Applying Sensory Distortion Devices in Artistic Production:

Practice-based studies of creating artefacts with perceptual devices which confuse artists' vision and kinesthesis

Jiun-Shian Lin

Submitted for the degree of Doctor of Philosophy

School of Arts and Cultures

Newcastle University

April 2017

Abstract

When I was an art school student, I was trained to pursue the likeness of subjects in all my artworks. This practice-based research explores alternative forms of self-expression in art practice. The exploration starts by questioning the relationship between perceptual devices, artists' perceptions and artistic production. Most perceptual devices are designed to enhance artists' sensory capabilities and facilitate the creation of art. Their success is often based on enabling artists to achieve a likeness of the subject drawn or making the creation of artefacts easier. My research focuses on investigating the consequences and artistic potential of applying sensory distortion devices that confuse, mislead and distort artists' vision and kinesthesis, increasing the difficulty of making art, and exploring the productive potential of such devices to engender new creative forms.

In this research three visual distortion devices and two kinaesthetic distortion devices are prototyped and used in experimental calligraphy, painting and drawing exercises. After analysing the artists' experience of using these devices, the influence and artistic potential of applying them are examined. It is discovered that distorted vision and kinesthesis can greatly influence the making of art by disrupting habitual eye-hand coordination and control over producing artefacts. Besides which, the use of visual and kinaesthetic distortion devices can be a technique for new forms of artistic expression. It can also be an effective technique for creating serendipitous opportunities in the visual arts and a way of exploring and provoking reflection upon artistic methodologies. Consideration of the attributes of visual and kinaesthetic distortion devices and distorted perceptions during the process of prototyping can benefit the generation of ideas, methods of production and the contents of artworks.

Some practical implications for creating art with visual and kinaesthetic distortion devices are also explored. They are discussed in relation to theories of human performance,

such as flow theory, and attitudes toward the conflict between habitual and unfamiliar perceptual experience. Keeping an open and uncritical mind toward unfamiliarity, chaos and the accidents caused by distorted perceptions and reduced control of drawing instruments is suggested to working artists. Finally, this research contributes to art education by demonstrating a possible way of achieving self-exploration through art making.

Keywords: practice-based research, human perception, digital technologies, perceptual devices, art practice

Acknowledgements

This thesis is dedicated to all my family for their support, especially to Yi-Shiuan Lin for her patience and supportiveness. Thanks for the assistance, guidance and encouragement of my supervisors John Bowers, Irene Brown, Tom Schofield and Brigitta Zics. I would also like to thank Dr. Tzing-Ying Lin and artist Liang-Chih Ko who have supported and participated in my research projects.

Table of Contents

Lists of Figures

Introduction

When I was an undergraduate majoring in Fine Arts in Taiwan, I received art training in National Taiwan Normal University (NTNU), a school which specializes in cultivating secondary school teachers. For historical reasons[1], Taiwanese education emphasises conformity, obedience and loyalty. Most teachers prefer obedient students to strong-minded ones, appreciating conformity instead of idiosyncrasy. Cultivating independent thinkers is never the main goal of Taiwanese education. With this background, the art training I accepted in NTNU ignored creativity, self-expression[2] and critical thinking. All my classmates and I were trained to pursue a high extent of likeness to subjects in our art practice, without choices. After seeing many fascinating contemporary artworks in various art genres, I started to question what I had learned from the school and felt a strong impulse to explore art forms aside from accurate visual representation[3] in my art practice.

This practice-based research is my exploration of self-expression in art. Influenced by Tim Ingold's concept of thinking though making, which emphasises the value of actual practice to the generation of creativity (described further in section 5.1.3), I implement several artistic experiments that question my habitual methods of artistic creation and investigate alternative relationships between perceptual devices, artists' perceptions, and artistic production[4]. This thesis reports my reflective practice projects.

---

[1] Taiwan was colonized by Japan from 1895 to 1944. At that time education was a means of convincing Taiwanese children that they were Japanese. In 1949 Kuomintang (a political party in China) took control of Taiwan. It followed the Japanese way of disciplining children in schools in order to improve the highly unstable political status of Taiwan. Education was still a method of social control (Wilson, 1970: 157-158). The concept of freedom, creativity and individuality was still avoided and discouraged in school at that time (Lai, 1999). Although Wilson's observation took place several decades ago, his findings are still quite true today.

[2] Self-expression refers to the act of clarifying one's feelings, thoughts, or ideas and showing them in art practice

[3] Accurate visual representation refers to an act of copying or imitating the appearance of subjects in artefacts.

[4] I use artistic production to refer to the whole process of creating artworks, including the generation of ideas, the choice of forms, material and techniques, and the action of showing the ideas in artefacts.

In the art field, various kinds of optical perceptual devices, such as Camera Lucida[5]and Claude Lorrain Filters[6], and digital perceptual devices, such as Oculus Rift[7] and HTC Vive[8], have been used by artists. In the main, these devices have been deployed to enhance artists' vision and control of art making[9]. They are intentionally applied to be useful to artistic production, enhancing artists' sensory capabilities to facilitate art making. Their success is based on enabling artists to depict the likeness of subjects to an enhanced extent or making the process of art creation more intuitive and efficient. In contrast, the perceptual devices used in the experimental artistic practices conducted in this research are intentionally prototyped not to be useful to artistic production in a conventional sense. This is inspired by the design research introduced in section 1.1.2, which indicates that people can be provoked to think, interpret, play and engage actively through things designed to be ambiguous, playful and functionless.

Influenced by a design strategy based on *Defamiliarization* and *Breakdown* (introduced in section 1.1.3), which facilitates creativity and innovation[10] by making familiar things problematic, I undermine the production of artefacts based on the emphasis of vision and skill, advocating the idea of unfamiliarity, distortion, struggle and lack of control. Therefore, this research focuses on investigating the use of sensory distortion devices which are deliberately developed to confuse, mislead and distort artists' perceptions and behaviour, in order to make artistic production more difficult and challenging.

---

[5] A drawing aid which enables artists to draw extremely accurate contours of subjects. See page 7.
[6] An optical drawing aid which can assist landscape painters in colour choice. See page 10.
[7] A virtual reality headset released by Oculus VR, which can provide users with vivid and immersive experiences of perceiving the digital world.
[8] A device similar to the Oculus Rift, developed and manufactured by HTC.
[9] Control here refers to the ability to direct the body to perform intended movements for creating desired art results. For example, controlling the drawing hand to draw exactly what the artist wants to create.
[10] Innovation means the action or process of creating new things (ideas, technologies or products) or making something better than what was there before.

The general inquiries of this research are:

- How can artists and their artworks be influenced by the use of sensory distortion devices during artistic production?
- What is the creative potential of applying sensory distortion devices in artistic production?

More specific key questions of this research are introduced in section 1.3. They are developed according to the general inquires and my continuous research interests as shown in my earlier experimental projects introduced in section 1.2.1.

Various kinds of sensory distortion devices are prototyped and used to produce experimental artworks in this research. The artists' reflections, their behaviour in art making and their artworks are closely observed, analysed and discussed to identify the artistic potential and the influence of using sensory distortion devices in artistic production. The main contribution of this thesis is to present the rich possibilities of this research area which has not yet been systematically investigated. This research also contributes to knowledge in the art field by providing actual examples and practical suggestions to artists and researchers who may further develop this work in the future.

Chapter 1 introduces the background, my motivation and research questions. It presents my earliest experimental projects concerning technologies and human perceptions and my reflections on the relationship between existing perceptual devices used in art making, artists' perceptions and artistic production. Design for ambiguity, *Ludic Design*, *Counter-Functional Design* and the concepts of *Defamiliarization*, *Breakdown*, the concept of ambiguity and involuntary drawings are also introduced in this chapter. Chapter 2 presents the methodology and methods that I applied in this study. It explains the reasons for using calligraphy and

drawing as the main art forms of the experimental practices in this research. Chapter 3 and Chapter 4 respectively introduce the experimental calligraphy, painting and drawing practices, applying various kinds of visual and kinaesthetic distortion devices. The work flow of constructing the practices, prototyping of the sensory distortion devices, analysis of artists' behaviour and the resulting artefacts are also described in detail in these chapters. In the next chapter, a comprehensive discussion based on the findings of the observation and analysis of the experimental calligraphy, painting and drawing practices is presented. Many contemporary drawing and calligraphic artworks and theories in relation to artists' performance and perceptions are involved in the discussion. In Chapter 6, the influences of the sensory distortion devices are summarized and the potential for applying the sensory distortion devices is outlined to answer the research questions. This final chapter concludes with practical suggestions to artists and researchers, the contributions of this research and possible future developments.

Chapter 1. Background, Motivation and Inquiries

The innovative potential and creative impact of perceptual devices that are developed to provide artists with confusing, strange and unfamiliar visual and kinaesthetic experiences in artistic production are investigated in this research. Section 1.1.1 outlines how perceptual devices have been used in the creation of art. Section 1.1.2 presents design notions that oppose the concept of usefulness which induced me to reconsider the use of perceptual devices in artistic production. Section 1.1.3 introduces design strategies derived from the concepts of *Defamiliarization* and *Breakdown* which helped me to clarify the goal of prototyping perceptual devices in this research. Section 1.1.4 presents the artistic potential of ambiguity and several experimental drawings which were involuntarily made. They have influenced my artistic exploration a lot. Section 1.2.1 introduces my earlier experimental projects which have shaped my developing research interests. Section 1.2.2 presents my research motivation, which comes from my attempt to extend the forms of my art expression and the application of obstructed vision and control used in existing experimental drawing exercises. Section 1.3 describes the research questions and provides clear descriptions of the research aims and objectives.

1.1 Research backgrounds

1.1.1 *Perceptual devices used in artistic production*

Perceptual devices of many kinds are widely used in our daily lives: glasses, telescopes, magnifiers, hearing aids etc. These devices are developed to assist us in sensing the world around us and to make life more convenient. Many perceptual devices have also been used in artistic production. This chapter reviews some typical perceptual devices used in drawing, choosing colours and making digital artworks, in order to explore the general relationships between the perceptual devices, the artists' senses and artistic production.

There are several well-known devices such as the camera obscura[11] and pantograph[12] that have been designed to assist artists in producing accurately depicted artworks; however, this research is concerned primarily with devices that directly alter the users' visual perspective in doing so. Devices such as Camera Lucida and Neo Lucida are optical drawing aids that alter the artists' perceptions in order to help the artists to draw the outline of subjects accurately. The Camera Lucida, initially designed by William Hyde Wollaston in 1807, is composed of a light-refracting glass prism, two convex glasses and an adjustable metal stand (Wollaston, 1807: 343-348). Artists use this device by fixing it on the edge of a table, placing the subject in front of the device and a piece of drawing paper under the glass prism (Figure 1.1). By adjusting the angle of the prism and looking down through it, the artists can see a semi-transparent image of the subject superimposed onto the paper. Instead of actually projecting the image of the subject onto the drawing paper physically, the Camera Lucida overlaps the image of the subject and the image of the drawing paper directly on the artists' retina. This special vision allows the artists to trace extremely accurate outlines and details of the subject by simply tracing the semi-transparent images they see.

[11] The camera obscura is an antique optical drawing aid general composed of a wooden box with a small hole, a semi-transparent screen and a mirror (Wenczel, 2007: 13-18). The images of drawing subjects are projected on the screen by refracting the light coming through the small hole by the mirror. Artists can produce very accurate contours of subjects by tracing the images on semi-transparent drawing paper.

[12] The pantograph is a mechanical drawing apparatus generally built with wood strips linked by moveable joints in a way based on parallelograms. Two pens are fixed on the two ends of this device. While one pen is moved to trace an image, the other pen can perform the same movements to create an identical, enlarged, or miniaturized copy of the image.

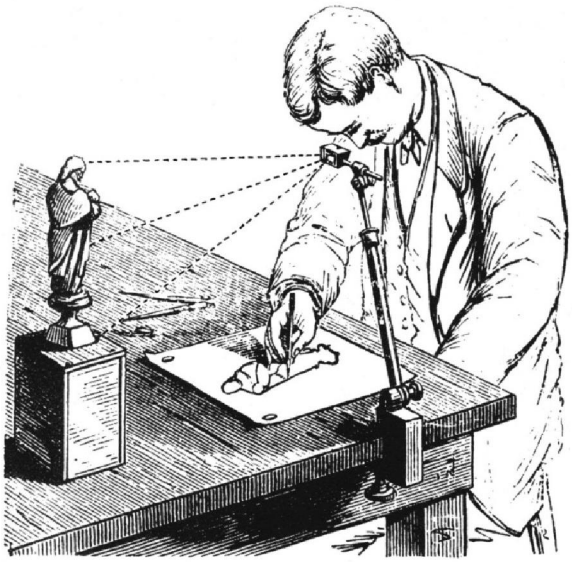

Figure 1.1 The Camera Lucida (Unknown, 1879)

Figure 1.2 The setting of the NeoLucida (left) and the view provided by it (right) (NeoLucida, 2014)

Although the Camera Lucida was very popular in the nineteenth century (Fiorentini, 2006: 11) it eventually fell out of use. However, in 2013, art professors Pablo Garcia[13] and Golan Levin[14] developed a drawing aid called a NeoLucida to encourage the use of the visual experience provided by the Camera Lucida (Figure 1.2). The NeoLucida is a portable,

[13] Pablo Garcia is an art professor from the School of the Art Institute in Chicago.
[14] Golan Levin is an art professor from Carnegie Mellon University.

affordable and open-source version of the Camera Lucida. It has a more flexible structure and is made from a much lighter and more inexpensive material. Garcia and Levin released the source files of the NeoLucida online[15] so that anyone could create one for themselves.

The optical devices Sew Red Glasses and Claude Lorrain Filters exemplify perceptual devices relating to the use of colour. The former helps artists to determine colour values, while the latter suggests colour hues to artists. The Sew Red Glasses, designed by quilt designer Joleene Kooyman, are a pair of glasses with red lenses (Figure 1.3). Kooyman developed the glasses to assist textile artists in the composition of their designs ("Sew Red Glasses - How It Works," 2013). By looking through the glasses, artists can see their designs and textile materials all converted via a red filter (Figure 1.4). This vision facilitates the determination of the colour value of the materials – light, medium or dark. Although the grey-scale observed through this vision is not entirely accurate[16], it is still effective in helping the user to focus on arranging the visual materials in relation to their colour values.

Figure 1.3 The Sew Red Glasses (Kooyman, 2013)

[15] The necessary files for developing the NeoLucida, including 3D-printing files and CAD files, can be downloaded at: http://neolucida.com/diy/

[16] The grey-scale observed through the Sew Red Glasses is not always accurate because the red lenses are absorption filters. The red lenses allow only red light to fully pass through and block light of all other colours to different extents. Therefore, the grey-scales of green and blue objects observed through the glasses are slightly darker than in reality.

Figure 1.4 Colourful fabrics (top) and how they look through the Sew Red Glasses (below) (Kooyman, 2013)

Figure 1.5 The Claude Lorrain Filters ("A Pocket Set Of Artist's Claude Lorrain Glass Filters," 2013)

The Claude Lorrain Filters are a set of five round, tinted glass filters: yellow, green, blue, brown and red (Figure 1.5). Each glass is approximately 2.5 centimetres in diameter. The coloured glass filters are mounted within a fan-shaped protective frame. The device is designed to be able to produce a variety of colours and explore colour combinations (Pike, 1856: 193). Its main use is by landscape painters who use it to help determine the colour of the scenery in different seasons. By looking through different coloured filters, the painters can see the same scenery in different colour tones, as if in different seasons. For example, the light

green glass can make the scenery look like spring; the yellow glass summer; orange (combining the red glass and the yellow glass) autumn and the blue glass winter. This vision assists the painters in choosing hues by directly presenting the suggested colour.

In terms of perceptual devices used in making digital art, the virtual reality headset Oculus Rift (Figure 1.6) and HTC Vive (Figure 1.7) are the most common. Both provide users with stereoscopic 3D vision, which is digital vision with natural scale, depth, and parallax generated by providing the users' left eye and right eye with parallel images. Although they are mainly used to improve game experience, they can also be applied in artistic production by using them along with software specially designed for artists.

Figure 1.6 The Oculus Rift (Oculus VR, 2014)

Figure 1.7 The HTC Vive (Chip, 2015)

VRclay, a 3D modelling system developed by computer scientist Vojtech Krs and Ondrej Jamriska, allows modellers to build digital 3D models by emulating the normal visual experience and instinctive hand gestures (Krassenstein, 2014). The programme adapts the Oculus Rift and two Six Degrees of Freedom (6DoF) game controllers (Figure 1.8). By using Oculus Rift, the modellers can see the virtual 3D models develop as vividly as if they were real objects existing in space right in front of them rather than 2D images displayed on screen. Tilt Brush is digital painting software developed by Google to provide artists with a new,

intuitive and immersive way of making digital drawings ("Painting from a new perspective," 2015). With the software and the HTC Vive, artists can make three-dimensional drawings in space. They can walk around and into their drawings during the drawing process (Figure 1.9).

Figure 1.8 Demonstration of building a 3D model with the VRclay system (Krassenstein, 2014)

Figure 1.9 An artist drawing in 3D space with the HTC Vive and the Tilt Brush (Kuchera, 2015)

These optical drawing aids and virtual reality equipment are intended to enhance artists' visual capability, facilitating artistic production. The Camera Lucida and the NeoLucida are designed to increase the accuracy[17] of drawings, the Sew Red Glasses and Claude Lorrain filters provide visual aids in relation to the use of colour and the Oculus Rift and the HTC Vive systems offer digital artists a more intuitive production system which can also improve

[17] Accuracy refers to the match between what artists see and what they draw in this case.

their control of art making. In all these cases, the relationships between the function of the perceptual devices, the artists' vision and art making are constructive; the perceptual devices enhance the artists' perception, control and accuracy. This research, however, explores an alternative relationship between the function of perceptual devices, artists' senses and artistic production by challenging this conventional association. Instead of developing devices that enhance control and accuracy, this research focuses on the creative potential of devices that distort the artists' perceptions and contest their control.

1.1.2 *Design notions opposite to usefulness*

Most of the perceived advantages of the perceptual devices mentioned above relate to enhancing the accurate and controlled portrayal of what is seen, whether transcribed onto a picture plane through drawing or painting or digitally manipulated. The perceptual devices are applied with the intention of being useful to artistic production. The idea of 'usefulness' is a mainstream design concept, which relates to the improvement of job performance, efficiency[18] or quality (Davis, 1989; Karsh, 2004) and "the extent to which a system's [a designed object's] functions allow users to complete a set of tasks and fulfil specific goals in a particular context of use" (MacDonald & Atwood, 2014). It has been widely regarded as a fundamental criterion of design, even a primary standard of judging design. Industrial designer Dieter Rams indicates that:

> *Good design makes a product useful. A product is bought to be used. It has to satisfy certain criteria, not only functional, but also psychological and aesthetic. Good design emphasizes the usefulness of a product whilst disregarding anything that could possibly*

[18] Efficiency here refers to the ability to be able to accomplish jobs with less time and effort.

detract from it. (Rams, 2012)

Although he mentions the psychological and aesthetic criteria of design, usefulness seems to be the ultimate requirement of good design to Rams. Anything that has any possibility of detracting from usefulness should be avoided. In addition to product design and industrial design, achieving usefulness has also been one of the main goals in other design fields, such as user-centred design (Gould & Lewis, 1985) and technology design (Karsh, 2004).

Although the concept of usefulness seems to have dominated the design field, there are still a few design approaches with notions opposite to the concept of usefulness, such as design for ambiguity, *Ludic Design* and *Counter-Functional Design*. It is these design approaches that have provided inspiration for this research.

Design researchers William W. Gaver, Jacob Beaver and Steve Benford (2003) emphasise the value of ambiguity in the design of digital systems. They regard ambiguity as the 'nemesis' of usefulness and usability in the development of human computer interaction because interfaces that have an uncertain purpose and convey unclear information are usually judged to be neither useable nor useful (Gaver, Beaver, & Benford, 2003: 233). Design for ambiguity proposes that providing ambiguous information, context or relationships between users and systems can impel people "to interpret situations for themselves" and to encourage people "to start grappling conceptually with systems and their contexts" (ibid: 236-237). This can induce people to establish a deeper and more personal connection with systems.

Ludic Design, proposed by Bill Gaver, emphasises the value of playfulness and pleasure instead of the value of functionality and usefulness. Gaver considers Johan Huizinga's idea of

Homo Ludens, “humans defined as playful creatures”, as an “antidote” to people’s assumptions that “technology should provide clear, efficient solutions to practical problems” (Gaver, 2002: 2). *Ludic Design* argues that pleasurable objects and situations can encourage people to have more subjective engagements and empathetic interpretations. Researchers can explore the new potential of technologies by studying how people interact with playful objects and how they feel about the enjoyable experience.

Counter-Functional Design, proposed by James Pierce and Eric Paulos, is a design approach directly opposed to the concept of usefulness. It promotes the value of “functional limitations” in device design (Pierce & Paulos, 2014: 375). *Counter-Functional Design* encourages designers to build “a counterfunctional thing”, which is “a thing that exhibits features that counter some of its own essential functionality” while still maintaining the familiarity of the thing (ibid). To demonstrate this idea, Pierce and Paulos develop *Inaccessible Digital Cameras*, which are digital cameras enclosed in wooden or plastic boxes (ibid: 378). The devices invert the typical characteristic of digital cameras that they allow users to easily view and access digital images. To access the images captured by the *Inaccessible Digital Cameras*, one has to put a lot of effort into sawing or smashing their enclosures first. Pierce and Paulos argue that removing, inhibiting and inverting the typical functions of the targeted devices are the main design methods in Counter-Functional Design (ibid: 376). Also, counter-functional devices can be of benefit to the exploration of new technologies (ibid: 384).

Instead of developing practical and useful functions, these design approaches emphasise producing objects, devices or systems that provoke people to think, reflect, play, interpret and engage actively. They consider design as a way of providing opportunities for people to gain more personal, more profound and more inspiring insights instead of solving certain problems

or achieving certain practical goals. Inspired by these design philosophies, the perceptual devices built in this research are intended neither to solve any problems related to making art, nor to improve the process of art creation. They are developed for the purpose of inspiring myself to think and to experiment actively.

1.1.3 *Defamiliarization and Breakdown*

In order to build perceptual devices that can enhance artists' engagement in artistic production and lead artists to be active in artistic experiment and exploration during art making, design strategies derived from concepts of *Defamiliarization* and *Breakdown* are applied in the design of perceptual devices in this research. *Defamiliarization* is a term coined by Russian novelist Victor Shklovsky and refers to an artistic technique that enhances audiences' perception of the familiar by making it unfamiliar or strange (Shklovsky, 1965: 2). This technique also relates to "the slowing down and the increased difficulty (impeding)" of the process of perceiving and understanding an artwork (Margolin, 1994). *Breakdown* is a notion derived from the philosophy of Martin Heidegger. Heidegger (1962) indicated that when we carry out our day-to-day activities with tools or implements, the equipment usually does not attract our conscious awareness. It is brought "into view" (ibid: 104) when ongoing unreflective practice is interrupted. Based on Heidegger's account, *Breakdown* is defined as an unexpected moment when our "unquestioning involvement in the here-and-now" is suddenly stopped by the failure of things that we take for granted (Koschmann, Kuutti, & Hickman, 2010: 25). At a breakdown moment, "the environment announces itself afresh" (Light, Blythe, & Reed, 2008: 4).

The concepts of *Defamiliarization* and *Breakdown* have been applied in the field of design as a strategy for enhancing creativity and achieving innovation by making familiar things problematic. Under this strategy, many design methodologies have been developed in

order to make familiar things slow down, become more difficult or fail to lead designers to question their habitual interpretations of and underlying assumptions about everyday objects (Bell, Blythe, & Sengers, 2005; Sengers & Gaver, 2006), such as using extreme character, exaggerating information and creating ambiguity (Poirier & Pringle, 2012). Designers are forced to step back from their habitual thoughts so that they can gain new insights (Fischer, 1994; Poirier & Pringle, 2012). Inspired by the design strategies of *Defamiliarization* and *Breakdown*, the development of perceptual devices in this research focuses on slowing or breaking down artistic production by challenging artists' perceptions. The perceptual devices should be able to distort artists' usual perceptions and disrupt their habitual behaviour of art making. Artistic production in this case is intentionally designed to be much more difficult to allow artists to refocus on it with unfamiliar perspectives and have more chances to explore new possibilities.

1.1.4 *Ambiguity and Involuntary Drawing*

As mentioned in Introduction, this research aims to explore art forms other than accurate visual representation[19] in my art practice. My exploration starts with reflecting and changing my habitual way of drawing. When I create still-life drawings, I am used to focusing on the appearance of subjects and drawing very carefully to achieve a high extent of likeness to subjects. The concepts of ambiguity and involuntariness are involved to challenge this drawing process.

Ambiguity is the character of "what is susceptible to several interpretations" and of "what lacks precision and disturbs" (Gamboni, 2002: 13). It is usually related to indeterminacy, polysemy (a sign with several meanings), equivocation and vagueness (ibid).

[19] See the third footnote on page 1.

The potential of ambiguity in the art field has been investigated by many artists. For example, Edward Hill (1966) argued that artists' creativity could be stimulated by the use of ambiguous, half-resolved forms. Similarly, John Willats (2006) observed that designers' ideas for new products could be inspired by unexpected shapes in their sketches composed of multiple outlines and indeterminate marks. Contemporary artist Richard Talbot (2006) also reflects that the essential ambiguity of linear perspective[20] enables his creative thought. He also suggests that ambiguity is necessary to make artworks creative and open-ended. In addition, Philip Rawson (1987: 26) argues that artworks with forms involving ambiguity and multiple meanings can induce the viewers to play a more active role. They are induced to seek out possible valid interpretation of the works by themselves. This echoes Arthur Schopenhauer's words quoted by Semir Zeki (Zeki, 2004: 189) that "*something, and indeed the ultimate thing, must always be left over for the mind to do*".

According to these arguments, ambiguity seems to be able to benefit artists' creativity and viewers' engagement with artworks. Influenced by this, in this research perceptual devices are designed to facilitate the creation of marks with uncertain meanings and confusing situations of art making. The purposes of doing so are to provide myself with more chance of generating creative thought and to allow viewers to have their personal interpretation of my artefacts.

Drawing involuntarily is my second strategy of exploring artistic possibilities. Artists, such as Pierre Bismuth and Susan Morris, have made marks without deliberate action or conscious intention in their practices. Bismuth's remarkable series named *Following the Right*

[20] By analysing complex geometric patterns in the works of several late mediaeval artists and early renaissance artists, Talbot suggests these artists possibly created the patterns by playing with the geometry of the patterns themselves rather than depicting reality. Talbot indicates this method provides opportunities for 'fuzzy logic' during the artists' working process, which 'actively allows ambiguity to be part of the creative process' (Talbot, 2006).

Hand relates cinema and drawing by tracing the movement of actresses' hands in famous movies (Figure 1.10). Bismuth projects a film on a piece of plexiglass and follows the position of the actress's right hand with a black marker for the duration of the whole film. The plexiglass with a sinuous, meandering marker line is enframed over the visage of the actress printed out from the movie. Bismuth grants the actress the power to conduct his drawing and hence "renders himself incidental, the simple facilitator of the séance"("Following the right hand of," 2009).

Figure 1.10 *Following the right hand of Gene Tierney* in *The Shanghai Gesture* (Bismuth, 2009)

Morris's series of *Untitled Motion Capture Drawings* is created by involving motion capture technologies. Morris creates several pre-planned, repetitive drawings at a motion capture studio while wearing sensors on her trunk and limbs. The data of her bodily movements while making the drawings are collected and visualised into a web of fine white lines against a matte black, dense background (Figure 1.11). The lines automatically drawn by computers reveal the involuntariness of her movements. This series presents the "the complex, almost dance-like rhythm of bodily movement" that can be found in mundane activities (Iversen, 2012).

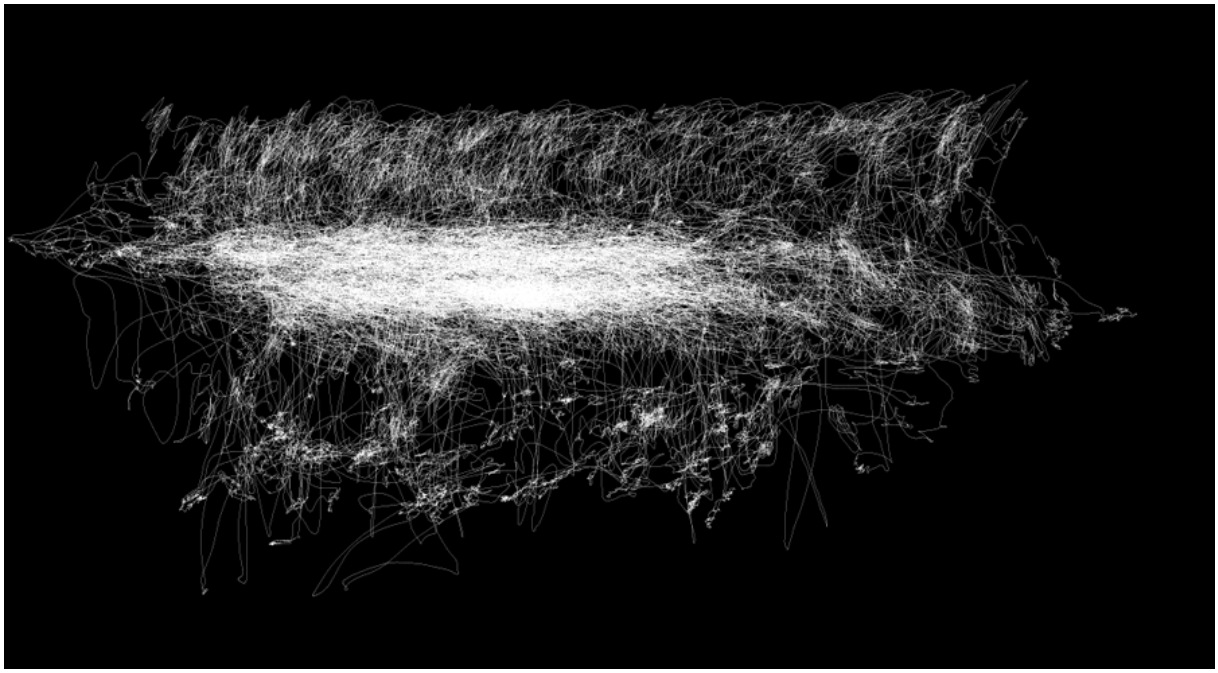

Figure 1.11 *Untitled Motion Capture Drawings (Left Elbow, Facing View)*, 150cm x 270cm (Morris, 2012)

I believe what makes Bismuth's and Morris's works so outstanding includes the meanings of the marks and the involuntary drawing approaches that have very strong connections to their chosen art concepts. The unique drawing methods and lines with irregular shapes and curvatures effectively express Bismuth's reflection on cinema's and drawing's capability of recording movement and Morris's observation of the rhythm hidden in unconscious bodily movement. This reminds me that my habitual drawing methods should never just change for change's sake. They should be based on profound artistic intention or expression.

1.2 Research interests and motivation

1.2.1 *My earlier experimental projects*

The development of the topic of this practice-based research is an expression of my continuous research interests, which were shaped through my earlier experimental projects. As a research assistant in the Futuristic Brilliant Interaction Laboratory[21] in Taiwan from 2008 to 2012, I was involved in several research projects developing interactive meditation installations for monks and nuns in the Dharma Drum Buddhist College (DDBC)[22], facilitating the study and practice of various types of Zen meditation[23]. The meditation methods guided people to achieve mindfulness through elevated self-awareness. They required people to focus intensely on their perceptions and every subtle bodily movement throughout the meditation. This professional experience triggered my interest in exploring possible relationships between human perceptions, bodily movements and digital technologies.

Responding to this interest, I prototyped two experimental perceptual devices, *Reversed Eyes (2013)* and *Perceptual Mismatch Gloves (2014),* in the early years of my PhD study. *Reversed Eyes* was a visual device (Figure 1.12) that provided the user with a variety of unfamiliar visual experiences. *Perceptual Mismatch Gloves* was a pair of biofeedback gloves (Figure 1.14) that induced unfamiliar perceptual experiences related to the sense of touch and the sense of bodily movement.

---

[21] Futuristic Brilliant Interaction Laboratory (FBI lab) is based in Taiwan. Its main goal is to explore potential applications of art and science by investigating issues around humans, nature, technologies, and society.

[22] Dharma Drum Buddhist College (DDBC) was established by Chan Master Sheng Yen in Taiwan. It is an education and research institute specializing in both the study and practice of Buddhism.

[23] The research established three creative meditation installations, which are zen_Move, zen_Circle and zen_Sit. They respectively correspond to attention training, walking meditation, and sitting meditation. The results of the research are described in a paper titled "Creative Zen Learning Space and Community" (Jiun-Shian Lin, Chi-Hung Tsai, Su-Chu Hsu, Chia-Wen Chen and Yu-Hsiung Huang), published in the International Electronic Arts conference (ISEA) 2011.

Reversed Eyes comprised an Arduino board[24], a helmet with an embedded display, a wide angle camera fixed on a robotic arm and two vibration sensors placed beside the user's cheeks (Figure 1.12). This device presented the user with images captured by the camera through the visual display. It also allowed them to control the movement of the robotic arm by touching the vibration sensors with their cheeks. The camera rotating along with the robotic arm provided users with an upside-down left-right reversal visual perspective and also a rear view perspective (Figure 1.13) {see Appendix A: Reversed eyes. mp4}. *Perceptual Mismatch Gloves* was a pair of gloves with a flex sensor and a mini vibration motor embedded into each finger (Figure 1.14). The gloves provided the user with a virtual perceptual connection between the fingers by developing stimulus-response relationships between random fingers. The gloves paired the fingers on each hand randomly. An information visualisation system was developed to show the virtual connections between the fingers. When one finger bent, a corresponding finger on the other glove received vibration feedback through the vibration motor. The degree of bend was reflected by the intensity of the vibration {see Appendix A: Perceptual mismatch gloves. mp4}.

[24] Arduino is a small circuit board with a microcontroller chip and sets of digital and analogue input and output pins. It can develop communications between computers, sensors and actuators to build digital devices and objects that can interact with their environment. The official site of Arduino is https://www.arduino.cc/

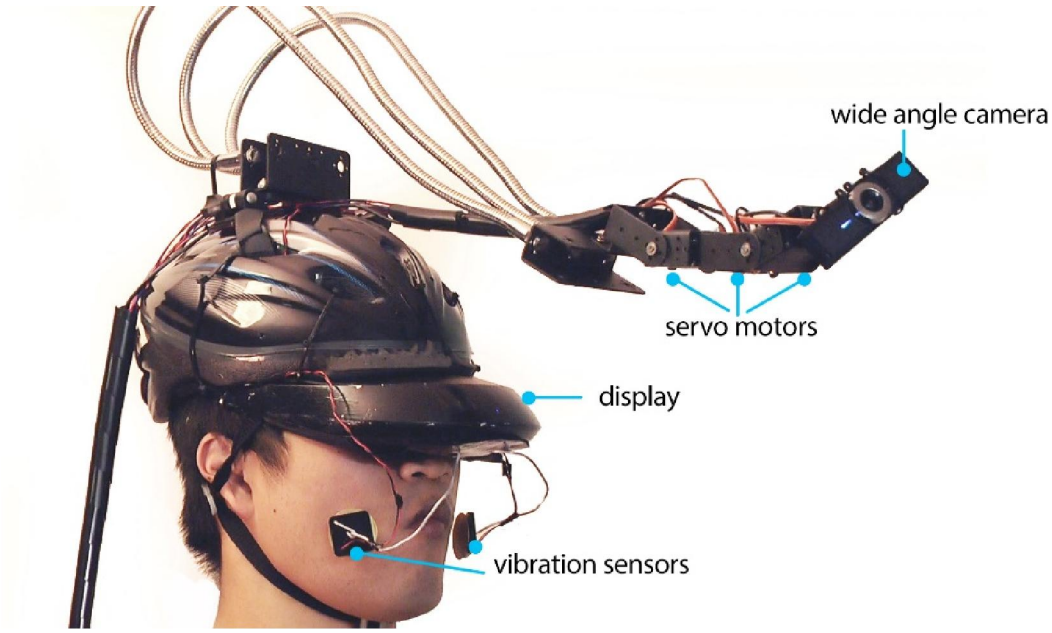

Figure 1.12 The structure of *Reversed Eyes*

Figure 1.13 The visual perspectives provided by *Reversed Eyes*

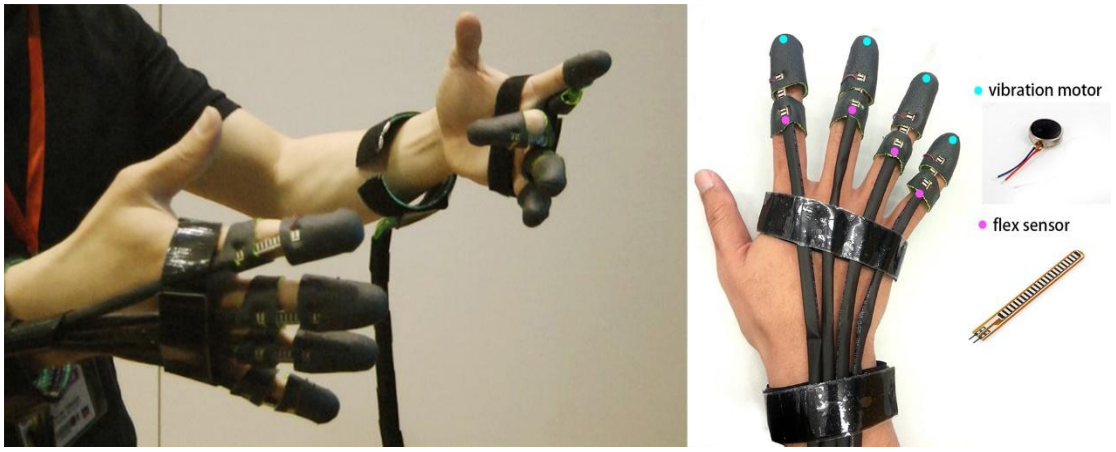

Figure 1.14 The structure of *Perceptual Mismatch Gloves*

Although the initial purpose of prototyping these two devices was to explore human perception, it became clear that the bodily movements and behaviour of the user were also strongly influenced by the devices. When the devices were presented to the public[25], I observed that both had the effect of slowing down people's movements and making them act hesitatingly and unsurely. The *Reversed Eyes* device even made people stumble over themselves. These phenomena made me curious about how I might change people's behaviour through the use of perceptual devices composed of digital technologies.

In response to this question, I developed *Action Visualizer*, a musical experimental device made in cooperation with professional flautist Dr. Tzing-Ying Lin. This perceptual device was designed to influence a musician's behaviour whilst playing a musical instrument by providing them unfamiliar visual experiences. The device informed the musician's finger movements through immersive light feedback. It was comprised of a pair of goggles which had ten RGB LED lights embedded inside and a pair of gloves, which had a pressure sensor installed in each finger (Figure 1.15). The RGB LED lights and the pressure sensors were

[25] The Reversed Eyes and The Perceptual Mismatch Gloves were exhibited in the Working in Progress Show held in Culture lab, Newcastle University in April 2014.

paired in order. Each light represented how hard its corresponding pressure sensor was pressed. In the experimental music performance held at Culture Lab, Newcastle University in June 2014, Tzing-Ying Lin performed flute improvisation with *Action Visualizer*. The device informed her which finger was pressing on the flute as well as the duration and the strength of the pressing behaviour during the whole performance (Figure 1.16) {see Appendix A: Experimental flute improvisation. mp4}. Although she was supposed to improvise according to the colours of light that she saw, she reported after the performance that her improvisation was actually barely influenced by the light feedback. *Action Visualizer* didn't effectively influence her performance. This was because the light feedback changed too fast for her to respond to it and also because she was not used to composing music according to colour. Improvising according to colours was too unfamiliar and difficult for her.

