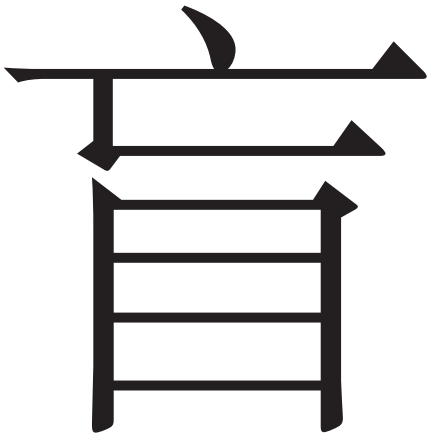

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Loss of Eye

Thesis presented in partia
fulfillment of the requiremen
of the degree o
Master of Design

Massey University, Wellington
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Zhiqing Yu
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Acknowledgement

This is the first time for me as a designer to design a book in a differe format to a traditional book. This research project, and programme of studies has changed and impressed me a lot. Through out this learning period, I have learnt to be more grateful and thankful in my life, and learn in that to be a healthy person means a lot to me. It is really a happy thing to live a healthy life. The hard learning experience of my project has encouraged me to cherish life. Meanwhile, during the process of conducting this research, I would like to express my great thanks to many people: firstly, special thanks go to my supervisors Dr Caroline Campbell and Anna Brown. Not only have they been my guides in this design research, but they also have helped me overcom difficulties I have faced with. Many times when I was confronted wit difficulties, I would almost give up. It is through their encouragement that I have completed my design research. Without their company, I would never have been able to go along this journey; secondly, my thanks go to my classmates and peers from the MDes and MFA. Duri the process, they have helped me search for evidence and academic materials; thirdly, I would like to give warm thanks to my parents and Dr Julieanna Preston. Without their help and support, I would not hav the chance to study in this promising university; lastly, I would like to extend my thanks to all those others who have in some way helped m during this design research process.

It is hoped that through a careful reading of this design project, the life of blind people could be enriched.

image 1
Blind children in Blind Children School in Tibet. (Wang2006)

Abstract

According to World Health Organization 2013 statistics, there are approximately 285 million visually impaired people in the world, 39 million of whom are blind. In China, the country that I come from, it is estimated that there are around 12 million children are visually impaired. This design research project focuses on the reading needs of this audience by exploring book design for children and blind people's ability to perceive despite their 'loss of eye'. In it I apply haptic theory, cultural criticism, and secondary research into blind people's sensory experience to re-purposing the visual language, format and construction of the book. Through this rethinking, and return to my cultural motifs, legends and forms, I aim to probe how tactile design can assist unsighted people read and understand text.

Introduction

According to a report from World Health Organization (WHO), the total number of visually impaired people in 2013 was approximately 285 million, and 3% of the world is blind population are children. Compared to 2004, in which there was about 1.4 million children suffering from blindness, it seems that the visually impaired group is becoming smaller and smaller. However 285 million people is still a large group. It means that in the world, there is a large amount of people who are suffering from the disability of blindness. Therefore, how to enrich the lives of blind people remains a big obstacle for the world. For decades, WHO and its member states as well as its international partners have tried their best to eliminate the primary cause of avoidable blindness through provision of technical support to carry out monitoring and coordination (WHO, 2012).

It was in 2009 that I first had a connection with blind people and came to realize how blindness impacts on their lives. For five days in that year I worked as a child-care giver for my neighbour taking care of their five-year-old daughter, Coco who was born blind. One day, after Coco made me keep on reading story books for about four hours, I decided to try to teach her a new game in order to give her something to do and so as to enrich her life as a result. This new game was painting, which was normal to other children but was something she had never learned before. The results of that game totally amazed me. I was amazed to find that Coco had the ability to draw and describe shapes easily.

This experience has encouraged me to believe one thing ---- that blind people might have the ability to understand and perceive shapes. If this has some truth, then blind people could read as well through words made of shapes as well.

Bearing this goal in mind, I had read a lot of previous research and articles to strengthen the belief that blind people can read with the help of shapes. With this encouragement, I have decided to try to explore a tactile book for blind children.

Literature review II

1. Definitions used in this research design

1.1 Blind and blind people

盲，目无牟(即眸)子。

《说文解字》

Blind means that there is no eyesight in eyes.

