蝶会飞向花，蜻蜓会点水或者鱼在水里面戏玩，这些都可以作为交互

的内容，给它设计动画，当人去接触的时候，比如说花上的蝴蝶接触它，然后飞走了又一会它又飞回来，又继续在花上面采蜜之类，或者一些小蜜蜂或者蜻蜓，这些都是可以用这种方式去做，像鱼你可以设计出那种在水中游的鱼，也用手去接触的时候，水面可以产生波纹，是吧？还可以产生一些涟漪，然后这些鱼会受到惊吓，会在水里面就藏到水草里面去了，这样子又可以对水草进行一个交互动画。然后藏在水草里面过一会安静下来，鱼就可以游出来，我觉得这些也是可以考虑的。

A: 好的，谢谢。

B: 目前就这些。

A: 好的，谢谢，非常感谢。非常感谢黄老师配合我的采访。谢谢，非常感谢。

B: 客气了，非常荣幸接受您的采访。

A: 好勒。好，我们再见。

B: 拜拜。

Appendix 7 The Scripts
Two Movable Shrimps

CInputer

```
using UnityEngine;

using UnityEngine.UI;


public class CInputer: MonoBehaviour

{

    public CMovement[] m_Controllers;

    private Camera m_Camera;

    private bool m_BothMoved;

    private bool m_IsTouched;

    private void Start()

    {

        if (m_Controllers == null)

            m_Controllers = new CMovement[0];

        m_Camera = GetComponent<Camera>();

        m_Camera.orthographic = true;

    }

    private void Update()

    {


#if UNITY_EDITOR

        if (Input.GetKeyDown(KeyCode.Mouse0))

        {

            var aScreenPos = Input.mousePosition;
```

```
            var aWorldPos = m_Camera.ScreenToWorldPoint(aScreenPos);


            MMoveTo(aWorldPos);
        }
#endif
        if (Input.touchSupported)
        {
            if (Input.touchCount > 0)
            {
                if (!m_IsTouched)
                {
                    var aPos1 = Input.GetTouch(0).position;
                    var aPos = m_Camera.ScreenToWorldPoint(aPos1);
                    MMoveTo(aPos);
                }
                m_IsTouched = true;
            }
            else
                m_IsTouched = false;
        }


        if (Input.GetKeyDown(KeyCode.Escape))
        {
            for (int i = 0; i < m_Controllers.Length; ++i)
            {
```

```
                if (m_Controllers[i].enabled)
                    m_Controllers[i].MIni();
            }
        }
    }

    private void MMoveTo(Vector2 aWorldPos)
    {
        for (int i = 0; i < m_Controllers.Length; ++i)
        {
            if (m_Controllers[i].enabled && m_Controllers[i].m_CurrentState == EnAnmState.Original)
            {
                if (m_Controllers[i].m_Collider.OverlapPoint(aWorldPos))
                {
                    m_Controllers[i].MActive();
                    return;
                }
            }
        }

        MSwitchMove(aWorldPos);
    }

    private void MSwitchMove(Vector2 aPos)
    {
```

```
if (m_BothMoved)
{
	m_BothMoved = false;
	int i = Random.Range(0, m_Controllers.Length);
	if (m_Controllers[i].enabled)
		m_Controllers[i].Destination = aPos;
}
else
{
	int i = Random.Range(0, m_Controllers.Length + 1);
	if (i == m_Controllers.Length)
	{
		m_BothMoved = true;
		for (--i; i > -1; --i)
		{
			if (m_Controllers[i].enabled)
				m_Controllers[i].Destination = aPos;
		}
	}
	else
	{
		if (m_Controllers[i].enabled)
			m_Controllers[i].Destination = aPos;
	}
}
```

```
        }
    }
```