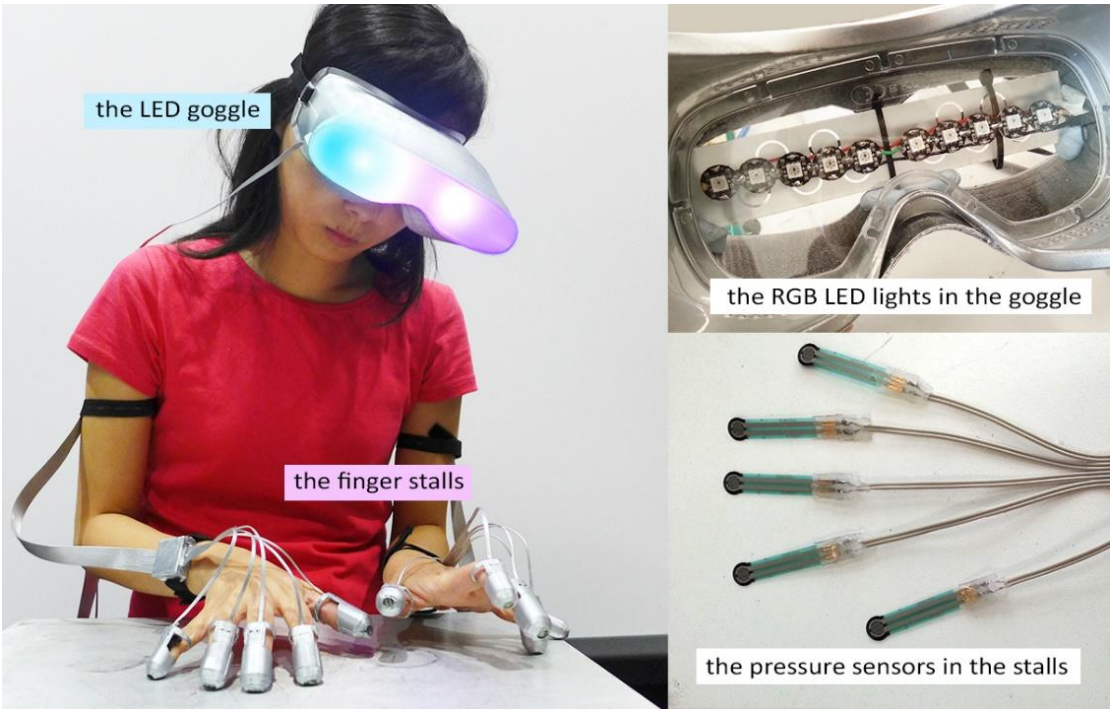

Figure 1.15 The structure and components of *Action Visualizer*

Figure 1.16 Tzing-Ying Lin's flute improvisation with *Action Visualizer*

Tzing-Ying Lin's feedback led me to reflect on the design of the device. Because I had no experience of performing improvised music, I designed the sensory feedback provided by *Action Visualizer* according to my own imagination and assumptions which resulted in an unsuccessful outcome. This suggested that developing perceptual devices for an art form that I had no experience with had a high risk of failure and that to build effective perceptual devices I needed to focus on those art forms that I was more familiar with. This experimental music project was instrumental in deciding which art form was the most appropriate one for me to apply in this research.

Reversed Eyes and *Action Visualizer* reflect my interest in exploring alternative visual experiences by prototyping digital and electronic devices. The interactive meditation installations and *Perceptual Mismatch Gloves* demonstrate my interest in influencing people's kinaesthetic perceptions through devices developed using digital technologies. Therefore, this

research focuses on vision, kinesthesis[26] and the development of digital and electronic perceptual devices.

1.2.2 *Experimental drawing exercises involving obstructed vision and control*

In addition to my attempt to break the limitations of my habitual method of art creation, this research is also motivated by my curiosity about what happens if sensory-altering devices built with digital technologies, like the *Reversed Eyes*, *Perceptual Mismatch Gloves* and *Action Visualizer* introduced in the last section, are used in experimental drawing exercises. As vision and kinesthesis are my continuous research interests, experimental drawing exercises involving the obstruction of visual perception and control over drawing instruments are valuable resources to this research. This section reviews several drawing exercises of this kind and points out the opportunities for involving digital technologies in influencing participants' perceptions and control in experimental artistic exercises.

In terms of drawing exercises involving vision obstruction, *Upside-down Drawing*, *Contour Drawing, A Tactile Object* and *Painting to Music Blindfolded* are typical and widely implemented. *Upside-down Drawing*, proposed by Betty Edwards (2012: 55), is a task requiring participants to copy an upside-down image of Picasso's *Portrait of Igor Stravinsky* (Figure 1.17) in a drawing. Edwards believes that in order to see things like an artist, one needs to turn down the dominant, rational left brain and allow the subdominant, visual, intuitive right brain to take over. The difficulty of recognizing upside-down images is a possible way to achieve this goal, leading participants to concentrate more on exploring the lines, forms and details of the images. *Contour Drawing*, proposed by Kimon Nicolaides

[26] Kinesthesis is a sense similar to proprioception. They are both related to bodily movement, position, and where the body is in space; however, kinesthesis is more behavioural, much more emphasising bodily movement, and proprioception is more cognitive, concerned more with limb position (Stillman, 2002; Wiertelak, 2013).

(1990: 10), is an exercise focused on developing eye-hand communication. Participants are asked to focus their eyes on some point along the outline of the subject and place the point of their pencil on paper. As they slowly move their eyes along the contours of the subject, their drawing hands also have to move slowly, matching the motion of the eyes. This exercise is often called *Blind Contour Drawing* because participants basically do not look at the paper while drawing. London-based artist Claude Heath also uses this eye-hand-synchronized drawing technique for art exploration in his works *Sedum Burrito* and *Money Plant,* which have similar qualities to my experimental drawings created in this research (described more in section 5.4.1).

Figure 1.17 An upside-down image of Pablo Picasso's *Portrait of Igor Stravinsky* (Edwards, 2012)

Figure 1.18 One of Nicolaides's examples of the *Contour Drawing Exercise* (Nicolaides, 1990)

A Tactile Object, proposed by Mick Maslen and Jack Southern (2011: 76), aims to induce participants to cultivate "a direct route of communication between their two hands". Participants are asked to examine an object for five minutes and write down the characteristics of the object, including its size, weight, colour, and so on. After being blindfolded totally, they have to use one hand to feel the object and simultaneously use the other hand to express the haptic sensation from the feeling hand with a range of pencil marks (Figure 1.19). *Painting to Music Blindfolded,* proposed by Dean Nimmer (2014: 37), aims to free participants' creativity and to increase their creative intuition. It asks participants to draw in a way which responds to the music heard by them without seeing. Participants are recommended to wear blindfolds while drawing to totally ignore what their drawings look like, in order to fully concentrate on presenting the emotion of the music in various genres, such as jazz, opera, rock 'n' roll and rap.

Figure 1.19 *A Tactile Object* workshop held at Bay School in San Francisco by artist Ascha Drake ("'Close Your Eyes and Sing': More on Experimental Drawing," 2013)

In drawing exercises which relate to the reduction of participants' control over drawing instruments, some directly disturb participants' movement of their drawing hands, and others extend the length of drawing instruments, such as *The Extended Arm*[27]. This research focuses more on the former, exploring experimental approaches to influencing artists' hand movement directly. Typical examples include *Gesture drawing*, *Collaborative Combative Drawing* and *Collaborative Drawing exercise*.

Gesture drawing, proposed by Kimon Nicolaides (1990: 14), is a quick drawing that captures the movement, dynamism, energy and the essential gesture of a subject (Figure 1.20). Participants are guided to draw rapidly and continuously without taking the pencil off the paper. The quickness and the limitation are designed to induce participants to rely on their sensation rather than thought, achieving the fluidity of the drawing. *Collaborative Combative*

[27] *The Extended Arm* asks participants to tape two pencils onto a 30 centimetre stick and a 60 centimetre stick respectively. Then participants have to observe objects carefully and make descriptive marks with the extended pencils on paper that is placed vertically on an easel with a drawing board. The goal of this exercise is to induce participants to draw with various degrees of control over the drawing instrument. The further away they hold the pencil from its tip, the less control they have (Maslen & Southern, 2011: 66).

Drawing (Animal), proposed by Melissa Wyman (2012), is a collaborative drawing activity that encourages pairs of participants to push, pull, outwit or escape each other while drawing their own personal power animals on a piece of large drawing paper (Figure 1.21). Wyman teaches participants some safe combat techniques at the very beginning of the drawing activity and guides them to use the combat skills to influence each other's drawing behaviour.

Figure 1.20 Nicolaides's examples of *Gesture Drawing* (Nicolaides, 1990)

Figure 1.21 Two participants draw while combating each other (Wyman, 2012)

In 2011, artist Ian Andrews led two kinds of *Collaborative Drawing exercises* in Birmingham Metropolitan College (Schoenfeld, 2011). One of them asked groups of participants to draw collaboratively with their drawing hands tied together with a cloth strip (Figure 1.22). The other paired participants and induced each pair to use one multiuser drawing instrument made by firmly fixing a marker pen in the middle of a short wooden stick. Each participant handled one end of the stick to draw objects placed in front of them collaboratively (Figure 1.23). During the whole drawing process of these two activities, the participants' hands were being pushed and pulled by each other so they could not control the drawing instruments accurately. Similarly, another drawing exercise, led by artist Alison Kotin and Risa Horn, invited each pair of participants to control one marker pen together with a rope ("Collaborative Drawing," n.d.). The pen was bound tightly in the middle of the rope, and each participant had to pull one end of the rope simultaneously to control the pen in order to draw (Figure 1.24). The strength and the direction of the movements of the participants' holding hands codetermined the movements of the marker pen.

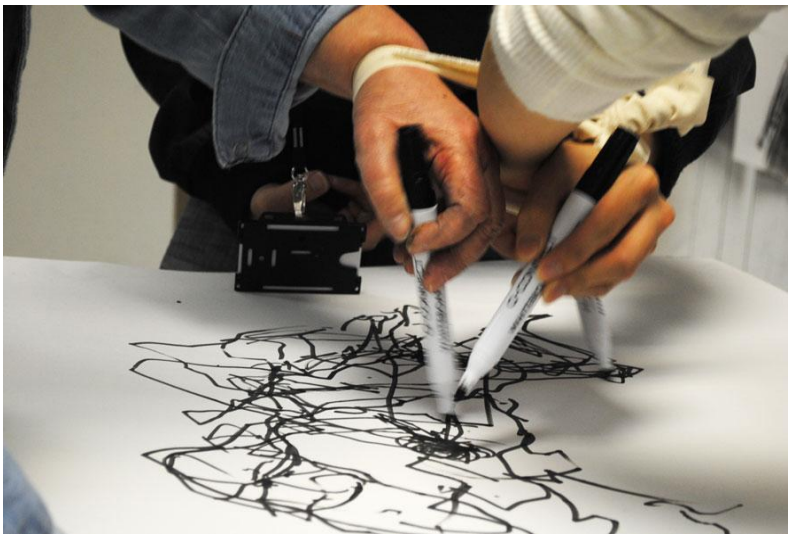

Figure 1.22 A drawing created by three drawing hands tied together (Schoenfeld, 2011)

Figure 1.23 Two people drawing together with a multiuser wooden drawing instrument (Schoenfeld, 2011)

Figure 1.24 Two people controlling a rope to draw collaboratively ("Collaborative Drawing," n.d.)

All the reviewed experimental drawing exercises are education-oriented. They are geared to help people to develop their drawing competence and to explore alternative forms of

drawing in their own right, leading participants to extend the definition of drawing (Maslen & Southern, 2011) and to understand more deeply the connection between brain, vision and hand movement in drawing behaviour. Similarly, the artistic experiments conducted in this research are developed to extend my understanding of art making and to explore alternative forms of art expression.

In addition, some drawing exercises introduced above use everyday objects to influence participants' vision and control. *A Tactile Object* and *Painting to Music Blindfolded* provide participants with totally blocked vision by using cloth strips and blindfolds. *Collaborative Drawing exercises* allow participants to have unpredictable influences on each other's hand movements and on the instrument through cloth strips, wooden sticks and ropes. Although the use of everyday objects seems very effective in altering participants' perceptions and drawing movement, the experiences created are uniform and very similar to each other. According to my experience of developing sense-altering devices, mentioned in section 1.2.1, I suggest that perceptual devices built with digital technologies can offer the participants more diverse perceptual experiences while drawing. Their viewpoints can be shifted and rotated flexibly, and their control of their drawing hand can be reduced in electronically determined ways instead of in the physical ways presented in this section.

1.3 Research questions, aims and objectives

The specific questions of this research are based on my personal artistic exploration and the general inquiries introduced in Introduction. They are developed under the guidance of my continual research interests as presented in my earlier experimental projects (introduced in section 1.2.1). The *Reversed Eyes* and the *Action Visualizer* reflect my interest in exploring alternative visual experiences by prototyping digital and electronic devices. The interactive

meditation installations and the *Perceptual Mismatch Gloves* demonstrate my interest in influencing people's kinaesthetic perceptions through devices developed using digital technologies. Therefore, this research focuses on vision, kinesthesis (the sense of bodily movement and limb position), and the development of digital and electronic perceptual devices. The specified research questions then are:

- How can artists and their artworks be influenced by the use of visual and kinaesthetic distortion devices involving digital technologies during artistic production?
- What is the potential of applying visual and kinaesthetic distortion devices in artistic production?

This practice-based research aims to explore the possibilities of my self-expression in art, to investigate the potential of applying digital and electronic sensory distortion devices during artistic production and to provide practical suggestions for artists who are interested in producing artefacts with distorted perceptions.

In order to achieve these aims and to support this research's contribution to current knowledge, several objectives have been developed, which are:

- Understanding how the distortion of vision and kinesthesis has been generally applied in the art field and identifying how it could be taken further.
- Producing experimental artistic practices involving the use of digital and electronic visual distortion devices and kinaesthetic distortion devices.
- Collecting observational research data from the experimental artistic practices.
- Recognizing the influences of the development and use of the sensory distortion devices on artistic production from the research data.

- Determining the potential of applying visual and kinaesthetic distortion devices in artistic production by observing their influences and reflecting on the artistic practices.
- Identifying the position of this research in the art field by comparing and contrasting the artistic practices and artefacts produced by this research with relevant contemporary artworks.

In the next chapter, both theoretical and practical methodologies of this research are introduced. They include the methods of developing sensory distortion devices, the considerations involved in choosing the art forms and the manners of analysing and discussing the results of using the devices.

Chapter 2. Methodology and Research Methods

This research is practice-based. It includes surveys of relevant theories, art practices and perceptual devices as well as the implementation of experimental art technologies and practices. It prototypes a series of visual and kinaesthetic distortion devices and produces artworks using them. In this research, artistic practices play an extremely important role. They are the embodiment of my opinions of how sensory distortion devices can be used in making art. In this sense, they are my "philosophy in action" and my "production of knowledge" (Barrett & Bolt, 2014: 1). Also, the artistic practices contain very rich research data. By analysing and reflecting, evaluating and discussing them closely and comprehensively, knowledge residing in both the artworks and the process of manufacturing them can be recognized (Candy, 2006: 3; Cross, 2001: 49-55).

This research is also phenomenologically-based. Phenomenological research enquires into people's experiences in order to understand a particular phenomenon (Colin, 2002: 195-196). In order to understand artists' experiences and reactions to producing artefacts with the sensory distortion devices, I interview the artists participating in this research, film their behaviour of making art and photograph their artefacts. The collected data provide rich resources for understanding the artists' experiences, motivations and actions. Data collection and analysis are introduced in section 2.4 in detail. The artists' feelings, emotions, considerations, reactions and also behaviours when producing artefacts with the sensory distortion devices are described in Chapter 3 and Chapter 4, and discussed in Chapter 5.

2.1 Contextual review

A review of relevant literature, artworks, art methodologies and digital sense-altering devices has been essential in directing the research, developing experimental art practices and

finding a place for this research within the field of art. The direction of this research is shaped in Chapter 1 by reviewing existing perceptual devices, design notions opposite to usefulness, and design strategies emphasising the unfamiliar and *Breakdown*. My research motivation is also reflected in a review of experimental drawing exercises in section 1.2.2. In addition, various existing viewpoint-shifting devices and kinaesthetic distortion devices are investigated in Chapter 3 and Chapter 4 respectively, guiding my prototyping of visual and kinaesthetic distortion devices. At last, a number of theories and contemporary artworks are included in Chapter 5 to draw links to the methodologies, processes and the outcomes of the experimental artistic practices, identifying the position of the research in the field of art and its new knowledge contribution.

2.2 Prototyping

Generally, prototyping is associated with the design process. Prototypes serve various purposes. They are used to collect manufacturing data, to explore technical solutions, to gather user feedback, to explore design possibilities and to express design concepts (Christie et al., 2012: 1; Houde & Hill, 1997: 367). They are the predecessors of final designs. Nevertheless, prototypes can also be the instantiation of critical thought. They can "function as critical artefacts" which can provoke debate, open up new design areas and "support an investigation on people's values and attitudes" (Arrigoni & Schofield, 2015: 27).

Prototyping embodies my subversion of the status quo of using perceptual devices in producing artefacts. Instead of making artistic production easier, the prototypes of visual and kinaesthetic distortion devices are deliberately designed to make artistic production more difficult. Rather than devices assisting artists' perceptions, these prototype devices confuse and distort the artists' perceptions. Also prototyping is involved in the expression of artistic concepts and inquiries. The artists' visual and kinaesthetic perceptions are distorted in a way

corresponding to the themes of the experimental artistic practices introduced in Chapter 3 and Chapter 4. Also, in order to allow for the easy recreation of the sensory distortion devices, the devices are built using methods that require low technical expertise and modify existing products and ready-made software.

2.3 Drawing and calligraphy as research methods

The artistic practices conducted apply drawing and Chinese calligraphy as the main art forms. This is because of my familiarity with them as an undergraduate majoring in Fine Arts, and also their own specific characteristics. The experimental music project mentioned in section 1.2.1 taught me that focusing on art forms that I am familiar with and have personally used to make art facilitates the development of effective perceptual devices. Also, the mark-making in both drawing and the calligraphy directly reflects their production processes. Drawing and calligraphy are techniques that will clearly help us understand how the artists respond to distorted visual and kinaesthetic perceptions during artistic production.

Drawing leaves traces. The marks drawn are authentic records of artists' manual gestures (Ingold, 2007: 120) and the movement of artists' implements (Betti & Sale, 2009: 22). Therefore, artists' drawing behaviour can be traced back through the marks. A piece of calligraphy is also "a veritable record of the process of artistic creation" (Barnhart, 1972: 239-240). Calligraphers' writing behaviour can be traced back through the strokes.

The writing tools of Chinese calligraphy include calligraphic brushes, ink and Xuan paper. A calligraphic brush is made of animal hairs. It is soft and elastic with high capillarity[28]. Soaked in ink, the brush can hold the ink in its tip. Xuan paper is a kind of white,

[28] Capillarity is the elevation or depression of liquids in capillaries.

resistant, soft paper with strong absorbency specifically made for use in calligraphy. Due to the elasticity and capillarity of the brush and the paper's absorption quality, when one writes characters on the Xuan paper with the calligraphic brush, every slight change of movement can produce a very diverse appearance of brushstrokes. Tim Ingold (2007:131) indicates that "every line [stroke] is the trace of a delicate gesture of the hand that holds the brush". Every subtle inflection of the brush is preserved permanently on the absorbent paper (ibid). Barnhart (1972: 240) similarly indicates:

> *In good calligraphy and bad, one sees almost as surely as if watching the artist at work every movement of the brush in the precise sequence through which it moved. Nothing is hidden, mistakes remain along with daring successes, splattered ink where the hand slipped, worn scrawls where the brush ran dry of ink but moved on to finish a last flourish, even where the writer paused to reload his brush with ink. The changing tempo of the artist's work, too, is apparent. (Barnhart, 1972: 240)*

He argues that a piece of calligraphy, good or bad, is capable of leading spectators to vividly imagine the calligrapher's writing behaviour, including the sequence, tempo, speed and even accidental mistakes.

Three experimental calligraphic practices involving the use of visual distortion devices (Chapter 3), and three experimental drawing projects involving the use of kinaesthetic distortion devices (Chapter 4) have been conducted. The pieces of calligraphy and the drawings produced are not only experimental artefacts but also important research data, providing evidence of how the artists' behaviour was influenced by the sensory distortion devices.

2.4 Data collection and data analysis

To explore the influence of visual and kinaesthetic distortion devices on artists, data on a range of the experimental art processes and the artefacts made have been collected. In the experimental calligraphy practices participated in by a professional calligrapher and myself (Chapter 3), the calligraphic works have been collected; the calligrapher's interviews and my self-reflections have been sound-recorded; the process of writing calligraphy and the images provided by the visual distortion devices have been video-recorded as well. Similarly, in the experimental painting and drawing projects implemented by myself (Chapter 4), the paintings and drawings have been collected; my self-reflections have been sound-recorded and the painting and drawing processes filmed.

The interviews conducted in this research are semi-structured. A semi-structured interview has "a sequence of themes to be covered, as well as suggested questions in order to follow up the answers given and the stories told by the subjects" (Kvale, 1996: 124). In order to understand the professional calligrapher's experience of writing calligraphy with the distorted visual perceptions, I interviewed him with several pre-designed questions (Appendix B) after finishing each experimental calligraphy session. The prepared questions focused on his feelings during the writing process, his reflections on the alternative writing methods and his evaluation of the calligraphic works. According to the calligrapher's answers, several questions were generated to induce him to describe his experiences as completely as possible. The interview questions are also a useful reference for my self-reflections. I reflected on my own experience of writing calligraphy with distorted vision based on the aspects emphasised in the interview questions. In terms of the analysis of the interview data, an inductive approach which is suitable in studying unfamiliar phenomena was used (Elo & Kyngäs, 2008:

109). The calligrapher's interviews were transcribed verbatim first. Then the texts[29] were iteratively studied and organized to allow possible influence of the visual distortion devices on the calligrapher to "emerge" (Strauss & Corbin, 1998: 12). The texts were organised with as many notes and headings as necessary. All the headings were grouped and categorised to provide a way of describing the phenomenon, increasing understanding and producing knowledge. My self-reflection was analysed in the same way.

One kind of visual data collected in this research is the artefacts (calligraphic works, paintings and drawings) created in the experimental artistic practices. Artists participating in this research can evaluate their own performance through them. Their appearance also provides valuable clues to trace back how artists' behaviour was influenced by distorted perceptions. The other kind of visual data is the video records of the artists' process of making art. Video data can "preserve the temporal and sequential structure" of activities (Knoblauch, Schnettler, Raab, & Soeffner, 2012: 19). A video recording can be stopped, slowed down or sped up to see captured activities in new ways (Jewitt, 2012: 4). This feature of videos made my observation of the relationships between the artists' distorted perceptions and their actions much easier during analysis. Following the strategy of recording complex activities suggested by Rogers Hall (2007: 8) in 'Guidelines for Video Research in Education', multiple cameras were used to capture the artists' processes of making art in this research. All video sources were synchronized before the analysis began. More detail on the setting-up of the video recording and the focus of the analysis of the visual data are provided in section 3.1.2 and section 4.1.2.

[29] The interviews were taken place in Chinese because the calligrapher's first language is Mandarin. The English translations of the original Chinese interview transcripts are provided in Appendix C.

Chapter 3. Writing Calligraphy with Visual Distortion Devices

This chapter introduces my experimental calligraphy project which includes one calligraphy exercise without using visual distortion devices and three experimental calligraphy practices involving the use of the devices. The observation and analysis of the calligraphy exercises are described in this chapter. Their outcomes are preliminarily discussed in section 3.8 and further discussed in Chapter 5. As has been mentioned in section 2.3, the main reason for choosing calligraphy as the art genre of this project is that the process of its production can be easily traced back through its appearance. This characteristic of calligraphy is of particular help to this research in the understanding of the calligraphers' writing behaviour.

In this project, visual distortion devices refer to head mounted devices that provide users with unfamiliar and confusing visual experiences. This project included the development and the use of three different visual distortion devices. They are the *Viewpoint-exchanging Device*, which allows two users to see things from each other's visual perspective, the *Sight-limiting Device*, which gives users restricted sight, and the *View-mirroring Device*, which makes users see everything reversed, left to right. All these visual distortion devices were prototyped in a fast, cheap and minimal skill manner, combining and modifying ready-to-use devices and software.

In order to understand how calligraphers with different levels of skill can be influenced by visual distortion devices while writing calligraphy, I invited contemporary calligrapher Liang-Chih Ko[30] to engage in all of the experimental exercises with me. Ko, a skilled

[30] Liang-Chih Ko is a Taiwanese calligrapher, who participated in several interdisciplinary art performances with dancers and musicians with his improvisational calligraphy writing. The following link is his introduction made for exhibition Two Points 2012, which is held in Venice. https://www.youtube.com/watch?v=N3sxbmbz-JI

calligrapher, has practiced calligraphy for more than twenty years. My experience of writing calligraphy is less than one year, and my skill level is much lower than Ko's. The difference between our writing experiences means that we responded to the unfamiliar visual experience provided by the distortion devices differently. Our writing behaviours, resulting calligraphy and reflections on the exercises were all recorded. The influence of the visual distortion devices on us and our calligraphic works can be identified by contrasting the recorded data. The result of these exercises and the visual distortion devices used by Ko and me were presented in an exhibition held at Culture Lab, Newcastle University in April 2015.

Section 3.1.1 introduces the viewpoint-shifting devices which inspired me to distort the calligraphers' vision by shifting their perspectives in the development of visual distortion devices in this project. Section 3.1.2 narrates how the research data was collected and the key points of analysing it. Section 3.2 introduces the work flow of developing the research experimental calligraphy practices. Section 3.3 describes the (control) exercise applying no visual distortion devices. Ko and I wrote calligraphy using our customary style and standard writing behaviour. Section 3.4 presents the exercise applying the *Viewpoint-exchanging Device*, which exchanged Ko's and my visual perspectives while we wrote calligraphy. Section 3.5 introduces the exercise using the *Sight-limiting Device*: Ko and I wrote calligraphy according to images that presented only the movement of the brush tip controlled by the other. Section 3.6 describes the exercise using the *View-mirroring Device*: Ko and I wrote calligraphy while seeing only the mirrored images of our own calligraphy and writing behaviours. Section 3.7 describes the exhibition presenting our writing process and writing results. Audiences were encouraged to try the visual distortion devices in person in the exhibition. Section 3.8 summarises the calligraphy exercises and provides a preliminary discussion of the findings observed.

3.1 Backgrounds

3.1.1 *Existing viewpoint-shifting devices*

There have been various kinds of visual devices created to provide users with a wide range of altered visual experience. Many of these devices explore the possibilities of human perceptions by the same strategy – shifting one's visual perspective. With a review of existing viewpoint-shifting devices, this section presents the advantages of this strategy and my design principles for the development of visual distortion devices used in artistic production in this research.

To provide people with a video-game-like viewpoint in the real world, which is to see themselves from behind, Takehito Etani undertook *The Third Eye Project* in 2002 (Etani, 2002). He developed a wearable single-user visual device that moved a user's point of view to overhead behind them. This device was made of a mono-eyed goggle with a 2-inch LCD monitor and a tiny surveillance camera attached on a long metal stick connected to the goggle (Figure 3.1). Images captured by the camera were transmitted through cables and displayed on the LCD monitor in real time. By doing so, the user's point of view was shifted to the tip of the long metal stick. In the video of *The Third Eye Project*[31], Etani wore this device while walking on the street, cooking meals and eating food. This video showed that Etani's behaviour was very stable, fluent and without any hesitation. His movement was influenced very little by the shifted viewpoint because he could still fully control the angle of the camera to see whatever he wanted to see by rotating his head.

[31] See https://vimeo.com/28805203

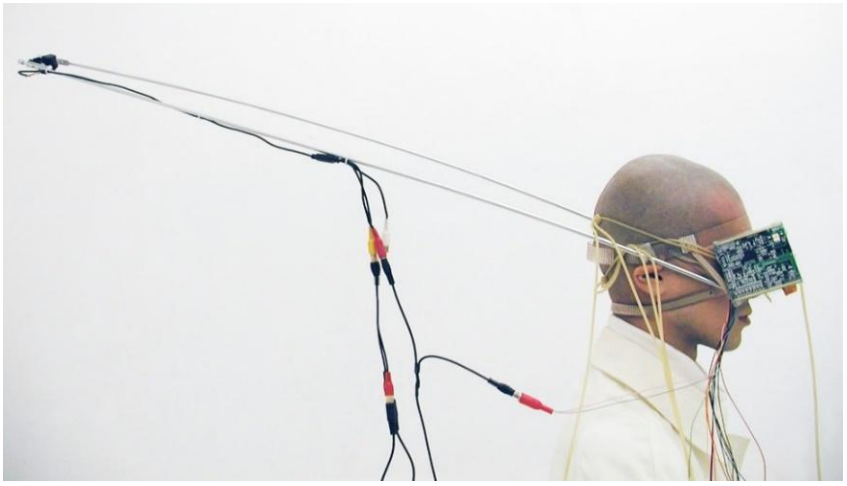

Figure 3.1 The structure of *The Third Eye* (Etani, 2002)

In 2007, artist Julius von Bismarck allowed a user to be able to see him- or herself from above by wearing a visual device called *The Top Shot Helmet* ("Top Shot Helmet," 2007). He developed it by installing a small wireless wide-angle video camera, directed vertically down, at the bottom of a big floating helium balloon which was connected to a ball-shaped helmet by four long threads (Figure 3.2). The camera filmed the user from above and transmitted the images wirelessly to video glasses embedded inside the helmet in real-time so that the user could see him- or herself from an overhead vantage point (Figure 3.3). In *The Top Shot Helmet*'s official video[32], Bismarck wore the device and walked around the Berlin Hauptbahnhof train station. This video showed that his new vision, the top shot view, frequently rotated and swung uncontrollably as the floating balloon was pulled when he walked and blown by the wind. With the unstable top shot view, Bismarck walked carefully and slowly with very small footsteps.

[32] See https://vimeo.com/20736117

Figure 3.2 The structure of *The Top Shot Helmet* ("Top Shot Helmet," 2007)

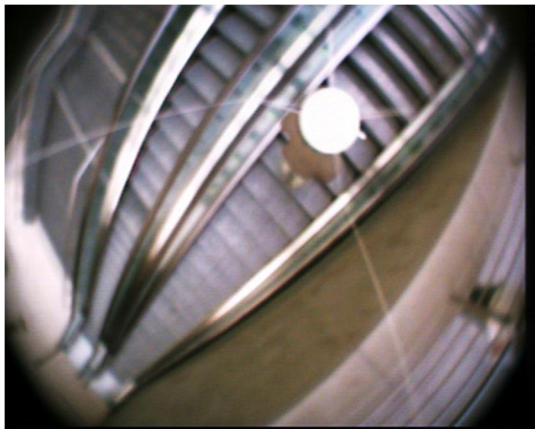

Figure 3.3 The vision provided by *The Top Shot Helmet* ("Top Shot Helmet," 2007)

Instead of providing a single altered point of view, visual device *EYEsect* developed by Sebastian Piatza, Christian Zöllner and Julian Adenauer in 2013 provided users with multiple and much more flexible perspectives ("EYESECT," 2013). It was composed of two freely attachable handheld camera eyes connected to a helmet display with plastic wires. Each camera eye contained a small camera on one end and a magnet installed on the other end of

the eye. The helmet display was covered by an irregular-shaped metal shell that allowed the camera eyes to be freely attached to any position on its surface by the magnets (Figure 3.4). The surrounding images captured by each camera eye were respectively transmitted to each of the user's eyes, in other words, the user's two eyes could receive very different images simultaneously. By doing so, the *EYEsect* could involve the user's sensory system to mix the images and construct unfamiliar spatial perceptions.

Figure 3.4 The *EYEsect* (left) and the unfamiliar visual experience provided by it (right) ("EYESECT," 2013)

Figure 3.5 Several possible ways of using the *EYEsect* ("EYESECT," 2013)

The *EYEsect* presented a very flexible design that allowed the users to determine the perspective seen through the display on their own. They could hold one camera eye with each hand, attach the camera eyes at any position on the helmet's metal shell or invite others to decide the perspective for them by allowing them to hold the camera eyes (Figure 3.5). In the video of the *EYEsect*[33], many users walk slowly and several of them almost fall. Many users also reported that they were confused by the mixed visual information. Although they made a lot of effort to interpret it, the interpretation was usually misleading.

Figure 3.6 Two audience members trying the *Inter Dis-communication Machine* ("Inter Dis-Communication Machine," 1996)

In addition to changing a single user's perspective, there are also devices exchanging users' points of view, developing a special connection between the users. Japanese artist Kazuhiko Hachiya developed the *Inter Dis-communication Machine* in 1996 ("Inter Dis-Communication Machine," 1996). The *Inter Dis-communication Machine* provided each user with a Head Mounted Display (HMD) with a camera embedded in the front and a backpack

[33] Please see https://vimeo.com/84939225

with two wings which contained a TV tuner, a battery, a transmitter and a TV antenna (Figure 3.6). Images captured by one user's camera were transmitted to the other user's HMD, and the HMD presented only the other user's view. In the video that Hachiya made to record users' reactions[34], a pair of users wearing the *Inter Dis-communication Machine* naturally started to interact with each other. They hesitantly walked, rotated, and most of them tried to use their hands to touch each other. This type of vision-altering device can "trigger" more interaction between the users (Hjorth & Khoo, 2015: 70).

All the altered viewpoints mentioned above were created by elaborately arranging the position and the angle of the cameras. The video-game-like viewpoint was created by placing the camera behind and above the user's head; the top view by floating the downward-pointing camera in the sky with the helium balloon; the flexible viewpoints by allowing the users to decide the position of camera eyes freely; the exchanged viewpoint by fixing one user's camera on the other user's head mounted display. The arrangement of the position and the angle of cameras seemed to be capable of generating various kinds of interesting and unfamiliar visual experiences. From a technical point of view, this method is quite easy to carry out. The technical simplicity, the flexibility and the rich possibilities for creating visual experiences are the advantages of achieving visual distortion by shifting the users' viewpoints.

The changes in users' behaviour and movements seemed to relate to the controllability of viewpoints and the clarity of visual information provided by viewpoint-shifting devices. The video-game-like viewpoint provided by *The Third Eye* barely influenced the users' behaviour because it provided the users with as stable and controllable a visual experience as the one they were used to. The users could adapt to the new viewpoint easily and act as usual. In

[34] See https://www.youtube.com/watch?v=JOzVzcmK0VU

contrast, the top viewpoint offered by *The Top Shot Helmet* and the exchanged viewpoints provided by the *Inter Dis-communication Machine* were both uncontrollable to the users. The former frequently shifted and rotated randomly because of the wind and the user's movement. The latter was unpredictable because it was totally controlled by the other user. The uncertainty and unpredictability of the viewpoints led to the changes in the users' behaviour and movements. In terms of the flexible viewpoint provided by the *EYEsect*, although it was controllable because the users could freely hold the two camera eyes themselves, the users' behaviour and movements were still strongly influenced. This was because the visual information provided by the device, the mixture of images respectively captured by the two camera eyes, was too unrecognizable and confusing for the users to interpret and understand correctly. According to these examples, uncontrollable, unstable viewpoints and confusing visual information can influence users' behaviour strongly. Therefore, in order to effectively influence the calligraphers' behaviour in this project, the prototyping of visual distortion devices in this research followed two principles. The first is to make one's viewpoint unstable and out of control, and the second is to make visual information confusing.

Following these principles, three viewpoint-shifting visual distortion devices were developed. They are *Viewpoint-exchanging Device*, *Sight-limiting Device* and *View-mirroring Device*. The first two devices make a user's viewpoint freely controlled by the other. The *Sight-limiting Device* and *View-mirroring Device* provide users confusing visual information by respectively filming the tip of calligraphy brushes very closely and left-right reversing captured images in real-time.

3.1.2 ***Data collection and data analysis***

A variety of methods were used to document the experimental calligraphy exercises. Ko's and my calligraphy on paper, our verbal reflections and the images shown on the visual

distortion devices were recorded using video and photography. Ko's writing behaviour and mine were filmed using video cameras from various angles. Two cameras hung above us shooting the process of producing calligraphy from a downward angle, and one video camera was set in front of our working tables to record our body language and hand movements. The images provided by the visual distortion devices were recorded using preinstalled software in the devices themselves. Interviews with Ko took place after each exercise and his and my own reflections of the experience were video recorded.

Each kind of collected data was analysed from multiple perspectives. In terms of the calligraphy, the position, the shape and the ink tonality of each stroke and character were analysed. The differences between the appearance of the calligraphy written when using the visual distortion devices and the appearance of the calligraphy produced without them were also investigated. This is because the differences can provide useful clues to the influence of the visual distortion devices. In terms of analysing our writing behaviour, the identification of our writing behaviour as influenced by what we saw on the visual distortion devices is important. This was analysed by placing the video record of our writing behaviour beside the video record of the images shown on the visual distortion devices and playing these two videos simultaneously. This method highlights our reactions to the confusing visual experience provided by the visual devices, and how these reactions affect our writing speed, hand movements and ink use. In analysing Ko's interviews and my reflections on the exercises, our feelings/perceptions and how they were influenced by the use of the visual distortion devices were explored. Also of relevance is our self-evaluation of the calligraphic works and the production process. Each calligraphy exercise was evaluated based on the results of the analysis mentioned above.

3.2 The work flow of developing the calligraphy practices

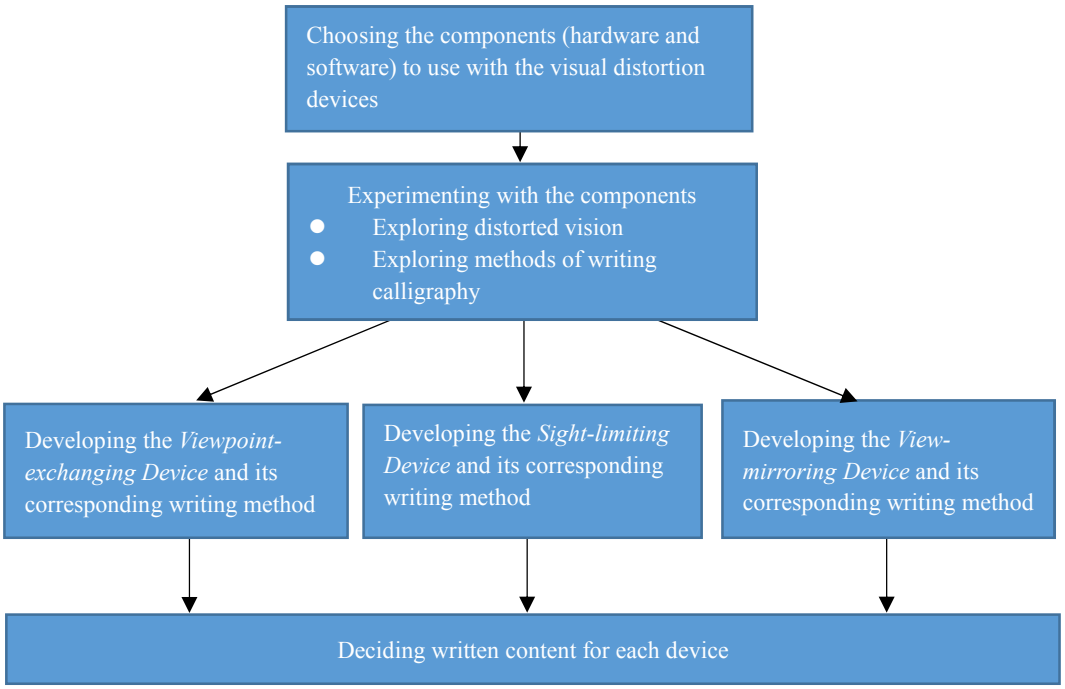

Figure 3.7 The work flow of developing the experimental calligraphy practices

The purpose of the experimental calligraphy practices conducted in this study is to investigate the artistic potential of the influence of visual distortion devices on calligraphers and their works. The design of visual distortion devices is therefore placed at the centre of the development of the calligraphy practices. This device-centred approach to developing artistic practices strongly influences the generation of ideas, the methods of production and the contents of the artworks.

The choice of the basic components for developing visual distortion devices was mostly concerned with the ease of access and efficiency. I therefore used ready-made hardware and software as the basic components. In the prototyping, the chosen components were combined and modified freely in various ways to enable the exploration of interesting, confusing, distorted visual perceptions and challenging ways of writing calligraphy. Three distinctly

different visual distortion devices were made as a result of this initial experimentation. The methods of writing calligraphy with these three visual distortion devices were also developed during the process of device prototyping. At last, the sentences that the calligrapher, Liang-Chih Ko, and I were going to write were decided by considering the coherence between the meaning of the characters and the distorted visual experiences.

3.3 Writing calligraphy without the visual distortion devices

3.3.1 *Introduction*

Figure 3.8 Ko (right) and I (left) write calligraphy without using any visual distortion device.

Before carrying out the exercises using the visual distortion devices, Ko and I individually wrote a piece of calligraphy in our usual way without using any visual distortion device (Figure 3.8). This exercise presents our normal writing habits and the regular quality of our calligraphy. The writing content of the calligraphy is a short Chinese sentence, 不見塵寰見雲霧. The content was the same for both of us and remained the writing content for the first and the third experimental exercises using visual distortion devices. The literal meaning of each Chinese character is 不(not) 見(see) 塵寰(annoying mortal life) 見(see) 雲

(cloud) 霧(fog). The full sentence can be translated as ‘see cloud and fog through the annoying mortal life surrounding us.’ Natural things like cloud and fog are usually used as a symbol of inner peace and balance in Chinese poetry. 見雲霧(see cloud and fog) is a metaphor for ‘achieving inner peace and balance’. This sentence is a metaphorical description reminding people to remain mentally at peace and balance while dealing with tiresome chores. This sentence corresponds to this project strongly. 見(see) is the main verb of the sentence, and this project focuses on calligraphers’ sense of seeing. This sentence reminds people not to lose their inner balance by being influenced by what they see. This project provides confusing visual experience to the calligraphers. Therefore this sentence could be a useful reminder for the calligraphers when writing with the use of visual distortion devices, to overcome the challenge of strange and unfamiliar visual experience by keeping an inner balance.