The Motivations of the Characters

The Chinese character ‘盲’, or ‘mang’, means blind in the mainstream language of China, Mandarin. This character is formed of two parts; the first part ‘亡’ means loss, while the second part ‘目’ represents eye. The definition of blindness in Chinese means the loss of eye (vision). According to the Royal New Zealand Foundation of the Blind (RNZFB), blindness is defined as “a condition which causes sight loss e.g. cataracts, diabetic retinopathy, macular degeneration, glaucoma, myopia” (RNZFB, 2009, p. 1). According to the definition of RNZFB, there are different kinds of blindness. As to total blindness, it is usually defined as having very little or completely no visual sense (RNZFB, 2009). For most unsighted people, they can still partly experience light or shapes (RNZFB, 2009.). For grown-ups, sight disability means the difficulty or disability of seeing ‘ordinary newsprint and/or the face of someone from across a room, even when wearing corrective lenses’ according to Statistics New Zealand (Statistics New Zealand, 2007, p. 2). For children, sight disability means “blindness or having trouble with eyesight, even when wearing corrective lenses” (Statistics New Zealand, 2007, p. 3).

The post-Census analysis found that there are 11,400 children and 59,700 adults out of 71,100 people in New Zealand who have a serious

visual impairment (Statistics New Zealand, 2007). VISION 2020 New Zealand reported that, in 2009, “almost 125,000 New Zealanders over 40 had vision loss, and around 12,000 were blind” (p. 2); and the Vision 2020 target for severe visual-loss in children is to reduce the global incidence from 0.75 to 0.4 per 1000 children by 2020.

In China, the blind population increases by about one person and three low vision patients every minute. According to WHO research data there are about 17 million eyesight disabled patients in China at present, occupying more than a quarter of the total blind population in the world. The population of eyesight disabled patients in China is really a large group. What’s worse is that according to the China Disabled Persons Federation (CDPF), there is one person out of 60,000 visually impaired people who has the ability to read Braille publication (Foster & Resnikoff, 2005). According to the reports, most eyesight disabled patients do not even have access to Braille publication, letting alone reading publications designed for them. However, in comparison to a non-sighted person, a sighted person would be able, on average, to have access to read 40 books each per year (Chinadp, 2013, p. 4). For blind people, the lack of blindness education could cause ‘double blindness’ (Chinadp, 2013, p. 3), meaning lack of vision and lack of literacy. Therefore, in order to prevent double blindness, a lot of research has been conducted to help eyesight disabled people to live a better life.

‘The hands want to see, the eyes want to caress.’

Johann Wolfgang von Goethe

1.2 Haptic theory

Haptic is associated with the sense of touch. Haptic theory is designed to explore the importance of touch in our perception process. Just as Goethe has said, “The hands want to see, the eyes want to caress”, for eyesight disabled people, even though they may not have access to a normal life like sighted people, they could still live a normal life by their hands, especially by their touch system (Pesquita, Brennan, Enns, & Soto-Faraco, 2013). Haptic theory mainly deals with the matter of touch in our daily life. According to research, when one part of a person’s body is weaker, then the other parts of the person would be stronger so as to partly make up for the loss of function of an organ (Grabowecky, List, Iordanescu, & Suzuki, 2011). For eyesight disabled people, even though they have problem with their eyesight, there is nothing wrong with their hands and touch system; instead, the touch system could be stronger than sighted people. Now days more and more books are designed for eyesight disabled people based on haptic theory (Fuchs, Moreau, & Guitton, 2011).

According to haptic theory, touch is core. Therefore, during the process of this design research, touch is at the heart of the reading system for eyesight disabled people. Without touch, the tactile book would probably make no sense. It is acknowledged that through touch, eyesight disabled people would gradually learned to comprehend shapes, forms, and patterns. As a matter of fact, there is no denying the importance of touch in the reading process of eyesight disabled people.

As to a touch system for eyesight disabled, they could use their hands, skins, faces.