CMovement

```
using System;
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class CMovement : MonoBehaviour
{
	public float m_HeadAngleDegree;
	public Vector3 m_Destination;
	public float m_MaxSpeed = 2f;
	public float m_BrakingRate = 2f;
	public float m_AngularSpeed = 90f;
	public float m_ArrivalPosThredhold = 0.01f;
	public float m_ReturnWaitingTime = 3f;

	[NonSerialized]
	public float m_CurrentSpeed = 0;
	[NonSerialized]
	public float m_CurrentAngle = 0;

	[NonSerialized]
	public Animator m_Animator;
	private Vector2 m_HeadVector;
```

```
private Vector3 m_IniPos;
[NonSerialized]
public Collider2D m_Collider;

[NonSerialized]
public Dictionary<EnAnmState, int> m_Dic;
[NonSerialized]
public EnAnmState m_CurrentState;

public EnAnmState CurrentState
{
    get { return m_CurrentState; }
    set
    {
        if (m_CurrentState == value)
            return;

        m_CurrentState = value;
        m_Animator.CrossFade(m_Dic[value], 0.1f);
    }
}

public Vector3 Destination
{
    get { return m_Destination; }
```

```
        set {
            StopAllCoroutines();
            m_Destination.x =value.x;
            m_Destination.y = value.y;
            StartCoroutine(MMoveIter());
        }
}

private void OnEnable()
{
        m_Destination = m_IniPos = transform.position;
        m_HeadVector = Quaternion.AngleAxis(m_HeadAngleDegree, Vector3.back) * Vector3.up;
}
private void Start()
{
        m_Animator = GetComponent<Animator>();
        m_Collider = GetComponent<Collider2D>();

        m_Dic = new Dictionary<EnAnmState, int>();
        var aType = typeof(EnAnmState);
        var    aValues = Enum.GetValues(aType);
        for (int i=0;i<aValues.Length;++i)
        {
            var aValueObj = aValues.GetValue(i);
            var aStr = Enum.GetName(aType, aValueObj)    ;
```

```
            var aHash = Animator.StringToHash(aStr);
            var aValue = (EnAnmState)Enum.ToObject(aType, aValueObj);
            if (i == 0)
                m_CurrentState = aValue;
            m_Dic.Add(aValue, aHash);
        }
}

public void MActive()
{
        CurrentState = EnAnmState.Alive;
        StartCoroutine(MActiveIter());
}
private IEnumerator MActiveIter()
{
        yield return new WaitForSeconds(m_ReturnWaitingTime);
        CurrentState = EnAnmState.Original;
}

public void MIni()
{
        StopAllCoroutines();
        CurrentState = EnAnmState.Original;
        transform.position = m_IniPos;
        transform.up = new Vector3(0, 1, 0);
```

```
}



private IEnumerator MMoveIter()
{
    while (MMoveToTarget())
    {
        yield return null;
    }
    CurrentState = EnAnmState.Alive;
    yield return new WaitForSeconds(m_ReturnWaitingTime);

    m_Destination = m_IniPos;
    while (MMoveToTarget())
    {
        yield return null;
    }
    while (true)
    {
        float aAngle = Vector2.SignedAngle(Vector2.up,transform.up );
        if (aAngle < 3f && aAngle>-3f)
        {
            transform.rotation = Quaternion.AngleAxis(0, Vector3.forward);
            break;
        }
```

```
            aAngle = Mathf.MoveTowardsAngle(aAngle, 0, m_AngularSpeed * Time.deltaTime);
            transform.rotation = Quaternion.AngleAxis(aAngle, Vector3.forward);

            aAngle = Mathf.DeltaAngle(aAngle, 0);
            if (aAngle > 0f)
                CurrentState = EnAnmState.TurnLeft;
            else if (aAngle < 0f)
                CurrentState = EnAnmState.TurnRight;
            yield return null;
        }
        CurrentState = EnAnmState.Original;
    }

    private bool MMoveToTarget()
    {
        var aSrcPos = transform.position;
        var aVector = m_Destination - aSrcPos;
        var aDistance = aVector.magnitude;
        if (aDistance < m_ArrivalPosThredhold)
            return false;

        var v = aDistance * m_BrakingRate;
        if (v > m_MaxSpeed)
            transform.position = Vector3.MoveTowards(aSrcPos, m_Destination, Time.deltaTime
* m_MaxSpeed);
        else if (v < m_MaxSpeed * 0.3f)
```

```
            transform.position = Vector3.MoveTowards(aSrcPos, m_Destination, Time.deltaTime * m_MaxSpeed * 0.3f);
        else
            transform.position = Vector3.Lerp(aSrcPos, m_Destination, Time.deltaTime * v);

        var aAngelSrc = Vector2.SignedAngle(Vector2.up,transform.up);
        var aAngelDst = Vector2.SignedAngle(m_HeadVector, aVector);
        var aAngel = Mathf.MoveTowardsAngle(aAngelSrc, aAngelDst, m_AngularSpeed * Time.deltaTime);
        transform.rotation = Quaternion.AngleAxis(aAngel, Vector3.forward);
        aAngel = Mathf.DeltaAngle(aAngelSrc, aAngelDst);
        if (aAngel < -20f)
            CurrentState = EnAnmState.TurnRight;
        else if (aAngel > 20f)
            CurrentState = EnAnmState.TurnLeft;
        else
            CurrentState = EnAnmState.Move;
        return true;
    }
}

public enum EnAnmState { Original,Alive,Move,TurnLeft,TurnRight }
```