3.3.2 *Calligraphy*

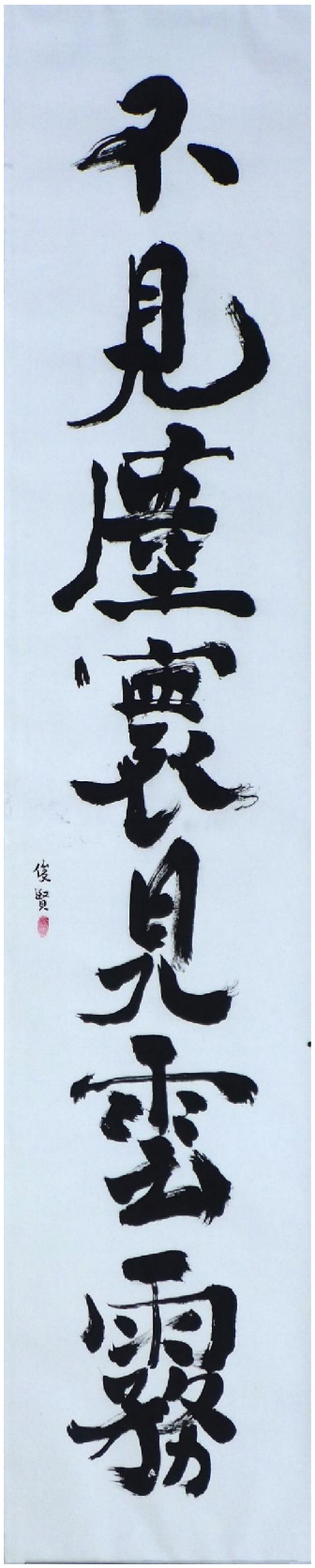

Figure 3.9 My calligraphy, 49.5 x 228 cm

Figure 3.10 Ko's calligraphy, 49.5 x 248.8 cm

3.3.3 *Observation and Analysis*

This section describes Ko's habits of writing calligraphy and the characteristics of our calligraphy created without applying visual distortion devices. I have not practiced calligraphy since I graduated from senior high school fifteen years ago. Therefore, to me, calligraphy is an unfamiliar form of artistic creation, and I haven't developed solid writing habits; however, Ko has practiced calligraphy almost every day for more than twenty years, and he has formed habitual writing methods. This section considers his writing habits from observing the characteristics of his calligraphy and also presents the difference between our skill-levels by comparing examples.

Ko paid more attention to shaping each stroke than me. The shape of the starting points of Ko's strokes marked in red in Figure 3.11 are well-designed and carefully produced; however, the starting point of my strokes, also marked in red in Figure 3.11 look relatively rough and dull. Also, Ko's long strokes marked in blue in Figure 3.11 are smoother and more fluent than mine.

Figure 3.11 The comparison of the shape of the strokes made by Ko and me

In addition to the shape of the strokes, Ko also emphasized the design, structure and the contours of the characters. For example, Ko wrote the two characters 塵寰 carefully following the character structure presented in copybooks. The copybooks record how famous Chinese calligraphers have written the characters. In these copybooks the structures of the two characters are slightly modified to achieve a better expression of the beauty of calligraphy. Ko applied this modified structure instead of the regular structure that is presented in my calligraphy (Figure 3.12). Also, the three characters 見雲霧 (see cloud and fog), as written by Ko, are connected to each other by additional strokes (Figure 3.13). Ko grouped the three characters together in order to show that they compose a complete meaning.

Figure 3.12 The comparison of the character structures of 塵寰

Figure 3.13 The comparison of the characters 見雲霧

Ko composed the appearance of the calligraphy by using characters with a variety of contours. He applied this variation to make his calligraphy look vivid and dynamic. The red geometrical shapes in Figure 3.14 represent the approximate contours of Ko's characters and mine. The geometrical shapes in Ko's calligraphy are much more varied than the geometrical shapes in my work. Most of the shapes in my calligraphy are rectangles of similar sizes.

Figure 3.14 Comparison of the character contours.

In summary, when Ko writes calligraphy, he purposefully designs the shape of the strokes and the characters. He uses the character structure found in copybooks and groups the characters with additional strokes. Also, he applies a variety of character contours to give his calligraphy a better overall appearance; I, on the other hand, neglect the design of the strokes and the characters, showing my limited writing experience.

3.4 Writing calligraphy with exchanged viewpoints

3.4.1 *Introduction*

Figure 3.15 Ko and I writing calligraphy with the *Vision-exchanging Device*.

Writing calligraphy with exchanged viewpoints was the first experimental calligraphy exercise applying the visual distortion device in this project. It involved the development and use of the *Viewpoint-exchanging Device*, which is a visual device designed for two calligraphers to use at the same time. Both calligraphers can only see the first-person perspective image of the other's writing behaviour. The main goal of this exercise was to explore how Ko and I could be influenced by the use of the device and what kind of calligraphy could be produced.

The *Viewpoint-exchanging Device* is composed of two head mounted displays and two web cameras (Figure 3.16). The two web cameras are installed on the top of the two head mounted displays. As shown in Figure 3.16, display A presents the images captured by camera B in real time while display B shows the images captured by camera A in real time.

Therefore, the user wearing head mounted display A can only see things from the perspective of the user using the head mounted display B, and vice versa.

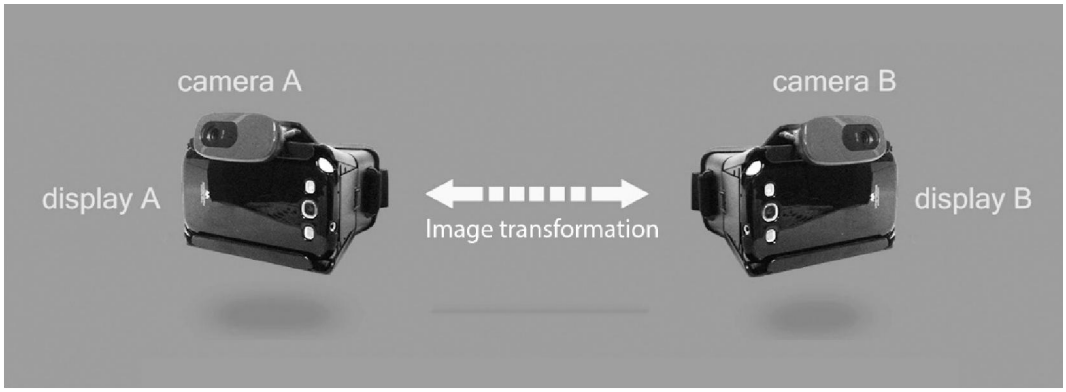

Figure 3.16 The image transformation of the *Vision-exchanging Device*

Figure 3.17 The images shown on my display (left) and Ko's (right)

In this exercise, Ko and I used the *Viewpoint-exchanging Device* together and wrote the sentence 不見塵寰見雲霧[35] on our own writing paper separately (Figure 3.15). What I saw was Ko's writing behaviour and his calligraphy. What Ko saw was my writing behaviour and the calligraphy I was working on (Figure 3.17). In addition, we attempted to apply a synchronous writing method to keep our writing progress the same. We spoke to each other and worked on the same characters in our individual works simultaneously in this exercise.

[35] The meaning of this sentence is explained in section 3.3.1.

This method was designed to provide more opportunity for us to respond to the other's writing behaviour as shown on the device we were wearing.

3.4.2 *The development of the Viewpoint-exchanging Device*

Figure 3.18 The components of the *Viewpoint-exchanging Device*

The *Viewpoint-exchanging Device* is composed of two smartphones, two virtual reality headsets, two webcams and two OTG cables[36] (Figure 3.18). The smartphones are placed in the virtual reality headsets individually using their screens to act as head mounted displays. A webcam is fixed on the top of each head mounted display. The webcams are connected to the smartphones in a mismatched order using the OTG cables; the webcam fixed on one head mounted display is connected to the smartphone placed in the other head mounted display. In terms of the software, a commercial android application named 'USB Camera'[37] was installed on each smartphone. This application allows the smartphones to show the images captured by the webcams in real time.

---

[36] The OTG cable is a USB adapter which allows a smartphone to connect to USB devices, such as USB flash drives, mouse, keyboard or webcam.

[37] The android application, 'USB Camera' is developed by company Infinitegra. It allows a smartphone to display and record the images captured by a USB camera connected to it. The application can be download from: https://play.google.com/store/apps/details?id=infinitegra.app.usbcamera

3.4.3 *The calligraphy*

Figure 3.19 My calligraphy, 49.6 x 320 cm (left)

Figure 3.20 Ko's calligraphy, 49.4 x 250.7 cm (right)

3.4.4 ***Observation and Analysis***

3.4.4.1 Writing Behaviour

The use of the *Viewpoint-exchanging Device* increased the difficulty and uncertainty of both Ko's calligraphy and mine. We could not see our own writing behaviour or our own calligraphy while wearing the displays, only each other's. Therefore, we had to guess the position of all the strokes and the characters during the process. Also, we had to guess the amount of ink held on the calligraphic brushes. Ko reported that the unfamiliar writing experience made him feel "unconfident" and "unsure", and he did not get used to it until starting to write the last character (personal communication, 23 February 2015). The difference between the last character 霧 and all other characters of his calligraphy (Figure 3.20) supported his reflection. All the other characters had less variety in ink tonality and less expression in the speed and strength of the writing.

We naturally played different roles in this exercise because of the difference in our writing experience. Ko played the lead calligrapher and I played the follower. In this exercise, we could see the other's brush movements and calligraphy. Therefore, we helped each other to locate the writing position of the strokes and characters. We did so by speaking to each other. However, Ko not only guided me where to write but also how to write. He told me which writing technique I was supposed to apply and how long the strokes should be. Ko said this was because he has been a calligraphy teacher for many years, so he naturally started to teach me in this exercise (personal communication, 23 February 2015). I know that Ko has far more experience so I chose to follow his instructions.

The images provided by the *Viewpoint-exchanging Device* had little influence on Ko's writing behaviour. However, they had a great deal of influence on mine. Ko indicated that he wrote the calligraphy mainly by following his writing habits and the memory of how these

characters should be written. He said, *"Actually I don't think the production of my characters was influenced much by you. How I wrote the calligraphy was based more on my own instincts and my previous experience"* and *"I moved the brush and reloaded the brush with inks in my usual way and at my usual tempo"* (personal communication, 23 February 2015). His writing behaviour was not affected by my writing behaviour as shown on his head mounted display. However, Ko's writing behaviour presented on my head mounted display influenced me a great deal. I copied the speed, the strength, the direction and the technique of Ko's calligraphy. I moved my writing hand to match Ko's hand movements as shown on the visual device. Therefore, my writing method greatly relied on what I saw in my *Viewpoint-exchanging Device*.

Both Ko's writing speed and mine became extremely slow. In the exercise without using any visual distortion device described in section 3.3, I finished the calligraphy in about six minutes, and Ko three minutes. In this exercise, writing the same content took both Ko and I about thirty minutes. Ko said that he slowed down his writing speed because he was afraid that I could not keep up with him (personal communication, 23 February 2015). My writing speed was slowed down because I was waiting for Ko to write first so that I could follow him.

3.4.4.2 Calligraphy

Figure 3.21 places Ko's calligraphy written without using any visual distortion device beside his calligraphy written in this exercise. Comparing these two works, the one written with the *Viewpoint-exchanging Device* has a much lower readability. The poor readability of this work was caused by misplaced strokes and serious ink expansion. The strokes were written in a position that did not match the regular structure of the Chinese characters because Ko could not see the calligraphy that he was working on while wearing the head mounted device. In addition, ink expansion caused by Ko's slow writing speed produced several black

pools that make the characters unreadable. The ink expansion also reduces the visual contrast of the overall appearance of the calligraphy.

In Figure 3.21, the last three characters, 見雲霧, of the calligraphy written using the *Viewpoint-exchanging Device* do not connect to each other as they do in the other one. This means the unfamiliar writing experience made Ko unable to consider the design of the character shape as he did in the previous exercise. Generally speaking, the use of the *Viewpoint-exchanging Device* had a negative influence on Ko's calligraphy.

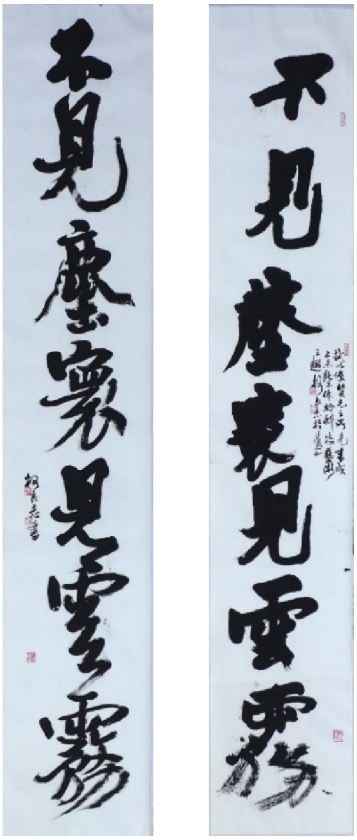

Figure 3.21 Ko's calligraphy written without visual distortion devices (left) and the one produced with the *Viewpoint-exchanging Device* (right)

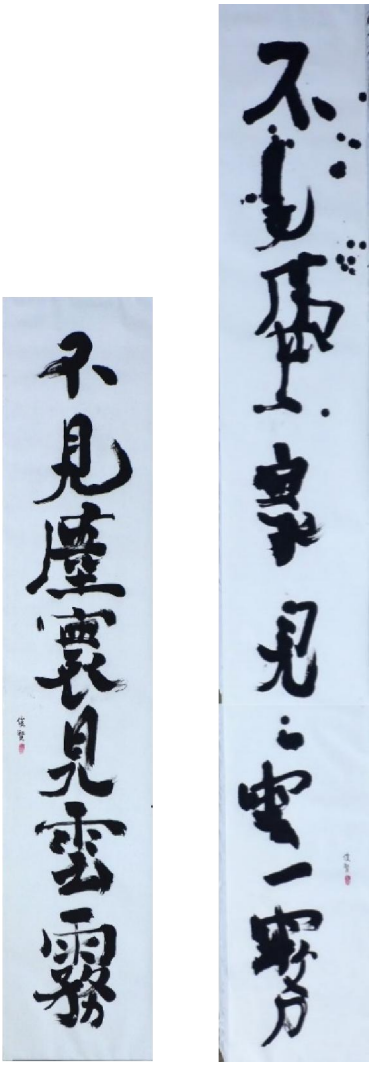

Figure 3.22 My calligraphy written without visual distortion devices (left) and the one produced with the *Viewpoint-exchanging Device* (right)

Figure 3.22 presents both my calligraphy written without using visual distortion devices and the one written with the *Viewpoint-exchanging Device*. Comparing the two works, the latter one has lower readability. Like Ko's calligraphy, this is because many strokes are misplaced. The incorrect character structure created by the misplaced strokes makes the characters hard to recognize. Nevertheless, the unreadable characters have various and dynamic shapes. The diversity of the character shape accidentally produces strong visual contrast. Ko said that this calligraphy looks more like "a black-and-white abstract drawing with a strong visual effect" (personal communication, 23 February 2015).

Figure 3.23 applies geometric shapes to show the contours of the visual elements of my calligraphy produced in this exercise and the contours of the characters written without using any visual distortion device. The geometric shapes in the one produced using the *Viewpoint-exchanging Device* are much more diverse than in the other. The ink accidentally splattered on the calligraphy provides small visual elements that increase the variation and vividness of the appearance of this work. In addition, the shapes of the two characters 雲霧 (cloud and fog, Figure 3.24) match their literal meanings. Ko said the loose and unstable structure of these two characters looks like the cloud and fog are blowing away (personal communication, 23 February 2015). In general, the use of the *Viewpoint-exchanging Device* had a positive influence on my calligraphy, increasing its quality and interest.

Figure 3.23 The contours of the visual elements of my calligraphy produced with the *Viewpoint-exchanging Device* (right) and the contours of the characters written without the device (left)

Figure 3.24 The shape of the characters, 雲霧

The findings of the observation and analysis mentioned above are discussed further in Chapter 5 along with the other experimental artistic practices conducted in this research.

3.4.4.3 Summary

The use of the *Viewpoint-exchanging Device* influenced our writing behaviour and our calligraphy a great deal. In terms of writing behaviour, it forced us to guess the writing position of the strokes because we could not see our own calligraphy while using the device. It made Ko's writing performance worse by making him unconfident and unsure. In addition, Ko and I automatically played different roles in this collaborative writing exercise according to our different writing experiences. Ko played the leader who guided me on where to write and how to write by speaking, and I was the follower. Both Ko's writing speed and mine became extremely slow and although Ko's writing behaviour was not affected by mine shown on the device, my writing behaviour was greatly influenced by Ko's shown on my head mounted display. I wrote by imitating Ko's writing actions, including the writing speed,

direction, strength, and technique.

In terms of the resulting calligraphy, the use of the *Viewpoint-exchanging Device* also really influenced our calligraphy. It made Ko's work and mine unreadable by causing us to produce many characters with incorrect structures. Also, the quality of Ko's calligraphy in this exercise is lower than the one produced without using any visual distortion device. This is because the use of the device made Ko produce many strokes with very serious ink expansion and made him unable to design the shape of the characters. Ko's calligraphy in this exercise became more monotonous.

However, the use of the *Vision-exchanging Device* increased the quality of my calligraphy. The shapes of the unreadable characters in my works are various and dynamic. The accidentally splattered ink made the overall appearance of this work more vivid and lively. The misplaced strokes also composed characters with meaning-corresponding shapes by accident. In the case of the characters 雲霧 (cloud and fog, Figure 3.24) in my work, the loose structures formed by misplaced strokes can be associated with the image that cloud and fog are blowing away. The use of the device made my calligraphy into a black-and-white abstract drawing with strong visual effects.

3.5 Writing Calligraphy with Restricted Sight

3.5.1 *Introduction*

Figure 3.25 Ko and I using the *Sight-limiting Device*. Ko was the leader and I was the follower.

The *Sight-limiting Device* presents the users with a very small visual field. This device was applied to the second exercise of this experimental calligraphy project, named *Writing Calligraphy with Restricted Sight*. As before, the contemporary calligrapher Liang-Chih Ko and I used the device together. The *Sight-limiting Device* was developed to shift the user's viewpoint onto the calligraphic brush controlled by another. It is composed of a head mounted display and a webcam fixed onto a calligraphic brush (Figure 3.26). The webcam shoots only a small area around the tip of the brush. The head mounted display presents the images captured by the webcam in real time.

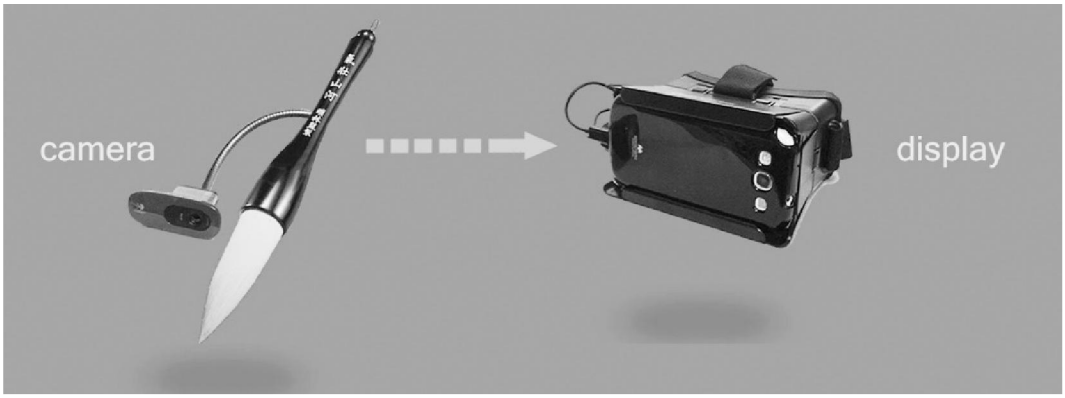

Figure 3.26 The structure of the *Sight-limiting Device*

Ko and I played different roles, 'the leader' and 'the follower', in turn when we used the *Sight-limiting Device* to produce calligraphy. The leader uses the calligraphic brush with the webcam attached to write a short Chinese sentence that is not known to the follower. When the leader is writing, the webcam has to remain balanced on top of the brush and not become lopsided so that the direction of brush movement shown on the head mounted display is correct. The follower wears the head mounted display that presents a real time video of the movement of the leader's brush tip. The follower, using only this very narrowly focused visual information, tries to reproduce exactly what the leader is writing (Figure 3.27). In this exercise, Ko and I both played the leader and the follower in turn twice.

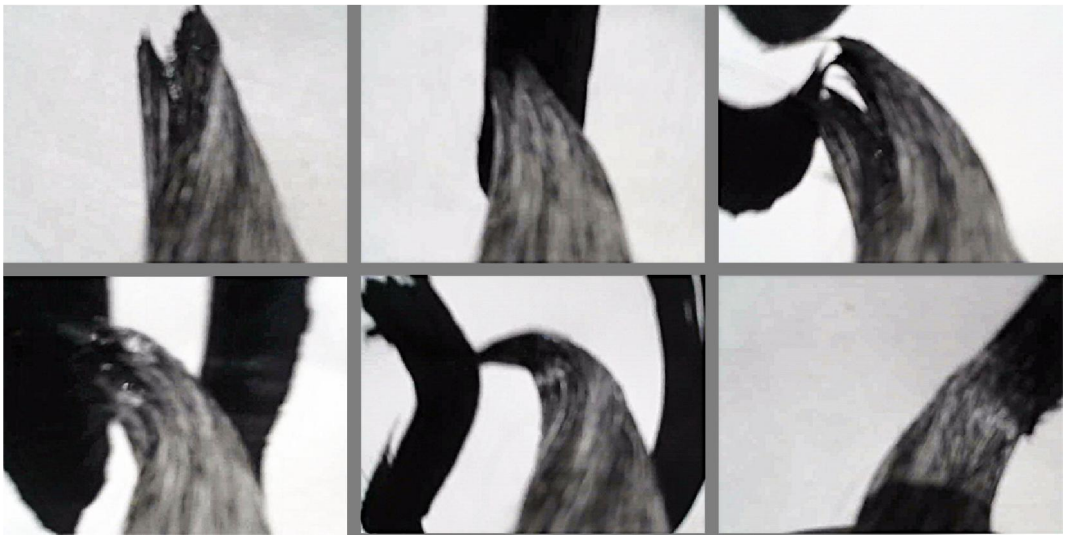

Figure 3.27 The images seen by the follower on the head mounted display

In terms of the writing content, when I played the leading calligrapher, I wrote 禪心似月迥無塵 and 凝眸處即會心處 in order. The first sentence is a reminder to keep an inner peace and balance. The second one means that whatever the eyes focus on is where the thought focuses also. The meanings of these sentences correspond to the writing experience of this exercise to a certain extent. When Ko played the leader, he first wrote 暢敘幽情遊目騁懷, which expresses a tourist's view of a carefree and leisurely moon, derived from enjoying looking at a natural scene. He also wrote 天朗氣清惠風和暢, which describes a clear sky, fresh air and a mild breeze.These sentences are both derived from a famous calligraphic work 'Preface to the Poems Collected from the Orchid Pavilion' [38].

3.5.2 *The development of the Sight-limiting Device*

Figure 3.28 The components of the *Sight-limiting Device*

The components of the *Sight-limiting Device* are very similar to the components of the *Viewpoint-exchanging Device* mentioned in section 3.4.2. They are a smartphone, a virtual reality headset, an OTG cable and a webcam bound on a flexible metal tube with a clip

[38] 'Preface to the Poems Collected from the Orchid Pavilion' is written by the most famous Chinese calligrapher in history, Shichih Xizhi. It is one of the most known and often copied calligraphic pieces in Chinese history. Also, it provides very important educational material for calligraphy scholars.

(Figure 3.28). The head mounted display was built by placing the smartphone in the virtual reality headset. The webcam was fixed onto a calligraphic brush using a flexible metal tube and a clip, connected to the smartphone through the OTG cable, and focused closely on the tip of the calligraphic brush. In addition, the android application 'USB Camera', which is the same application used in the *Viewpoint-exchanging Device* mentioned in section 3.4.2, was installed on the smartphone to allow it to present the images captured by the webcam.

3.5.3 *The calligraphy*

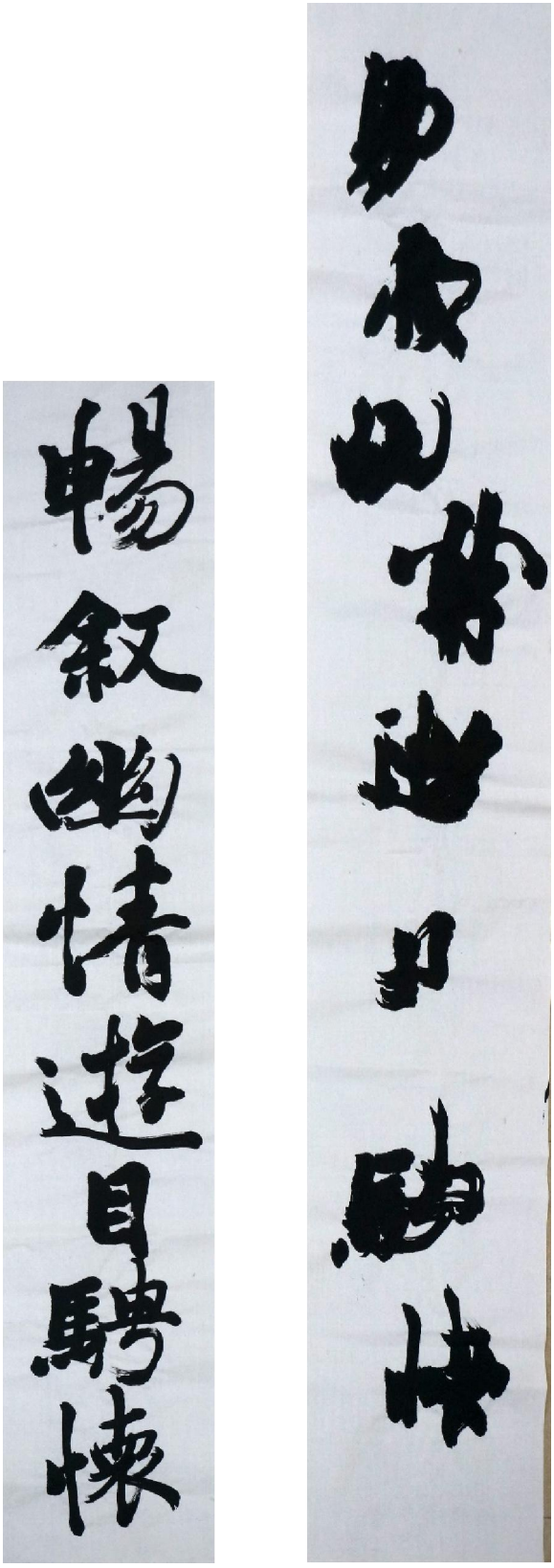

Figure 3.29 Ko's leading calligraphy, 49 x 215 cm (left) and my following calligraphy, 49.5 x 272.5 cm (right). Here I am the follower for the first time.

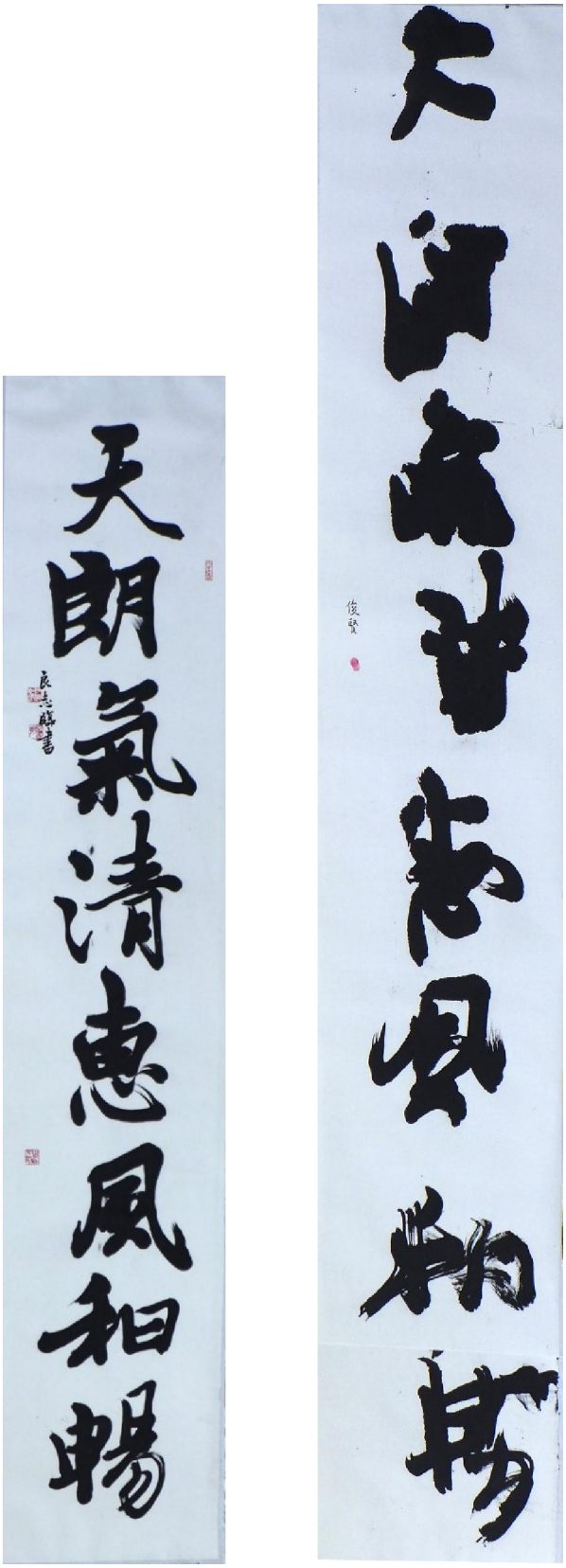

Figure 3.30 Ko's leading calligraphy, 49.5 x 223 cm (left) and my calligraphy, 49.5 x 280 cm (right). Here I am the follower for the second time.

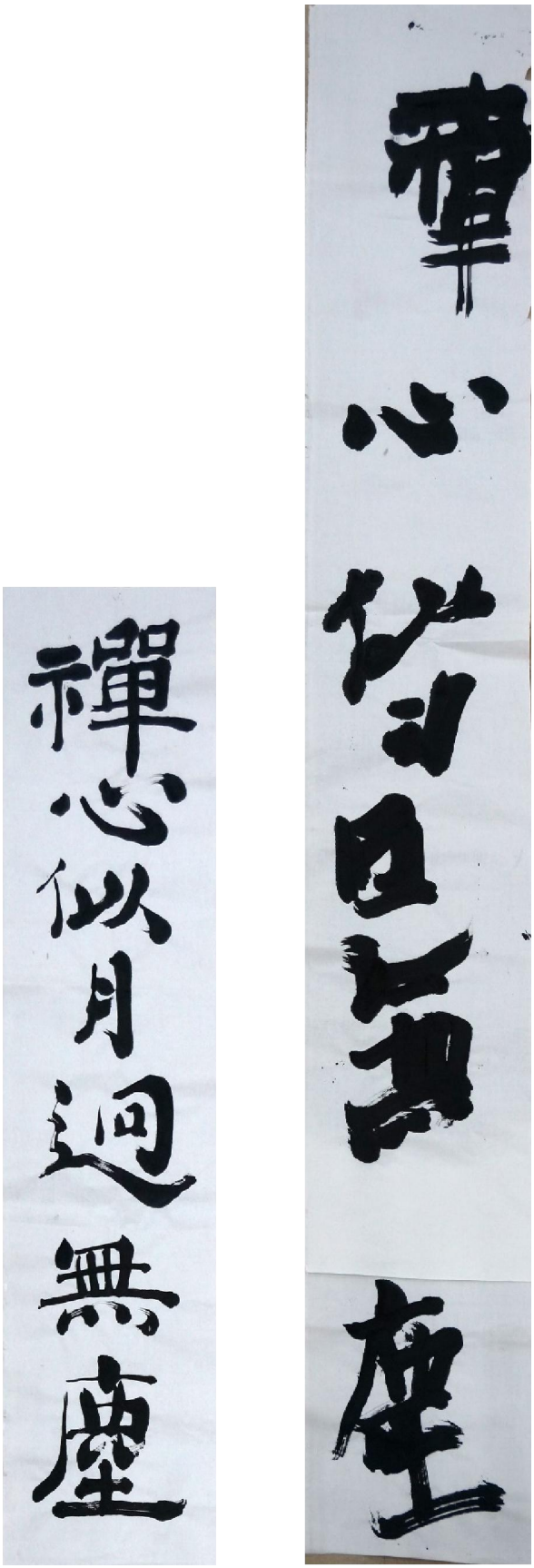

Figure 3.31 My leading calligraphy, 49.8 x 203 cm (left) and Ko's calligraphy, 49 x 255 cm (right). Ko is the follower for the first time.

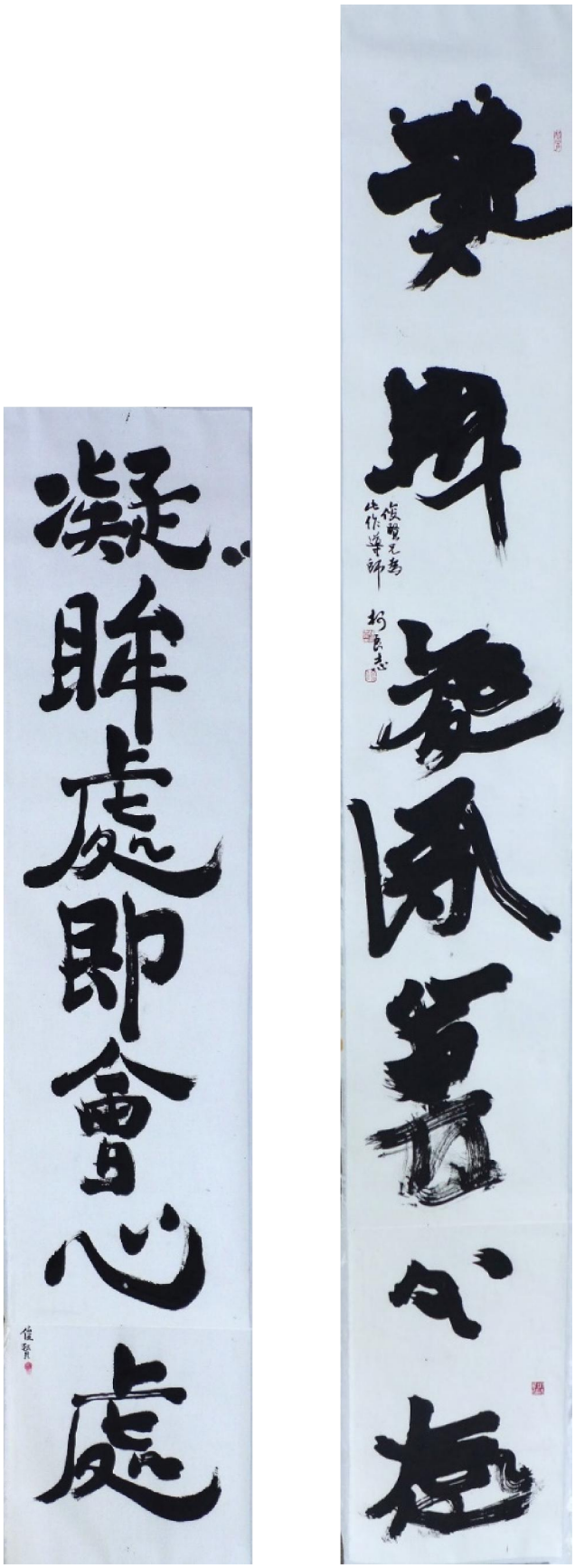

Figure 3.32 My leading calligraphy, 49 x 213 cm (left) and Ko's calligraphy, 49.6 x 315.7 cm (right). Ko is the follower for the second time.

3.5.4 ***Observation and Analysis***

3.5.4.1 Writing behaviour

The *Sight-limiting Device* had little influence on whoever took the leading role. However, it seriously influenced the follower's writing behaviour and made their attempts at writing calligraphy much more difficult. In this exercise, although Ko and I played the roles of leader and follower in turn, our writing behaviours were similar. When we were the leader we had to concentrate solely on keeping the angle of the webcam balanced while writing. This didn't influence our writing very much. However, when we played the follower, wearing the head mounted display, we had to guess the writing position of each stroke on the paper by relying mainly on our bodily perceptions, because we could not see what we were writing. The task of the follower was to copy very closely what the leader was writing based solely on observing the movement of the brush tip shown on the head mounted display, guessing the movement of the leader's hand as he wrote.

As the follower, Ko's writing behaviour was as influenced by his mood as it was affected by the use of the *Sight-limiting Device*. The quality of Ko's calligraphy in this case closely related to his mental status. When Ko was the follower for the first time, he felt very unconfident due to his inability to adapt immediately to writing with restricted sight (personal communication, 23 February 2015). This made him slow down his writing speed and misjudge the position of the strokes. Therefore, Ko's calligraphy presented in Figure 3.31 had many strokes with serious ink expansion and characters with twisted shapes. The ink tonality of this calligraphy became duller and the overall appearance was more disorganised than Ko's calligraphy written without any distortion device (Figure 3.10). However, when Ko played the follower for the second time, he got used to the visual experience. He became as confident as usual when he produced the calligraphy presented in Figure 3.32 (personal communication, 23 February 2015). With his quick adaptation came the return of his confidence and he was

able to compose the overall visual effect of the calligraphy as usual. His work presented a diversity of ink tonality and beauty in the strokes, using a variety of writing speeds and strengths.

The use of the *Sight-limiting Device* did not affect my writing mood when I was the follower; however, it caused me to make multiple, tentative strokes around the same position repeatedly in both pieces of my calligraphy (Figure 3.29, Figure 3.30). My uninfluenced mood may have been because I was the designer of the device and could approximately predict what kind of images I would see during the writing process. Nevertheless, because I had no experience of writing such big calligraphic characters before I conducted this project, I had poor capability of locating the writing position of the strokes without seeing them. This made me produce many strokes overlapping each other.

3.5.4.2 Calligraphy

The readability of all the calligraphic works produced in this exercise, whether Ko or I played the follower, was very low. Most of the characters in the works were incorrect and hard to identify. In my work, the low readability was caused by the repeatedly overlapping strokes; in Ko's work, this was due to the misplaced strokes. Neither of us could see our own writing while wearing the head mounted display and therefore our strokes and their position on the paper were made by guessing.

When playing the follower, the use of the *Sight-limiting Device* gave us both particular visual styles. Many characters in my calligraphy presented in Figure 3.29 and Figure 3.30 look like pictorial ink marks instead of Chinese characters. Figure 3.33 places all these ink marks together to show their similarity and difference. They all have a dynamic and varied shape composed by irregular ink pooling and lines. Also their shapes are very different from

each other. This diversity was derived from the various stroke types and the writing order of these Chinese characters. Figure 3.33 looks like a design study of exploring possible compositions of ink marks.

Figure 3.33 The characters with the pictorial ink-mark style in my calligraphy

In the interview, Ko reflected on the calligraphy he wrote when he was the follower for the second time (Figure 3.32) as follows:

> *I really like my second calligraphy although it looks like work produced by an untrained calligrapher. The characters are incorrect, and not well-designed. They look crude and primitive instead… You can see the natural expression of my emotions through the characters……expressing emotions truly and naturally through calligraphy is a very high realm in Chinese calligraphy… it is much more than just creating pretty, good-looking characters. This realm is beyond my capability……I am very surprised with the good outcome (personal communication, 23 February 2015).*

According to Ko's statement, his calligraphy presents a crude and primitive style. Ko explained that, for him, this style represented a very high realm of calligraphy that went beyond the pursuit of just an attractive appearance. It was the natural, authentic and inartificial visual expression of a calligrapher's emotion. In Ko's calligraphy, this style was composed of strokes with imperfect shapes, inaccurate position and expressive tonality. Ko appreciated this work a great deal and regarded it as something beyond his capability at this stage. Therefore, the use of the *Sight-limiting Device* had a positive influence on Ko's calligraphy when he was the follower for the second time.