In recent decades, people have come to rely on visual experience a great deal. Therefore, more and more attention has been given to research visual experience for sighted people as well as eyesight disabled people (Levin, 1993, p. 205). During the research process of human visual experience, there is little research covering the sense of touch. According to haptic theory, sense of touch is of equal importance to eyesight, if no better than eyesight. This brings us to the question: What does touch mean for us? Why it is so important? Ackerman (1990) argues that “our skin is what stands between us and the world. If you think about it, no other part of us makes contact with something not us but skin” (p. 46). Through the touch system in skin, eyesight disabled people can feel the change of temperature and the change of sunlight. As a consequence, touch is of great importance for human beings, no matter whether they are eyesight disabled people or not.

At a primary level, touch is a sort of self-awareness, which could help us recognize ourselves (Pallasma, 2005). Compared with eyesight, touch has some advantages in that a sense of touch can help us touch things easily, and through touch, people can form the general sense of the objects, while eyesight cannot handle things related with sense of touch. As Pallasma (2005) points out the reason why people rely on their senses of touch is probably because people start to have the

ability of touch before they are born. This sensory capability was built up even earlier than vision. For example, when people wake up in a dark and quiet night, and go out of their room without turning on the light, what people would do is probably use their hands to explore the things in front of them, so as to avoid bumping into something. Except for the sense of balance, the sense of touch is applied to self-navigation incisively and vividly. For blind people, surely touch dominates their everyday lives.

2. Previous research of disabled people's reading system

Schmidt (2005) points out that unsighted people actually possess the ability to see "in the sense of understanding ", although how and what they might see is very different from sighted people. Walhof (1996), who was born blind, describes that when sighted people read a book, they may scan the pages through using their eyes. Similarly, blind people could use their fingers, hands and even their feet to have a brief sense of the environment they are living in. Similarly, they could use their hands to scan the content of the book instead of scanning with their eyes. The book content is totally different from sighted people's content: the content is a specific object or a Braille book. To some extent, using touch to understand things has much in common with vision (Kennedy, 1993). Blind people are able to use their hands to read and understand Braille, but are they able to read shapes? Pring and

Rusted (1985) state that “pictorial representation may be like a symbolic language system, accessible to touch and vision alike” (p. 3). Also, Kennedy (1980) found out that those people who have been visually impaired since their birth and those who acquired blindness have the ability to understand pictures. This evidence suggests that visually impaired people can make some kind of connection between touch and pictures similar to what sighted people do. However, discovering the world through touch is significantly harder than seeing as not everyone has a very sensitive touching ability. According to the research from Vision 2020, there are only 10% blind people who can read Braille expertly through touch (2003). Also, the ability to read Braille needs to be trained from an early age. It is extremely hard for adult blind people and adolescent visual impaired people to develop the skill of using the top of their fingers to read.

For a long period of time, the main role of children’s reading literature was to introduce the audience to knowledge much like textbooks. Modern children’s books, with brightly coloured covers that appeal to children, were not created until approximately 100 years ago (Yu, 1997). With the development of knowledge and society, the requirement of the content for children would also change. What seemed suitable in the past may not be suitable in the present. In another words, textbooks could not satisfy the curiosity and imagination of children any more. Faced with new environments and society, the demand for change in textbooks for visually impaired people should be met. As

Yu (1997) claims, children's reading literature did not change until the nineteenth century. It is a fact that literature should keep pace with the development of society. The development of children's books reveal a spiralling trend between pragmatism, which means "an approach that evaluates theories or beliefs in terms of the success of their practical application" (Yu, 1997), and romanticism, which has a more open and creative form. In the conceptual development of my design, I used the romantic form, which emerged 1962 (Yu, 1997). Furthermore, according to the 2013 research conducted by scientists from Harvard University and Beijing University, toddlers build up an understanding of abstract shapes from around 4 years of age (Dillon, Huang & Spelke, 2013). While sighted children can quite easily understand textbooks designed for them with the help of their parents, teachers and other older people (Yu, 1997), blind children need the support of other people as a guide to understanding how to interpret the environment (Walhof, 1996). It is strongly acknowledged that an eyesight disabled person can read and learn through the help of sighted people. Therefore, for this design work, it is suggested children are accompanied by sighted people who can read the content for them.