Mantis Catching Cicada

CArray

```
using Colin.CollectionRef;
using System;
using System.Collections;
using System.Collections.Generic;

namespace Colin
{

    public static class CArray
    {
        public static int BinarySearch<T>(T[] aArr, int aIndex, int aLen, T aValue)
        {
            return BinarySearch(aArr, aIndex, aLen, aValue, Comparer<T>.Default);
        }
        public static int BinarySearch<T>(T[] aArr, int aIndex, int aLen, T aValue, IComparer<T>
aComparer)
        {
            int low = aIndex;
            int high = aIndex + aLen - 1;
            int mid;
            int compare;
            while (low <= high)
            {
```

```
            mid = low + ((high - low) >> 1);
            compare = aComparer.Compare(aArr[mid], aValue);
            if (compare == 0)
                return mid;
            if (compare < 0)
                low = mid + 1;
            else
                high = mid - 1;
        }
        return ~low;
}

public static void Sort<T>(T[] aArr, int aIndex, int aCount)
{
        QuickSort(aArr, aIndex, aIndex + aCount - 1, Comparer<T>.Default);
}

public static void Sort<T>(T[] aArr, int aIndex, int aCount, IComparer<T> aComparer)
{
        QuickSort(aArr, aIndex, aIndex + aCount - 1, aComparer);
}



public static void Clear<T>(T[] aArr, int aIndex, int aCount)
```

```
{
    int aEnd = aIndex + aCount;
    for (int i = aIndex; i < aEnd; ++i)
    {
        aArr[i] = default;
    }

}

public static int FindIndex<T>(T[] aArr, int aIndex, int aLen, Predicate<T> aValue)
{
    int aEnd = aIndex + aLen;
    for (int i = 0; i < aEnd; ++i)
    {
        if (aValue.Invoke(aArr[i]))
            return i;
    }
    return -1;
}
public static int FindLastIndex<T>(T[] aArr, int aIndex, int aLen, Predicate<T> aValue)
{
    for (int i = aIndex + aLen - 1; i > -1; --i)
    {
        if (aValue.Invoke(aArr[i]))
            return i;
```

```
        }
        return -1;
}

public static void Fill<T>(T[] aArr, int aIndex, int aLen, T aValue)
{
        for (int i = aIndex + aLen - 1; i > -1; --i)
        {
                aArr[i] = aValue;
        }
}

public static void ForEach<T>(T[] aArr, int aIndex, int aLen, Action<T> aAction)
{
        for (int i = aIndex + aLen - 1; i > -1; --i)
        {
                aAction.Invoke(aArr[i]);
        }
}
public static void Reverse<T>(T[] aArr, int aIndex, int aLen)
{
        int i = aIndex;
        int j = aIndex + aLen - 1;
        while (i < j)
        {
```

```
            Swap(ref aArr[i], ref aArr[j]);
            ++i;
            --j;
        }
    }

    public static void Swap<T>(ref T a, ref T b)
    {
        T c = a;
        a = b;
        b = c;
    }


    private static void QuickSort<T>(T[] aArr, int low, int high, IComparer<T> aComparer)
    {
        int i;
        while (low < high)
        {
            i = high - low;
            if (i < 17)
            {
                if (i == 0)
                    return;
                if (i == 1)
```

```
        {
            SwapIfGreater(ref aArr[low], ref aArr[high], aComparer);
            return;
        }
        if (i == 2)
        {
            SwapIfGreater(ref aArr[low], ref aArr[low + 1], aComparer);
            SwapIfGreater(ref aArr[low], ref aArr[high], aComparer);
            SwapIfGreater(ref aArr[low + 1], ref aArr[high], aComparer);
            return;
        }

        InsertSort(aArr, low, high, aComparer);
        return;
    }
    i = low + ((high - low) >> 1); ; //middle
    SwapIfGreater(ref aArr[low], ref aArr[i], aComparer);
    SwapIfGreater(ref aArr[low], ref aArr[high], aComparer);
    SwapIfGreater(ref aArr[i], ref aArr[high], aComparer);
    T pivot = aArr[i];
    int j = high - 1; //
    Swap(ref aArr[i], ref aArr[j]);
    i = low + 1; //
    while (i < j)
    {
```

```
                if (aComparer.Compare(aArr[i], pivot) > 0)
                {
                    --j;
                    if (i == j)
                        break;

                    Swap(ref aArr[i], ref aArr[j]);
                }
                else
                    ++i;
            }
            if (i != high - 1)
                Swap(ref aArr[i], ref aArr[high - 1]);

            QuickSort(aArr, i + 1, high, aComparer);
            high = i - 1;
        }
    }

    private static void InsertSort<T>(T[] aArr, int low, int high, IComparer<T> aComparer)
    {
        int i, j;
        T t;
        for (i = low; i < high; ++i)
```

```
        {
            j = i;
            t = aArr[i + 1];
            while (j >= low && aComparer.Compare(aArr[j], t) > 0)
            {
                aArr[j + 1] = aArr[j];
                --j;
            }
            aArr[j + 1] = t;
        }
    }


    private static void SwapIfGreater<T>(ref T a, ref T b, IComparer<T> aComparer)
    {
        if (aComparer.Compare(a, b) > 0)
        {
            T c = a;
            a = b;
            b = c;
        }
    }


    public static VArrayRange<T> ToCollection<T>(this T[] aArr, int aIndex, int aCount)
```

```
    {
        return new VArrayRange<T>(aArr, aIndex, aCount);
    }

    public static VArrayRange<T> ToCollection<T>(this T[] aArr)
    {
        return new VArrayRange<T>(aArr, 0, aArr.Length);
    }
}
public struct VArrayRange<T> :IReadOnlyCollection<T>, IEnumerableRef<T>
{
    public T[] m_Array;
    public int m_Start;
    public int m_Count;

    public VArrayRange(T[] aArray, int aIndex, int aCount)
    {
        m_Array = aArray;
        m_Start = aIndex;
        m_Count = aCount;
    }

    public T this[int i]
    {
        get { return m_Array[m_Start + i]; }
```

```
        set { m_Array[m_Start + i] = value; }
}

public int Count { get { return m_Count; } }

public VEnumerator GetEnumerator()
{
        return new VEnumerator(this);
}

IEnumerator IEnumerable.GetEnumerator()
{
        return new VEnumerator(this);
}
IEnumerator<T> IEnumerable<T>.GetEnumerator()
{
        return new VEnumerator(this);
}

public VEnumerator GetEnumeratorRef()
{
        return new VEnumerator(this);
}

IEnumeratorRef<T> IEnumerableRef<T>.GetEnumeratorRef()
```

```
{
    return new VEnumerator(this);
}

public struct VEnumerator : IEnumerator<T>, IEnumeratorRef<T>
{
    VArrayRange<T> m_This;
    int m_Pos;
    public VEnumerator(VArrayRange<T> aThis)
    {
        m_This = aThis;
        m_Pos = m_This.m_Start - 1;
    }
    public bool MoveNext()
    {
        if (m_Pos + 1 < m_This.m_Start+m_This.m_Count)
        {
            ++m_Pos;
            return true;
        }
        else
            return false;
    }

    public void Reset()
```

```
            {
                m_Pos = m_This.m_Start - 1;
            }
            public void Dispose()
            {
                m_This =default;
            }

            public T Current { get { return m_This.m_Array[m_Pos]; } }

            object IEnumerator.Current { get { return m_This.m_Array[m_Pos]; } }

            public ref T CurrentRef { get { return ref m_This.m_Array[m_Pos]; } }
        }

        public static implicit operator T[](VArrayRange<T> aArr)
        {
            return aArr.m_Array;
        }
        public static implicit operator VArrayRange<T> (T[] aArr)
        {
            return new VArrayRange<T>(aArr, 0, aArr.Length);
        }
    }
}
```