Also, some characters with a very good visual effect were produced accidentally when we were influenced by the *Sight-limiting Device* either 'negatively' or when I used the device carelessly. For example, the last two characters, 和暢 (Figure 3.34), in my second calligraphic text written while 'following' had more variety in ink tonality and more powerful strokes than all the other characters I wrote in this exercise. The two characters were produced when I developed sore eyes from watching the display too long. I felt uncomfortable, so I wrote these characters faster and with less care.

Figure 3.34 My calligraphy 和暢

The character 會 in Ko's second calligraphic text, also written when 'following', looked very emotional and powerful (Figure 3.35). The ink tonality of this character fully reflected Ko's fast writing speed and great writing strength. Ko said *"I wrote so fast because you wrote the character so fast that I felt anxious and wanted to give up. In order to follow your speed, I scribbled the character carelessly"* (personal communication, 23 February 2015). The scratchy strokes accidentally expressed his feelings well and presented a very strong visual effect.

Figure 3.35 Ko's calligraphy 會

Figure 3.36 Ko's calligraphy 即

Also, the appearance of Ko's character 即, in the same calligraphic text, was attractive and well-structured (Figure 3.36). The rightmost stroke of this character is the most crucial stroke in terms of its success. This curved stroke is supposed to be vertical. Because of my

neglect of keeping the webcam on the calligraphic brush in the right place and at the right angle, my brush stroke moving from top to bottom vertically became one moving from upper-left to lower-right on Ko's display. This right-downward stroke that should not really exist balances the structure of the character well and therefore increased its quality.

Ko's and my influenced writing behaviour, the use of the *Sight-limiting Device* and our calligraphic works will be further discussed in Chapter 5.

3.5.4.3 Summary

The use of the *Sight-limiting Device* had little influence on me or Ko when we were the lead calligrapher. However, when we played the follower it made our writing more difficult by blocking sight of our own calligraphy. Our writing behaviour became blind-following because we both wrote by imitating the lead calligrapher's writing behaviour. The device influenced Ko's mood and his writing performance significantly. When he was the follower for the first time, his lack of confidence slowed his writing speed and led him to write strokes in the wrong place. This gave his characters a dull ink tonality and disordered shapes. However, when he played the follower for the second time, he became used to the limited visual field, regaining his confidence. He was then able to focus more on the composition by creating a variety of expressive strokes. In terms of my writing behaviour, the limited visual field provided by the device caused me to make multiple strokes around the same position, due to my incapability of locating the position of the strokes without being able to see the paper in front of me.

In terms of the calligraphy, the limited visual field made both of us misplace strokes. Our works had many incorrect and unrecognizable characters so their readability was poor. However, the misplaced strokes gave our calligraphy an interesting style. Many of my

characters looked like pictorial ink marks instead of Chinese characters and my calligraphy looked like a sort of design study of the diversity of the contours of ink marks. In contrast, Ko's had a crude and primitive style, which was a natural, authentic expression of his emotions. Ko admitted that this style was, he thought, beyond his usual capability, so use of the device improved this aspect of his work. Also, some characters that had an interesting visual effect were produced accidentally, created when I had very tired eyes, when Ko wanted to give up and when I operated the device carelessly.

3.6 Writing Calligraphy with Mirrored View

3.6.1 *Introduction*

Figure 3.37 Ko and I writing calligraphy with the *View-mirroring Device* separately

Writing Calligraphy with Mirrored View is the third experimental calligraphy exercise in this project applying a visual distortion device. Ko and I wrote the main sentence 不見塵寰見雲霧 (see cloud and fog through annoying mortal life surrounding us), as used in the first *Writing calligraphy with exchanged viewpoints* exercise, this time with the *View-mirroring Device*. This device was developed to reverse users' viewpoints, providing them with a left-right mirrored visual experience.

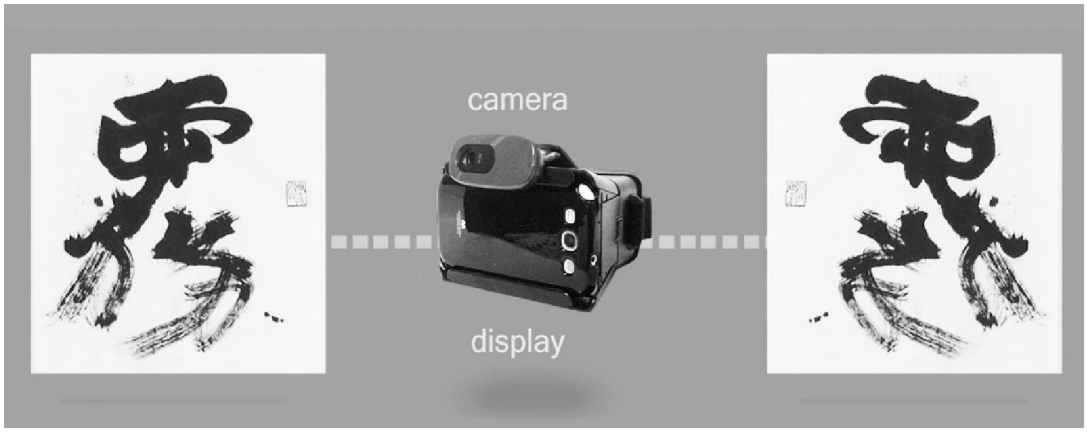

Figure 3.38 The function and the structure of the *View-mirroring Device*

The *View-mirroring Device* is a head mounted display with a webcam on top. This device automatically mirrors the images captured by the webcam and presents the modified images on the display (Figure 3.38). When Ko and I used this device in our writing process, what we saw was the left-right reversed images of our own writing behaviour and calligraphy. Our writing hands moving to the right were represented as hands moving to the left on the display, and vice versa. In this exercise, Ko wrote twice and I wrote once.

Figure 3.39 The images seen on the display (left) and my actual calligraphy (right)

Figure 3.40 The images seen by Ko on the display (left) and his actual calligraphy (right)

3.6.2 *The development of the View-mirroring Device*

Figure 3.41 The components of the *View-mirroring Device*

The components of the *View-mirroring Device* are the basic elements of both the *Viewpoint-exchanging Device* and the *Sight-limiting Device* mentioned previously. They are a smartphone, a virtual reality headset, a webcam and an OTG cable (Figure 3.41). As in the other two visual distortion devices developed in this project, the smartphone was placed in the

virtual reality headset to build a head mounted display. The webcam was fixed on the top of the display and connected to the smartphone through the OTG cable. In terms of the software, this device also uses the android application ‘USB Camera’. This not only makes the smartphone able to present the images captured by the webcam, but also provides an image-processing function that can mirror these images.

3.6.3 *The calligraphy*

Figure 3.42 Ko's first calligraphy, 48.6 x 248.3 cm, (left) and second calligraphy, 49 x 290 cm, (right) produced with the *View-mirroring Device*

Figure 3.43 My calligraphy, 48.6 x 234.2 cm, written with the *View-mirroring Device*

3.6.4 ***Observation and Analysis***

3.6.4.1 Writing behaviour

The *View-mirroring Device* made the writing experience for Ko and me more difficult. When we moved the calligraphic brush to the right while using the device, we saw the brush move to the left, and vice versa. This inconsistency between the sense of seeing and the sense of moving disrupted our eye-hand coordination. With this unfamiliar perceptual experience, we both applied a kind of trial-and-error method to locate the writing position of the strokes. We constantly moved the calligraphic brush around and kept correcting its position according to what we saw on the device until the brush approached where it seemed right to us. This position-finding process seriously interrupted our writing tempo and made our writing lack fluidity.

When Ko wrote with the *View-mirroring Device* for the first time, his writing behaviour was seriously misled by the mirrored images shown on the device. Ko's writing habit is to write strokes by slightly raising the stroke angle up and to the right, so he is used to seeing strokes with the angles slightly toward the upper right. However, the stroke angles shown on the *View-mirroring Device* were opposite, toward the upper left instead. This made Ko feel resistant and he had a strong impulse to correct them (personal communication, 23 February 2015). However, his attempts to adjust the stroke angle failed because he was confused by both the mirrored images and his writing habits. If he wanted to correct the stroke angles shown on the device from toward the upper left to the upper right, he needed to write strokes with their angle up to the left because what he saw was mirrored. However, this action conflicted with his habit of writing strokes by raising them up to the right. Then, Ko chose to follow his intuition and to correct the stroke angles by raising them even more toward the upper right. This caused most of the characters of his first calligraphy to tilt severely to the left (Figure 3.42). Also, the position of most characters in this calligraphic text was too close

to the right of the paper. This was because Ko located the first stroke of a character by referencing the position of the last stroke of the previous character (personal communication, 23 February 2015). However, most of the characters were tilting to the left, so the position of their last stroke was shifted to the right already. By referencing the position of the last stroke of the previous character, the first stroke of the following character usually started at a position further to the right.

When Ko wrote with the *View-mirroring Device* for the second time, he attempted to solve the problems of his first experience, the seriously left-inclining characters with right-shifted positions. In the interview, he mentioned his feelings and strategy:

> *I kept reminding myself not to adjust the stroke angle, but the right-inclining characters shown on the device were still very annoying. I had to try very hard to ignore the incorrect stroke angles. This made me feel very depressed. I knew I was confused by the vision, so the best I could do was to ignore what I saw and rely more on my writing habit. For example, the angles of 見 and 雲 were balanced by my habitual way and my memories of producing them (personal communication, 23 February 2015).*

Ko's writing method became focused on problem solving this time. He restrained his strong impulse to correct the stroke angle shown on the device during the whole writing process. This made him feel depressed. He also applied a writing strategy of ignoring the mirrored images provided by the device at times and obeying his writing habits more.

My writing behaviour became drawing-oriented in this exercise. This was because I do not have a solid habit of calligraphy writing, and my experience of drawing is greater than my experience of writing calligraphy. When I wrote with the *View-mirroring Device*, I first designed the shape of the strokes I was going to write in mind and then produced them by drawing. Both the drawing order and the drawing direction of the production process were at times very different from the regular writing order and writing direction of the Chinese characters.

3.6.4.2 Calligraphy

The shapes of the characters written by Ko using the *View-mirroring Device* for the first time seriously inclined toward the left, and also the position of the characters were all at the right side of the page (Figure 3.42). However, these left-inclining, right-shifted characters produced by Ko's confused writing behaviour produced a special visual effect. People who didn't know Ko's writing process might regard the emptiness on the left side of this work as an elaborate design to express a certain art concept.

In addition, the shape of the character 見 in Ko's second calligraphy is more dynamic and more stylish than the one produced without using visual distortion devices (Figure 3.44). The vivid, curvy shape of this character demonstrates Ko's effort to correct the problem of the left-inclining characters. When Ko was writing the first stroke of this character, which is marked in red in Figure 3.45, he was aware that the stroke had been written tilting too much down toward the right. Therefore, he corrected the stroke by ignoring the images shown on the device, instead relying totally on his writing habits. This transition made the stroke that was supposed to be a straight line into a curve. Ko then developed the shape of the character based on the curve.

Figure 3.44 The character 見 produced with the *View-mirroring Device* (right) and the one produced without any visual distortion devices (left)

Figure 3.45 The first stroke of the character 見

In terms of my calligraphy, the structure of the two characters 塵寰 in this exercise was opposite to the one that I produced in the first exercise without using any visual distortion devices (Figure 3.46). The characters I produced with the *View-mirroring Device* had mirrored structures. This is because my drawing-oriented writing method in this exercise relied heavily on my sense of seeing. I produced the two characters by designing their shapes according to the mirrored images shown on the device. Because I forgot what I saw was left-right reversed, I was misguided by the mirrored images to produce characters that looked totally correct on the *View-mirroring Device*.

Figure 3.46 My calligraphic characters 塵寰 produced without visual distortion devices (left) and the mirrored characters produced in this exercise (right)

3.6.4.3 Summary

The use of the *View-mirroring Device* increased the difficulty of Ko's calligraphy writing and mine. It disrupted the eye-hand coordination that we were used to by creating a conflict between the sense of seeing and the sense of bodily movement. Therefore, locating the correct writing position of the strokes became very difficult. The prolonged locating process seriously interrupted the tempo and the fluency of our writing behaviour.

The mirrored views provided by the device led Ko to accidentally create a special visual effect. The emptiness on the left side of the calligraphy seemed to be Ko's artistic strategy for expressing his art concept. However, when Ko wrote with the device for the second time, he started to ignore the mirrored images he saw and follow his intuition more. Although the use of the device made him feel depressed, it also allowed him to produce characters with dynamic, stylish shapes.

The use of the *View-mirroring Device* also influenced my writing method considerably, making my writing more oriented towards drawing. I produced the strokes with the calligraphic brush by drawing instead of writing. Therefore, sometimes my drawing order was

the opposite of the regular writing order of the Chinese characters, as I was easily misled by the mirrored images shown on the device, creating characters with left-right reversed structures.

3.7 Exhibition

3.7.1 *Introduction*

As part of this research I held an exhibition, *Writing Calligraphy with Distorted Vision*, at Culture Lab, Newcastle University, UK in April 2015. The aim of this exhibition was to show the potential of applying visual distortion devices in artistic production to the public and to invite people to experience the distorted visual perceptions for themselves. The show included examples of Ko's calligraphy, my calligraphy, the three visual distortion devices used in this project and the videos presenting our writing process {see Appendix A: Calligraphy_exchanged viewpoints. mp4, Calligraphy_restricted sight. mp4 and Calligraphy_mirrored view. mp4}. Videos showing our writing behaviour were shown next to videos of what we saw on the viewing devices while conducting the projects. Audience members could easily understand what the unfamiliar visual experiences were and how they influenced Ko and me. Each video was placed beside the corresponding calligraphic works. The exhibition also invited audience members to try out the viewing devices in person with a list of pictographs and hieroglyphs for non-Chinese-speaking participants to use.

Figure 3.47 The scenes of the exhibition *Writing Calligraphy with Distorted Vision*

Figure 3.48 The calligraphy created with the *Viewpoint-exchanging Device* and the video of its production process

Figure 3.49 The calligraphy created with the *Sight-limiting Device* and the video of its production process

Figure 3.50 The calligraphy created with the *View-mirroring Device* and the video of its production process

Figure 3.51 Two audience members writing calligraphy with the *Sight-limiting Device*

3.7.2 *Audience Feedback*

Most western audience members reflected that although they did not understand Chinese, they could still enjoy the calligraphy. They appreciated the calligraphic works for the structure of the characters, the tonality of ink and their overall appearance. This echoed researcher Ariane Peveto's opinion that knowledge of Chinese language is not a necessary requirement for delighting in calligraphy (Peveto, 2010: 44), as well as artist Stephen Little's viewpoint that calligraphy can be understood and appreciated for its "purely abstract values" (Little, 1987: 373). The exhibition mainly focused on presenting the influence of the visual distortion devices on Ko's calligraphy writing and mine. Therefore, fully understanding the meaning of each of the Chinese characters was not necessary to the audience's appreciation of the exhibition.

Some audience members indicated that the videos presenting our un-fluent, hesitant and incorrect writing behaviour were more interesting than the calligraphy itself. It was amusing to watch how Ko and I produced chaos and nonsense characters so seriously. This suggested that our reaction to the unfamiliar visual experiences caused by using the visual distortion devices had some performative qualities. In the exhibition, audience members were also invited to try the visual distortion devices. Most of them commented that the visual experience was more confusing and strange than they expected. Their hesitant behaviour of writing calligraphy with the devices, their confused faces and the marks they confidently produced were all very interesting, amusing and impressive. The interaction between the visual distortion devices and audience members was therefore performative as well. This implied that either artists' or audience members' use of visual distortion devices had potential to become an experimental performance.

3.8 Preliminary Discussion

A short discussion about the experimental calligraphy practices carried out in this research is provided in this section. It includes a summary of the observed findings and preliminary answers to the research questions.

The calligraphy practices involved a professional calligrapher, Liang-Chih Ko, and an unskilled calligrapher, I. We wrote calligraphy in our usual way without using any visual distortion devices as well as while our visual perspectives were exchanged, limited and left-right mirrored by different visual distortion devices. The function of the visual distortion devices was to confuse artists' sense of seeing in order to make artistic production more difficult. This demonstrated an alternative relationship between perceptual devices, artists' senses and artistic production.

The findings observed from the analysis of Ko's and my calligraphic works, writing behaviour and self-reflections are summarized as follows. Firstly, calligraphic works, as research data, contain rich clues to the calligraphers' writing behaviour. They, as artworks, can be appreciated without knowledge of Chinese language. Secondly, the visual distortion devices effectively broke down Ko's and my habitual eye-hand correspondence and writing habits, making calligraphy more challenging. Thirdly, various creative calligraphic writing methods were identified in the practice. In addition, distorted vision led Ko and me to create interesting styles of calligraphy beyond our capabilities by chance. Lastly, the use of visual distortion devices made the act of writing calligraphy interesting, amusing and performative.

The research questions proposed in section 1.3 can be partly answered by considering these findings. About the question "*how can artists and their artworks be influenced by the use of visual distortion devices during artistic production?*", the use of visual distortion

devices can greatly disturb artists' habitual behaviour in producing artefacts, eye-hand correspondence and the control of artistic production. The appearance of artworks then becomes more unpredictable and irregular. In terms of the question *"What is the potential of applying visual distortion devices in artistic production?"*, the use of visual distortion devices can potentially be a method of exploring new forms of making art and creating interesting artistic serendipities. It also has potential to turn the process of writing calligraphy into a performance. It has to be mentioned that these are not so-called 'correct' answers to the questions. The answers proposed above are simply derived from my observation of using specific visual distortion devices in specific calligraphy practice. Applying different visual distortion devices in different art genres in different ways may get different answers. This phenomenon implies the richness and potential of this research area.

Like vision, kinesthesis is a very important sense in producing artefacts. Investigating possible methods, consequences and artistic potential of using kinaesthetic distortion devices in artistic production is also part of the topic of this research. In the experimental painting and drawing practices introduced in the next chapter, sense of bodily movement and control of the painting and drawing hand are greatly confused and disrupted during the process of artistic production.

Chapter 4. Painting and Drawing with Kinaesthetic distortion devices

This chapter introduces one experimental painting exercise and three experimental drawing exercises produced to explore the influence and potential of using kinesthesis-distorting devices[39] in artistic production. The reasons for applying drawing as the main artistic form of this investigation are its characteristic of recording its production (introduced in section 2.3) and my personal background. As mentioned in Introduction, I trained as a still life artist when I was a university student majoring in fine art. The training emphasised the representation of the visible qualities of the subject, the improvement of artists' visual observation skills and eye-hand coordination. In this research, I reconsider drawing and painting, challenging the significance of this emphasis on vision in the production of still life paintings. Similar to *Writing Calligraphy with Exchanged Viewpoints* (section 3.4) and *Writing Calligraphy with Restricted Sight* (section 3.5), the experimental painting and drawing practices introduced in this chapter also limit my vision during artistic production. Painting and drawing methods that rely less on the sense of seeing are applied and in its place explore the possibility of using the invisible quality of the electrical conductivity of objects.

To this end I designed *Muscle-stimulating Conductivity Detector* and *Detecting-drawing Stick* as kinaesthetic distortion devices. Both of these devices inform the user of the degree of conductivity of still life subjects by making the muscles of the painting and drawing hand twitch involuntarily. The exploration of suitable methods to use these devices in painting and drawing is a significant aspect of the four specific artistic exercises. A suitable painting or drawing method should be able to adequately present the influence of the kinaesthetic distortion devices on the user's behaviour and also to challenge the importance of vision and

[39] This research defines kinesthesis-distorting devices as perceptual devices which can provide users with weird, confusing and unfamiliar sense of bodily movement.

eye-hand coordination to artistic production.

The painting and drawing methodologies and the environment of each exercise build on the experience and outcomes of the one before. The artwork outlined at the end of this chapter is, for example, directly inspired by the second drawing practice. It applies the same kinaesthetic distortion device and the same drawing method used in the second practice to explore the use of the device in the production of fully realised artworks. This artwork also incorporates the element of time in relation to the drawing process and considers how the finished drawings may represent this. It disassembles the production of drawing into many elements, including the artist's sensation, the artist's bodily movements when drawing and the operation of the drawing instrument. In this part of my research, I am the artist and the sole user of the devices and the experiments focus on their effect on my own painting and drawing practices.

Section 4.1.1 presents my design principles for developing the way of using the kinaesthetic distortion devices in my painting and drawing projects. The principles are derived from my critical review of motion-distorting devices which have been used in contemporary artworks. Section 4.1.2 describes how the research data from these exercises was collected, including the paintings and drawings created in the four practices, the video records of my painting and drawing behaviours and my reflections on the experience of artistic production. Section 4.2 introduces the work flow of the development of the research painting and drawing experiments. In the later sections, from 4.3 to 4.6, the research artistic practices are described in detail, including the kinaesthetic distortion devices, the methods and environments of artistic production, and the analysis and observation of the painting and drawing experiments. The outcomes of the observation and analysis will be preliminarily discussed in section 4.7 and further discussed in Chapter 5.

4.1 Background

4.1.1 *Existing motion-distorting devices used in artistic production*

Artists' bodily movements usually play a very important role in artistic production. For example, in most cases, paintings are made using hand movements and gestures. A dance is performed using whole body movements. Songs are sung using the movement of the body and vocal organs. A few movement-distorting devices, which are built to move artists' bodies and limbs forcibly, however have been applied in producing interesting artworks. These devices influence artists' kinesthesis, which is the sense mainly concerned with bodily movements (Wiertelak, 2013), by making artists' bodies and limbs move involuntarily. Inspired by them, the development of the kinaesthetic distortion devices used in this research focuses on interfering with artists' bodily movements. This chapter critically reviews typical movement-distorting devices used in artistic production to identify potential directions for developing kinaesthetic distortion devices in this research.

In *Pendulum Choir*, a choral piece produced by composer André Décosterd and architect Michel Décosterd in 2011, nine *a cappella* singers had extra oblique movements imposed on their bodies by using a large-scale body-inclining device in order to force them to produce more diverse and sonorous vocals ("Pendulum Choir," 2010). The device was composed of nine metal platforms, each of which was supported by two computer-controlled scalable hydraulic jacks. In the performance, the nine singers were bound tightly onto the metal platforms beforehand (Figure 4.1). As each platform moved and tilted, it also moved and tilted its singer, making large-angle inclines and movements in different directions according to the pre-made composition of each song performed. Therefore, the singers' performances were greatly influenced by gravitational forces from different directions that pulled their bodies around.

Figure 4.1 Nine *a cappella* singers performing the *Pendulum Choir* (Codact, 2011)

Instead of compelling artists to perform oblique bodily movements passively, Singapore artist Ka Fai Choy induced artists to perform uncontrollable bodily movements spontaneously by stimulating their muscles with electric impulses. In *Notion: Dance Fiction*, a lecture-performance held in 2011, Choy presented a muscle-stimulating system that was developed to explore the possibility of "implanting" the muscle memory of iconic dance movements into a dancer's body to assist the dancer in learning the movements (Choy, 2011). The system was composed of a multi-channel muscle stimulator, sending harmless electric impulses simultaneously on multiple channels to the user's muscles to make them contract involuntarily, and software installed on a computer that was programed to control the transmission of the electric impulses. The software included a database that Choy called a "dance movement vocabulary", a large collection of information on the limb movements involved in performing iconic dance movements composed by famous choreographers (ibid). The information was used to determine when and on which channel the muscle stimulator should send the electric impulses to the user's muscles.

In the lecture-performance, a dancer was invited to demonstrate the system with Choy. Various parts of her limbs were attached to the muscle stimulator through wires. When the

system was operating, Choy could choose a certain dance movement listed on the software in order to instruct the muscle stimulator to send electric impulses to the dancer with appropriate timing and on corresponding channels. The dancer's limb muscles were stimulated to perform spontaneous actions that caused it to look like the dancer was performing the chosen dance movement (Figure 4.2). Choy also presented a further potential application of the system as inspiration for choreographers in composing dance movements. He demonstrated this by mapping two different dance movements from two choreographers onto left and right side of the dancer simultaneously (Figure 4.3), leading the dancer to perform a hybrid new dance movement.

Figure 4.2 The dancer electrically stimulated to perform iconic dance movements (Choy, 2011)

Figure 4.3 The dancer electrically stimulated to perform hybrid dance movements (Choy, 2011)

Japanese artist Daito Manabe also developed a similar muscle-stimulating system named *Face Visualizer* in 2008, which was composed of software and many computer-controlled muscle stimulators (Manabe, 2008). It converted music played on the computer into electric impulses for stimulating the facial muscles. This muscle-stimulating system was used in producing experimental music performances and video artworks. In Manabe's live electric music performance in *HARAJUKU PERFORMANCE + (PLUS) 2008*[40], Manabe connected artist Masaki Teruoka's and his own faces to the *Facial Visualizer* and projected the images of their faces on a screen behind them (Figure 4.4). When the electric music (premade by Manabe) was played, their cramped facial expressions became a kind of real-time facial visualization of the music.

Figure 4.4 Manabe's live performance applying the *Facial Visualizer* in Tokyo (Manabe, 2008)

In terms of video works, in 2008, Manabe connected the *Facial Visualizer* to people's facial muscles to twitch their face dramatically in time with the beats of pre-made electric music (Figure 4.5). He filmed the weird, unnatural, extremely funny facial expressions caused

[40] *HARAJUKU PERFORMANCE + (PLUS) 2008* was an annual art festival held by the Laforet Museum in Harajuku Tokyo.

by the electric impulses and produced a series of video artworks[41]. In 2012, he used the same muscle-stimulating system to create the music video for the electric music piece *Straight & Arrow* (Manabe, 2012). Manabe sent electrical pulses to people's limb muscles to compose a special dance. The dance movements were unconventional rather than classical. He asked the performers to stand or sit together, relax and place their arms and legs (connected to muscle stimulators by wires) side by side (Figure 4.6). When the music was playing, the limbs received electric impulses in a carefully composed order. The rhythmic motion of these muscle cramps became the main theme of the video.

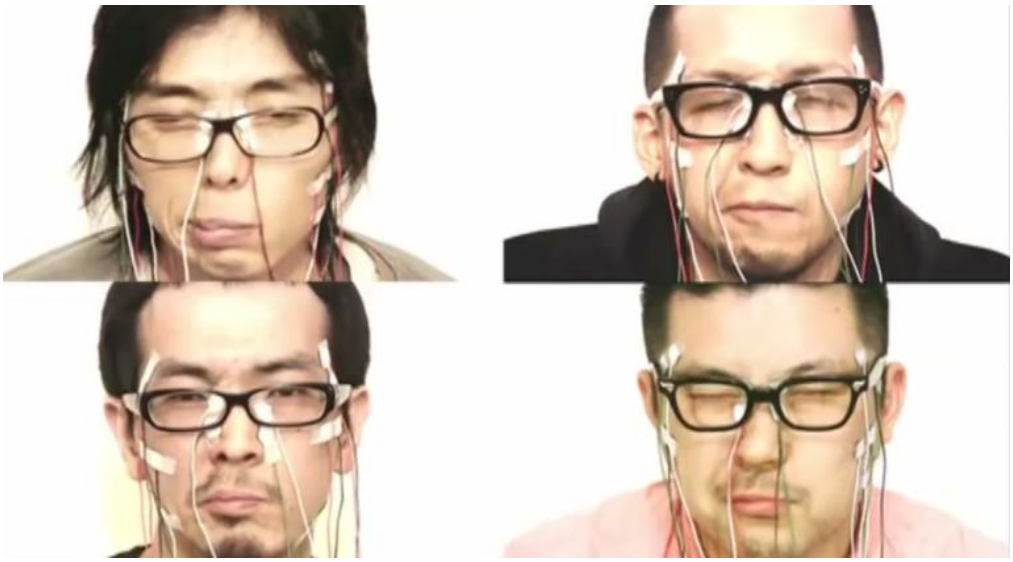

Figure 4.5 Manabe's video work *Electric Stimulus to Face - test4* (Manabe, 2008)

[41] Manabe released several video artworks on Youtube which used the video record of the tests of *Face Visualizer* as resources. Each video artwork included different numbers of people's faces, from one to thirty-six. In the video record of the test, the subject's face was filmed in a close-up view. Manabe placed the images of different subjects' faces side by side to form an array in the video works. In this way, audiences can see many different people's faces twitch simultaneously fitting the music's tempo and beats. The video clearly presents how diverse people's facial responses to the same electric stimulus can be. The video with four faces is available on https://www.youtube.com/watch?v=pLAma-lrJRM ; thirty-six faces is available on https://www.youtube.com/watch?v=CvmE4TZfeuo

Figure 4.6 The music video of electric music piece *Straight & Arrow* (Manabe, 2012)

In all the projects mentioned above, except Manabe's own live musical performance, the timing and the ways of changing the performers' movements were not decided by the performers themselves. In addition, both when and how the motion-distorting devices influenced the performers' bodily movements during the whole process of art making were pre-decided in advance. In *Pendulum Choir*, the movements of the large-scale inclining device were pre-designed by the composer according to his musical expression. In *Notion: Dance Fiction*, the channels and the orders of sending electric impulses to the dancer were pre-programed in the software based on the database of collected iconic dance movements. In Manabe's live music performance and video works, the timing and channels of the electric impulses were decided by the premade electric music. In these cases, the whole process of art making was elaborately organized and fully planned beforehand. The motion-distorting devices, including the inclinations of the nine *a cappella* singers' bodies, the twitches of the dancers' limbs and the people's cramped facial expressions, were intentionally used to achieve some pre-composed artistic effects. These made the role of the performers very passive and the artworks became predictable and limited in what they could explore.

Similar to the motion-distorting devices mentioned above, the kinaesthetic distortion devices built in this research are developed to effectively change artists' bodily movements.

However, different from them, the kinaesthetic distortion devices are also designed to be able to inspire artists during artistic production. Instead of achieving certain premeditated artistic effects, the kinaesthetic distortion devices focus more on inducing artists to explore the possibilities of artefacts and to gain new insights into the process of art making. To achieve this the use of the kinaesthetic distortion devices in artistic production should be designed to be improvisational, providing space for something unpredictable and creative to happen. In addition, it should only provide very rough guides, letting the artists themselves develop their own ways of using the kinaesthetic distortion devices through practice.

4.1.2 *Data collection and data analysis*

In order to develop a full understanding of how my painting and drawing behaviours are influenced by the kinaesthetic distortion devices, in each exercise a video recorded my behaviour of producing paintings or drawings while a microphone recorded my voice describing a self-reflective narrative of the painting or drawing experience. All experimental paintings and drawings produced in the exercises were photographed.

My painting and drawing behaviours were recorded on video from multiple angles. One camera recorded my painting or drawing hand in close-up, another filmed my 'detecting' hand (further explained on page 115), and the third camera recorded my whole body movement from a distance. The analysis of these video recordings focuses on the involuntary movements of my painting or drawing hand and how the brush lines reflect these uncontrollable hand movements. It also discerns the ease of use of the kinaesthetic distortion devices and their overall effect on changing my behaviour of artistic production.

The final appearance of the paintings and drawings is the main focus of the analysis. The brush lines and the linear marks are examined in detail including the position, the inclining

angle, the shape, the colour, and texture. The results of this analysis not only assist me in presenting the characteristics of the paintings and drawings, but also provide helpful clues about how my painting and drawing behaviours ware influenced by the kinaesthetic distortion devices. The analysis of the voice recordings focuses on identifying the difficulties I met with during the processes of painting and drawing. The results of this analysis contribute to the redesign of the painting and drawing methods, the refinement of the kinaesthetic distortion devices and the drawing environment of the later drawing exercises.

4.2 The work flow of constructing the painting and drawing practices

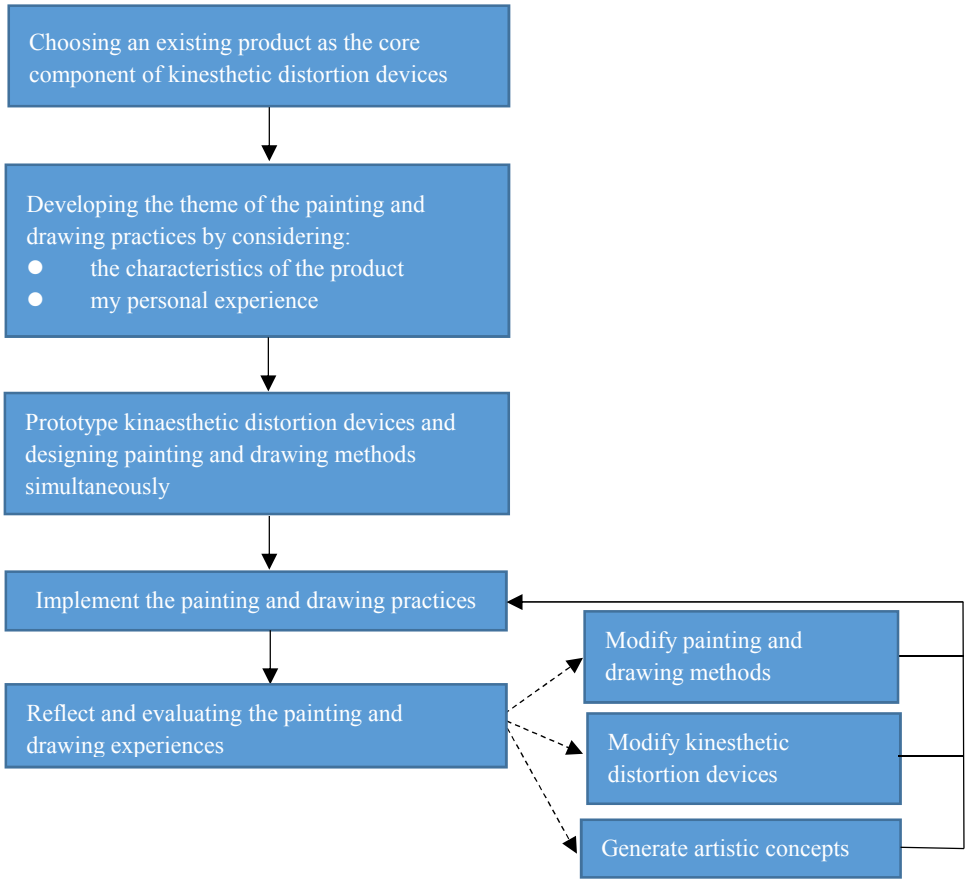

Figure 4.7 The work flow of developing the painting and drawing practices

Just like the calligraphy practices introduced in Chapter 3, the experimental painting and drawing practices presented in this chapter were also developed with a device-centred approach. The design of kinaesthetic distortion devices is placed at the centre of the project development. This is because the painting and drawing projects also serve the purpose of exploring the artistic potential of the influence of sensory distortion devices on artists and their artworks.

The development of the painting and drawing practices began by identifying the most suitable components for making kinaesthetic distortion devices from amongst existing products. Medical muscle stimulators were eventually chosen because the muscle twitches triggered by the electrical impulses provided by the devices effectively confuse people's sense of bodily movement. Consistent with this, the theme of the painting and drawing practices was designed to be electricity-related. Inspired by my previous educational experience of producing realistic still life paintings, I decided to focus on the idea of the still life, exploring the possibility of expressing the degree of conductivity of objects from a typical traditional still life painting, and negating the reliance on the sense of vision during the painting process.

The initial version of the kinaesthetic distortion device was prototyped as a *Muscle-stimulating Conductivity Detector.* Its corresponding painting method was designed to prevent me from actually seeing the subjects being painted. The device, the method of producing artefacts and the environment of creating artworks were repeatedly modified after each artistic practice. The modification was in relation to my evaluation of the experience of each practice. Subsequent concepts and experiments were inspired by and built upon earlier outcomes.

4.3 Experimental Painting Practice

4.3.1 *Introduction*

The training I received in NTNU almost exclusively emphasised visual observation skills. It required the student to observe the visible characteristics of the subject very carefully, such as the shape, the texture, the colour and the size. Also, constant comparisons between the appearances of one subject and another were necessary in order to present the correct visual relationship between the subjects in the painting or drawing. The student needed to constantly compare the subjects with what had been depicted on the paper to identify the differences between them. The drawing and painting methods proposed by this form of training rely on the participants' sense of sight and their eye-hand communication. Not only do they need to be able to observe accurately but they need to be able to translate this observation in a very careful and controlled way to their hand and onto the paper. This research exercise explores another possibility of producing still life paintings and drawings, one where the sense of vision is negated and hand control disrupted by an external force: the degree of electrical conductivity of the subject.

In this method the subjects of the still life were perceived by touching instead of seeing. A painting was made by detecting the degree of electrical conductivity of each object with a *Muscle-stimulating Conductivity Detector*. The different conductivities of the objects sent small electrical shocks to the muscles of the arm, making the hand twitch involuntarily. The more the hand twitched, the more conductive the subject. In this painting practice, I connected the *Muscle-stimulating Conductivity Detector* to the forearm of my painting hand. By doing so, my painting behaviour and my kinaesthetic sense were significantly influenced by the device during the painting process.

Figure 4.8 'Still Life' vegetables and fruit with various conductivity

In order to allow my painting behaviour and my kinaesthetic sense to be affected to various degrees, I used fruits and vegetables with different conductive potentials (Figure 4.8). To present the conductivity of each object clearly, I painted on a black canvas with only red and white acrylic pigments. The degree of conductivity of each object was reflected by the amount of red I used on the canvas. The objects with stronger conductivity had more red, and the objects with weaker conductivity more white. In addition, the amount of water used on the canvas relates to the moisture content of the object, sensed by touching; less water equals dryer materials and more water, moister materials. In terms of the painting environment, to prevent my seeing the subject during the painting process, a large black curtain was placed between the subject and me (Figure 4.9).

Figure 4.9 The drawing environment with a black curtain hanging between the subjects and line of sight

The main components of the *Muscle-stimulating Conductivity Detector* were a muscle stimulator and a detecting finger-stall (described in detail in section 4.3.2). Before the painting exercise, I placed the detecting finger stall on my left index finger and connected the muscle stimulator to the forearm of my right hand (the painting hand) with the electrodes (Figure 4.10). During the exercise, I moved my detecting hand (the left hand) through the black curtain and picked up an object randomly without seeing it. I then perceived the shape, the moisture and the texture of the subject with my detecting hand, detecting the degree of conductivity of both the surface and the inner material of the object with the detecting finger-stall. I used the corresponding amount of water and the corresponding colours to represent the object on the canvas. The painting process was repeated until all the objects were painted. For this exercise, I produced two paintings with the method described above.

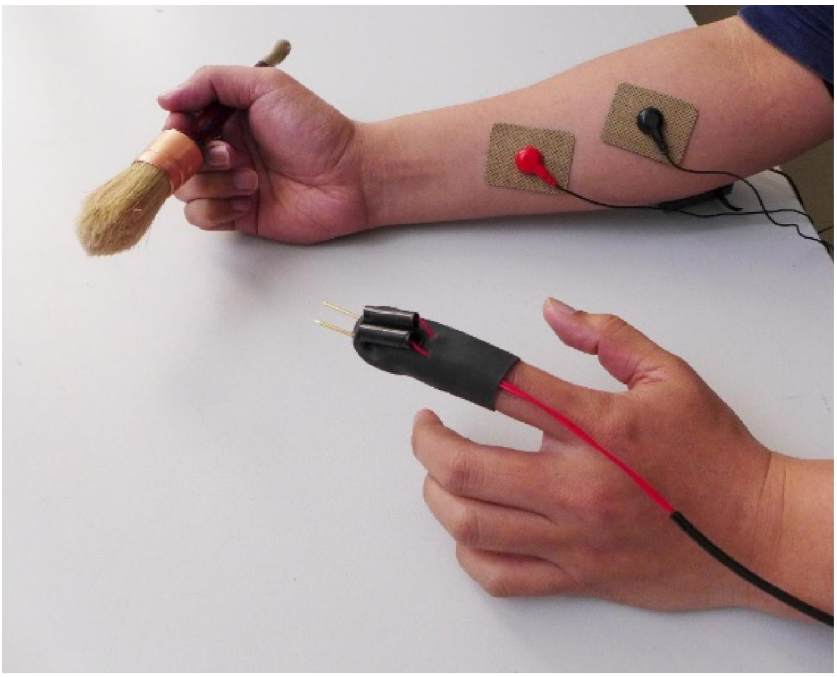

Figure 4.10 Setting up the *Muscle-stimulating Conductivity Detector*

4.3.2 *The development of the Muscle-stimulating Conductivity Detector*

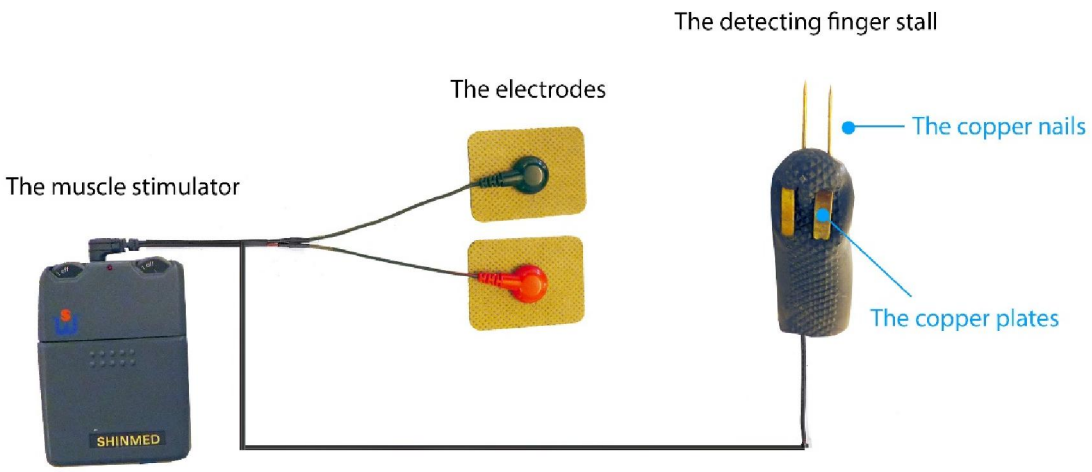

Figure 4.11 The components of the *Muscle-stimulating Conductivity Detector*

The *Muscle-stimulating Conductivity Detector* is composed of a muscle stimulator, a detecting finger-stall and two electrodes (Figure 4.11). The muscle stimulator is a common medical product widely used for relieving muscle pain. The detecting finger-stall is made by attaching two small copper nails and copper plates on a rubber finger-tip. The user can gently

move the copper plates across the object to detect the degree of conductivity of its surface, or they can pierce the copper nails into the object to detect the conductivity of the inner material. The electrodes transmit the electric impulses generated via the muscle stimulator to the targeted muscles in order to trigger spontaneous spasms of the drawing hand.