The reason for choosing the scroll as the format for my design emerged from research into the best reading mode for eyesight disabled people, and this mode has a significant difference to that of a sighted person. Walhof (1996), a visually impaired person since birth, states that sighted people use their eyes to scan the text on books whereas blind

people use their hands and feet instead. There are many kinds of books for sighted children; and nowadays, those books not only have beautiful illustrations, but also blend in other forms of multimedia, such as sound effects, and pop-up engineering. However, most Braille books are very thick and contain almost no illustrations. What is worse is that the characters are not well developed and thus not engaging for the eyesight disabled people to read. As a consequence, most of the textbooks designed for eyesight disabled people do not meet the demand they have for engaging literature that they themselves can read.

Therefore, the book design in this research, a tactile scroll book, is designed to make an attempt to enrich the life of eyesight disabled people by the action of “reading” and make their lives more interesting. Also my hope is that my design work will be able to help blind children develop space consciousness at an early age, which is very important but also very hard for them to cultivate. Visually impaired people can use their acquired skill with their sense of touch to perceive things, but this kind of ability is not easy to develop and needs to be nurtured at an earlier age. Based on these key criteria, I looked into ancient and traditional scroll and cliff paintings for inspiration. Cliff painting might be the oldest form of recording and documenting events; and the scroll is the oldest form of the book produced during the ancient age of China (Eardley & Pring, 2006). I posit that a scroll on the wall could be a book for the eyesight disabled in that through the touch system of eyesight disabled people, they can gain information from the scroll

book (Loitsch & Weber, 2012).

According to Jolley (2010), sighted children aged from 4 to 7 years old are not be able to concentrate for a long period of time. Blind children too cannot concentrate for a long period of time (Sarkar, Das, & Rudrapal, 2013). Their concentration span might be even shorter, so, the scroll format seems to be one of the best choices in this instance because it could help the eyesight disabled people learn easily and is short. For blind children, reading this type of book might not only need the guidance of parents, but could also be in the company of sighted children, or a friend who is able to read the story to them. This kind of activity could also improve the social consciousness of blind children from a young age. As a blind person from Hong Kong observed, social ability is very important for blind people, especially with sighted people. The reason for pointing this out is because it is unavoidable in their daily life (Lai, 2013), and blind people usually rely on sighted people to guide them around.

Case study analysis II

In 1824, Frenchman Louis Braille invented braille, a tactile writing system consisting of six dots that could be combined to convey meaning. For all vision-impaired people, this opened the door to knowledge. Three years later, the first braille book was published in the UK. After this, most countries began to establish libraries for blind people. In China, the Chinese Braille Publishing House established China's first braille library, called the Chinese Braille Library in October 1994 (Chinadp, 2013). All the braille books in that library are offered to blind Chinese citizens for free.

In one sense, blind people have to face more challenges in life than sighted people do. From a sighted person's perspective a visual impairment means that life is harder. Therefore, it is essential to take efforts to build a learning system for visual impaired people. However in China the situation is not optimistic. Education for blind people is one of the biggest problems facing Chinese society. In Shanghai, there is only one school for blind children ---- the Shanghai Blind Children's School (image 2). This school is the only stated-owned school for the blind in Shanghai. On one hand there are a few schools for the blind and on the other proportion of the blind people in China is increasing every year, there does not seem to me to be enough books designed for them.

I decided to come to New Zealand to continue studying design in 2011.

image 2
Shanghai Blind Children's School, 2007. Shanghai, China. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

After this, I began looking into the Western designers involved in research about design for blind people. At the beginning, I did not find a lot of related design work, but in further research, I found out that there are not only designers working in this area, but also lots of artists, and even some educators who teach blind children, as well as parents of visually impaired children. Current books for the visually impaired are either very old fashioned or not specifically aimed at blind children. In my research, I aim to provide a book specifically to educate blind children.

⠠⠍⠁⠝⠛ ⠤⠤⠤⠤ ⠠⠇⠕⠎⠎ ⠕⠋ ⠠⠑⠽⠑

At the very beginning of my research into design precedents, a book which is called ‘Blind’ caught my attention. The author of the book is a female photographer, Sophie Calle. She interviewed many blind people about the most beautiful thing in their mind, and took pictures based on the interview. That huge, yellow hardcover book was the first book which introduced me into the world of blindness. The author uses a sighted person’s view to explain blind people’s understanding of colour (image 5, 6) In this book, touch is mentioned by the interviewees more than once, and is also mentioned in almost all the books that I have read during my research (image 3,4). Also, in reading Calle’s book I have understand that many visually impaired people *can do* simple reading, which is really important for my research. Therefore, touch is at the heart of my design research.