CCollection

```
using System;
using System.Collections;
using System.Collections.Generic;

namespace Colin.CollectionRef
{
    public class CCollection<T> : IList<T>, IReadOnlyCollection<T>, IEnumerableRef<T>
    {
        protected T[] m_Array;
        protected int m_Count;

        public CCollection() : this(4)
        {
        }
        public CCollection(int aCapacity)
        {
            m_Array = new T[aCapacity];
            m_Count = 0;
        }

        public void Sort()
        {
            CArray.Sort(m_Array, 0, m_Count);
```

```
}
public void Sort(IComparer<T> aComparison)
{
      CArray.Sort(m_Array, 0, m_Count, aComparison);
}

public int BinarySearch(T aItem, IComparer<T> aComparer)
{
    return CArray.BinarySearch(m_Array, 0, m_Count, aItem, aComparer);
}

private void CheckSize(int aCount)
{
      if (m_Count + aCount > m_Array.Length)
      {
            var aIncrement = (m_Count + aCount) >> 1;
            var aNewArr = new T[m_Count + (aIncrement > 8 ? aIncrement : 8)];
            Array.Copy(m_Array, 0, aNewArr, 0, m_Count);
            m_Array = aNewArr;
      }
}

public T[] GetValueArray()
{
      return m_Array;
```

```
}

public T this[int aIndex]
{
    get { return m_Array[aIndex]; }
    set { m_Array[aIndex] = value; }
}

public ref T GetValueRefAt(int aIndex)
{
    return ref m_Array[aIndex];
}

public int Count
{
    get { return m_Count; }
}

public bool IsReadOnly { get { return false; } }

public void Add(T aItem)
{
    CheckSize(1);
    m_Array[m_Count++] = aItem;
```

```
}
public void AddRange<U>(U aItems)where U: IReadOnlyCollection<T>
{
    CheckSize(aItems.Count);
    foreach(var aItem in aItems)
    {
        m_Array[m_Count++] = aItem;
    }
}

public void Clear()
{

    CArray.Clear(m_Array, 0, m_Count);
    m_Count = 0;
}

public bool Contains(T aItem)
{
    return Array.IndexOf(m_Array, aItem, 0, m_Count) > -1;
}

public void CopyTo(T[] aArr, int aArrIndex)
{
    Array.Copy(m_Array, 0, aArr, aArrIndex, m_Count);
```

```
}

public int IndexOf(T aItem)
{
    return Array.IndexOf(m_Array, aItem, 0, m_Count);
}

public bool Remove(T item)
{
    int i = Array.IndexOf(m_Array, item, 0, m_Count);
    if (i < 0)
        return false;

    --m_Count;
    if (i < m_Count)
        m_Array[i] = m_Array[m_Count];

    m_Array[m_Count] = default;
    return true;
}

public void RemoveAt(int i)
{
    if (i > -1 && i < m_Count)
    {
```

```
            --m_Count;
            if (i < m_Count)
                m_Array[i] = m_Array[m_Count];

            m_Array[m_Count] = default;
        }
}

public void Insert(int aIndex, T aItem)
{
        if (aIndex > m_Count)
            aIndex = m_Count;
        if (aIndex <0)
            aIndex = 0;

        CheckSize(1);
        if (aIndex != m_Count)
            m_Array[m_Count] = m_Array[aIndex];

        m_Array[aIndex] = aItem;
        ++m_Count;
}

public VEnumerator GetEnumerator()
```

```
{
    return new VEnumerator(this);
}

IEnumerator<T> IEnumerable<T>.GetEnumerator()
{
    return new VEnumerator(this);
}

IEnumerator IEnumerable.GetEnumerator()
{
    return new VEnumerator(this);
}

public VEnumerator GetEnumeratorRef()
{
    return new VEnumerator(this);
}

IEnumeratorRef<T> IEnumerableRef<T>.GetEnumeratorRef()
{
    return new VEnumerator(this);
}
public struct VEnumerator : IEnumerator<T>, IEnumeratorRef<T>
{
```

```
public VEnumerator(CCollection<T> aThis)
{
	m_This = aThis;
	m_Pos = -1;
}

public CCollection<T> m_This;
public int m_Pos;
public T Current { get { return m_This.m_Array[m_Pos]; } }
object IEnumerator.Current { get { return m_This.m_Array[m_Pos]; } }
public ref T CurrentRef { get { return ref m_This.m_Array[m_Pos]; } }
public void Dispose()
{
	m_This = null;
	m_Pos = -1;
}
public void Reset()
{
	m_Pos = -1;
}
public bool MoveNext()
{
	if (m_Pos + 1 < m_This.m_Count)
	{
		++m_Pos;
```

```
                    return true;
                }
                return false;
            }
        }
    }
}
```