The conductivity detector has to have two detecting points to work. Each is a detecting head composed of a copper nail and a copper plate. The detecting heads are embedded into a rubber finger-tip and are linked to the muscle stimulator. For the device to work both of the detecting heads have to be touching the object. The object (in this exercise, a piece of fruit or vegetable) acts as the conductor of the electrical impulse that flows from the muscle stimulator through the subject and onto the electrodes, stimulating the muscles of the painting arm to various degrees depending on the conductivity of the object. The more conductive the object, the less electrical resistance occurs and the greater the stimulus, resulting in the user's muscles performing larger spasms. Therefore, the involuntary movements of the muscles of the user's painting arm reflect the conductivity of the subject.

4.3.3 *The paintings*

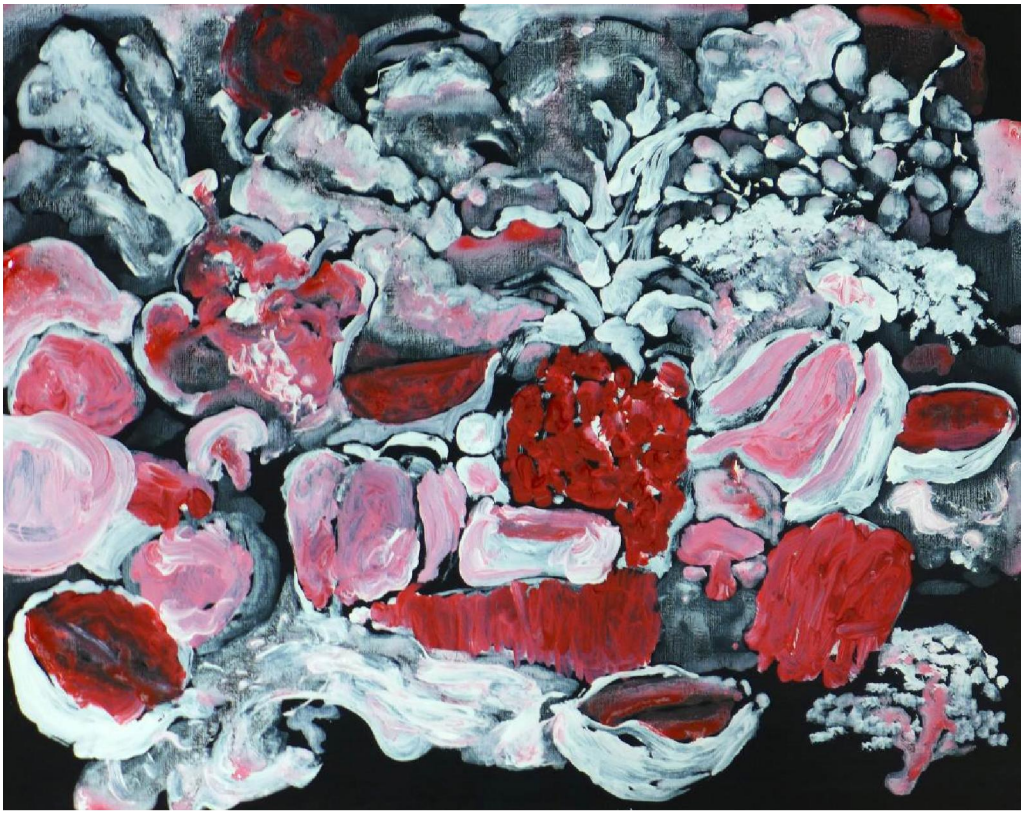

Figure 4.12 The first painting produced in this practice, 59.4 x 42 cm

Figure 4.13 The second painting produced in this practice, 59.4 x 42 cm

4.3.4 ***Observation and Analysis***

4.3.4.1 The paintings

The fruits and vegetables depicted in the two paintings (Figure 4.12 and Figure 4.13) have monotonous colours, few details and rough shapes. The monotony of the colour is because I decided to use only red and white pigments in order to represent the degree of conductivity of the subjects. The lack of detail and the irregular contours are caused by the use of the *Muscle-stimulating Conductivity Detector*. The detector constantly made my painting hand twitch excessively during the painting process, so it was very hard for me to use the brush accurately. Because of the uncontrollable twitching, I could not present the subjects in detail or make the shape of the subjects even. Although these paintings contain a variety of interesting visual effects produced by using different amounts of water and moving the brush at various speeds, the rough description and the distorted shapes of the fruits and vegetables make the works look as if they have been produced carelessly and inaccurately.

In addition, comparing the two paintings presented an inconsistency in the logic of the painting. Sometimes the same object was painted in very different colours, for example, the carrot was red in the first painting, which represented the strong conductivity of its inner material, but became white in the second painting which represented the weak conductivity of its surface. The grapes were pink and white in the first painting but red in the second painting. Also, in both paintings, the pineapple was drawn with a small amount of water, reflecting the dryness of its surface. The use of water and colour were inconsistent, reflecting the fact that I relied heavily on my intuition, arbitrarily deciding where and when to present the characteristics of the inner material of the object. A new method of depicting the objects with specific steps and clear rules about when and where to present the characteristics of the inner material of the object are needed to be developed for the next practice.

4.3.4.2 The painting behaviour

My painting behaviour in this exercise was greatly influenced by my previous experience of producing realistic still life paintings. I created spatial relationships between the subjects and tried hard to compose strong visual contrasts. During the painting process, I picked up each object with my left hand one by one and 'observed' them with my fingertips instead of my eyes. However, the perspective of the two paintings is still very typical in its use of a 45 degree angle of depression as if looking slightly down onto the subject. All the objects in the paintings seemed to be placed on a black table. The objects overlap one another just as if there were an existing spatial relationship between them. Also, I also tried to increase the visual contrast in the paintings by deliberately placing objects presented in white beside objects painted in red or pink. I also left the black background in some of the areas purposely to separate the objects. Although the painting method of this exercise was very different from the painting method that I was taught, many of my considerations in relation to making the paintings were similar to what I was used to when I created realistic still life paintings.

Influenced by my previous painting habits of making the objects recognisable, I tried to control the involuntary movements of my painting hand in order to keep the completeness of the shape of the objects. When painting very conductive subjects in red, the muscles of the forearm of my painting hand twitched strongly and frequently. The length and the position of the brush lines produced by the twitching hand should be irregular and out of control. However, I controlled and limited the lines deliberately to form shapes that were similar to the shape of the subjects. I consciously attempted to control the twitching to prevent the shape of the subject becoming unrecognisable. This controlling action reduced the true presentation of the influence of the kinaesthetic distortion device. Therefore, my painting habit had an influence which contradicted the possible emergence of new painting practices in this case.

4.3.4.3 The painting environment

The black curtain hanging between the objects and my working area made the operation of the conductivity detector very problematic. The organisation of the painting environment in this exercise forced me to use only my left hand to sense the objects and to detect their conductivity. When I pierced the fruit with the copper nails of the detecting finger stall to detect the conductivity of the inner materials, the copper nails sometimes got stuck. Once this happened, I could not use my right hand or my sight to solve the problem, because the curtain blocked them. I had to try to pull out the copper nails with my left hand only. This increased the difficulty of the conductivity detection. As the aim of the research is focused on the function rather than usability, the disruption of artistic production caused by the low usability of sensory distortion devices is not the focus of this research. The setting of the painting environment needed to be more carefully considered.

4.4 Experimental Drawing Practice One

4.4.1 *Introduction*

This drawing practice modified the painting method and environment of the first practice based on the conclusions drawn in section 4.3.4. It applies an improved method of depicting objects and alters the painting environment. The kinaesthetic distortion device, the objects and the main theme of this practice are the same; the *Muscle-stimulating Conductivity Detector* (introduced in section 4.3.2), fruit and vegetables with various degrees of conductivity and the exploration of drawing without seeing, presenting the invisible quality of the degree of conductivity of the objects.

In terms of the drawing environment, this practice removed the black curtain making the conductivity detection easier and more efficient. If the copper nails of the detecting finger-stall got stuck in the subject, I could see and use both my hands to solve the problem. In terms of the drawing method, a linear technique was designed to prevent my habit of producing realistic still life paintings from counteracting the influence of the *Muscle-stimulating Conductivity Detector* on my hand movements.

This linear drawing method still required me to draw while performing the conductivity detection. It pre-determined the approximate drawing areas for representing the characteristics of the surface and inside of each object. Marks reflecting these characteristics were drawn on the canvas in sequence, from left to right and top to bottom (Figure 4.14). The method of perceiving the subjects and of using colour and water was the same as in the previous painting exercise. I perceived the subjects only by using the sense of touch, and once again the more conductive the subject the more red was used and the less conductive the subject the more white. Also the wetter the subject, the more water was used.

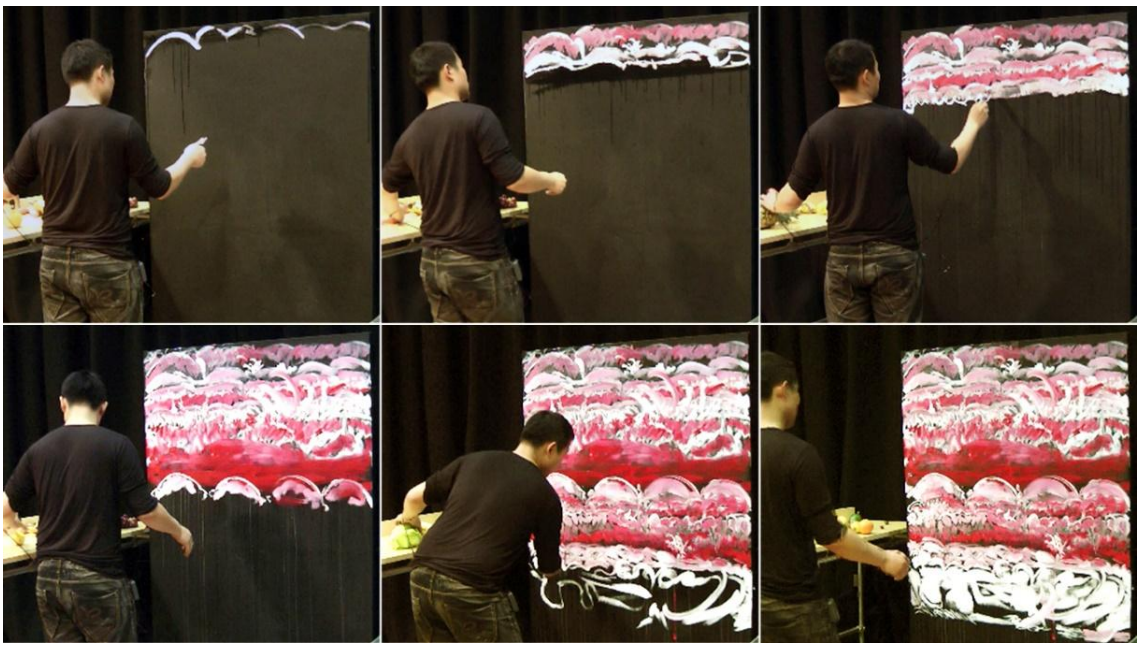

Figure 4.14 The process of the linear drawing method

The drawing process involving the linear drawing method is:

1. Randomly place the subjects (fruit and vegetables) on a table next to the canvas.
2. Black the whole canvas.
3. Randomly pick up a subject with the detecting hand (the left hand) without looking.
4. Keep the drawing hand as relaxed as possible and draw marks from the leftmost side of the canvas to the rightmost to represent the surface of the subject. Each mark should be produced while perceiving the surface of the subject by touching and by using the conductivity detector. The direction, water and colour of each linear mark should reflect the sensed shape, moisture and degree of conductivity.
5. Apply steps 3-4 again to detect and present the characteristics of the inner material of the subject. The marks should be drawn just below the previous marks created.
6. Repeat steps 3 to 5 with different subjects, filling the canvas from the top to the bottom.

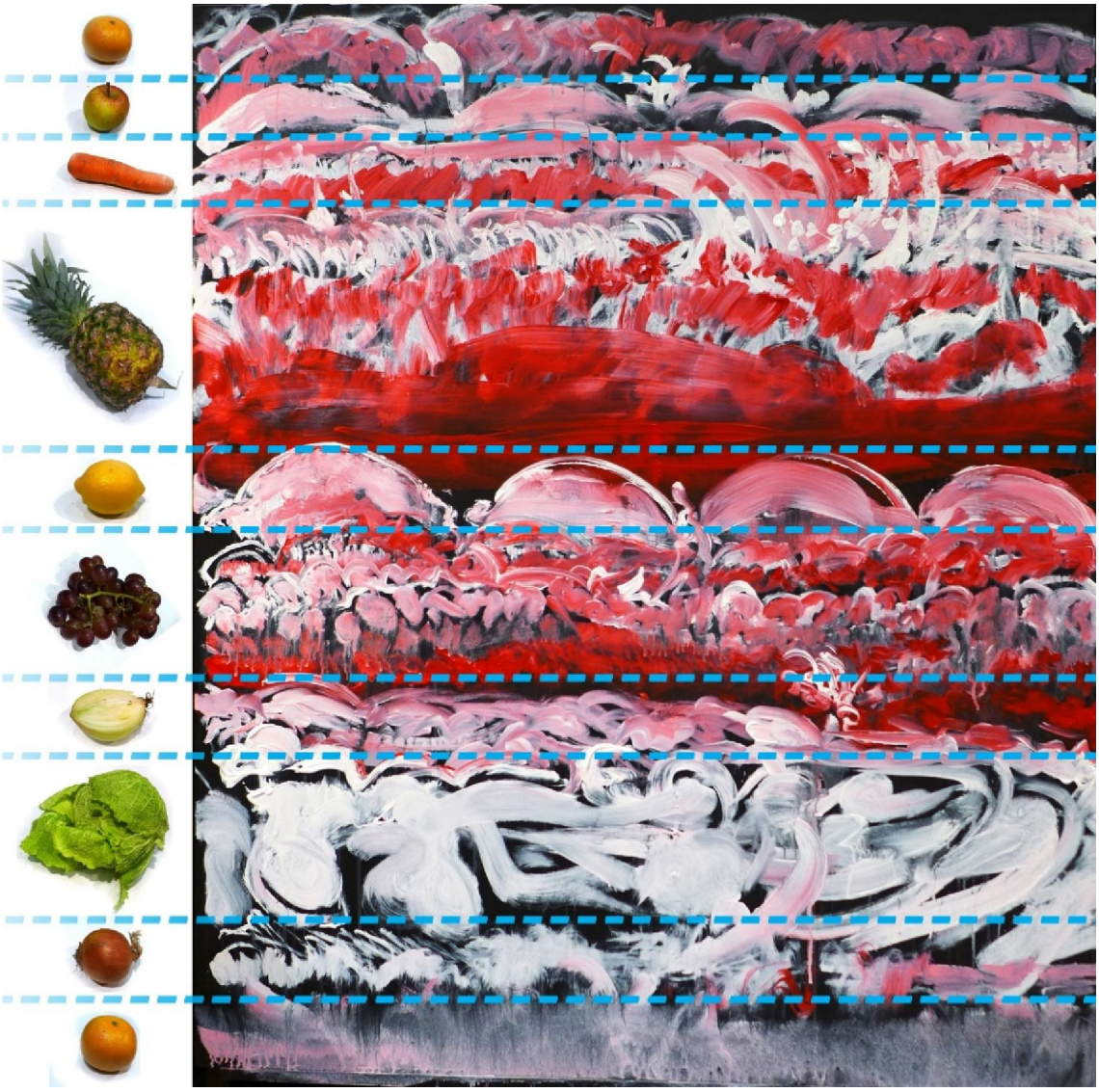

Figure 4.15 The objects and their corresponding drawing areas

Figure 4.15 presents the objects next to their corresponding drawing areas on the canvas. According to this linear drawing method, a row of brush lines representing the characteristics of the surface of the object is followed by a row of brush lines reflecting the characteristics of its inner material. These patterns are repeated until the canvas is full.

4.4.2 *The drawing*

Figure 4.16 The drawing produced with the linear drawing method, 162 x 130 cm

4.4.3 ***Observation and Analysis***

4.4.3.1 The drawing

The drawing produced in this practice was abstract and had strong visual contrast, composed of the black background and the vivid, dynamic brush lines in red, pink and white (Figure 4.16). The interweaving and momentum of the brush strokes make the work look expressive. Due to the surfaces of most vegetables and fruits being dryer and less conductive than their inner materials, the colour layout of the drawing becomes a repeated pattern of a row of whiter lines followed by a row of redder lines, making the work very contrastive. The contrasts of the colours increase the visual tension of the work.

4.4.3.2 The drawing behaviour

During the whole drawing process I concentrated on expressing my bodily sensations rather than describing the form of the objects. This was made possible by the use of the linear drawing method, which not only provided clear steps to follow but also guided what to draw in each area of the canvas. By following the prescribed drawing sequence, decisions on the organisation, contrast and form were out of my hands. Therefore, I was able to be more aware of the tactile and kinaesthetic sensations and to concentrate on the interpretation and expression of them.

However, being more focused on my tactile and kinaesthetic senses during the drawing process, I found there was a problem with the fluidity of the method. I prepared the paints and drew while detecting the conductivity of the objects, the muscles of my drawing hand convulsing strongly. This strange perceptual experience attracted all my attention, distracting me from my interpretation of the sensation and from decisions about the use of colour and water. I was sometimes forced to stop the conductivity detection to allow myself time to refocus on them. Also, the tactile sensation disrupted my interpretation of the kinaesthetic

sensation. Once I perceived the subjects with distinguishing, unique and special textures (such as the pineapple and the broccoli) with my left hand I was easily distracted from the on-going interpretation of the sensation of my involuntary right hand movements. To avoid the mutual interruption between the kinaesthetic perception and the tactile perception, the next drawing experiment conducted in this research was developed to have only one sensory focus. Because the intended emphasis of this research is on exploring the influence of distorted kinaesthetic sense on artists and their artworks, I decided to simplify the drawing method by removing aspects that rely on the sense of touch.

Although the method of the painting exercise introduced in section 4.3 also involved the tactile and kinaesthetic senses, I was not aware of this problem of mutual distraction. This may be because I focused more on the description of the subjects and the composition of the appearance of the paintings during that time, rather than my bodily perceptions.

4.4.3.3 The drawing environment

The black curtain used in the first drawing exercise was removed and without it I could use both hands to perform the conductivity detection, solving the problem of the copper nails becoming stuck in the object. The removal of the curtain facilitated the use of the conductivity detector, however it had a negative influence on the main theme of this drawing practice, which was to challenge the importance of vision to artistic production. I tried to avoid looking at the subjects by placing them to the left of the canvas, far enough away so that I could not clearly see them without turning my head. Nevertheless, it was inevitable that I would see them whenever I had to pull out the stuck copper nails using both hands. This, even a casual glance, I felt was a major flaw in the experiment. Therefore, the setting of the drawing environment had to consider both the practical use of the conductivity detector and the main focus of the drawing exercise.

4.5 Experimental Drawing Practice Two

4.5.1 *Introduction*

This section introduces the second experimental drawing practice designed in response to the conclusions drawn from the previous two practices. This practice focuses on the expression of my kinaesthetic perceptual experience during the drawing process. The subjects of this exercise are six different everyday objects with various degrees of conductivity. In order to prevent the reciprocal distraction of the tactile sensation and the kinaesthetic sensation that happened in the first drawing practice, a drawing method that only focuses on reducing the use of sight was used in this drawing practice. The use of the sense of touch in the previous two practices was de-emphasised.

Figure 4.17 The setting of the drawing environment

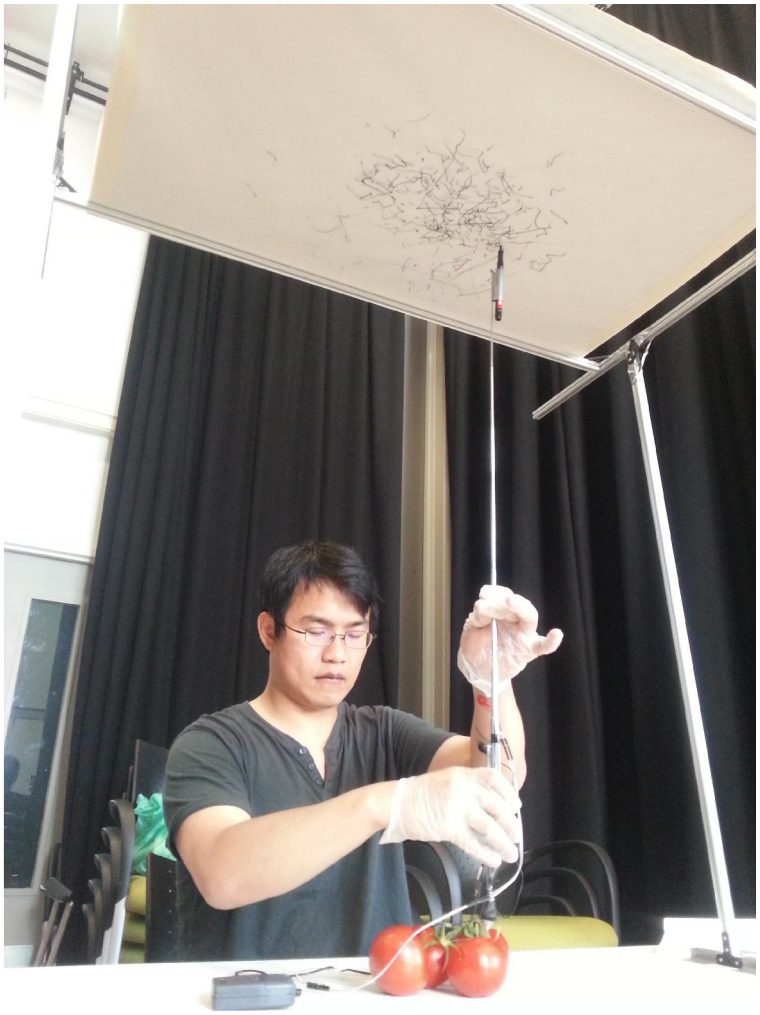

Figure 4.18 The method of mark making

The drawing environment was constructed from a metal frame placed on top of a table (Figure 4.17). Paper was attached onto a wooden board and the board was placed on top of the metal frame with the paper face down. Using this arrangement (Figure 4.18) prevented me from seeing what I was drawing on the paper.

In order to be able to draw on the paper placed above my head on the metal frame, the *Muscle-stimulating Conductivity Detector* used in the previous two projects had to be redesigned. I developed a special mark-making and conductivity-detecting device that had both the drawing function and the detecting function. One end of the device produces marks on the drawing paper placed on the top of the metal frame, while the other end detects the

degree of conductivity of the subjects and creates impulses that make the hand convulse. The device is named *Detecting-drawing Stick*, and it was built by attaching a detecting head to one end of an adjustable antenna and a pen to the other (Figure 4.19).

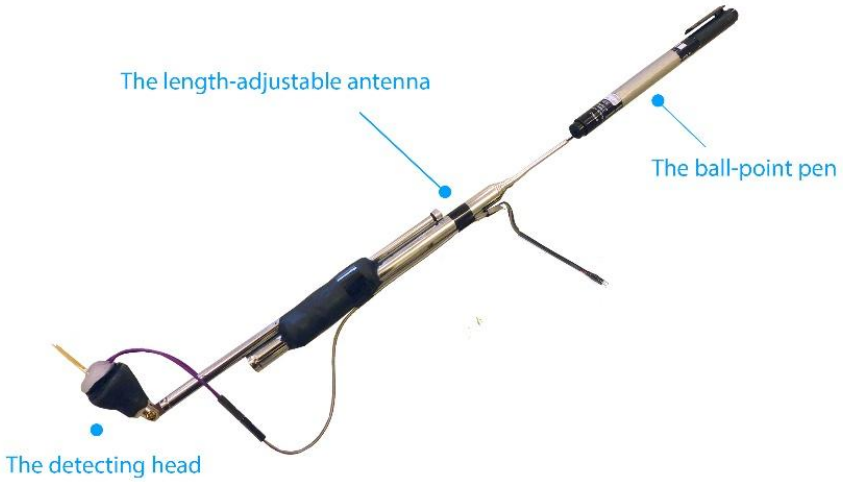

Figure 4.19 The structure of the *Detecting-drawing Stick*

In terms of the drawing process, first, I fixed one of the objects firmly onto the working table under the metal frame with sticky tacks and connected the muscle stimulator element of the conductivity detector to my left forearm. I then held the *Detecting-drawing Stick* vertically in my right hand and adjusted the length of the antenna so that the pen contacted the paper and the detecting head contacted the object at the same time. As the degree of conductivity of the subject was reflected by the involuntary convulsions of my left hand, I pushed the antenna of the device held by my right hand with this twitching left hand. By doing so, marks corresponding to the degree of conductivity of the object were created on the drawing paper by the pen. In this project, I used a red pen to represent the conductivity of the inner material of the object and a black pen for the conductivity of the surface of the object.

In addition to the mark making, the expression of my kinaesthetic perceptual experience included the choice of material for the drawing paper. I used semi-transparent tracing paper to

help express the rapid and overlapping characteristics of my perceptual experience. In the previous painting practice (described in section 4.3.1) the objects were placed next to each other in a typical still life arrangement. In the first drawing practice I used a predetermined structure of strips, left to right going down the canvas (described in section 4.4.1). For this practice I drew one object only on each piece of tracing paper, six objects in total. I then stacked the six drawings on top of one another in order of their making. The drawing produced last was placed on the top so that the marks of that drawing were most apparent. This organisation expresses the idea of how my memory of the most recent drawing experience is clearer than the earlier ones. The final work consisted of six pieces of semi-transparent tracing paper, overlaid on top of one another, showing masses of tangled linear red and black marks with various degrees of clarity, saturation and tone.

4.5.2 *The development of the Detecting-drawing Stick*

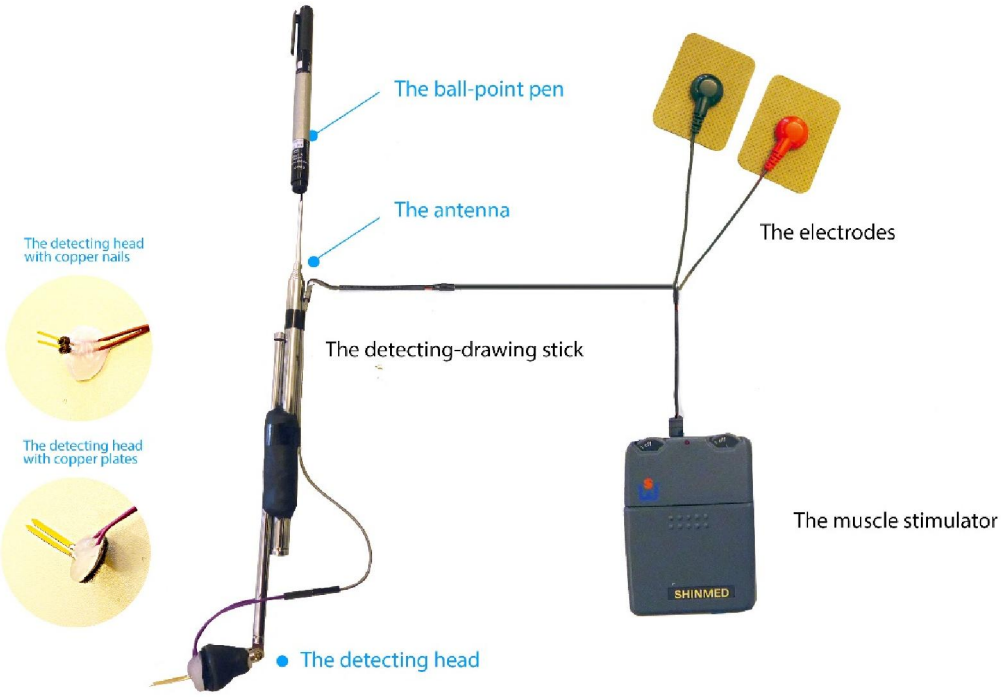

Figure 4.20 The structure of the *Detecting-drawing Stick*, which can be extended to 138 cm height

This *Detecting-drawing Stick* is composed of two types of detecting heads, a muscle stimulator, two electrodes, a variable-length antenna and ball-point pens (Figure 4.20). One of the detecting heads was made by coating two copper nails with Sugru, a flexible glue that turns into rubber in 24 hours. The other was made by coating two small copper plates in Sugru. The muscle stimulator is the same one used in the previous drawing practices. Red and black ball-point pens were fixed on one end of a variable-length antenna using tape. The detecting head on the other end of the antenna was attached using Velcro. When the stick is held vertically to perform the conductivity detection on the object fixed to the working table, the pen can simultaneously produce marks on the drawing paper placed above. In addition, the pens and the detecting head can be easily switched during the drawing process according to the detecting target.

4.5.3 *The drawings*

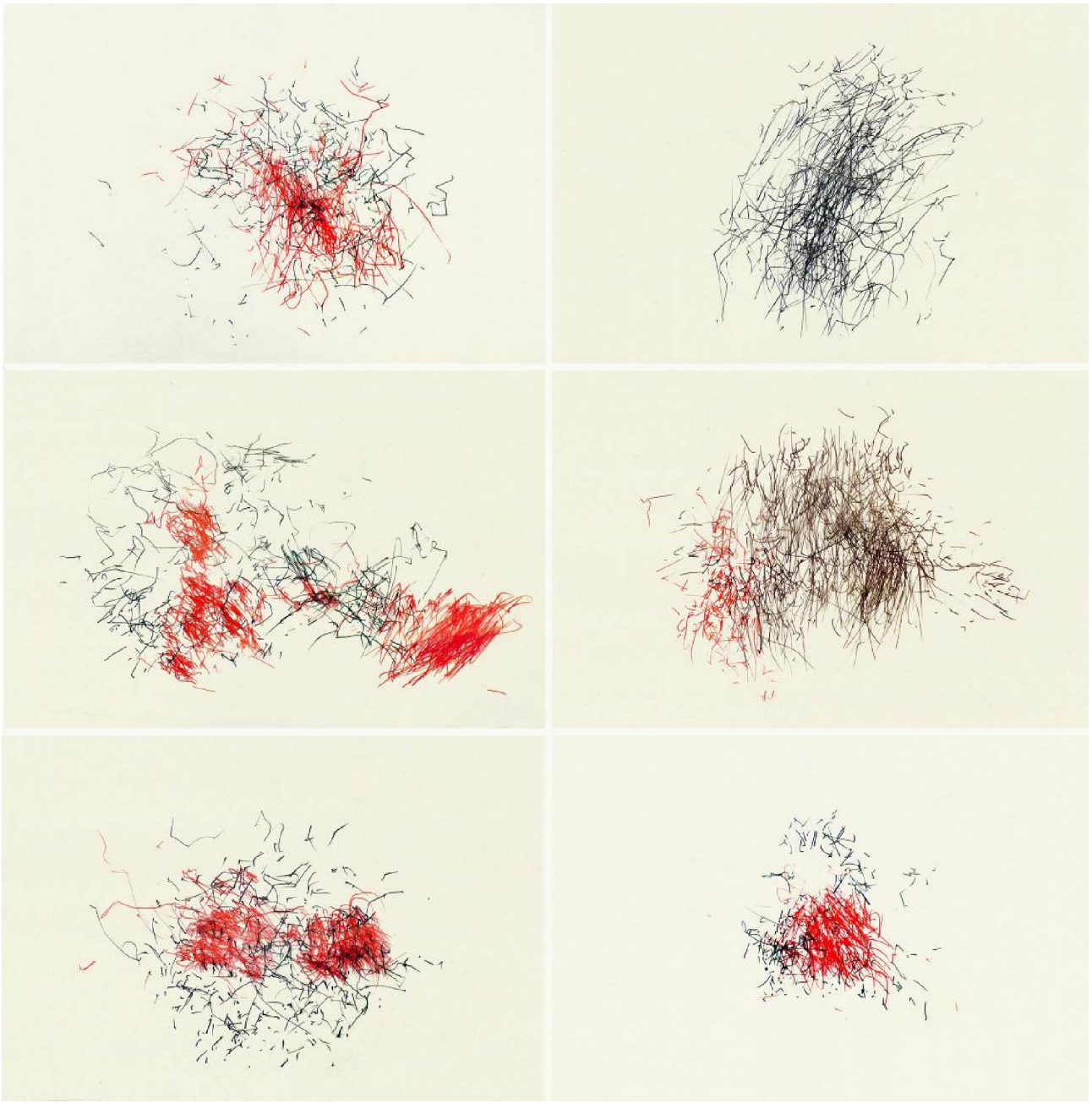

Figure 4.21 The six drawings drawn on the six pieces of tracing paper, 80 x 60 cm each

Figure 4.22 The final work made by stacking the six drawings in order, 80 x 60 cm

4.5.4 ***Observation and Analysis***

4.5.4.1 The drawings

All the six drawings (Figure 4.21) produced on the semi-transparent tracing paper were abstract. They show many linear marks with a variety of lengths, shapes and curvatures. The tangled red and black marks have irregular shapes, vary in clarity and have different levels of tone and saturation. These marks contribute to multiple forms of order coexisting, in a delicate and stylish appearance presented in Figure 4.22.

The linear marks can be regarded as a direct record of my drawing behaviour in this practice. Many aspects of my drawing behaviour can be traced back through them. For example, the inclining angles of the marks show the direction that I pushed the antenna with my twitching hand. The length of the marks reflects the intensity of the involuntary twitches of my hand and also corresponds to the degree of conductivity of the object. The density of the marks shows how long I spent on detecting the object. The longer I spent detecting a certain point, the more linear marks were produced in the corresponding area on the tracing paper.

The appearances of the six drawings are very different from each other. This is because the detected objects had different degrees of conductivity and shapes. The degrees of conductivity of the objects affected the lengths of the linear marks. A more conductive subject triggered stronger muscle spasms so that I pushed the antenna harder, causing the ballpoint pen to perform larger amplitudes of swing and produce longer marks on the tracing paper. The shape of the subject influenced the position of the linear marks and the design of the drawings. I performed the conductivity detection by examining the edges first and the surfaces later. During the drawing process, I held the *Detecting-drawing Stick* vertically to produce marks on the paper above, the marks approximately reflecting the shape of the object.

The positions of the marks on the tracing paper were also strongly influenced by the length and the inclining angle of the antenna. Ideally, according to the drawing method, I should have used the *Detecting-drawing Stick* vertically to produce marks directly above the detecting points of the object. However, in practice, it was impossible for me to keep the device at a perfect right angle and erect all the time. Once the device was misaligned, this was amplified by the long antenna. The positions of the marks became greatly misaligned from where they supposed to be. Figure 4.23 presents the deviation of the position of the marks by overlapping the objects and the drawings at the corresponding position and in the correct proportion. All the marks should be inside or just around the edge of the subjects. However, many of them exceed the edges to quite a great degree. This serious shift in position makes the appearance of the drawings more random, unpredictable and interesting especially when the drawings are juxtaposed with photos of the subjects as in Figure 4.23.

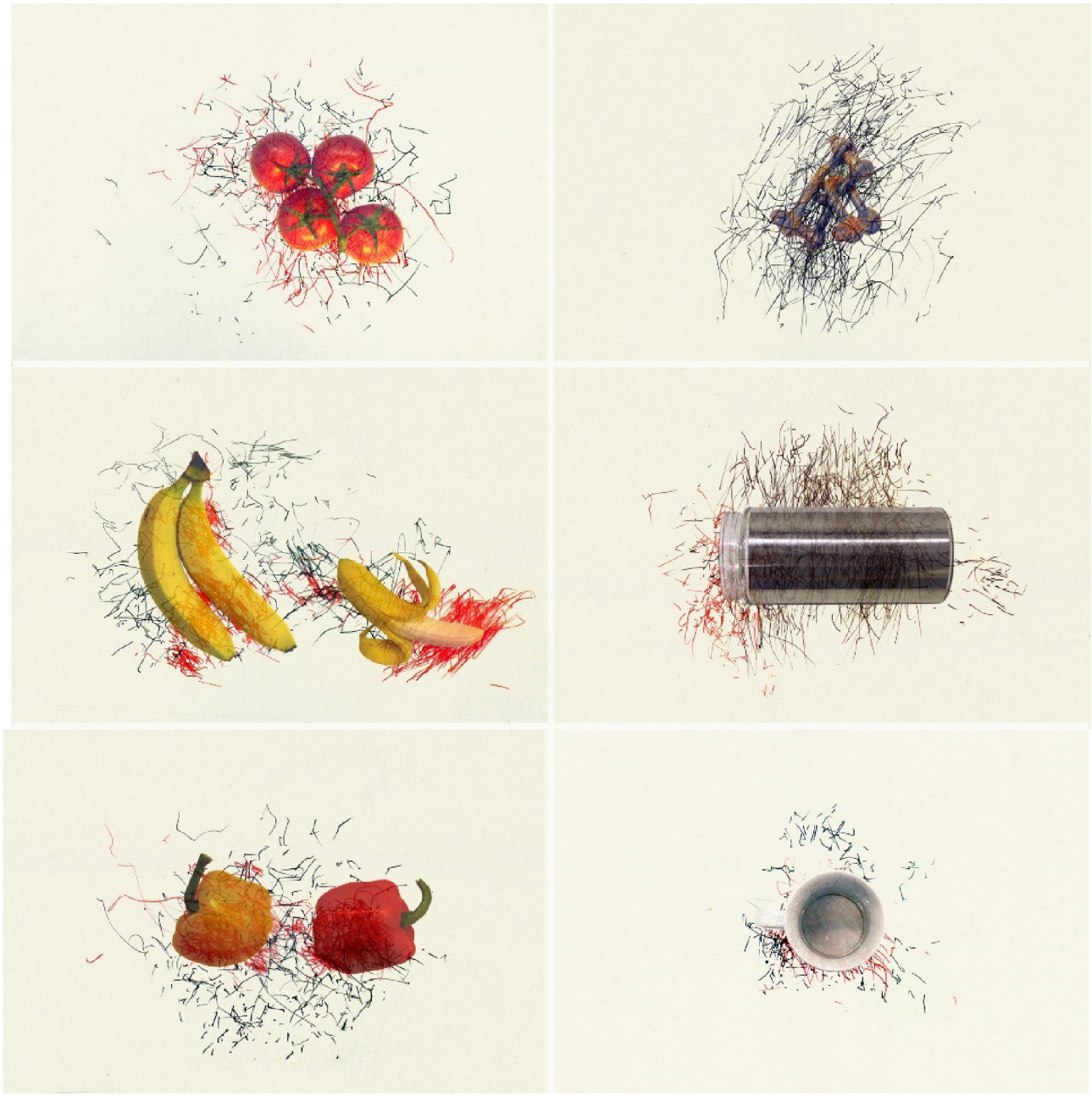

Figure 4.23 The mapping images of the drawings and the subjects

4.5.4.2 The drawing behaviour

In comparison to the previous two practices, my drawing behaviour in this exercise was more like a scientific experiment studying the conductivity of various materials. The drawing process was the detecting process and the marks produced were like a side product of the conductivity detection experiment. As I could not see what I was drawing, the work was not directly influenced by my visual preference and drawing habits – I almost became part of the

experimental equipment. This method provided less opportunity for me to pre-decide the appearance of the drawings in this drawing exercise than in the previous two practices.