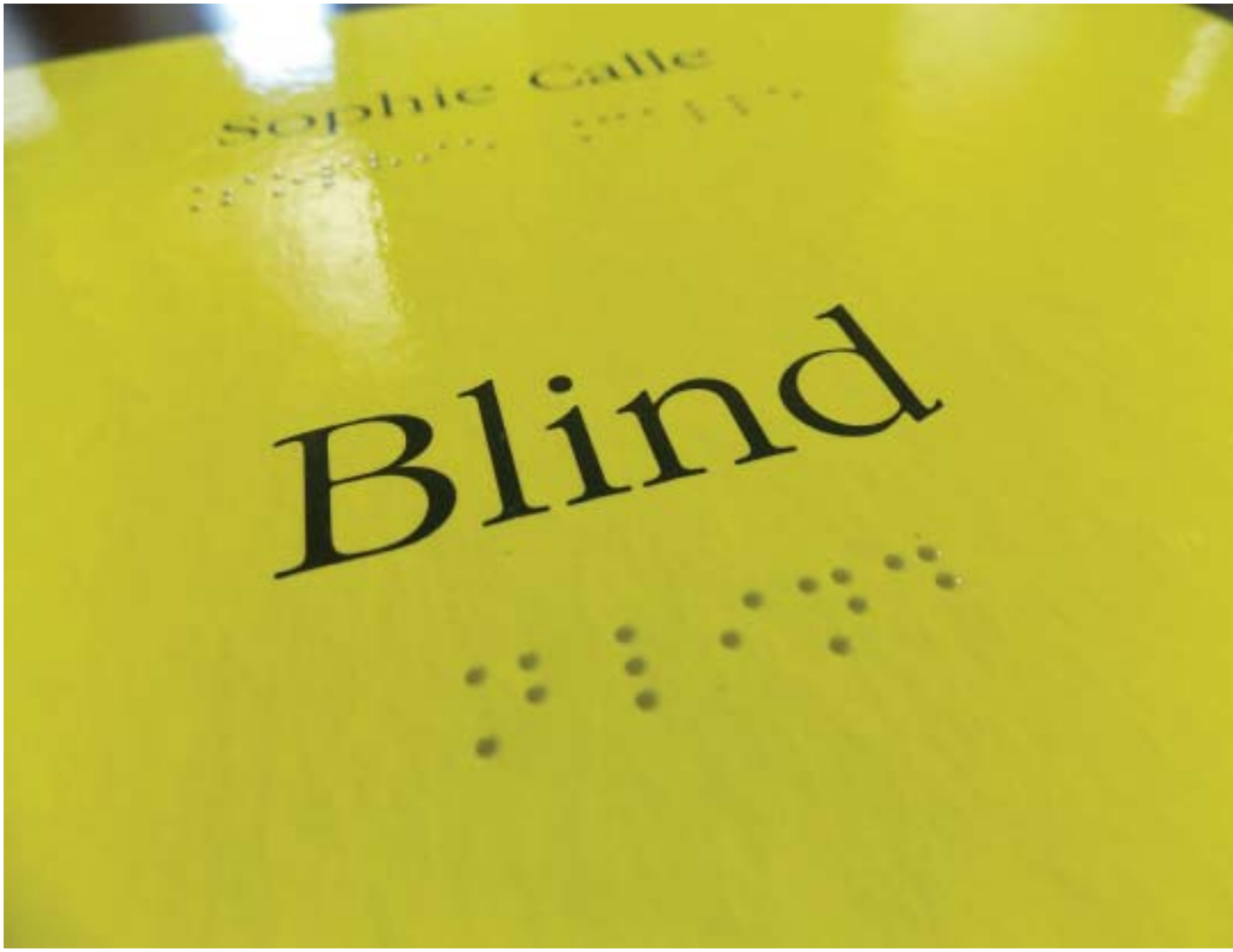


image 3

Blind, Sophie Calle, 2011, Actes Sud

image 4

An internal braille page in Sophie Calle's *Blind* book

⠍⠁⠎⠞⠑⠗ ⠕⠋ ⠙⠑⠎⠊⠛⠝

image 5

An internal page in Sophie Calle's *Blind* book describe a blind boy's favorite colour green

image 6

An internal page in Sophie Calle’s *Blind* book describes a blind boy’s favorite colour ---- green