CKinectGesture

```
using Colin;
using System;
using System.Collections;
using System.Runtime.InteropServices;
using UnityEngine;

public class CKinectGesture : MonoBehaviour
{
    const int FOK = 0;
    public float m_HandMoveSpeed = 0.6f;

    IEnumerator m_Iter;
    bool m_Enable;

    public event Action OnHandFlip;

    private void OnEnable()
    {
        m_Enable = true;
        StartCoroutine(m_Iter = MWorking());
    }
    private void OnDisable()
    {
```

```
        m_Enable = false;
        m_Iter.MoveNext();
    }

    IEnumerator MWorking()
    {
        int aResult;
        if ((aResult = MOpenSensor(out UIntPtr aSensor)) == FOK)
        {
            if ((aResult = MGetBodyFrameSource(aSensor, out UIntPtr aSource)) == FOK)
            {
                if ((aResult = MGetBodyCount(aSource, out int aBodyCount)) == FOK)
                {
                    if ((aResult = MOpenBodyFrameReader(aSource, out UIntPtr aReader)) ==
FOK)
                    {
                        var aBodyArray = MNewBodyArray(aBodyCount);
                        var aJointArray = MNewJointArray();

                        long aTimeLeft0 = 0;
                        long aTimeRight0 = 0;
                        float aLenLeft0 = 0;
                        float aLenRight0 = 0;
                        while (m_Enable)
                        {
```

```
                    if ((aResult = MAcquireLastestFrame(aReader, out UIntPtr aFrame))
== FOK)
                    {
                        if ((aResult = MGetAndRefreshBodyData(aFrame,
aBodyCount, aBodyArray)) == FOK)
                        {
                            UIntPtr aBody = UIntPtr.Zero;
                            bool aIsTrack = false;

                            for (int i = 0; i < aBodyCount; ++i)
                            {
                                aBody = MValueAtBodyArray(aBodyArray, i);
                                if (MIsTracked(aBody, out aIsTrack) == FOK &&
aIsTrack)
                                    break;
                            }
                            if (aIsTrack)
                            {
                                if ((aResult = MGetJoints(aBody, aJointArray)) ==
FOK)
                                {
                                    var aJointShoulder =
MValueAtJointArray(aJointArray, JointType.JointType_SpineShoulder);
                                    var aJointMid =
MValueAtJointArray(aJointArray, JointType.JointType_SpineMid);
                                    var aJointHandLeft =
MValueAtJointArray(aJointArray, JointType.JointType_HandLeft);
```

```
                                                    var aJointHandRight =
MValueAtJointArray(aJointArray, JointType.JointType_HandRight);


                                                    if ((aResult = MGetRelativeTime(aFrame, out
long aTime1)) == FOK)
                                                    {
                                                        if (aJointShoulder.TrackingState ==
TrackingState.TrackingState_Tracked &&
                                                        aJointMid.TrackingState ==
TrackingState.TrackingState_Tracked)
                                                        {


                                                            VPlane aPlane = new
VPlane((aJointShoulder.Position - aJointMid.Position).normalized, aJointMid.Position);
                                                            if (aJointHandLeft.TrackingState ==
TrackingState.TrackingState_Tracked && aPlane.GetDistanceToPoint(aJointHandLeft.Position) > 0)
                                                            {
                                                                float aTime = (aTime1 -
aTimeLeft0) * 0.000_000_1f;
                                                                float aLen =
aJointHandLeft.Position.x - aJointMid.Position.x;


                                                                var aSpeed = (aLen - aLenLeft0)
/ aTime;
                                                                if (aSpeed > 0.5f
&& !float.IsInfinity(aSpeed))
                                                                    OnHandFlip?.Invoke();
```

```
                aTimeLeft0 = aTime1;
                aLenLeft0 = aLen;
            }
            else
            {
                aTimeLeft0 = 0;
                aLenLeft0 = 0;
            }

            if (aJointHandRight.TrackingState == TrackingState.TrackingState_Tracked && aPlane.GetDistanceToPoint(aJointHandRight.Position) > 0)
            {
                float aTime = (aTime1 - aTimeRight0) * 0.000_000_1f;
                float aLen = aJointHandRight.Position.x - aJointMid.Position.x;

                var aSpeed = (aLen - aLenRight0) / aTime;
                if (aSpeed > m_HandMoveSpeed && !float.IsInfinity(aSpeed))