Originally I felt that in order to deny the power of sight over the drawing process I would need to prevent myself from seeing the subject. However, as this exercise demonstrated, it was not looking at the subject that was the issue but looking at the canvas. Originally a black curtain prevented me from seeing the object I was going to draw, but feeling it with my fingers still allowed me to know what it was – a tomato, pineapple, cabbage etcetera. This knowledge could just as easily influence the shape of the object I attempted to draw, as clearly demonstrated in the previous painting practice, where even though I could not see the object chosen, I was still able to paint the form of it (Figure 4.12 and Figure 4.13).

4.5.4.3 The drawing environment

The setting of the drawing environment for this exercise not only facilitated the use of the *Detecting-drawing Stick*, but also increased the randomness and unpredictability of the appearance of the drawings. The area created was spacious and without any obstruction so I could use my both hands and my vision to perform the conductivity detection smoothly. Also, the tracing paper placed on the top of the metal frame, totally out of my sight, made the drawing practice more experimental and increased the chance of my producing more imaginative and less traditionally influenced drawings.

4.6 Experimental Drawing Practice Three: Disassembly and Reconnection

4.6.1 *Introduction*

This chapter introduces the last drawing practice conducted in this research. The same drawing method, the same drawing environment (introduced in section 4.5.1) and the same *Detecting-drawing Stick* (introduced in section 4.5.2) used in drawing practice three were applied again in this practice to support my artistic exploration of the practice of drawing. The resulting drawings and the process of this practice were exhibited at the Project Space in Fine Arts Building, Newcastle University in March 2016.

'Disassembly' and 'reconnection' are the themes of this practice. They were the strategies that I applied in this practice to explore the possibilities of art expression. I reconsidered the production of drawings from the aspects of time and the drawing behaviour. In a sense, drawings are the result of the expenditure of time because time is the medium where thought and drawing behaviour take place. As a temporally extended practice, the production of drawings is usually divided into 'producing processes' and 'finished works'. The processes stand for a period of time that artists take to make drawings. The finished works represent the moment that artists' drawing behaviour stops. Usually finished drawings are regarded as static objects, separated from time and their production. In this case, however, I presented the finished drawings and the producing process simultaneously in the same exhibition space in order to induce audiences to reconnect and recomplete the timeline of my artistic production by themselves. Because time was one of the core concepts of this work, two common but contrasting time measurement devices, a wall clock and a digital alarm clock, were chosen as the subjects to be drawn in this practice.

I conceptually separate my drawing behaviour into several elements, such as perceptions, bodily movements, the control of drawing instruments and the relationship between me and

the subjects drawn. These elements were reconnected to each other alternatively and experimentally by using the *Detecting-drawing Stick* and the drawing method used in drawing practice two (Figure 4.18). By placing the drawing paper above me during the whole drawing process, I reduced the use of vision and my control over the visual appearance of my drawings. By receiving the electric impulses provided by the *Detecting-drawing Stick*, I decreased my control of the drawing instrument. On the other hand, the electric impulses created a physical connection between me and the subjects during the drawing process so that the subjects and I gained a new kind of intimate relationship.

During the drawing process, I disassembled one of the selected time measurement devices and sorted its components into groups according to their original position in the device. Then, I detected the conductivity of each of the components and drew them in sequence, each group on a separate piece of semi-transparent tracing paper. After all the drawings were completed, I layered them in the order, corresponding to the time they were produced. All the marks shown on the layered tracing paper expressed my whole perceptual experience of the artistic production.

4.6.2 ***The drawings and exhibition***

In the exhibition, the drawings composed of layered tracing paper were hung in front of two standing LED lights. The backlight was used to emphasise the different levels of tone and saturation of the marks drawn on the tracing paper, so the variety and complexity of the visual appearance of the drawings could be increased (Figure 4.26 and Figure 4.27). To enhance the audience's empathy and understanding of my perceptual experience of this drawing practice, I presented the *Detecting-drawing Stick*, the subject drawn and my drawing process within the exhibition. Audience members were invited to try the *Detecting-drawing Stick* to experience the electrical stimulation in person. The wall clock and the digital clock drawn in this practice

were taken apart and placed on a table below the drawings (Figure 4.25) to show the shape and the material of what I detected and drew. Black-and-white videos of my drawing process and detecting process (Figure 4.28) {see Appendix A: Drawing and detecting. mp4} were projected beside the drawings (Figure 4.24).

Figure 4.24 The setting of the exhibition

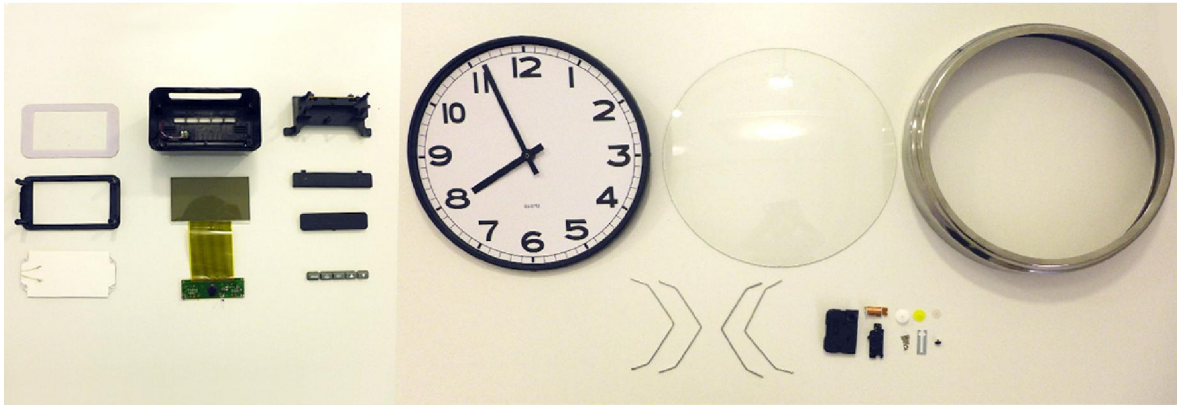

Figure 4.25 The components of the two clocks drawn in this practice

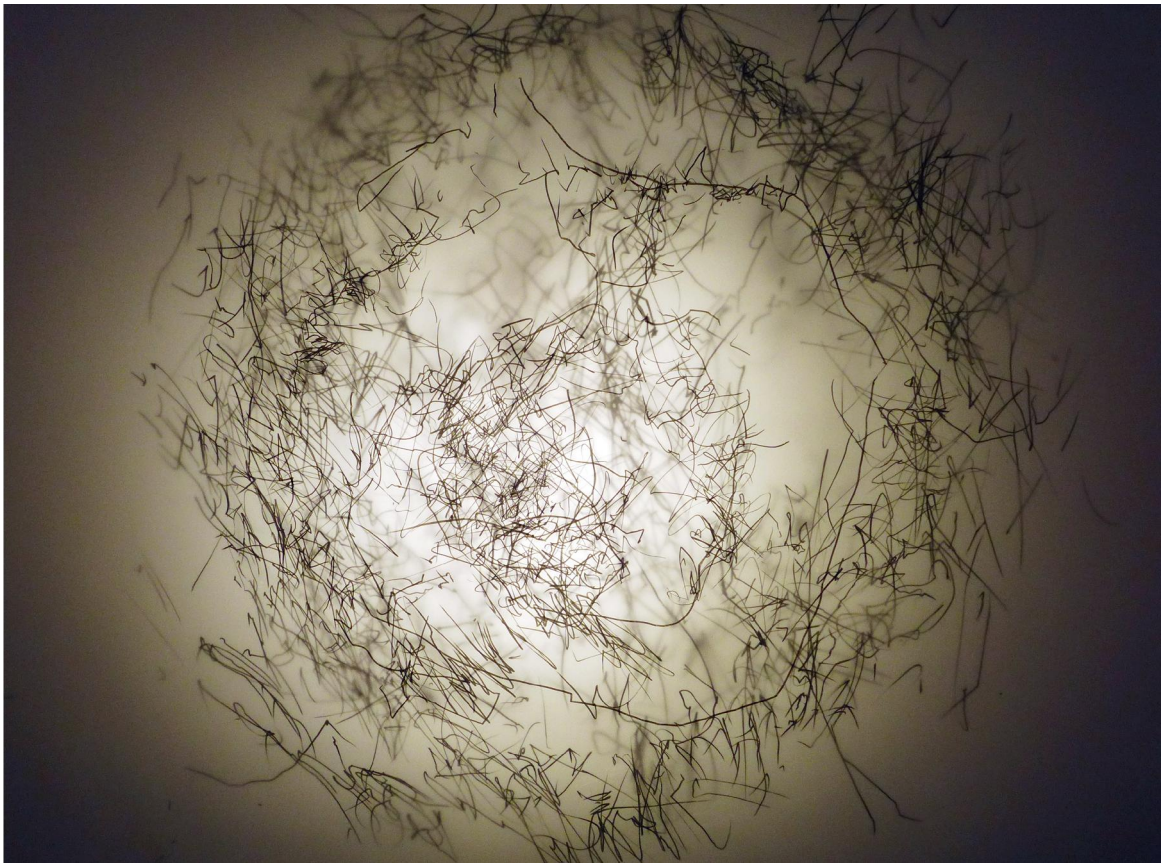

Figure 4.26 The drawing of the wall clock with a backlight, 80 x 60 cm

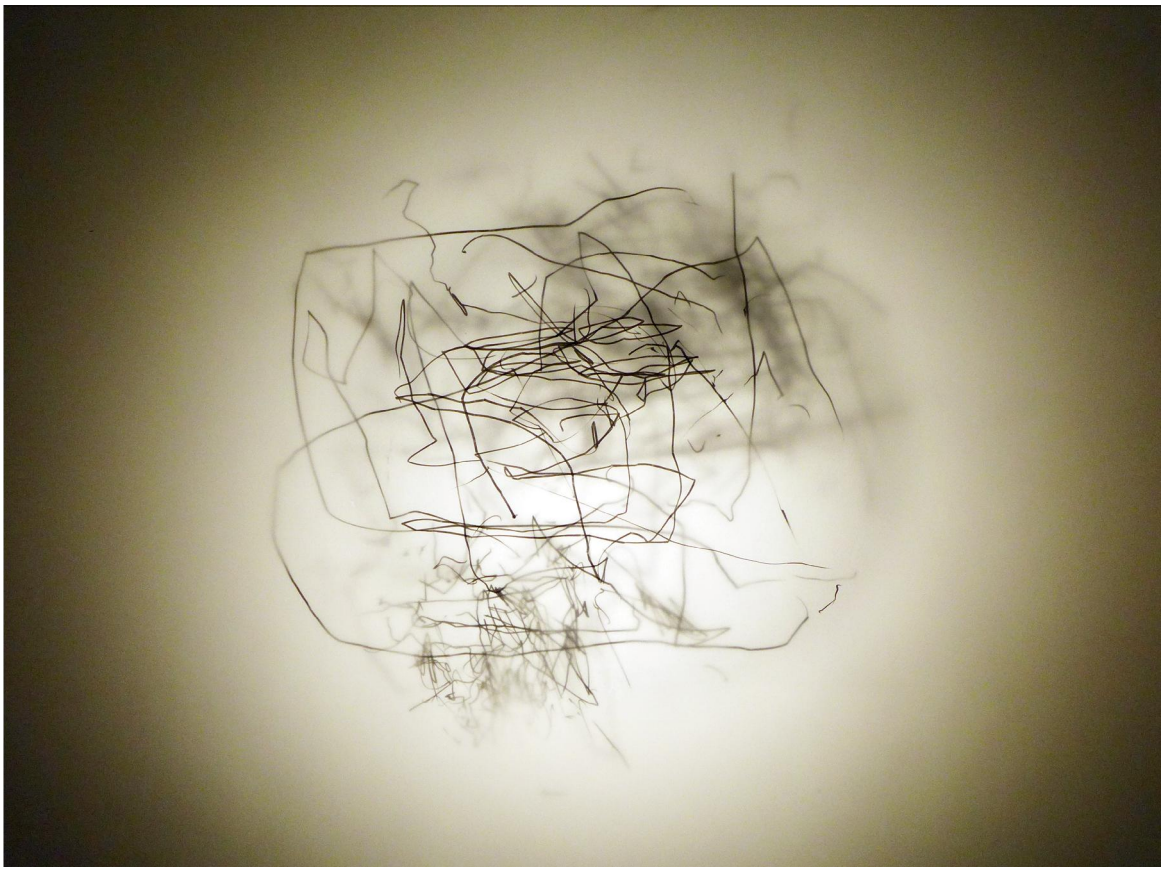

Figure 4.27 The drawing of the digital alarm with a backlight, 80 x 60 cm

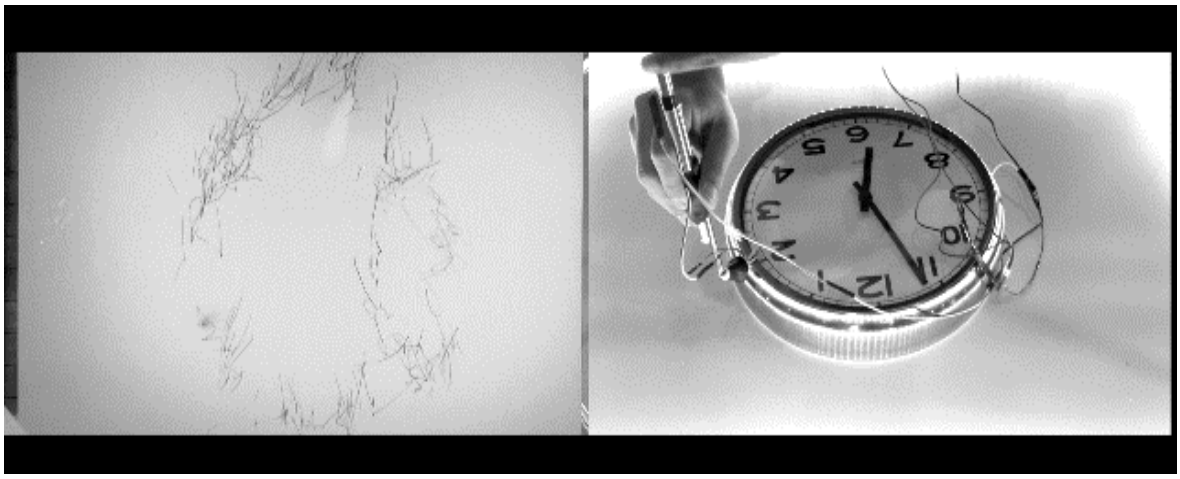

Figure 4.28 The video of my drawing process and detecting process presented in the exhibition

4.6.3 *Audience feedback*

During the exhibition, some audience members indicated that after staring at the drawings (Figure 4.26 and Figure 4.27) for a while, they felt as if they were absorbed in the artworks. This feeling derived from not only the complexity of the tangled, irregular marks but also the variety of the darkness and clarity of the marks. There was a small space between each piece of tracing paper when they were stacked together, so when the stacked tracing paper was lit from the rear, the marks on the more distant paper became more blurred. This increased the visual depth of the appearance of the drawings and composed a three-dimension-like visual effect. This visual effect could be improved further by increasing the amount of layers of the stacked drawings.

Although the subjects drawn – the components of the two clocks – were presented just below their corresponding drawings (Figure 4.24), most audience members could not figure out the relationship between the displayed clock components and the drawings without reading my introduction. This was because the drawings of the components were stacked together to compose the two final works, but the components were presented in a spread way to provide an exploration view of the clocks. This inconsistency confused some audience

members' interpretation of the artworks. This problem could be solved by shifting the display of the components to the front of the projection of my drawing/detecting process.

A few audience members refused to try the *Detecting-drawing Stick* in person when I invited them. Although understanding that the electrical stimulus provided by the device is safe and harmless, they were still afraid of the electrical shock. This phenomenon reminded me that not all viewers were happy to let their perceptions be distorted, even if the experience had attracted their curiosity. Some audience members felt more comfortable seeing others' reactions, clumsy behaviour and scared facial expressions. This implied that the interaction between the users and the kinaesthetic distortion device was performative.

In addition, most audience members reflected that my demonstration of the *Detecting-drawing Stick* and their actual use of the device made them able to 'understand' and 'imagine' how the drawings were produced. However, instead of the understanding of the drawing process what I really wanted to achieve was to enable the audiences to fully 'feel' and 'experience' my distorted kinesthesis during the artistic production. My demonstration of the *Detecting-drawing Stick* could not achieve this goal alone. A more immersive way of introducing the device is needed. To achieve a deeper empathy, one possibility would be to develop software to record the timing and intensity of electrical impulses that I received during my drawing process. Then, to build an installation that could recreate the exact electrical stimulus according to the recorded data. The audience members would be able to 'feel' my distorted perceptual experience by interacting with the installation.

4.7 Preliminary Discussion

This section presents a short discussion of the experimental painting and drawing practices. The summaries of the practices and the identified findings are first described. They are followed by preliminary answers to the research questions.

One painting and three drawing experiments involving the use of kinaesthetic distortion devices were implemented. Each of them was built on the experience and outcomes of the one before. In the experiments, my vision was limited with pre-designed environments and methods of painting and drawing. My kinesthesis and control of painting and drawing hand were also disrupted by the kinaesthetic distortion devices. The devices made my painting and drawing hand twitch involuntarily while producing artefacts. The intensity of the electrical impulses provided by the device corresponded to the degree of conductivity of the still life subjects.

These painting and drawing experiments demonstrated an alternative relationship between perceptual devices, artists' perceptions and artistic production. The kinaesthetic distortion devices confused my sense of bodily movement and reduced control of my hand, making painting and drawing more difficult.

The findings observed through analysing the paintings and drawings, my behaviour of artistic production and audience feedback are summarized below. Firstly, the kinaesthetic distortion devices were able to effectively reduce my control over producing the paintings and drawings. Secondly, my habit of making realistic still life paintings limited the effect of the kinaesthetic distortion device in *Experimental Painting Practice.* Thirdly, although uncontrollability of the hand can decrease the quality of paintings (Figure 4.12 and Figure 4.13), it can also generate interesting visual effects and make the drawings more experimental

(Figure 4.16, Figure 4.22, Figure 4.26 and Figure 4.27). In addition, the use of kinaesthetic distortion devices inspired the creation of new painting and drawing methods, such as the method relying on touching (introduced in section 4.3), the linear drawing method (section 4.4) and the one preventing me from seeing my work during the drawing process (section 4.5). Lastly, the interaction between the users (artists and audience members) and the kinaesthetic distortion devices have performative qualities.

These findings can preliminarily answer the research questions proposed in section 1.3. With regard to *"How can artists and their artworks be influenced by the use of kinaesthetic distortion devices during artistic production?"*, similar to visual distortion devices, the use of kinaesthetic distortion devices can greatly reduce artists' control of artistic production. Although this uncontrollability may reduce the quality of artefacts, it also provides chances to create artistic serendipities, making artworks more interesting and experimental. To *"What is the potential of applying kinaesthetic distortion devices in artistic production?",* the findings imply that the use of kinaesthetic distortion devices can lead to the creation of new forms of artistic production. It also has the potential to turn the process of making art into contemporary performances just like the use of visual distortion devices. As mentioned in the discussion of the use of visual distortion devices in section 3.8, these answers are just parts of all possible answers. More of the influence and potential use of kinaesthetic distortion devices can be further explored in different artistic practices.

The discussions presented in both this section and section 3.8 are based on the findings themselves. In the next chapter, the findings will be discussed in a broader context by comparing and contrasting them with relevant artists, artworks and theories. Also, the process of prototyping sensory distortion devices and the development of the experimental artistic practices will be reviewed.

Chapter 5. Comprehensive Discussion

So far, the findings observed from the experimental calligraphy, painting and drawing practices have only been discussed by themselves. To increase the impact of this research in the art field, a comprehensive discussion is needed. In this chapter, the experimental artistic practices are examined from more aspects. Contemporary art practices and theories are referenced, identifying the position of this research in the field of art. Also, practical suggestions relating to the use of sensory distortion devices in making art are made to artists who are interested in this field.

The discussion presented in this chapter includes the relationship between the development of artistic practices and the prototyping of sensory distortion devices (section 5.1), the generation of alternative writing, painting and drawing methods (section 5.2), the influence of distorted visual and kinaesthetic perceptions on the artists' performances (section 5.3), the features of the experimental artefacts (section 5.4), the performative qualities of the process of producing the artefacts (section 5.5) and the exhibition of the experimental artistic projects (section 5.6).

5.1 The development of the artistic practices

The initial purpose of developing the calligraphy, painting and drawing practices presented in this thesis was to investigate the artistic potential and the influence of visual distortion devices and kinaesthetic distortion devices on artists and their artworks. The design of the sensory distortion devices was therefore placed at the centre of the development of new artistic practices. As the work flow of project development showed in section 3.2 and section 4.2, this device-centred approach to developing artistic projects strongly influenced the generation of ideas, the methods of production and the contents of the artworks. This section

presents my strategies for developing the experimental artistic practices, to provide useful, referential examples for artists.

5.1.1 *The coherence between device use and artistic expression*

The two device-centred work flow diagrams presented in section 3.2 and section 4.2 show two different ways of developing artistic practices involving the use of sensory distortion devices. The biggest difference between the two is the order of the generation of the art contents and the prototyping of the devices. In the development of the calligraphy project, the prototyping of the visual distortion devices led to the choice of Chinese poems being used as the content. On the other hand, in the construction of the painting and drawing projects, the 'still life' content was decided first and this decision guided the prototyping of kinaesthetic distortion devices. Although the two processes of developing the artistic practices were different, my attitude towards the relationship between artistic content and the use of sensory distortion devices was the same. In both cases I emphasised the coherence between device use and artistic expression. All the written, painted and drawn content applied in the experimental artistic practices should be fully supported by the design and use of visual and kinaesthetic distortion devices. This attitude relates to visual artist Lisa L. Cyr's opinion on the use of tools and techniques in creating mixed media artworks:

> *The choice to use one substrate, tool or technique over another is never random but quite deliberate. Ever mindful of the conceptual intent, each conscious choice becomes part of a collective whole in the overall reading of a work. (Cyr, 2011: 21)*

According to Cyr, the meaning of an artwork is interpreted alongside the artist's choice of tools, materials and techniques. This implies that the use of tools, materials and techniques

must relate to the concept, otherwise the expression may be weakened or become confused.

Contemporary sound artist Michel Waisvisz also proposed a similar perspective regarding new instrument design. In a text written to guide a panel discussion at the *New Interfaces for Musical Expression (NIME)* conference in 2006[42], Waisvisz indicated:

> *If our goal is musical expression we have to move beyond designing technical systems…. We should abolish the illusion of 'control'. Merge our intentions into those of the instrument and the audience…designing for new musical expression is casting a spell on instrumental practice. (Waisvisz, 2006: 415)*

Waisvisz pointed out that the ultimate purpose of developing new sound instruments was to explore new musical expression. Therefore, he reminded designers not to overemphasize technical control and suggested that they consider art expression and their intentions during the design of new sound instruments.

As in Cyr's and Waisvisz's statements, developing a mutual supporting relationship between art content and the use of sensory distortion devices was one of the goals in my project development. The purpose of developing visual and kinaesthetic distortion devices was not just to disrupt artists' perceptions but to express art as well. My strategy – pursuing the coherence between device use and art expression – not only increased the rationality of applying sensory distortion devices in artistic production, but also helped the visual and kinaesthetic distortions to become unique techniques of art expression. Also, this strategy

---

[42] *The New Interfaces for Musical Expression (NIME)* conference is an international conference which explores the possibility of new musical interface design from the viewpoint of interface design, human-computer interaction and computer music.

facilitated the construction of artistic projects by providing me with a clear direction for designing sensory distortion devices and creating art content. It turned the determined perceptual devices and content into valuable resources for stimulating my creativity.

5.1.2 ***Designing opposite to the concept of usefulness***

The design notions opposite to the concept of usefulness introduced in section 1.1.2 influenced my development of experimental calligraphy, painting and drawing practices. Following the principle of *Counter-Functional Design*, I inverted the typical function of perceptual devices. Instead of making the creation of artefacts easier, the visual and kinaesthetic distortion devices were developed to make it harder. As *Counter-Functional Design* suggests, new user experiences and the potential of perceptual devices are explored in this research. This will be described further in section 5.2, 5.3 and 5.4.

Design for ambiguity indicates that systems providing ambiguous information can create a deeper and more personal connection between users and the systems (introduced in section 1.1.2). Influenced by this concept, *Sight-limiting Device* used in *Writing Calligraphy with Restricted Sight* was designed to provide the users ambiguous visual information. The device allowed one calligrapher to see only a very small part of strokes written by the other. The strokes and characters became unrecognizable to the users. The uncertainty led Ko and me to engage in the artistic experiments deeply, developing our own personal interpretation of what we saw. This eventually allowed us to create calligraphic works with unique styles (described in section 3.5.4.2).

Ludic Design suggests pleasurable situations can encourage people to have more subjective engagements with designed objects and benefit the exploration of the new potential of technologies (introduced in section 1.1.2). Based on this, the challenging experimental

artistic practices were developed to be playful. Although Ko sometimes felt unconfident and struggled in the experimental calligraphy practices, his overall experience of writing calligraphy with distorted vision was still enjoyable (personal communication, 23 February 2015). I, as the designer of the practices, enjoyed all the challenges. With our full engagement, the potential of visual and kinaesthetic distortion devices was found, which is that the devices can benefit the exploration of new artistic methodologies (mentioned in section 5.2.5).

5.1.3 ***Designing / thinking through prototyping***

During the process of project development, ideas on exactly what kind of distorted perception to use, what specific sensory distortion device to build and how to use the device in making calligraphy, paintings and drawings were gradually formed and became clearer during prototyping. In this case, prototyping was a process of exploring possibilities instead of a process of materializing pre-decided design ideas or thoughts as many designers consider it (Yang, 2005; Moggridge, 2007; Lim, Stolterman, & Tenenberg, 2008; Christie et al., 2012). This thinking-through-prototyping design method echoes philosopher Tim Ingold's concept of thinking though making. Ingold challenges the traditional making-through-thinking assumption that making is to impose form upon material according to a design in mind. He indicates that:

> *the forms of things arise within fields of force and flows of material. It is by intervening in these force-fields and following the lines of flow that practitioners make things.…Rather than reading creativity 'backwards', from a finished object to an initial intention in the mind of an agent, this entails reading it forwards, in an on-going generative movement that is at once itinerant, improvisatory and*

rhythmic. (Ingold, 2010: 91)

Ingold argues that creativity is generated through physical and improvisatory engagement with the materials. It is derived from an on-going binding together of material flows, practitioners' movements and their sensory awareness and thoughts. My visual and kinaesthetic distortion devices were developed without clear plans or design. They were produced while I played around with the chosen components freely, intuitively and improvisatorially. My sensory awareness and thoughts joined with the flow and change of the components during the prototyping process. This deep engagement naturally led me to develop innovative devices and unique ways of writing calligraphy, painting and drawing. The innovation also benefited from the low-skill-required prototyping method. The method prevented me from being distracted by solving tedious technological problems and allowed me to fully concentrate on the exploration of possibilities.

5.1.4 *An extension of Ingold's perspective of kinaesthetic and material flow*

In the book Making, Tim Ingold uses Figure 5.1 to explain his perspective on the relationship between the movement of kinaesthetic awareness and the flow of material (Ingold, 2013: 103). After examining practices, such as flying a kite, making a pot, tying a noose and playing a cello, Ingold argues that *"the movement of kinaesthetic awareness (respectively of the flyer, the potter, the herdsman and the player) is converted by way of a transducer (respectively kite, wheel, toggle and cello) into a corresponding flow of material (respectively of air, clay, rope and sound)"* (ibid). This argument can also be used to explain the relationship between the artists' kinaesthetic awareness, devices and the flow of artefacts in my experimental artistic practices. The movement of the artists' kinaesthetic awareness was converted through the sensory distortion devices into a corresponding flow of the experimental artefacts. The visual distortion devices converted the movement of Ko's and my

kinesthesis, which was influenced by our distorted vision, into the flow of the calligraphy. The kinaesthetic distortion devices transformed the movement of my distorted kinesthesis, caused by the uncontrollable actions of my painting and drawing hand, into the flow of the paintings and drawings. Figure 5.2 extends Ingold's perspective by adding new examples based on the experimental calligraphy, painting and drawing practices. This implies that Ingold's theory can be also used in digitally mediated practices and experimental artistic practices.

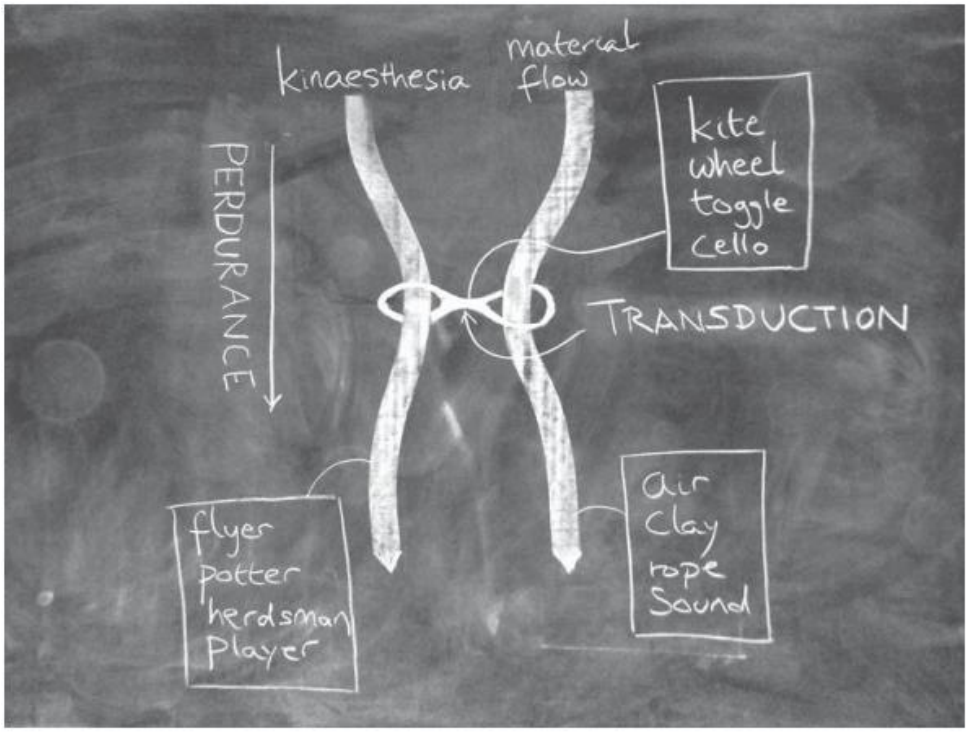

Figure 5.1 The diagram of the movement of kinaesthetic awareness and material flow (Ingold, 2013: 103)

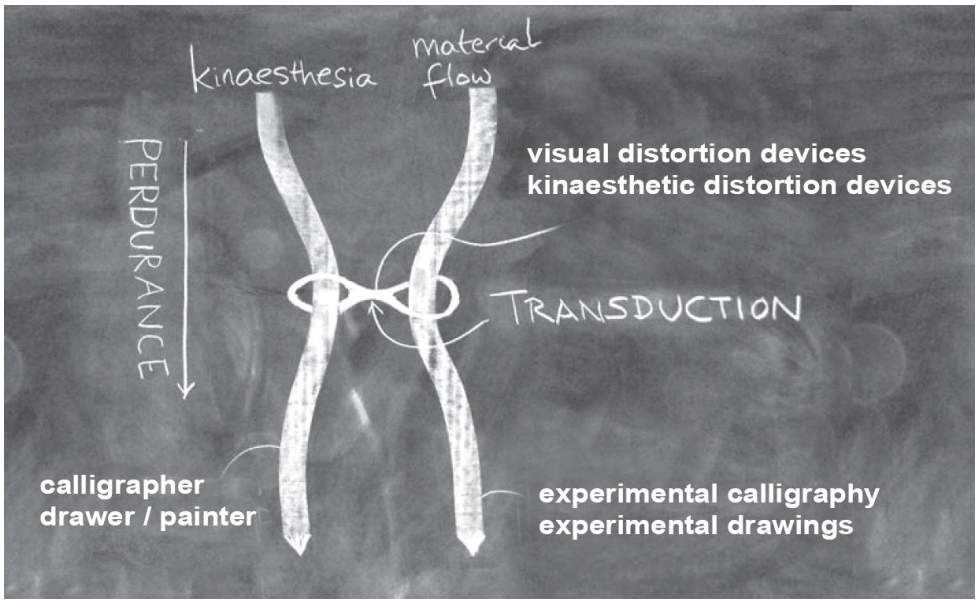

Figure 5.2 Ingold's diagram with new examples based on the experimental artistic practices conducted in this research

5.2 The methods of producing artefacts with sensory distortion devices

The different ways of writing calligraphy, painting and drawing outlined in Chapter 3 and Chapter 4 originated from four concerns. The first was inspired by the distorted perceptions provided by sensory distortion devices. The second was the artists' physical and mental responses to their distorted perceptions. The third was the consideration of artistic expression and the last was the improvement of problematic methods of making artworks. This section explains the generation of the different methods of producing artworks as applied in this research and argues that the use of visual and kinaesthetic distortion devices can promote the exploration of new methods of art making.

5.2.1 *Methods inspired by distorted perceptions*

Clear instructions for applying sensory distortion devices in the production of art were created along with the sensory distortion devices during prototyping. The methods of use were developed in consideration of the confusing perceptual experiences caused by the sensory distortion devices and how they might influence artists' behaviour. The calligraphic

writing methods were inspired by aspects of artists' distorted visual perceptions and the painting and drawing methods were inspired by features of the artist's distorted sense of bodily movement. All methods were designed to disrupt artists' behaviour of making art as much as possible, but in such a way that new practices might come into existence.

The *Viewpoint-exchanging Device* and the *Sight-limiting Device* were both designed for two users to operate simultaneously. This aspect provoked me to develop the calligraphic writing methods by focusing on finding a way of letting the two calligraphers influence one another through the devices. After repeatedly trying and modifying, the devices were both designed to enable one calligrapher to control the other's visual perspective. Inspired by the uncontrollability of the calligraphers' perspectives, the synchronous writing method, that required Ko and me to write calligraphy in response to each other's writing behaviour, was developed for the *Viewpoint-exchanging Device*. The 'blind-following' writing method, which required Ko and me to imitate each other's writing behaviour when we each played the role of follower, was created for the *Sight-limiting Device*. The two writing methods not only presented challenges for Ko and me but also provided two possible ways of interacting and communicating with each other through visual distortion devices during the production of cooperative calligraphic works.

5.2.2 ***Methods generated from artists' responses and strategies***

The writing methods which were developed along with the visual distortion devices during the process of prototyping were pre-designed before the calligraphy practices actually began. Influenced by the design strategies of *Defamiliarization* and *Breakdown* (introduced in section 1.1.3), the main purpose of these writing methods was to set specific, challenging tasks for Ko and me by using the visual distortion devices. The pre-set writing methods broke down Ko's and my habitual eye-hand correspondence, increasing the difficulty of calligraphy

writing by disrupting the relationship between brain, vision and bodily movement. This challenging situation made us naturally refocus on our writing behaviour, provoking us to develop our own individual writing methods according to our background and intelligence.

In the exercise *Writing Calligraphy with Exchanged Viewpoints*, we both knew that Ko had much more experience and better writing skills than me. This awareness strongly influenced the roles we played and the strategies we applied. Ko spontaneously led this collaborative writing exercise, and I naturally followed his guidance and his writing behaviour. Ko regarded my writing behaviour, as presented on the *Viewpoint-exchanging Device*, as a way of guiding me in how to write rather than as a resource for inspiring his work. He wrote using his muscle memory and writing habits developed over his long-term writing experience. Ko also found the images provided by the *Viewpoint-exchanging Device* distracting, so at times he ignored what he saw and developed his own vision-ignored writing method. I, on the other hand, wrote calligraphy by copying Ko's writing speed, writing direction and writing strength. During my writing process, I focused on closely observing Ko's writing behaviour as presented on the *Viewpoint-exchanging Device*, moving my writing hand according to what I saw. The writing method I presented was totally vision-led.

In the exercise *Writing Calligraphy with Mirrored View*, left/right reversed images provided by the *View-mirroring Device* seriously distorted both Ko's and my habitual eye-hand correspondence. The mirrored images and Ko's strong writing habit meant that Ko could not help but produce left-inclined and right-shifted characters. To attempt to correct this, Ko's writing behaviour became problem-solving-oriented. He presented a problem-solving writing method involving deliberate adjustment of the stroke angle and position of characters. On the other hand, the mirrored images induced me to see the writing task from a new perspective, regarding it as a drawing activity. I was so focused on creating ideal shapes for the strokes and

characters that my writing order and the direction of the Chinese characters were at times totally incorrect. I presented a drawing-oriented method of writing calligraphy.

The generation of Ko's and my unique writing methods as mentioned above proved the effectiveness of the strategies of *Defamiliarization* and *Breakdown* in exploring new and creative methods of writing calligraphy. The creativity and innovation occurred by forcing Ko and me to overcome the pre-set challenges of writing calligraphy using an unfamiliar aspect of vision provided by visual distortion devices. The effect of this method was influenced by the degree of Ko's and my sensory adaption to the distorted perceptions. According to George Malcolm Stratton's inverted-glasses experiment conducted in 1896, it can take only a short time to successfully adapt to distorted visual perceptions (Stratton, 1896). Stratton wore a monocular spectacle composed of double-convex lenses that rotated his visual field 180 degrees. He found himself nearly completely adapted to the new vision and sometimes stated that the upside-down visual field looked upright, or 'normal' (Welch, 2013: 112). In the same way, Ko and I also gradually got used to the distorted vision provided by the sensory distortion devices during our writing process. The more we adapted to the unfamiliar visual experience, the lower the chances that we would develop new methods of writing calligraphy. This implies that a challenge of exploring new artistic practices through sensory distortion devices is the adaption to distorted perceptions.

5.2.3 ***Methods developed for art expression***

The painting method outlined in section 4.3.1 was developed to express the painting content (still life). The work flow presented in section 4.2 shows how the theme of the experimental painting project guided the prototyping of the *Muscle-stimulating Conductivity Detector* and the method of using the device to make paintings. In order to present the degree of conductivity of still life and reduce the use of vision, fruit and vegetables were perceived

only by using touch and the *Muscle-stimulating Conductivity Detector* and were not able to be seen.

5.2.4 *Methods created for improving the previous problematic drawing methods*

The drawing methods used in the first and second drawing practices (outlined in section 4.4 and section 4.5) were created to solve the problems that occurred in the previous practice. The linear or banded drawing method applied in *Experimental Drawing Practice One* was developed to avoid the counteraction of the involuntary movement of my hand that occurred in *Experimental Painting Practice*. This created a drawing process very different from my habitual one by providing me with very clear steps to follow and predetermining the drawing area for each subject. The drawing method applied in *Experimental Drawing Practice Two* was created to prevent the reciprocal distraction of the tactile and kinaesthetic sensations which occurred in the previous painting and drawing practices. This method abandoned the technique of sensing subjects by touch and applied a new technique to reduce the use of sight.

5.2.5 *A potential way of exploring new artistic methodologies*

The development of sensory distortion devices and experimental artistic practices facilitated the creation of alternative methods of writing calligraphy, painting and drawing. Distorted perceptions, artistic content, artists' responses and challenging methods of making artwork all became inspiring resources and new methods of producing art. They caused the generation of various kinds of creative calligraphic writing methods, such as the synchronous method, the blind-following method, Ko's habit-oriented method, my vision-leading method, Ko's problem-solving method and my drawing-oriented method. They also led to the creation of the painting method of sensing subjects by touch, the linear drawing method and the drawing method that prevented me from seeing my drawings as they were being made. Therefore, applying sensory distortion devices in making art is a way of creating and

exploring new artistic methodologies.

5.3 Artists' influenced performance of producing artefacts

According to the observation and analysis of each artistic practice mentioned in Chapter 3 and Chapter 4, the artists' performance was influenced a great deal by the use of sensory distortion devices. Sometimes the distorted perceptions and unfamiliar methods led the artists to create work beyond their original capabilities. Sometimes, they inhibited the artists' performance. Utilising Csikszentmihalyi's *flow theory*, I investigated the factors causing these different results, and propose some practical suggestions.

5.3.1 *Csikszentmihalyi's flow theory*

Psychologist Mihaly Csikszentmihalyi began his study of flow experience in 1975 (Csikszentmihalyi, 1975). He indicated that flow was a "subjective state that people report when they are completely involved in something to the point of forgetting time, fatigue, and everything else but the activity itself" (Csikszentmihalyi & Rathunde, 1992: 59). People fully concentrated and absorbed in the activity and situation at hand are in the state of flow. Csikszentmihalyi (1990) argued that flow is an optimal psychological state that can provide people with an enjoyable and rewarding experience. Flow, as an optimal mental state, has been associated with peak performance (Jackson, Thomas, Marsh, & Smethurst, 2001: 130; McInman & Grove, 1991). It is believed to be able to enhance performance because of its special features such as the lack of worry of failure (Csikszentmihalyi, 1996), higher concentration and sense of control (Schüler & Brunner, 2009: 169). The sense of control refers to "a sense that one can control one's actions; that is, a sense that one can in principle deal with the situation because one knows how to respond to whatever happens next" (Nakamura & Csikszentmihalyi, 2002: 90). Csikszentmihalyi also regarded "a balance between challenge and skill" as one of the most important conditions of achieving flow status

(ibid). The challenge-skill balance can be explained by Figure 5.3. This diagram is made after Csikszentmihalyi's diagram presenting the model of flow state in his book *Flow: The psychology of optimal experience* (Csikszentmihalyi, 1990: 74). It demonstrates flow state based on perceived challenges and skills.