⠍⠁⠎⠞⠑⠗ ⠕⠋ ⠙⠑⠎⠊⠛⠝

Mang ---- Loss of Eye

In April 2012, two students, called Alex J. Brien and Matthew Chenard created a tactile mural at Perkins School for the Blind in Watertown,in the United States. This wide-scale mural combined two-dimensional murals (elements such as the park scene) with three-dimensional objects such as the park bench, tree bark, artificially scented flowers and so on (image 7). Blind people could use their touch system to feel the trees, bark, flowers and other objects, simulating the sensation of wondering in the garden. This research has made me realize that there are lots of ways to educate blind people, such as a “textbook” that could provide an experience beyond a 2D books. This work encouraged me to think that my work could use an interaction form, which would encourage visually impaired children to “read” my book in an experience framework.

image 7

Tactile mural, Alex J. Brien & Matthew Chenard, Watertown, the United State, 2012

This artwork seems to have been created in the same spirit as the museum for the blind in the United States, which encourages vision impaired people to discover the world through touching. Tactile artist Ann Cunningham, who is from the US, exhibited a very special public art installation in the Iowa Department for the Blind on July the 10th, 2009 (image 8). Just as the name of the event *Please Touch the Art*, the main purpose of the seven pieces of artworks was to encourage people who could not see to experience the paintings through touch. As the artist said, “most art is of the ‘do not touch’ nature, but this artwork is meant to be touched and interpreted.” (Cunningham, 2009, p. 4). As is evident from these images, both artworks highlight a significant fact that for blind people the best way of acquiring information and learning about the world seems to be through touch. This artwork is base on stories and western legends. This made me start thinking about using a traditional Chinese legend as a medium to show and give blind children, especially Chinese children, knowledge and information which could be more entertaining.

image 8

Please Touch the Art, Ann Cunningham, Iowa, the United State, 2009

During my online search, I found some tactile books that were created by blind educators and parents of blind children. Although these books are not as professional as the ones designed by artists and designers, they are very practical. These books are more focused on explaining general knowledge. For example, one of the books uses two paintbrushes, one bigger and the other smaller, to explain the meaning of ‘size’ for blind children, which you can see demonstrated in image 9. These books are not only very practical, because they are based on the experience of teaching, but they are also easy for people to produce themselves. These books made me realise that it would be very important for my design research to incorporate general concepts (like size) into my final work, therefore I made my ‘ten suns’ into different sizes to try to help blind children get the concept of big and small.

image 9

How to make tactile pictures understandable to the blind reader, Yvonne Eriksson, 1999

Gabby O'Connor, a Wellington-based artist used a huge amount of blue paper to create and construct a large paper carving artwork that is called *What Lies Beneath* (image 10). In the art gallery the artist folded out the huge shapes so as to let people have an immersive feeling like being under water. This artwork gave me the idea of using paper engineering as the mode of expression for my design output.

Artists and designers are exploring a range of alternative methods in order to try to enhance the reading experience for vision-impaired people. Some of the artist/designer created textbooks are practical; some sensory artworks are created by blind people themselves; some designer creations for the blind are 3D books that are customized by using 3D technology. There do not appear to be many art or design works that combine all the advantages of such methods together. In my design research, the most important core components are making a information engaging and interesting for blind children.