                    OnHandFlip?.Invoke();

                aTimeRight0 = aTime1;
                aLenRight0 = aLen;
            }
```

```
                                        else
                                        {
                                            aTimeRight0 = 0;
                                            aLenRight0 = 0;
                                        }
                                    }

                                }
                            }
                        }

                        MReleaseLastestFrame(aFrame);
                    }
                    yield return null;
                }
                MDeleteBodyArray(aBodyArray, aBodyCount);
                MDeleteJointArray(aJointArray);
                MReleaseBodyFrameReader(aReader);
            }
            else
                Debug.Log(string.Format("Cant get reader:{0:X}", aResult));
        }
        else
            Debug.Log(string.Format("Cant get BodyCount:{0:X}", aResult));
```

```
            MReleaseBodyFrameSource(aSource);
        }
        else
            Debug.Log(string.Format("Cant get source:{0:X}", aResult));

        MCloseSensor(aSensor);
    }
    else
        Debug.Log(string.Format("Cant open sensor:{0:X}", aResult));

}

[DllImport("CKinect")]
public static extern int MOpenSensor(out UIntPtr aSensor);
[DllImport("CKinect")]
public static extern void MCloseSensor(UIntPtr aSensor);
[DllImport("CKinect")]
public static extern int MGetBodyFrameSource(UIntPtr aSensor, out UIntPtr aSource);
[DllImport("CKinect")]
public static extern void MReleaseBodyFrameSource(UIntPtr aSource);
[DllImport("CKinect")]
public static extern int MGetBodyCount(UIntPtr aSource, out int aBodyCount);
[DllImport("CKinect")]
```

```
public static extern int MOpenBodyFrameReader(UIntPtr aSource, out UIntPtr aReader);

[DllImport("CKinect")]

public static extern void MReleaseBodyFrameReader(UIntPtr aReader);

[DllImport("CKinect")]

public static extern int MAcquireLastestFrame(UIntPtr aReader, out UIntPtr aFrame);

[DllImport("CKinect")]

public static extern void MReleaseLastestFrame(UIntPtr aFrame);

[DllImport("CKinect")]

public static extern int MGetRelativeTime(UIntPtr aFrame, out long aTime);

[DllImport("CKinect")]

public static extern UIntPtr MNewBodyArray(int aBodyCount);

[DllImport("CKinect")]

public static extern void MDeleteBodyArray(UIntPtr aBodyArray, int aBodyCount);

[DllImport("CKinect")]

public static extern UIntPtr MValueAtBodyArray(UIntPtr aBodyArray, int aIndex);

[DllImport("CKinect")]

public static extern int MGetAndRefreshBodyData(UIntPtr aFrame, int aBodyCount, UIntPtr aBodyArray);


[DllImport("CKinect")]

public static extern int MGetTrackingID(UIntPtr aBody, out ulong aID);

[DllImport("CKinect")]

public static extern int MIsTracked(UIntPtr aBody, out bool aIsTracked);

[DllImport("CKinect")]

public static extern int MIsRestricted(UIntPtr aBody, out bool aIsRestricted);
```

```
[DllImport("CKinect")]
public static extern int MGetLean(UIntPtr aBody, out float aX, out float aY);

[DllImport("CKinect")]
public static extern UIntPtr MNewJointArray();
[DllImport("CKinect")]
public static extern void MDeleteJointArray(UIntPtr aJointArray);
[DllImport("CKinect")]
public static extern Joint MValueAtJointArray(UIntPtr aJointArray, JointType aIndex);

[DllImport("CKinect")]
public static extern int MGetJoints(UIntPtr aBody, UIntPtr aJointArray);
public enum JointType : int
{
    JointType_SpineBase = 0,
    JointType_SpineMid = 1,
    JointType_Neck = 2,
    JointType_Head = 3,
    JointType_ShoulderLeft = 4,
    JointType_ElbowLeft = 5,
    JointType_WristLeft = 6,
    JointType_HandLeft = 7,
    JointType_ShoulderRight = 8,
    JointType_ElbowRight = 9,
    JointType_WristRight = 10,
```

```
        JointType_HandRight = 11,
        JointType_HipLeft = 12,
        JointType_KneeLeft = 13,
        JointType_AnkleLeft = 14,
        JointType_FootLeft = 15,
        JointType_HipRight = 16,
        JointType_KneeRight = 17,
        JointType_AnkleRight = 18,
        JointType_FootRight = 19,
        JointType_SpineShoulder = 20,
        JointType_HandTipLeft = 21,
        JointType_ThumbLeft = 22,
        JointType_HandTipRight = 23,
        JointType_ThumbRight = 24,
        JointType_Count = (JointType_ThumbRight + 1)
}

public enum TrackingState
{
        TrackingState_NotTracked = 0,
        TrackingState_Inferred = 1,
        TrackingState_Tracked = 2
}
```

```
    [StructLayout(LayoutKind.Sequential)]
    public struct Joint
    {
        public JointType JointType;
        public Vector3 Position;
        public TrackingState TrackingState;

        public override string ToString()
        {
            return string.Format("JointType:{0} Pos:{1} State:{2}", JointType, Position, TrackingState);
        }
    }
    enum EState { Default, Working, Stopping }
}
```