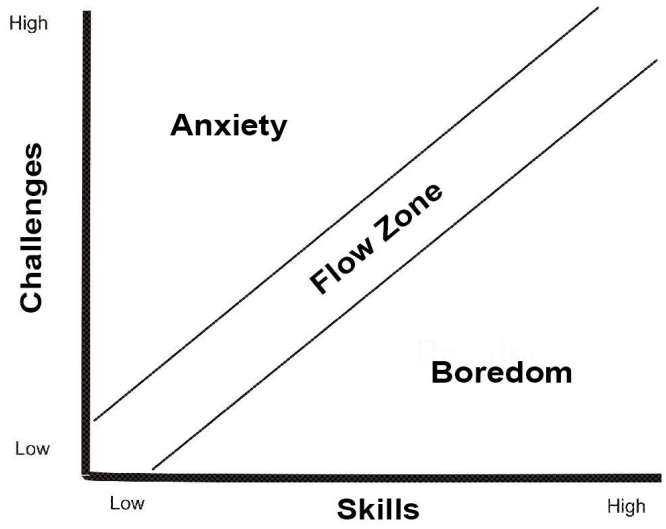

Figure 5.3 The model of flow state

According to Csikszentmihalyi's *flow theory*, different relationships between challenges and skills can generate three different regions of experience. The region of anxiety is generated from high-challenge low-skill situations. People feel anxious while facing challenges that exceed their capacities. In contrast, boredom happens in low-challenge but high-skill situations. People feel bored when their capabilities are higher than the challenges they confront. At last, flow state is achieved when challenges and skills matched, either in high-challenge high-skill situations or low-challenge low-skill situations. Thus, in order to achieve flow state, challenges should be at a level appropriate to one's capacities, neither too difficult nor too easy.

5.3.2 *Ko's and my performance of writing calligraphy*

According to the challenge-skill balance argument, professional calligrapher Ko had more opportunities to achieve flow state and perform better than me in the calligraphy projects because Ko was a very experienced calligrapher. He was therefore able to focus more directly on dealing with the challenges derived from the distorted vision. My lack of writing experience and skill however made simply writing the calligraphy a significant challenge. Therefore the level of difficulty of the calligraphy projects was more appropriate to Ko than me, leading to Ko's writing performance being predictably better than mine.

However, using the *Viewpoint-exchanging Device* and its corresponding synchronous writing method, I managed to produce a calligraphic work with a much more attractive appearance and visual contrast (Figure 3.19) than Ko's (Figure 3.20). My writing performance was better than Ko's in this exercise. This unexpected result contests Csikszentmihalyi's argument of challenge-skill balance. Significant challenges beyond my original capability enhanced my performance, whereas challenges with relatively appropriate difficulty reduced Ko's performance.

This unforeseen phenomenon was closely related to Ko's and my willingness to be open to the unfamiliar calligraphy practice. The challenging practice initially developed for the artists to overcome can be transformed into an interesting practice developed for inducing artistic exploration if the artists are open to the distorted visual perceptions and the unfamiliar writing methods. The practice-transformation is an important factor in Ko's and my performance. However, the challenge-skill theory seems to have an inadequate recognition of this.

As a professional calligrapher, Ko naturally focused on pursuing the original quality of his calligraphic work. He regarded the exchanged vision and the synchronous writing method as in direct conflict with his extensive writing habits and long-term writing experience. He was very resistant to its influence, sometimes trying to ignore the visual information provided by the *Viewpoint-exchanging Device* or fight against it. This negative attitude obstructed his flow status, affecting his confidence and causing fear of failure. It also made Ko resist practice-transformation, locking him in a sub-optimal challenge-skill balance. This in turn impacted on his calligraphy, causing ink expansion and an inability to consider the expression of the ink tonality and the meaning of characters as he usually did.

I, on the other hand, was relaxed and had an open mind in relation to the exchanged vision and the synchronous writing method. This positive attitude made me open to the possibility of practice-transformation so as to find a new flow state. Although the writing task seemed too hard to me, I did not care about the final appearance of my calligraphic work and just let things happen, appreciating the results created by accident. In the end, I had an enjoyable, playful writing experience.

In the use of the *Sight-limiting Device* and the *View-Mirroring* Device, Ko's and my levels of performance were also influenced by our individual willingness to be open to the challenging calligraphy practices. When Ko wrote using the *Sight-limiting Device* and the blind-following writing method for the first time, he felt very unconfident and tried to guess the characters that I was writing. This lack of confidence and the distraction derived from the guesses resisted practice-transformation and prevented Ko from reaching flow state. He produced a calligraphic work with very loose character structures and dull ink tonality (Figure 3.31). However, this changed when he wrote in the same circumstances for a second time. He found that writing by deconstructing and reconstructing characters was very interesting. This

positive attitude led him to be more open to the distorted vision and unfamiliar writing methods. He focused on exploring new artistic possibilities instead of overcoming the writing challenges. Therefore, he concentrated and engaged fully in the writing activity, rather than guessing the characters being written. He enjoyed the writing process a great deal and finally produced a piece of calligraphy with a direct, primitive style (Figure 3.32) that he thought beyond his capability.

When writing using a mirrored view, Ko was very resistant and had a very strong impulse to correct the contradictory stroke angles shown on the *View-mirroring Device*. He struggled with the conflict between the distorted vision and his habitual writing experiences, producing calligraphic works with serious stroke-inclining and position-shifting problems (Figure 3.42). These struggles, based on his refusal to accept a new eye-hand relationship, prevented him from achieving practice-transformation and flow. I, on the other hand, had a less defensive attitude, quickly accepting the unfamiliar writing experience. This may be because I had formed no strong calligraphy habits. I regarded the challenging practice as the one for encouraging the exploration of new artistic possibilities. It turned out that the use of the *View-mirroring Device* enhanced my artistic performance although some of the characters in my work were mirrored. I was able to produce deliberately designed, arranged and well-finished strokes and characters (Figure 3.43) by using the mirrored vision.

5.3.3 ***My painting and drawing performance***

In the later experimental painting and drawing projects, my performance was also influenced by my willingness to be open to new practices. In the painting exercise, the strong reliance on my painting habits formed by creating realistic still life paintings interfered with my representation of the subjects' degree of conductivity using involuntary hand movements. There was also confusion between the expression of the characteristics of the inner material

and surface of subjects. My advocacy of habitual painting habits prevented me from transforming the challenging painting practice into the one encouraging the exploration of artistic possibilities. It reduced my performance, producing representational works that seemed careless and inaccurate (Figure 4.12, Figure 4.13). To try and avoid these negative influences, in later drawing exercises I established a series of clear parameters and detailed instructions. The clarity of each step facilitated the achievement of practice-transformation by freeing me to concentrate on sensing, interpreting and expressing my sensations. Then flow state was achieved. I created expressive and stylish abstract drawings with attractive visual effects (Figure 4.16, Figure 4.22, Figure 4.26 and Figure 4.27).

5.3.4 *An extension of Csikszentmihalyi's flow theory*

Achieving flow state does not necessarily guarantee good performance; however, negative influences preventing Ko and me from flow state, such as fear of failure and lack of confidence, did inhibit our performance. Thus, keeping an open, curious mind, having a positive attitude toward unfamiliar distorted perceptual experiences, appreciating accidents and not judging what has been created during the production process benefit artists' performance when producing artefacts with visual and kinaesthetic distortion devices.

Most examples discussed in the existing flow literature are about established, fixed and known activities, such as sports, games or "other kinds of structured leisure" (Nakamura & Csikszentmihalyi, 2002: 101). These activities have predictable rules and outcomes. However, in this research, artists' performance and the relationship between challenges and skills are discussed in experimental artistic practices which are unusual, unpredictable and full of potential. Csikszentmihalyi's model of flow state seems inadequate in explaining artists' performance in creative artistic practices.

According to the discussion of the artists' performance of writing calligraphy, painting and drawing in the previous two sections (5.3.2 and 5.3.3), Csikszentmihalyi's model of flow state can be extended by adding a new factor – willingness to transform the original high-challenge practice into a new one. This factor can provide artists with more opportunities to achieve flow state in creative artistic practice. In Figure 5.4, the red point located outside the flow zone represents an artist dealing with a practice whose challenge is too great for the skill he has. If he is not willing to transform the practice or to consider it from a different perspective, he stays in the region of anxiety. Whereas if he is willing to transform the practice into a new one to some degree, then his current state can be shifted (the blue arrow), and probably moved into the flow zone (the blue point).

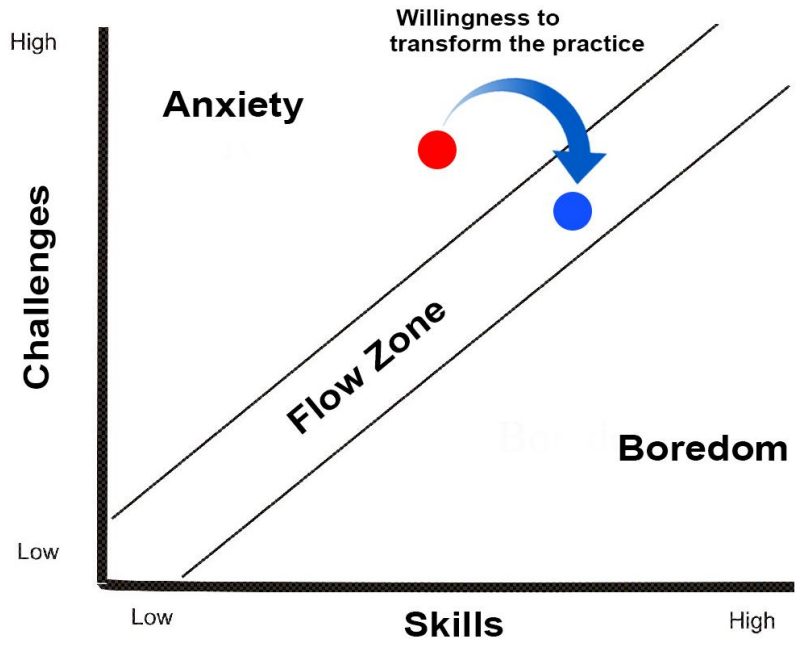

Figure 5.4 The diagram explaining the factor of the willingness of practice-transformation

Although Csikszentmihalyi's *flow theory* does not fully explain creative artistic practices, it is still a useful frame to think through the artists' performance of producing artefacts with sensory distortion devices.

5.4 Unpredictability, irregularity and chance techniques

Unpredictability and irregularity are the common characteristics of the experimental calligraphy, paintings and drawings produced in these projects. They are reflected in misplaced strokes, uncontrollable ink expansions and unexpected ink stains as well as irregular contours, tangled brush lines and marks. These characteristics are mainly generated by methods of artistic production that involve chance and the lack of control. This section focuses on discussing the relationships between the unpredictable and irregular appearance of the artefacts, artists' influenced perceptions, chance and the lack of control. The discussion involves relevant artists and artworks and finally proposes that the use of sensory distortion devices can be an effective chance technique for creating interesting artistic serendipities in the visual arts.

5.4.1 *Unpredictability and irregularity caused by distorted vision*

Many of the experimental projects for this research obstructed the artists' sight of either the objects they were attempting to describe or the artwork being produced. The artists were not visionless, the sight limitations allowed them to see either visual information provided by the visual distortion devices, as in the calligraphy practices, or either the subjects to be depicted or the process of making artefacts in the painting and drawing practices. The artists' distorted vision caused the uncertainty and influenced chance in the process of art making.

Ko's and my distorted sight greatly reduced our control of writing calligraphy. The lack of control accidentally led both of us to create stylised calligraphic works and characters beyond our existing capabilities. For example, I created meaning-corresponding characters (Figure 3.24), calligraphic works with an abstract-drawing-like style (Figure 3.19) and the pictorial-ink-mark style (Figure 3.33). Ko also created calligraphic work with a direct and primitive style (Figure 3.32). These unexpectedly good writing results were produced by

chance.

Many of Ko's and my calligraphic characters produced with the visual distortion devices had random character structures which were developed by incorrectly placed strokes. Characters with random structure are also the main feature of Chinese contemporary artist Xu Bing's artwork, *Book from the sky* (Figure 5.5), exhibited in the Beijing National Gallery in 1988. Xu's work was composed of more than 4,000 unreadable printed Chinese characters with incorrect structures created by the artist. It aimed to remind people "how language has already been abused by those in control of it" and to strike "against those who have violated the written character through modern political propaganda" (Silbergeld, 2003: 2). Although Xu's work was like Ko's and my calligraphic works, having irregular character structures, we generated them by very different means. Xu deliberately created the incorrectness and irregularity of character structures by carefully composing the position of every stroke. He made efforts to design nonexistent characters during the production process. The pre-designed characters were carved onto woodblocks (Figure 5.6) and printed on paper. Xu's method of exploring possible structures of characters greatly relied on his consciousness. In contrast, Ko and I created nonexistent characters totally by chance. We did not pursue incorrect characters on purpose. The irregular character structures were a side-product of the use of the visual distortion devices. We relied more on our instinctive response to distorted vision and unfamiliar writing methods.

Figure 5.5 Xu Bing. *Book from the sky* (1988)

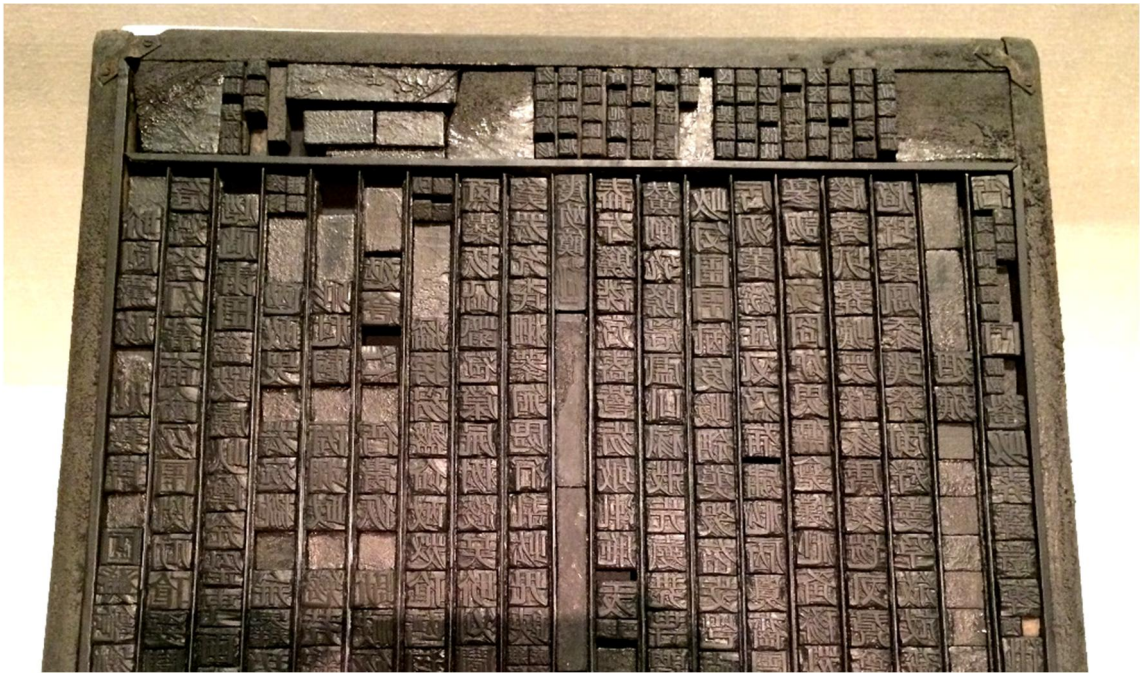

Figure 5.6 The woodblocks of *Book from the sky* ready for printing (Mattern, 2014)

The drawing environment of the second and third drawing exercises (introduced in section 4.5 and section 4.6) placed the drawing paper above my head on a metal frame to prevent me from seeing what was being drawn during the process. This contributed greatly to

the unpredictability and irregularity of the drawings (Figure 4.22, Figure 4.26 and Figure 4.27). Artist Claude Heath also carefully arranged his drawing environment to limit his sight of what he was drawing in order to keep himself in a state of "innocence" about what was being drawn (Kingston, 2003: 21). In the process of drawing *Sedum Burrito* and *Money Plant*, Heath attached two pieces of paper beneath the table where the plants were placed, drawing the plants upside down on the paper under the table (Figure 5.7). He used a system of synchronizing his eye and hand movements just like experimental drawing exercise *Blind Contour Drawing* intrudoced in section 1.2.2. He slowly moved his sight along the contours of the plants little by little as if his eyes were fingertips exploring the plant's surface. Simultaneously, his drawing hand moved, matching the motion of the eyes. In the project *Four-Fold Drawing / Four Plants*, Heath built a free-standing form composed of two long rectilinear boards intersecting at right angles at the centre to form a cross. This formed four areas, each with two surfaces. A piece of drawing paper was attached to each of the eight surfaces (Figure 5.8). In order to draw without seeing the paper, Heath placed a plant in each of the four spaces. He then drew the plants one by one using both his right and left hand (in turn or simultaneously) on the papers pinned on the opposite surface to the segment that held the plant, using the eye-hand-synchronized drawing technique.

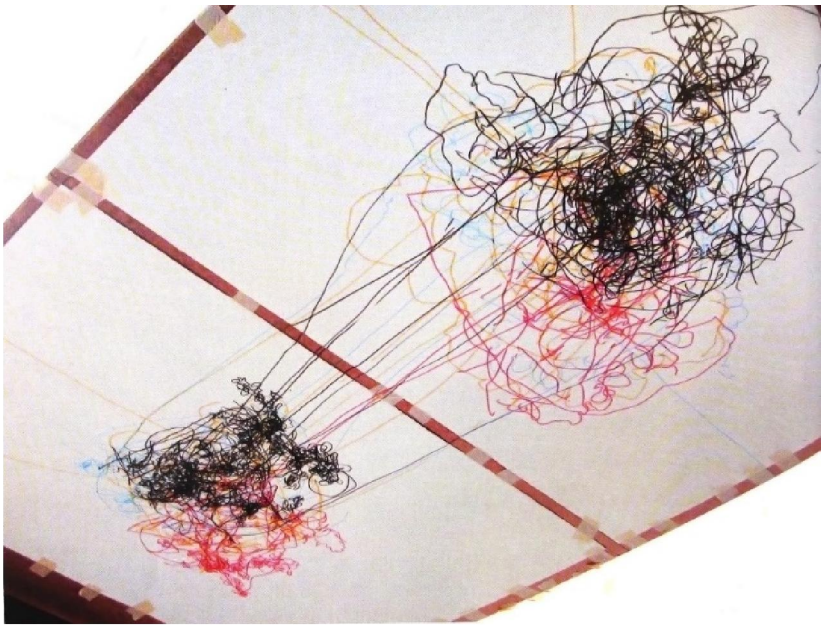

Figure 5.7 Drawings of *Sedum Burrito* and *Money Plant* attached beneath the work table (Heath, 2001)

Figure 5.8 The free-standing form with plants placed in each quadrant in the project *Four-Fold Drawing / Four Plants* (Heath, 2001)

This sight limitation led both Heath and me to create drawings containing many unpredicted, accidental, tangled lines and marks. Both of us drew without seeing the gradual appearance of our work. Heath's projects were made in order to express the "disjunction" between vision, drawing and the appearance of the subject (Patrizio, 2002: 33). I was interested in challenging the importance of vision in artistic production and expressing the concept of disassembling and reconnecting the artist's sensation and bodily movements. Both

of us benefited from sight limitation as it helped us to avoid drawing according to our habitual visual preferences and escape preconceived aspirations and allowed something unpredictable to happen, broadening the potential of drawing.

5.4.2 *Unpredictability and irregularity derived from uncontrollability*

The lack of control over the drawing instruments also led to the generation of unpredictable and irregular marks in my experimental drawings. The electrical impulses, the long length of the drawing implement and the error-prone drawing methods[43] led me to produce vivid, dynamic, random marks by chance, making my drawings more experimental, unpredictable and interesting (Figure 4.22, Figure 4.26 and Figure 4.27).

The electrical impulses provided by the kinaesthetic distortion devices jerked my hand muscles during the drawing process so that my drawing behaviour became uncontrollable. Artist Bryan Lewis Saunders[44] also utilised lack of control to affect his drawing behaviour, directly separating his brain from his drawing hand by consuming stimulant drugs and antipsychotic medicine. In 2011, Saunders produced his famous series of drug-influenced self-portraits made under the influence of legal and illegal drugs, from Cocaine to cough syrup, every day for several weeks. Once the drug started to take effect, he used water colour, pencils, crayons, or acrylic pigments on sketch books to draw himself. When Saunders introduced a self-portrait drawn after consuming PCP[45] (Figure 5.9) to reporters from *The*

---

[43] Error here refers the deviation from how I expect a thing should be done. In this case, error-prone drawing methods refers to drawing methods that can easily give results very different from my initial design.

[44] Saunders is a Tennessee artist who has drawn at least one expressive self-portrait on size 8 1/2" x 11" sketchbooks every day since 30th March 1995. Up until today he has made more than 10,000 different self-portraits, and the number is still climbing. The main theme of these self-portraits is Saunders' sensory experiences. He has presented how he experiences, processes and interprets his own sensory phenomenon through drawing himself (Saunders, 2008).

[45] PCP also known as Angel Dust. It is a kind of anaesthetic with strong side effects of causing dissociative hallucinations and out of body experiences. See http://www.drugfree.org/drug-guide/pcp/

Guardian, he told them that PCP caused immediate brain-body separation, making him unable to control his hand. This brain-body separation made him represent his own face using many warped short lines and random dots below the position where his face was supposed to be drawn.

Figure 5.9 Self-portrait drawn under the influence of the drug PCP (Saunders, 2008)

Although consuming drugs is an effective way of reducing control in order to create irregular marks, this bold method might not be appropriate for other artists to apply in their own artistic production because of its risk to health and illegality. The use of kinaesthetic distortion devices modified from muscle stimulators is however a very safe method. The electrical impulses provided by muscle stimulators are harmless. The circuit of the devices is isolated from high voltage or high current supplies. Also, this method is more flexible than Saunders' drug method in terms of art expression because muscle stimulators can be easily

turned into various kinds of devices reflecting different art concepts, just as I did in the experimental painting and drawing practices.

The length of the drawing instrument and error-prone drawing methods also led to the generation of unpredictable and irregular marks in my drawings. This is exemplified by my use of the *Detecting-drawing Stick* in the second and third drawing practices. The *Detecting-drawing Stick* made with an adjustable antenna was not only a kinaesthetic distortion device but also an innovative drawing instrument. The device was designed to be used vertically in order for the ball-point pen end at the top to directly reflect the position of the detecting points on the objects below. However, it was often misaligned during the drawing process because of the difficulty of keeping it at a perfect right angle and erect all the time. This misalignment of the drawing instrument along with its long length and slight flexibility led to the marks being irregularly created at random positions (Figure 4.22, Figure 4.26 and Figure 4.27).

Making marks with long drawing instruments was also used by American abstract artist Brice Marden in creating artworks. He sharpened one end of long twigs to fit the thickness of the lines that he wanted to create and dipped the end in ink. Holding the far end he would draw on a canvas, vertically placed far away from him (Figure 5.10) (Costello, 2013: 88). Although the long drawing instrument made it difficult to control the exact movement of the drawing tip, Marden claimed that his artworks significantly benefited from this method. When interviewed by art magazine *Purple* in 2012, he mentioned that the long drawing instruments forced him to stand further away from the canvas, and the long distance between him and the canvas allowed him to be more aware of the composition of the whole work, preventing him from over-focusing on drawing the details. In addition, because the long drawing instruments magnified his gestures, he could easily create long, smooth and fluent lines by just moving his body and hand smoothly and rhythmically (Figure 5.11). Also, the unintended splashes and

trickles accidentally made by the long instruments composed unpredictable and exciting visual effects (O'Brien, 2012).

Figure 5.10 Brice Marden holding a long twig to draw (Costello, 2013)

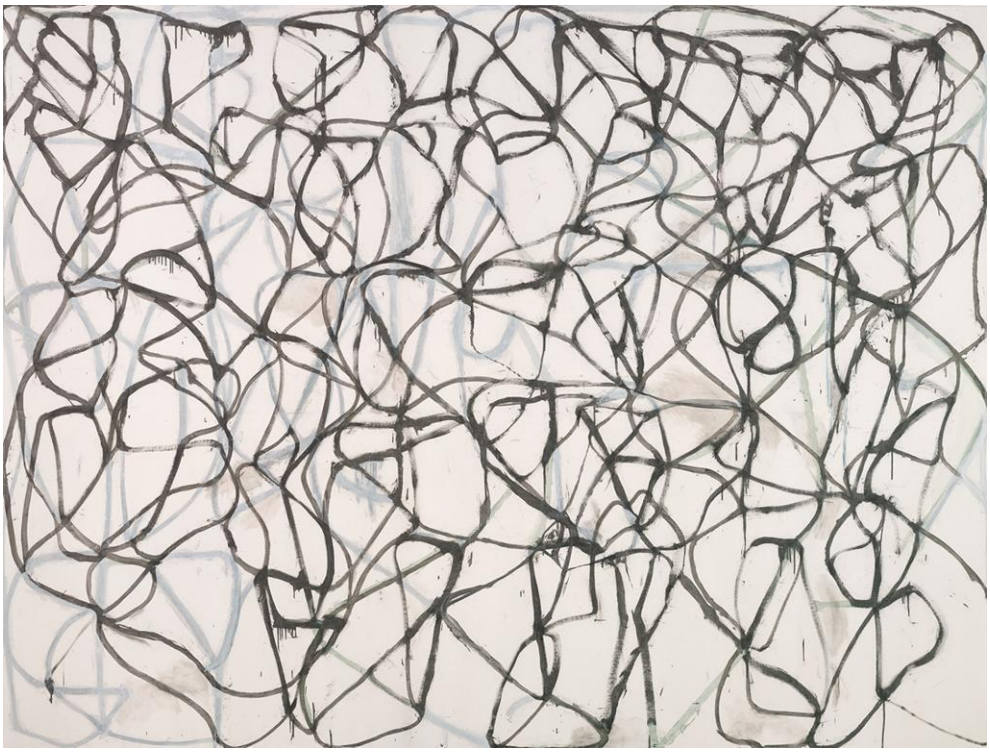

Figure 5.11 *Cold Mountain 6 (Bridge)* painted with long-stick brushes (San Francisco Museum of Modern Art)

Features of unpredictability and irregularity in both Marden's and my works were derived from the use of long drawing instruments. We both regarded the reduction of the accuracy of control as a creative drawing technique; however, our way of using this drawing technique differed quite significantly. Marden replaced regular brushes with long drawing instruments to pursue certain visual qualities in his work. He consciously composed lines created in inaccurate places to develop intended visual effects. He could see the canvas at all times and his vision was not impaired by the methodology during the drawing process. He could focus on the composition of the work as it developed. However, when I drew with the long drawing instrument (the *Detecting-drawing Stick*), my only focus was the detection of the objects' conductivity. My error-prone drawing method prevented me from seeing the paper as the drawing developed and from consciously composing the appearance of drawings, and increased the uncertainty of my works.

5.4.3 *Applying sensory distortion devices as a chance technique*

According to section 5.4.1 and section 5.4.2, distorting the artists' perceptions and influencing their behaviour can make the production of art very uncertain and unpredictable, therefore the use of sensory distortion devices can be regarded as an effective chance technique applied in the visual arts. This special chance technique provided many serendipitous opportunities for the artists. For example, Ko and I both produced works considered beyond our capabilities, such as the stylized calligraphic works presented in Figure 3.19 and Figure 3.32. I also created the vivid, dynamic, expressive marks presented in my drawings (Figure 4.16, Figure 4.22, Figure 4.26 and Figure 4.27). However, the chance technique can also seriously reduce the quality of artefacts, for example it made the visual effect of the calligraphic works presented in Figure 3.20 and Figure 3.31 very dull and my paintings presented in Figure 4.12 and Figure 4.13 very unrefined. Although the use of sensory distortion devices may have negative influences on artworks, it did provide Ko and me with many opportunities to explore new possibilities in terms of making art and made our works more experimental.

In the 20th century various kinds of chance techniques were applied by Dadaists, visual artists and musicians. Dadaists advocated chance techniques to express their opposition to society and critiqued the conventional idea of artistic excellence and mastery (Elger, 2004). Visual artists, such as abstract expressionist Jackson Pollock and Dadaist Jean (Hans) Arp, have used chance techniques to create intended visual effects. Pollock dripped and poured paint on a large canvas with rhythmical and spontaneous movements (Naifeh & Smith, 1984). Arp dropped pieces of coloured paper onto a large sheet of paper and glued the scraps wherever they happened to fall (Thrall & Arp, 1958). In music, John Cage and lannis Xenakis applied chance techniques to express their reflection on music composition. Cage tossed coins or threw dice during composition in order to "let sounds to be themselves rather than vehicles

for man-made theories or expressions of human sentiments" (Cage, 1961: 10). Xenakis devoted himself to establishing a way of composing music based on mathematics and logic (Xenakis, 1992). He used computer programs with probability functions during composition, allowing many decisions to be made by random number generators (Alpern, 1995). All these chance techniques were used as artistic strategies by the artists. The lack of control caused by the chance techniques was deliberately used as a way of expressing art concepts or creating intended visual effects. Similarly, a chance technique – applying sensory distortion devices in artistic production – was also used to express my artistic concept in my project *Disassembly and Reconnection* introduced in section 4.6. It was used to present my reflection on artists' drawing behaviour. The main difference between this chance technique and the others is in the way of generating uncertainty. Instead of emphasising automatism and unreason, its method is based on artists' instinctive response to their distorted perceptions in relation to their background, experience and intelligence.

5.5 Process and Performance

In the exhibitions of the calligraphy and drawing projects (introduced in sections 3.7 and 4.6), the processes of making experimental calligraphy and drawings were presented to audience members through videos. Many audiences said that the hesitant, awkward and incorrect writing behaviour of Ko and me and my electric-shock drawing behaviour presented in the videos amused them greatly. They enjoyed seeing the chaos and errors in the artworks generated in such concentrated and serious ways. This implies that the process of producing artefacts with sensory distortion devices had performative qualities. In addition, many audience members tried the sensory distortion devices in person. Their hesitant behaviour of writing calligraphy, their confused, scared facial expressions and the error characters and chaotic marks they confidently produced were all very interesting, amusing and impressive. The interaction between the devices and audience members was therefore also performative.

The use of visual and kinaesthetic distortion devices can lead to interesting processes of artistic production and performative actions.

Investigating the relationships between the artefact, process, action and performance is one of the main themes in the art field. Many artists emphasise the importance of the process rather than the produced artefacts. Curator Nicole Burisch indicates that many recent artworks and exhibitions shift artefacts from their once-central role. Burisch argues that an artefact instead serves "as a record of an event or process, a prop or tool, and in some cases disappearing altogether" (Burisch, 2016: 55). Likewise, researcher Kristine Stiles said, "what is missing from art objects, what artists engaged in action restore to them, is that relationality between making and doing and the artifactuality itself" (Stiles, 1998: 235). Stiles's statement highlights the importance of revealing the process behind the artefact. As in Burisch's and Stiles's arguments, my exhibitions of the experimental calligraphy and drawing projects greatly emphasised the process. The videos revealing the process of production were presented alongside the artefacts. The experimental calligraphy and drawings were more like the records of the artists' reactions to their distorted perceptions than deliberately produced objects.

The relationships between actions and performances were the theme of the exhibition *Out of Actions: Between Performance and the Object, 1949-1979*[46], held by Curator Paul Schimmel in Los Angeles Museum of Contemporary Art in 1998. This exhibition is regarded as a definitive museum survey of performance art, focusing on the merging of performance with other art genres, such as sculpture and painting. More than three decades of artworks that are very tied to their producing process were collected and exhibited. In the introductive essay

[46] The link of the exhibition is http://www.moca.org/exhibition/out-of-actions-between-performance-and-the-object-1949-1979

of the exhibition, Schimmel categorized actions of artistic practices into three types: “actions performed with the goal of producing objects”, “performative actions whose primary goal was the process of creation rather than the production of object” and “performances that often involved audience participation, from which no resulting object was produced” (Schimmel, 1998: 17). This categorisation provides me with a helpful frame for reflecting on the relationships between artefacts, actions influenced by distorted perceptions and performance in my experimental artistic practices. Following Schimmel’s categories, artists’ behaviour of writing and drawing with sensory distortion devices was a performative action with a goal of creation instead of producing objects. Interesting visual effects, serendipitously produced, were the side-products of the experimental practices. In addition, audience participation can be considered in the development of the experimental artistic practices. Audience members can be invited either to create marks with artists by using the sensory distortion devices together or to interact with each other through the sensory distortion devices. The former generates performative actions focusing on creation; the latter is a creative performance that may not produce any resulting objects. What can be sure is that both of them can transfer the use of sensory distortion devices into interesting experimental live performances.

5.6 Exhibition

The exhibitions of the experimental calligraphy projects (section 3.7) and the final drawing project (section 4.6) both presented the final artefacts, the video records of producing them and the sensory distortion devices. Although the content of the artworks may not be fully understood by audience members, the visual effect of the works still attracted their attention, raised their interest and provided an enjoyable experience. In the exhibitions, audience members could watch the videos to understand how the artefacts were created. They were also welcome to try the visual distortion devices and the kinaesthetic distortion device to actually experience the distorted perceptions.

The distorted perceptions were very confusing and weird to most audiences who tried the devices. They fascinated many audience members. This phenomenon related to the concept of enchantment proposed in human computer interaction design. Enchantment is "an experience of being caught up and carried away, in which, although we are disoriented, perception and attention are heightened" (McCarthy, Wright, Wallace, & Dearden, 2006: 370). Peter Wright, Jayne Wallace and John McCarthy (2008: 18:10) indicated that an enchanting interactive system should "offer the potential for the unexpected, giving the chance of new discoveries and new ways of being and seeing". In my exhibitions, the sensory distortion devices enchanted many audience members by providing them new and unanticipated perceptual experiences. Wright, Wallace and McCarthy also proposed that "the greater the opportunity they [the interactive system] offer, the greater the depth of the experience and the longer enchantment may last" (ibid). This theory leads to a practical tip for developing sensory distortion devices: the stronger and more unpredictable perceptions that sensory distortion devices can offer, the more unforgettable and enchanting an experience audience members will have.

The exhibitions of the experimental artistic projects can also be discussed from the view of the concepts of 'thing' and 'object'. These two concepts were originally proposed by Heidegger and further explained by Tim Ingold. Ingold said:

> *The object, he [Heidegger] argued, is complete in itself, defined by its confrontational 'over-againstness'– face to face or surface to surface – in relation to the setting in which it is placed (Heidegger 1971: 167). We may look at it or even touch it, but we cannot join with it in the process of its formation. However metrically close our interaction with the object may be, it remains affectively distant. (Ingold, 2013: 85)*

An artwork can be regarded as an art object if it is complete in itself and independent to audience members. Audience members cannot join in with the process of its formation, although they can look at it or even touch it. In this sense, the experimental calligraphy and drawings presented in the exhibitions are art objects. Their formation was independent to audience members. However, in the exhibitions, I attempted to make the process of formation available to audience members. I not only provided them with videos of the producing process but also encouraged them to try the sensory distortion devices. My exhibition strategy is to help audience members to join with the production process of the artworks.

In terms of the concept of ‘thing', Ingold indicates:

> *To reinforce the point, Heidegger made much of the etymological derivation of ‘thing’ from ting (or its Germanic equivalents). And it was above all the sense of the thing as a gathering that he drew from the word’s earlier usages (ibid.: 177).*

> *The thing, by contrast, is a ‘going on’, or better, a place where several goings on become entwined. …We participate, as Heidegger rather enigmatically put it, in the thing (Ingold, 2010a: 4).*

A thing involves a gathering, which is “a place where people would gather to resolve their affairs” (ibid: 4). My exhibitions can be regarded as gatherings. They brought people together to participate in and discuss the work. I was there to raise the discussion and help people to try things. According to Ingold's understanding of Heidegger's ‘thing’, my strategy embedded in the activities of the exhibitions is to create gatherings, bringing together people, technologies, artists and discussion.

5.7 Summary

The experimental calligraphy, painting and drawing practices were comprehensively discussed in this chapter. Several highly relevant artists, artistic practices and theories were brought into the discussion. My underlying strategy for developing the experimental artistic practices was identified in section 5.1.1, which was to pursue the coherence between the use of sensory distortion devices and art content. This strategy echoed artist Lisa L. Cyr's and Michel Waisvisz's opinions emphasising the consistency between device use and art expression. It facilitated my creativity by turning the determined perceptual devices and content into inspiring resources. In section 5.1.2, the value of the concepts of *Ludic Design, Counter-Functional Design* and design for ambiguity to this research was pointed out. They guided me to develop artistic experimental exercises which Ko and I enjoyed and deeply engaged in. They also benefit the exploration of the potential of sensory distortion devices. In section 5.1.3, the importance of prototyping to the development of the experimental artistic practices was pointed out. Prototyping was used as a process of exploring possible sensory distortion devices and ways of using the devices. Tim Ingold's theory about kinaesthetic and material flow was reviewed along with my experimental artistic practices in section 5.1.4. This research extended his theory by providing new examples in relation to digitally mediated practices and experimental artistic practices.

The discussion in section 5.2 focused on the generation of the new methods of writing calligraphy, painting and drawing used in the experimental artistic practices. The methods originated from four concerns, which were the inspiration of the distorted perceptions, the artists' physical and mental responses to the distorted perceptions, the consideration of artistic expression and the improvement of problematic methods of using sensory distortion devices in producing artefacts. As all the new methods were derived from the use of visual and kinaesthetic distortion devices, it was argued that applying visual and kinaesthetic distortion

devices in artistic production can be a way of creating and exploring new artistic methodologies. Also, distorted perceptions, artists' influenced behaviour of making art and the challenges of using sensory distortion devices in producing artefacts can be inspiring resources for this artistic exploration. In the last part of this section, the results of George Malcolm Stratton's experiment about sensory adaption implied that the adaption to distorted perceptions is a challenge of exploring new artistic practices with sensory distortion devices.

In section 5.3, Mihaly Csikszentmihalyi's *flow theory* was utilised in the discussion of Ko's and my performance of producing artefacts. Csikszentmihalyi's perspective on challenge-skill balance and the achievement of flow state seemed inadequate to explain our performance in the experimental artistic practices. A new factor – willingness to be open to transforming the high-challenge practice – was proposed to supplement Csikszentmihalyi's theory. Practice-transformation, which refers to seeing practices which are too hard for artists from a new perspective, can provide artists more opportunities to achieve flow state. Two practical suggestions to future artists were also proposed in this section. The first is to have an open, curious mind and a positive attitude toward the distorted perceptions. The second is to try to appreciate accidents and not to judge what has been created during the production process.

The common characteristics of the experimental calligraphy and drawings – unpredictability and irregularity – were the focus in section 5.4. They were derived from chance and the lack of control caused by the use of sensory distortion devices. Relevant artists, such as Xu Bing, Claude Heath, Bryan Lewis Saunders, Brice Marden, Jackson Pollock, Jean (Hans) Arp, John Cage and lannis Xenakis, were mentioned in the discussion. Since distorted vision and kinesthesis made Ko's and my artistic production very uncertain and unpredictable, the use of visual and kinaesthetic distortion devices can be regarded as an

effective chance technique to be applied in the visual arts. It can lead to interesting artistic serendipities and make the works more experimental.

My emphasis on presenting the process of artistic production in the exhibitions was focused on in section 5.5. It echoed Nicole Burisch's and Kristine Stiles's views of the importance of the process. This section also focused on the performative quality of the behaviour of using the sensory distortion devices. According to curator Paul Schimmel's category of actions in artistic practices, Ko's and my distorted behaviours of writing calligraphy, painting and drawing belonged to "performative actions whose primary goal was the process of creation rather than the production of object" (Schimmel, 1998: 17). Also, the future development of the artistic practices involving audience participants could be "performances that often involved audience participation, from which no resulting object was produced" (ibid).

Section 5.6 discussed the exhibitions. According to the concept of enchantment proposed in human computer interaction design, audience members can have more unforgettable and enchanting experiences if the presented sensory distortion devices can offer stronger and more unpredictable perceptions. In addition, according to Ingold's understanding of Heidegger's 'thing' and 'object' distinction, the exhibited experimental calligraphy and drawings were artistic objects and the discussion and demonstration in the exhibitions were 'things' that gathered people, technologies, artists and discussion together.