CMantisController

```
using System;
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using CRamdom = UnityEngine.Random;

public class CMantisController :MonoBehaviour
{
    public MeshFilter m_TargetArea;
    public bool m_IsRandom= true;
    public float m_Speed =5;
    public float m_TurnBackSpeed = 8;
    public float m_Delatime = 3;
    private Vector3 m_Target;
    private Dictionary<EAnimatorState,int> m_Dic;
    private Animator m_Animator;
    private EAnimatorState m_CurrentState;
    private Vector3 m_IniPos;
    public float m_JumpHeight =1;
    public float m_JumpLerp =0.5f;
    public EAnimatorState CurrentState
    {
```

```
        get { return m_CurrentState; }
        set
        {
            if (m_CurrentState == value)
                return;

            m_CurrentState = value;
            m_Animator.CrossFade(m_Dic[value], 0.1f);
        }
    }

    private void Start()
    {
        m_IniPos = transform.position;
        m_Animator = GetComponent<Animator>();
        m_Dic = new Dictionary<EAnimatorState, int>();
        var aType = typeof(EAnimatorState);
        var aValues = Enum.GetValues(aType);
        for (int i = 0; i < aValues.Length; ++i)
        {
            var aValueObj = aValues.GetValue(i);
            var aStr = Enum.GetName(aType, aValueObj);
            var aHash = Animator.StringToHash(aStr);
            var aValue = (EAnimatorState)Enum.ToObject(aType, aValueObj);
            if (i == 0)
```

```
            m_CurrentState = aValue;
        m_Dic.Add(aValue, aHash);
    }

    void OnHandFlip()
    {
        if(CurrentState ==EAnimatorState.Default)
        {
            StartCoroutine(MoveTo());
        }
    }
    GetComponent<CKinectGesture>().OnHandFlip += OnHandFlip;
}

public IEnumerator MoveTo()
{
    if (m_TargetArea == null)
        yield break;

    Vector3 aTarget ;
    if(m_IsRandom)
    {
        var aMesh = m_TargetArea.mesh;
        var aVertices = aMesh.vertices;
        var aTringles = aMesh.triangles;
```

```
            var i = CRamdom.Range(0, aTringles.Length / 3) * 3;
            aTarget = Vector3.Lerp(Vector3.Lerp(aVertices[aTringles[i]], aVertices[aTringles[i + 1]], CRamdom.value), aVertices[aTringles[i + 2]], CRamdom.value);

            aTarget = m_TargetArea.transform.TransformPoint(aTarget);
        }
        else
        {

            var aMesh =    m_TargetArea.mesh;
            var aVertices = aMesh.vertices;
            var aTringles = aMesh.triangles;
            aTarget = Vector3.Lerp(Vector3.Lerp(aVertices[aTringles[0]], aVertices[aTringles[1]], CRamdom.value), aVertices[aTringles[2]],CRamdom.value);
            aTarget =m_TargetArea.transform.TransformPoint(aTarget);
        }

        var aObjects= GameObject.FindGameObjectsWithTag("Alived");
        foreach(var aObject in aObjects)
        {
            aObject.GetComponent<Animator>().CrossFadeInFixedTime("Alive", 1f);
        }
        CurrentState = EAnimatorState.Move;

        Vector3 aPos0;
```

```
        while ((aTarget-(aPos0 =transform.position)).magnitude > 0.001f)
        {
            transform.position = Vector3.MoveTowards(aPos0, aTarget, Time.deltaTime * m_Speed);
            yield return null;
        }
        CurrentState = EAnimatorState.alive;
        GetComponent<CToWarningArea>().SetWarning();

        yield return new WaitForSeconds(m_Delatime);

        CurrentState = EAnimatorState.Jump;
        var aInfos = m_Animator.GetCurrentAnimatorClipInfo(0);
        aInfos[0].clip.wrapMode = WrapMode.Once;
        m_Animator.speed = aInfos[0].clip.length /(( m_IniPos - transform.position).magnitude / m_TurnBackSpeed);

        aPos0 = transform.position;
        var aPos1 = new Vector2(Mathf.Lerp(m_IniPos.x,aPos0.x,m_JumpLerp) , Mathf.Max(aPos0.y, m_IniPos.y)+m_JumpHeight);
        var aPos2 = m_IniPos;
        float a = (aPos0.y - aPos1.y) / ((aPos0.x - aPos1.x) * (aPos0.x - aPos2.x)) - (aPos1.y - aPos2.y) / ((aPos1.x - aPos2.x) * (aPos0.x - aPos2.x));
        float b = (aPos0.y - aPos1.y) / (aPos0.x - aPos1.x) - ((aPos0.x + aPos1.x) * (aPos0.y - aPos1.y)) / ((aPos0.x - aPos1.x) * (aPos0.x - aPos2.x)) + (aPos0.x + aPos1.x) * (aPos1.y - aPos2.y) / ((aPos1.x - aPos2.x) * (aPos0.x - aPos2.x));
        float c = aPos0.y - a * aPos0.x * aPos0.x - b * aPos0.x;
```

```
        Vector3 aPos =aPos0;
        while ((m_IniPos - aPos).magnitude > 0.001f)
        {
            aPos = Vector3.MoveTowards(aPos, m_IniPos, Time.deltaTime * m_TurnBackSpeed);
            transform.position = new Vector3(aPos.x, a*aPos.x* aPos.x + b* aPos.x + c ,aPos.z);

            yield return null;
        }
        transform.position = m_IniPos;
        CurrentState = EAnimatorState.Default;

        foreach (var aObject in aObjects)
        {
            aObject.GetComponent<Animator>().CrossFadeInFixedTime("Default", 1f);
        }
}

public enum EAnimatorState {Default,alive,Move ,Jump}}
```

CToWaringArea

```
using UnityEngine;


public class CToWarningArea: MonoBehaviour
{
    [Range(0,1)]
    public float m_GetInVolumn =0.2f;
    [Range(0,1)]
    public float m_WarningVolumn =1f;

    private AudioSource m_AudioSource;

    public void SetWarning()
    {
        m_AudioSource.volume = m_WarningVolumn;
    }

    private void Start()
    {
        m_AudioSource = FindObjectOfType<AudioSource>();
    }

    private void OnTriggerEnter2D(Collider2D collision)
    {
        var aSource = m_AudioSource;
```

```
            aSource.volume = m_GetInVolumn;
            aSource.Play();
        }
        private void OnTriggerExit2D(Collider2D collision)
        {
            var aSource = m_AudioSource;
            aSource.volume = 0;
            aSource.Stop();
        }
}
```

Appendix 8 Description of accompanying video material

The video named Two Movable Shrimps_1 is a demonstration of my work *Two Movable Shrimps* on a touchable tablet computer. It has been shown in the video that the objects in Qi Baishi's digital Chinese paintings are transformed into interactive, dynamic ones, upon touching the screen of the tablet. When fingers touch the body of the shrimp, it will be activated to the Alive state. When the touching point is outside the shrimp's body, a random number of shrimp will move to the point, accompanied by the action state of Move and Turn Left/Right. After a few seconds, if the touchable screen does not recognize the touch point, the two objects will automatically move to the initial position and remain in the initial state, waiting for the next touch of fingers.

The video named Mantis Catching Cicada_1 is a demonstration of my work *Mantis Catching Cicada.* Two of Qi's paintings, *Mantis and Rice* and *Autumn Cicada on a Branch*, are respectively projected onto the wall by two projectors, each with a Kinect camera device in front of it for recognizing a participant's hand movements. When the hand is waved, the praying mantis in the painting on the left will slowly crawl into the picture of the cicada on the right, ready to prey. When the preying mantis appears in the picture on the right, the cicada will stir its wing, accompanied by singing in a low to loud voice. A few seconds later, the preying mantis turns and jumps back to its left painting, returning to the original. Then the cicada's chirping disappears, and the cicada returns to its original appearance.

The video named Mantis Catching Cicada_2 is also an interactive process, similar to Mantis Catching Cicada_1 in terms of the recording content. The difference is that the projectors are replaced with computer monitors that produced two paintings.