In this chapter, the experimental artistic practices conducted in this research have been examined in great detail and in a wider view. Several new findings and potential uses of visual and kinaesthetic distortion devices were identified from the comprehensive discussion. In the

next chapter, the research questions will be re-engaged and possible answers will be proposed. The overall contributions, practical implications and future development of this research will also be outlined.

Chapter 6. Conclusion

So far, three experimental calligraphy practices, one experimental painting practice and three experimental drawing practices involving the use of visual distortion devices and kinaesthetic distortion devices have been developed and implemented. The relationships between device use and art expression, prototyping and project development, sensory distortion and artistic exploration, artists' willingness and performance, objects and things, process and performance have also been considered and discussed. In this final chapter, the contributions of this research are outlined. They are followed by a restatement of my research questions. Answers to the questions are proposed based on the findings and the comprehensive discussion presented in Chapter 5. Some practical implications for future artists are also indicated in this chapter. This thesis is finally finished with suggestions for future development of the artistic projects and research.

6.1 Contributions

My research demonstrates the rich possibilities of studying and using sensory distortion devices in artistic production, which is an area not yet systematically investigated by artists or researchers. It provides practical examples of prototyping and applying visual and kinaesthetic distortion devices in art creation, achieved by introducing my experimental calligraphy, painting and drawing practices in Chapter 3 and Chapter 4. This research also presents possible artistic strategies for future artists and researchers by explaining my thought processes and methods in developing these artistic projects in Chapter 5. Also, it proposes the artistic potential of the influence of visual and kinaesthetic distortion devices, which is observed by analysing and discussing the artists' works and how their behaviour and feelings have been influenced. In addition, this research extends Csikszentmihalyi's *flow theory* and Ingold's theory of kinesthesis and material flow by closely examining the experimental

artistic practices.

This research is also a valuable referential example for artists who have accepted art education like that I experienced in NTNU which comparatively ignores the value of artists' creativity and self-expression. The series of experimental painting and drawing practices presented in Chapter 4 clearly show the progress of my understanding of drawing. In the first painting exercise I still stick to my painting habits, trying to make subjects recognizable in the paintings. However, in the last drawing exercise I am able to establish my personal drawing method and create abstract, expressive drawings that support my artistic concept well (described in section 4.6). This change is contributed by design notions such as *Defamiliarization*, *Breakdown*, the opposition of usefulness, and my approaches including thinking through making / prototyping, honest self-reflection and comprehensive analysis. Therefore, this research can not only provide practical implications for working artists who are also interested in distorted perceptions, but also contribute to art education by presenting a possible method of self-exploration through art making.

6.2 Re-engagement with the main questions of this research

The relationship between perceptual devices, artists' perceptions and artistic production have been reconsidered and reconfigured throughout this research. Sensory distortion devices that shift artists' visual perspective and confuse their kinesthesis have been prototyped and used in experimental calligraphy, painting and drawing practices. The answers to the main questions of this research can be concluded from the findings and the implications of these experimental artistic practices. They are indicated below along with the restated questions.

6.2.1 *How can artists and their artworks be influenced by the use of visual and kinaesthetic distortion devices during artistic production?*

Distorted perceptions caused by visual and kinaesthetic distortion devices can effectively change the way of making art by breaking down habitual eye-hand coordination and reducing control. The artists seemed to be more engaged in artistic production because of its unfamiliarity. Although the difficulty and inefficiency of art making are indeed increased by distorting the artists' vision and kinesthesis, sometimes the artists' performance and artworks benefit from this. Uncontrollability generated by the use of visual and kinaesthetic distortion devices leads to unpredictability and irregularity of the artworks. Sometimes unexpectedly vivid, dynamic, stylized and expressive artworks, even artworks beyond the artists' usual capabilities, can be produced by chance with distorted vision and kinesthesis.

6.2.2 *What is the potential of applying visual and kinaesthetic distortion devices in artistic production?*

Consideration of the characteristics of visual and kinaesthetic distortion devices and distorted vision and kinesthesis during the prototyping process can benefit the generation of ideas, the methods of production and the contents of artworks. The coherence between device use and artistic expression can turn the use of visual and kinaesthetic distortion devices into a technique for expressing artistic content. It can also make the perceptual devices and content into resources for inspiring artists' creativity. Applying vision and kinesthesis distortion devices in artistic production can be a method of exploring new artistic methodologies. The challenging and unfamiliar situations caused by the distorted perceptions can induce the artists to develop their own unique methods of creating artefacts according to their individual background, intelligence and reaction to the unfamiliar perceptions. Artistic practices

involving the use of visual and kinaesthetic distortion devices can also provide additions to existing theories. For example, Tim Ingold's theory of kinaesthetic and material flow is provided with new examples of digitally mediated practices and experimental artistic practices (section 5.1.4). For Mihaly Csikszentmihalyi's *flow theory*, it is suggested to add a new factor that is 'the willingness to transform the original high-challenge practice to a new one' (section 5.3.4). The analysis of the unpredictable and irregular characteristics of artefacts suggests that the use of visual and kinaesthetic distortion devices can be an effective chance technique for creating serendipitous opportunities in the visual arts (section 5.4.3). The use of visual and kinaesthetic distortion devices can also make the process of artistic production performative. Artists' distorted behaviour of making artefacts has potential to be turned into a contemporary performance.

6.3 Practical implications for future artists

My experimental calligraphy, painting and drawing practices as introduced in Chapter 3 and Chapter 4 presented several possible ways of involving visual and kinaesthetic distortion devices in artistic production. In addition to these referential examples, some practical implications can also be proposed for future artists.

According to the discussion of Csikszentmihalyi's *flow theory* in section 5.3, a better creative performance can be created when the artist is willing to be open to the conflict between habitual and unfamiliar perceptual experiences. This positive attitude gives the artist more opportunities to regard the challenging artistic practices as experimental projects for exploring new artistic possibilities, instead of difficult tasks that need to be overcome. This promotes the importance of keeping an open, curious, uncritical mind toward the unfamiliar and the chaos and accidents caused by distorted perceptions and reduced control. Also,

confidence and the lack of fear of failure can increase the chance of producing serendipitous and interesting artworks.

6.4 Future development

The feasibility and artistic potential of involving sensory distortion devices in artistic production has been presented. Much of my attention has been focused on the design of new perceptual experiences for artists, the prototyping of sensory distortion devices and the development of artistic contents and methods of production. All these aspects have rich possibilities for further artistic exploration. So far, only vision, kinesthesis and low-technique methods of prototyping and drawing-oriented artworks have been involved. My future development will aim at involving more sensory modalities, audience members, more advanced technologies and different art genres.

In addition to the sense of sight and bodily movement, there are other kinds of human perception in relation to the behaviour of making art, for example, the sense of touch, hearing, direction, time, balance and so on. Involving more sensory modalities may enhance the exploration of new perceptual experiences and methods of artistic creation. Also, the artists' perceptions are targeted one at a time in this research. However, it is also possible to alter multiple sensory modalities simultaneously during artistic production through sensory distortion devices. One possible way of doing so is to build virtual connections between unconnected senses through perceptual devices to create 'artificial synaesthesia'. Unfamiliar and confusing perceptual experiences caused by the artificial synaesthesia could produce more diverse, interesting and unexpected influences on artists and their artworks. Deeper and more complex issues in relation to physiology, cognition and psychology of artistic production will be raised subsequently.

The use of the *Viewpoint-exchanging Device* and *Sight-limiting Device* showed that artists can communicate with each other through multi-user sensory distortion devices while creating artworks. This communication can be extended further to involve audiences. Applying sensory distortion devices to create real-time dialogues and interactions between artists and audiences in producing experimental collaborative artworks is also an interesting topic to study in the future.

Although modifying existing ready-to-use products makes prototyping of sensory distortion devices easier and more convenient, this low-tech method risks limiting the artists' creativity and imagination. Artworks could be compromised by the functionality of ready-made products. As I am experienced in making digital and interactive art installations, my future research will involve virtual reality technology, bio-feedback, graphic computing and human computer interaction. These advanced technologies can free my creativity and expand the possibilities of experimental sensory distortion devices.

Applying sensory distortion devices in creating performative artworks across more types of art forms is also an ambition. I will cooperate with performers, such as musicians, actors and dancers, to see how sensory distortion devices can be involved in their works. To prevent myself from developing the devices by relying on my own assumptions too much, as the problem mentioned in section 1.2.1, sufficient communication between me and the performers will be emphasised during the prototyping process. By using sensory distortion devices, the performers' influenced actions could add a new parameter of the performances in relation to chance, uncontrollability and unpredictability. The influence and artistic potential of the use of sensory distortion devices in performance art will also be focused on in future works.

In addition to my own practices, future work should also consider the relationship of this research to other possible areas, such as art education, improvisation and art theory. As mentioned in section 1.2.2, many experimental drawing exercises have been developed for introducing the language of marks, training eye-hand coordination and increasing concentration and confidence in drawing (Maslen & Southern, 2011). They attempt to achieve these goals by distorting participants' perceptions with everyday objects, such as blindfolds and long wooden sticks. Sensory distortion devices involving digital technologies can be used as teaching aids as well. By using them, art educators can develop more flexible, diverse and interesting educational drawing exercises for participants.

Improvisation is "an exemplification of art creativity" (Bertinetto, 2012: 129). It is creating things freely, by means of "following, changing, inventing, and evaluating the action's rules in ways that are unexpected and surprising" (ibid). The use of sensory distortion devices can benefit change and invention by breaking down habitual methods and perceptions of art making. Things accidentally produced because of reduced control and distorted perceptions can be inspiring resources to improvisers in exploring new artistic possibilities. R. Keith Sawyer (2000: 152) indicates the characteristics of improvisation to include its "emphasis on creative process rather than creative product" and its "emphasis on creative processes that are problem-finding rather than problem-solving". However, improvisational works involving the use of sensory distortion devices challenges Sawyer's statements. In my experimental calligraphy, painting and drawing practices, although the process of creating artefacts was indeed highlighted, the artistic serendipities contained in the calligraphy and drawings were also outstanding and remarkable. In this case, the creative products are not necessarily less important them the process of their production. In addition, in each of my experimental calligraphy projects, the artists faced the same challenges as each other caused by visual distortion devices. The artists' different attitudes, responses and solutions were the

most interesting and creative part of the artistic practices. In this case problem-solving is more important than problem-finding. According to my experimental artistic practices, the characteristics of improvisational works involving the use of sensory distortion devices are different from what proposed by Sawyer. More investigation is required to fully understand the differences.

The use of sensory distortion devices provides researchers with a new perspective to reconsider existing theories. This research extends Tim Ingold's theory of kinaesthetic and material flow by arguing that it also works in digitally mediated practices and experimental artistic practices. In section 5.1.4, a general relationship between sensory distortion devices, artists' kinesthesis and artefacts has been proposed. Sensory distortion devices are transducers that convert the movement of artists' kinaesthetic awareness into a corresponding flow of artefacts. However, how the transformation process actually works is still undiscovered. Does the uncertainty of artistic production caused by distorted perceptions affect the flow of artefacts? Do artists' distorted perceptions influence the movement of artists' kinaesthetic awareness? Do different types of sensory distortion lead to different transformations? All these questions are worthy of further investigation.

Appendices

Appendix A: Videos documentations and video clips

The video files on the accompanying DVD are documentations of my earlier experimental projects (introduced in section 1.2.1) and clips of whole video records of the production processes of my experimental calligraphy and drawings shown in the exhibitions (introduced in section 3.7 and 4.6).

The video documentations include:

1. Reversed eyes. mp4
2. Perceptual mismatch gloves. mp4
3. Experimental flute improvisation. mp4

The video clips include:

4. Calligraphy_exchanged viewpoints. mp4
5. Calligraphy_restricted sight. mp4
6. Calligraphy_mirrored view. mp4
7. Drawing and detecting. mp4

Appendix B: Main interview questions

1. Can you tell me your personal background and when you start the practice of writing calligraphy?

2. Can you tell me your cross-discipline works involving calligraphy?

3. How do you feel about the experimental calligraphy exercise?

4. What was the experience of writing calligraphy with distorted vision like?

5. What was the most difficult part of the exercise?

6. How do you feel about our calligraphy? Were there any interesting outcomes?

7. Which are the characters in the produced calligraphy you like most?

Appendix C: The translations of the interview transcripts

Background Interview with the professional calligrapher

Interviewer: Jiun-Shian Lin
Interviewee: Liang-Chih Ko
Date: 23rd February, 2015
Start Time: 13:05 pm
End Time: 13:28 pm
Location: Art Gallery, Fuxing Senior High School, Taipei, Taiwan

Lin: can you tell me your background?

Ko: I started the practice of writing calligraphy when I…studied in senior high school. When I was majoring in Fine Arts at National Hsinchu University of Education, many teachers and professors expanded my horizons in contemporary art. They encouraged me to create calligraphic artworks from the perspective of drawing and Action Art. Influenced by them, I usually wrote calligraphy with unconventional writing methods…and I am a fine art teacher now, working in Fuxing Senior High School… um…I teach students calligraphy in a very traditional way. They are asked to imitate famous ancient Chinese calligraphers' works. I believe this method can efficiently develop their basic skills of writing calligraphy… my teaching is very traditional, but my artistic production is not.

Lin: How do you distinguish traditional ways of writing calligraphy from unconventional ways?

Ko: So-called 'classic' or 'traditional' ways of writing calligraphy need to choose a Chinese poem as the content first. Then during the writing process, we have to focus on presenting the beauty of the strokes, the tonality and the structure of the characters. But my writing method emphasizes overall visual effect rather than the appearance of each character.

Lin: Can you explain what you emphasize further?

Ko: To me, a piece of calligraphy is a drawing. Every visual element of the calligraphy, including the colour of paper, is carefully considered to create attractive and interesting visual effects…… The strokes can be roughly produced but the overall appearance of the calligraphy must be good.

Lin: I know you have made several cross-discipline works. Can you tell me more about them?

Ko: Sure, when I studied in graduate school at National Taiwan Normal University, I had a chance to cooperate with a modern dance group…I forgot its name…but… I joined a dance performance which contained improvisations of calligraphy, dance and music. In the performance, I wrote calligraphy on stage and the dancers and musicians performed around me at the same time… and we interacted with each other and influenced each other's performance…then I understood…um…this work taught me that artists' attitudes to life can be presented on stage through their bodies. This influenced me in the development of my own calligraphic works…

Lin: yes…

Ko: …After this performance, I took almost one year to plan my work *The Fading History of The Stage.* This work combined Action Art and calligraphy… I built a big wooden platform and wrote several short sentences which described important issues and news which had happened in Taiwan on it. When the platform was full, I cleaned the platform with a paint roller. The written characters were covered by white paint. Then I wrote new sentences on the platform again. This process was repeated many times and fully video recorded. The piece ended with a dirty wooden platform without any sentences on it.

Lin: It sounds like a very interesting work. What is its concept?

Ko: This work was about the fleeting nature of things that happen. Things exist in our memories for a short time and gradually fade away. I wanted to reflect how quickly these things can be forgotten by the media and people through this work.

Lin: It seems you are not a traditional calligrapher…

Ko: I think… I am not one hundred percent a calligrapher. I prefer to see myself as an artist. I would not limit myself in being a calligrapher. Sometimes I present my thoughts through drawing and painting. However, calligraphy is still my most familiar medium of making art.

Lin: Thank you very much.

Interview with the professional calligrapher after finishing the exercise

Writing Calligraphy with Exchanged Viewpoints

Interviewer: Jiun-Shian Lin
Interviewee: Liang-Chih Ko
Date: 23rd February, 2015
Start Time: 14:45 pm
End Time: 15:11 pm
Location: Art Gallery, Fuxing Senior High School, Taipei, Taiwan

Lin: We just finished the practice *Writing Calligraphy with Exchanged Viewpoints* together. How do you feel about this exercise?

Ko: This exercise was very interesting. I found many things were uncontrollable. I couldn't guide your writing behaviour accurately during the writing process… and I could only provide very vague instructions. If we had the chance to do the exercise one more time, I would provide you with instructions relating to writing speed, character size, and stroke thickness as well.

Lin: What was the most difficult part of the exercise?

Ko: The calligraphic brush had no shadow because of the setting of the light, so I didn't know the distance between your brush and the paper. This made it very hard to identify the exact position of your brush and guide you to the position of the next stroke.

Lin: It seems you put lots of effort into guiding me in how to write during the exercise. Can you explain why?

Ko: It may be because I have been a calligraphy teacher for many years and I also knew that you are not good at writing calligraphy. So, it is just a natural reaction to spend lots of energy to guide your writing in the exercise.

Lin: Did the viewpoints-exchanged vision and my writing behaviour influence your writing behaviour?

Ko: Actually I don't think the production of my characters was influenced much by you. How I wrote the calligraphy was based more on my own instincts and my previous experience.

Lin: Can you explain more?

Ko: For example, I moved the brush and reloaded the brush with inks in my usual way and at my usual tempo. The only way that the visual device influenced me was it blocked my sight from my own work…although I could still finish the writing by depending on my previous writing experience, my blocked sight made me unsure of where to write the characters and strokes…and also…I didn't…I had no idea if the positions of the strokes were correct or not…um…this made me feel unconfident. But after writing several characters, gaining some experiences, I became braver. I almost felt as confident as usual when I wrote the last character 霧.

Lin: It seems that it was very hard to write strokes at the place we wanted when producing calligraphy with the exchanged viewpoints. Do you think this had a positive or negative impact on your work?

Ko: From the perspective of creating randomness, it was positive. However, from the view of classic calligraphy, it is better if we can control the brush well, to write strokes where we want them.

Lin: How do you feel about our calligraphy?

Ko: I think your work is more vivid than mine. It doesn't look like a piece of calligraphy but a black-and-white abstract drawing with a strong visual effect. My work is lower than my

usual level…I think it was influenced by my lack of confidence.

Lin: Were there any interesting outcomes?

Ko: Yes, the unpredictability of the characters is very interesting. Most of my characters were very different from what I expected…this was mainly caused by my slowed down writing speed. My writing speed was influenced by you. You wrote quite slowly. I was afraid that you couldn't keep up with me, so I slowed down. My slow writing speed caused the serious ink expansion. I couldn't control the expansion. In another words, I couldn't accurately control the shape of the characters. This uncontrollable situation let me produce characters with a freedom and randomness that I can't create in the general way of writing calligraphy…it is interesting that the unpredictability was derived from a very serious and careful writing process.

Lin: Which are your favourite characters?

Ko: I like my character 霧. I produced this character as confidently as usual, so it has better visual effects than the other characters in my calligraphy. I also like your 塵 and 寰. The structure of 塵 is very loose, but the structure of 寰 is very tight. The two characters are complementary, composing a visual effect with strong contrast…and also…your 見 and 雲霧 are also very good. The shapes of 雲霧 (cloud and fog) look like the characters are floating away. The appearance of the two characters really matches their meanings.

Lin: Thank you very much.

Interview with the professional calligrapher after finishing the exercise

Writing Calligraphy with Restricted Sight

Interviewer: Jiun-Shian Lin
Interviewee: Liang-Chih Ko
Date: 23rd February, 2015
Start Time: 16:05 pm
End Time: 16:32 pm
Location: Art Gallery, Fuxing Senior High School, Taipei, Taiwan

Lin: Can you describe your experience of writing calligraphy with restricted sight?

Ko: It was a very exciting and interesting exercise. When I played the role of the following calligrapher, the extremely limited vision meant that… I had no idea about what characters I was writing. The vision made me feel very uncertain during the writing process…everything became unpredictable…and… I didn't know what the next stroke was. I had no chance to pre-design the structure and the shape of the characters as usual.

Lin: Did the blind-following writing method influence you?

Ko: Yes, it influenced my writing speed and writing tempo. When you [the leading calligrapher] wrote fast, I was forced to speed up as well.

Lin: You played the role of the follower twice in this exercise. Did you prefer the experience of the first time or the second time?

Ko: I preferred the second time… because I felt more confident. The first time, I felt very unconfident and unsure because I had never written calligraphy with such a strange visual perception before. The restricted sight was out of range of my imagination…and it was so hard to adapt to in such a short time. So, I felt a little bit scared and wrote in an excessively careful way. However, I felt much braver the second time. With the experience of the first

time, I didn't worry about the results of the work anymore. I just focused on my writing behaviour… and kept writing even if the brush ran out of ink or the tip of the brush was unsmooth. This in turn gave my work more varied ink tonality and vivid visual effects.

Lin: How do you feel about the resulting calligraphy?

Ko: All the characters to me are very interesting because the writing results are unpredictable. The limited sight and blind-following writing method made me write calligraphy while deconstructing the Chinese characters…writing calligraphy in this way is quite fascinating.

Lin: How do you evaluate the outcomes?

Ko: I would say that the calligraphy produced in the second practice is much better than the calligraphy produced the first time. I was not satisfied with my first calligraphy. During the writing process, I tried to guess what characters you [the leading calligrapher] were guiding me to write…sometimes I could successfully figure out the characters through the first several strokes. Once I knew the characters, I designed the shape of the characters on purpose during the writing process. However, it was too hard to guess correctly, so after trying several times, I gave up and really followed the blind-following writing methods.

Lin: yes…

Ko: I really like my second calligraphy although it looks like work produced by an untrained calligrapher. The characters are incorrect, and not well-designed. They look crude and primitive instead. This work was produced quite freely. I gave up guessing, just focusing on presenting the ink tonality of the strokes and the strength of my writing behaviour. You can see the natural expression of my emotions through the characters.

Lin: Are you satisfied with your second calligraphy?

Ko: Of course, you know…expressing emotions truly and naturally through calligraphy is a very high realm in Chinese calligraphy… it is much more than just creating pretty, good-looking characters. This realm is beyond my capability. It usually takes calligraphers many decades to achieve. I am very surprised with the good outcome.

Lin: Which characters in my calligraphy do you like? Can you explain way?

Ko: I like 惠風 in your calligraphy. I saw that you produced these characters professionally. You managed the start point and the end point of each stroke just like an experienced calligrapher would. Although the structures of the characters are incorrect, they still present an authentic calligraphic style…and also…和暢…the two characters in your work were produced in a rush. I knew this was because I wrote the characters too fast for you to keep up. So your writing behaviour became careless, especially in the last two strokes. However, the carelessness made you fully present the characteristic of your dry brush, producing hollow strokes with varied ink tonality.

Lin: Which characters in your work do you like most? Can you explain way?

Ko: In my own work, most of my characters were incorrect. However, I really like 即, even though I can barely recognize it. The strokes of this character reflect the powerful strength that I used well. I also like 會 a lot because of its strong and emotional visual effect. The dryness of the ink of the strokes reflected my fast writing speed… I wrote so fast because you wrote the character so fast that I felt anxious and wanted to give up. In order to follow your speed, I scribbled the character carelessly. It turned out that the appearance of 會 perfectly matched my feelings at the time.

Lin: Thank you very much.

Interview with the professional calligrapher after finishing the exercise

Writing Calligraphy with Mirrored View

Interviewer: Jiun-Shian Lin
Interviewee: Liang-Chih Ko
Date: 23rd February, 2015
Start Time: 17:45 pm
End Time: 18:10 pm
Location: Art Gallery, Fuxing Senior High School, Taipei, Taiwan

Lin: We just finished the exercise *Writing Calligraphy with Mirrored View.* How do you feel about this exercise?

Ko: The left-right reversed vision was very annoying. It made me so confused… I can't believe my writing behaviour was almost totally out of control just because my sight was mirrored...it just…um…my hand moved to the right, but the device showed me that it moved to the left. The incoherence between my senses of seeing and limb movement disturbed my habitual eye-hand coordination.

Lin: What are the difficulties you met during the writing process?

Ko: Locating the appropriate position of the characters and writing strokes at the correct angle.

Lin: Can you tell me more about them?

Ko: The sensory incoherence made me spend too much time on locating the position of each stroke. This greatly disturbed my writing tempo. My writing behaviour was also greatly influenced by the left-right reversed stroke angles displayed on the device. The stroke angles were exactly opposite to what I am used to, so the writing experience was very strange.

Lin: Can you tell me more about your writing experience?

Ko: When I wrote calligraphy with the mirrored vision for the first time, the left-right reversed stroke angles [shown on the device] bothered me a lot. I have gotten used to writing strokes slightly toward the upper right, so I usually create left-inclining characters. So, when the device showed me I was creating right-inclining characters, I just couldn't help but adjust the stroke angles. I really wanted to make the characters presented on the device go back to left-inclining again…although I knew what I saw was left-right reversed, I still couldn't stop my impulse to adjust the stroke angles. This contradicting situation made me feel depressed.

Lin: If you wanted to correct the stroke angles shown on the device from right-inclining to left-inclining, you would have had to write strokes toward the upper left to balance the characters. However, you wrote strokes even more toward the upper right, producing extremely left-inclining right-shifted characters. What happened?

Ko: The left-right reversed sight was so confusing. I guess it is because my writing habit meant that writing stokes toward the upper left would never be an option. But I still needed to do something to adjust the angle, so… It turned out I produced seriously left-inclining characters in the first calligraphy.

Lin: yes…

Ko: I located the first stroke of a character by depending on the position of the last stroke of the previous character in the exercise. Because the last stroke of an over left-inclining character was already right-shifted, the character created depending on it became too close to the right of the paper.

Lin: I saw you tried to soften the left-inclining and right-shifted problem in the second calligraphy. Can you tell me how did you do that?

Ko: I kept reminding myself not to adjust the stroke angle, but the right-inclining characters shown on the device were still very annoying. I had to try very hard to ignore the incorrect stroke angles. This made me feel very depressed. I knew I was confused by the vision, so the best I could do was to ignore what I saw and rely more on my writing habit. For example, the angles of 見 and 雲 were balanced by my habitual way and my memories of producing them.

Lin: Which are your favourite characters?

Ko: Actually, I think every character was ok. I have no preference. My judgement may still be influenced by my depressing experience of writing the calligraphy.

Lin: OK...then what was the most interesting thing in the exercise?

Ko: The most interesting thing was the uncontrollability of the exercise. Although I carefully planned how to write the characters, the actual works were always very different from my expectation.

Lin: Thank you very much.

Bibliography

A Pocket Set Of Artist's Claude Lorrain Glass Filters. (2013). Retrieved June 13, 2015, from https://www.doeandhope.com/products/a-rare-c-1840-pocket-set-of-artist-s-claude-lorrain-glass-filters?variant=1158111404

Alpern, A. (1995). Techniques for algorithmic composition of music. Retrieved June 20, 2016, from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.23.9364&rep=rep1&type=pdf

Arrigoni, G., & Schofield, T. (2015). Understanding Artistic Prototypes Between Activism and Research. *xCoAx 2015: Proceedings of the Third Conference on Computation, Communication, Aesthetics and X*, 27.

Barnhart, R. (1972). Chinese Calligraphy: The Inner World of the Brush. *The Metropolitan Museum of Art Bulletin*, *30*(5), 230–241.

Barrett, E., & Bolt, B. (Eds.). (2014). *Practice as research: Approaches to creative arts enquiry*. Ib Tauris.

Bell, G., Blythe, M., & Sengers, P. (2005). Making by Making Strange : Defamiliarization and the Design of Domestic Technologies. *ACM Transactions on Computer-Human Interaction*, *12*(2), 149–173. http://doi.org/http://doi.acm.org/10.1145/1067860.1067862

Bertinetto, A. (2012). Performing the Unexpected Improvisation and Artistic Creativity. *Daimon Revista Internacional de Filosofía*, *57*, 117–135.

Betti, C., & Sale, T. (2009). *Drawing: A contemporary approach*. Thompson/Wadsworth.

Burisch, N. (2016). From Objects to Actions and Back Again: The Politics of Dematerialized Craft and Performance Documentation. *TEXTILE*, *14*(1), 54–73.

Cage, J. (1961). *Silence. Middletown*. Wesleyan University Press.

Candy, L. (2006). Practice Based Research:A Guide. *CCS Report*, *V1*.

Choy, K. F. (2011). Prospectus For A Future Body. Retrieved June 18, 2014, from http://www.ka5.info/prospectus.html

Christie, E. J., Jensen, D. D., Buckley, R. T., Menefee, D. A., Ziegler, K. K., Wood, K. L., & Crawford, R. H. (2012). Prototyping strategies: literature review and identification of critical variables. *American Society for Engineering Education*.

"Close Your Eyes and Sing": More on Experimental Drawing. (2013). Retrieved June 8, 2015, from https://bayschoolsf.wordpress.com/2013/09/12/close-your-eyes-and-sing/

Colin, R. (2002). *Real world research: A resource for social scientists and practitioner-researchers* (2nd ed.). Victoria: Blackwell Publishing.

Collaborative Drawing. (n.d.). Retrieved November 13, 2015, from http://www.urbanoproject.org/neighborhood/?p=420

Costello, E. (2013). *Brice Marden*. Phaidon Press.

Cross, N. (2001). Designerly Ways of Knowing: Design Discipline Versus Design Science. *Design Issues*, (17), 49–55.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.

Csikszentmihalyi, M. (1996). *Creativity, Flow and the Psychology of Discovery and Invention*. New York: HarperCollins.

Csikszentmihalyi, M., & Rathunde, K. (1992). The measurement of flow in everyday life: toward a theory of emergent motivation. *Nebraska Symposium on Motivation*, *40*, 57–97.

Cyr, L. (2011). *Experimental Painting: Inspirational Approaches for Mixed Media Art*. North Light Books.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, *13*(3), 319–340.

Edwards, B. (2012). *Drawing on the right side of the brain: The definitive*. Penguin.

Elger, D. (2004). *Dadaism*. Taschen.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1).

Etani, T. (2002). The Third Eye Project. Retrieved January 2, 2015, from http://www.takehitoetani.com/the-third-eye-project/

EYESECT. (2013). Retrieved July 18, 2014, from http://theconstitute.org/eyesect/

Fiorentini, E. (2006). *Camera Obscura vs. Camera Lucida - Distinguishing Early Nineteenth Century Modes of Seeing*. *Max Planck Institute for the History of Science*.

Fischer, G. (1994). Turning breakdowns into opportunities for creativity. *Knowledge-Based Systems*, *7*(4), 221–232. http://doi.org/10.1016/0950-7051(94)90033-7

Following the right hand of. (2009). Retrieved from http://www.teamgal.com/artists/pierre_bismuth/exhibitions/153/following_the_right_hand_of

Gamboni, D. (2002). *Potential Images: Ambiguity and indeterminacy in modern art*. Amsterdam: Reaktion Books.

Gaver, B. (2002). DESIGNING FOR HOMO LUDENS. *i3 Magazine*, 2–5.

Gaver, W. W., Beaver, J., & Benford, S. (2003). Ambiguity as a resource for design. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM*, 233–240.

Gould, J. D., & Lewis, C. (1985). Designing for Usability: Key Principles and What Designers Think. *Communications of the ACM*, *28*(3), 300–311.

Hall, R. (2007). Strategies for Video Recording: Fast, Cheap, and (Mostly) in Control. In S. J. Derry (Ed.), *Guidelines for Video Research in Education: Recommendations from An Expert Panel* (pp. 4–14). Data Research and Development Center (NORC at the University of Chicago).

Heidegger, M. (1962). *Being and Time*. (J. Macquarrie & E. Robinson, Eds.) (First Engl). London.

Hill, E. (1966). *The Language of Drawing*. New Jersey: Prentice-Hall.

Hjorth, L., & Khoo, O. (Eds.). (2015). *Routledge Handbook of New Media in Asia*. Routledge.

Houde, S., & Hill, C. (1997). What do Prototypes Prototype? In M.G. Helander, T.K. Landauer, & P.V. Prabhu (Eds.), *Handbook of Human—Computer Interaction* (2nd ed.). North Holland.

Ingold, T. (2007). Lines: A brief history.

Ingold, T. (2010a). Bringing things back to life: Creative entanglements in a world of materials. *ESRC*

National Centre for Research Methods.

Ingold, T. (2010b). The textility of making. *Cambridge Journal of Economics*, 91–102.

Ingold, T. (2013). *Making: Anthropology, archaeology, art and architecture*. Routledge.

Inter Dis-Communication Machine. (1996). Retrieved September 24, 2014, from http://90.146.8.18/en/archives/prix_archive/prix_projekt.asp?iProjectID=11264

Iversen, M. (2012). Untitled Motion Capture Drawings. Retrieved from http://www.artexchange.org.uk/exhibition/susan-morris-untitled-motion-capture-drawings

Jackson, S. A., Thomas, P. R., Marsh, H. W., & Smethurst, C. J. (2001). Relationships between flow, self-concept, psychological skills, and performance. *Journal of Applied Sport Psychology*, (13), 129–153.

Jewitt, C. (2012). *An introduction to using video for research*. London: National Centre for Research Methods Working Paper.

Karsh, B.-T. (2004). Beyond usability: designing effective technology implementation systems to promote patient safety. *Quality and Safety in Health Care*, *13*(5), 388–394.

Kingston, A. (2003). *What is drawing?* (A. Kingston, Ed.). Black Dog Publishing Limited.

Knoblauch, H., Schnettler, B., Raab, J., & Soeffner, H.-G. (2012). *Video analysis: methodology and methods: Qualitative Audiovisual Data Analysis in Sociology*. Peter Lang GmbH.

Koschmann, T., Kuutti, K., & Hickman, L. (2010). The Concept of Breakdown in Heidegger , Leont ' ev , and Dewey and Its Implications for Education The Concept of Breakdown in Heidegger , Leont ' ev , and Dewey and Its Implications for Education. *English*, *9039*(February 2015), 37–41. http://doi.org/10.1207/s15327884mca0501

Krassenstein, B. (2014). New Details on VRClay, The Virtual Reality CAD Software Which Could Transform the 3D Modelling Space. Retrieved June 18, 2015, from https://3dprint.com/17752/vrclay-3d-model-oculus-rift/

Kuchera, B. (2015). A Disney animator draws his signature characters in VR, and it's magical. Retrieved February 3, 2016, from http://www.polygon.com/2015/9/11/9310729/disney-virtual-

reality-animator-valve-tilt-brush

Kvale, S. (1996). *InterViews: An Introduction to Qualitative Research Interviewing*. London and New Delhi: Sage Publications.

Light, A., Blythe, M., & Reed, D. (2008). Defamiliarising Design. *Design Principles and Practices*, *1*(4), 63–72.

Lim, Y.-K., Stolterman, E., & Tenenberg, J. (2008). The anatomy of prototypes: Prototypes as filters, prototypes as manifestations of design ideas. *ACM Transactions on Computer-Human Interaction (TOCHI)*, *15*(2), 7.

Little, S. (1987). Chinese Calligraphy. *The Bulletin of the Cleveland Museum of Art*, *74*(9), 372–403.

MacDonald, C., & Atwood, M. (2014). What does it mean for a system to be useful?: an exploratory study of usefulness. *Designing Interactive Systems*, 885–894.

Manabe, D. (2008). "Face Visualizer" , "Face Instrument." Retrieved April 17, 2015, from http://www.daito.ws/en/work/smiles.html

Manabe, D. (2012). FaltyDL "Straight & Arrow." Retrieved April 20, 2015, from http://www.daito.ws/en/work/faltydl_straight_and_arrow.html

Margolin, U. (1994). Russian Formalism. In E. M. Groden, M. Kreiswirth, & S. Imre (Eds.), *The Johns Hopkins Guide to Literary Theory and Criticism*. The Johns Hopkins University Press.

McCarthy, J., Wright, P., Wallace, J., & Dearden, A. (2006). The experience of enchantment in human–computer interaction. *Personal and Ubiquitous Computing*, *10*(6), 369–378.

McInman, A. D., & Grove, J. R. (1991). Peak moments in sport: A literature review. *Quest*, *43*(3), 333–351.

Moggridge, B. (2007). *Designing Interactions*. The MIT Press.

Naifeh, S., & Smith, G. W. (1984). Jackson Pollock. *Ann Arbor: UMI Research Press*, *345*, 58.

Nakamura, J., & Csikszentmihalyi, M. (2002). *The concept of flow*. *Flow and the Foundations of Positive Psychology*. Springer Netherlands.

Nicolaides, K. (1990). *The natural way to draw: A working plan for art study*. Houghton Mifflin

Harcourt.

Nimmer, D. (2014). *Art from Intuition: Overcoming your fears and obstacles to making art*. Watson-Guptill.

Painting from a new perspective. (2015). Retrieved November 30, 2015, from https://www.tiltbrush.com/

Pendulum Choir. (2010). Retrieved May 15, 2015, from http://codact.ch/gb/pendugb.html

Peveto, A. (2010). Black Ink and White Paper : The Traditional Art of Chinese Calligraphy, *3*(October), 42–45.

Pierce, J., & Paulos, E. (2014). Counterfunctional Things : Exploring Possibilities in Designing Digital Limitations, *1*, 375–384.

Pike, B. (1856). *Illustrated descriptive catalogue of optical, mathematical, and philosophical instruments*. New york.

Poirier, C., & Pringle, C. (2012). *Defamiliarization in innovation and usability*. *CHI'12 Extended Abstracts on Human Factors in Computing Systems*. ACM.

Rams, D. (2012). Ten principles for good design. *Wikipedia, the Free Encyclopedia*.

Schimmel, P. (1998). Leap into the void: Performance and the Object. In P. Schimmel (Ed.), *Out of Actions: between performance and the object, 1949-1979* (pp. 17–157). New York: Thames and Hudson.

Schoenfeld, T. (2011). Experimental Drawing with Ian Andrews. Retrieved February 18, 2015, from http://thisisoutline.blogspot.co.uk/2011/02/experimental-drawing-with-ian-andrews.html

Schüler, J., & Brunner, S. (2009). The rewarding effect of flow experience on performance in a marathon race. *Psychology of Sport and Exercise*, *10*(1), 168–174.

Sengers, P., & Gaver, B. (2006). Staying open to interpretation: engaging multiple meanings in design and evaluation. *Proceedings of the 6th Conference on Designing …*, 99–108. http://doi.org/http://doi.acm.org/10.1145/1142405.1142422

Sew Red Glasses - How It Works. (2013). Retrieved March 5, 2014, from

https://www.youtube.com/watch?v=Tw57KnHJFMI

Shklovsky, V. (1965). Art as Technique.

Silbergeld, J. (2003). *Book from the Sky: a work by Xu Bing*. PRINCETON UNIVERSITY ART MUSEUM.

Stiles, K. (1998). Uncorrupted Joy: International Art Actions. In R. Ferguson (Ed.), *Out of Actions: Between Performance and the Object 1949-1979* (pp. 226–358). Los Angeles: The Museum of Contemporary Art.

Stillman, B. C. (2002). Making Sense of Proprioception. *Physiotherapy*, *88*(11).

Stratton, G. M. (1896). Some preliminary experiments on vision without inversion of the retinal image. *Psychological Review*, *3*(1), 611–614.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage Publications.

Talbot, R. (2006). Ambiguity and the development of Linear Perspective. *TRACEY Online Journal of Contemporary Drawing*.

Thrall, J., & Arp, J. (1958). *Arp, the Art Work of Jean (Hans) Arp*. the Museum of Modern Art New York.

Top Shot Helmet. (2007). Retrieved January 5, 2015, from http://juliusvonbismarck.com/bank/index.php?/projects/topshot-helmet/

Waisvisz, M. (2006). Manager or Musician?-About virtuosity in live electronic music. *NIME*, 415.

Welch, R. B. (2013). *Perceptual modification: Adapting to altered sensory environments*. Elsevier.

Wenczel, N. (2007). The Optical Camera Obscura II - Images and Texts. *Inside the Camera Obscura – Optics and Art under the Spell of the Projected Image*, 15.

Wiertelak, E. (2013). Proprioception vs. Kinesthesia. Retrieved June 8, 2016, from http://www.macalester.edu/academics/psychology/whathap/UBNRP/proprioception08/ProprioceptionvsKinesthesia.html

Willats, J. (2006). Ambiguity in Drawing. *TRACEY: The Online Journal of Contemporary Drawing*

Research.

Wilson, R. W. (1970). *Learning to be Chinese: The Political Socialization of Children in Taiwan*. MIT Press.

Wollaston, W. H. (1807). Description of the Camera Lucida. *The Philosophical Magazine*, *27*.

Wright, P., Wallace, J., & McCarthy, J. (2008). Aesthetics and experience-centered design. *ACM Transactions on Computer-Human Interaction (TOCHI)*, *15*(4), 18.

Wyman, M. (2012). Animal: Collaborative Combative Drawing. Retrieved February 21, 2017, from https://www.soex.org/projects/animal-collaborative-combative-drawing

Xenakis, I. (1992). *Formalized music: thought and mathematics in composition*. Pendragon Press.

Yang, M. C. (2005). A study of prototypes, design activity, and design outcome. *Design Studies*, *26*(6), 649–669.

Zeki, S. (2004). The neurology of ambiguity. *Consciousness and Cognition*, *13*(1).