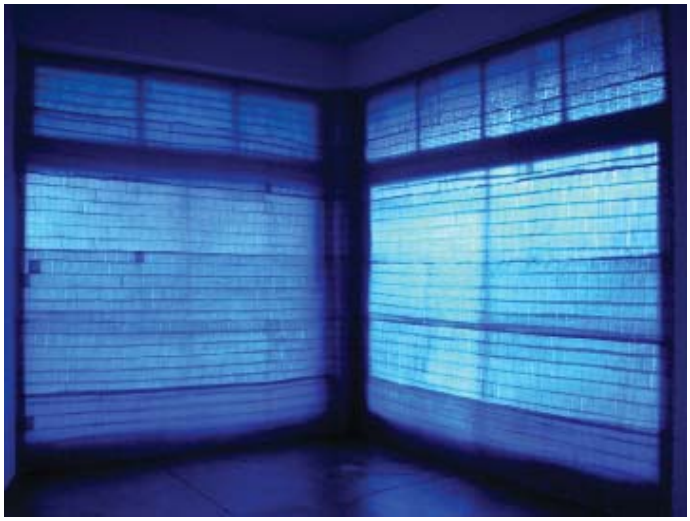


image 10

What Lies Beneath, Gabby O'Connor, Auckland, New Zealand, 2011

The Century of Artists' Books, by Johanna Drucker, is the seminal full-length study of the development of artists' books as a 20th-century art form (Drucker, 1995). By situating artists' books within the context of mainstream developments in the visual arts, Drucker (1995) raises critical and theoretical issues as well as providing a historical overview of the medium. Within its pages, she explores more than two hundred individual books in relation to their structure, form, and conceptualization. In this book, people are asked to broaden their knowledge and understanding about books. To be exact, a book refers in essence to something that could be useful and give people knowledge. Refleching on Drucker's comeptualising of the book opens us up to the idea that a scroll on the wall could also be understood as a 'book'.

Self-authored work IV

Some proper nouns and techniques used in this chapter are introduced to help accomplish this design research. It is acknowledged that eyesight disabled people cannot read normally. Therefore, their learning and reading cannot, without the support of the teachers understand different shapes and patterns. In this chapter, techniques including storytelling, paper folding and the correct use of Chinese characters' formulation are introduced.

1. Book

What is the oldest form of documentation? What stores knowledge, ideas, and beliefs about the world? I suppose the answer for most of us would probably be a book. The history of the book is said to be longer than four thousand years (Haslam, 2006). In the ancient world, there were just a few people who could read or write (Martyn, 2011).

As the nation at that first invented paper, printing and printing skills (Lyons, 2011), Chinese people are proud of themselves. The origins of Chinese characters, Hanzi (the Chinese term) has experienced the following stages: Oracle bone script period, Bronze Age, Regular script period. A very famous Chinese linguistician, named Chu Junsheng, wrote the book named 'the explanation of Chinese characters' pronunciation and their word formation'. He stated that '作书，上古以刀录于竹若木，中古以漆画于帛，后世以墨写于纸。' which translates as, 'in ancient times, people used knifes to cut characters on

bamboo, in mediaeval times, people started painting on silks using oil paints; in current times, people began to write on paper'. In English, the word 'book' comes from *bok* which is an Old English word (Haslam, 2006), and is associated with 'beech tree'. Haslam (2006) states that "Beech boards were written on by Saxons and Germans, and a literal definition of the book is board writing." The first book designers were Egyptian. They did not use the modern form of their nations' characters but scrolls, which could be rolled up. This is known as the oldest form of books. Since then, the book has been widely used in the areas of education, religion, politics in print or manuscript form in the last "two and half millennia" (Lyons, 2011).

For us, the traditional form of a book might be a few printed and bound papers that we could hold in our hands like I designed as my bachelor graduate design (image 11). The Oxford Dictionary definition of the book is a "portable written or printed treatise filling a number of sheets fastened together" (Simpson & Weiner, 1989). The Encyclopedia Britannica states that the meaning of book is an "instrument of communication" (Britannica, 1974), which describes the public value of books. From these two explanations, it is not hard to tell that a book is not only a common form of documentation, but also a form for disseminating information. With the invention of the book, the way that people exchanged and spread resources, not just physically but mentally, had changed dramatically. Even though we are so familiar with modern media such as television or radio that can entertain us

as well as educate us, there are still many people who like to buy or borrow physical books. The reason for this might be that books are easily transported; it might also be because reading a book allows us to inhabit a imaginary space of our own. For sighted people, books offer an experience similar to the enrichment gained from visiting a museum (Ackerman, 1990); for blind people, this ‘museum’ needs to be opened (Chinadp, 2013). Further more, readers decide the type of reading forms they wish to engage in. For blind people, the limitation of visual offerings brings out a unique way of reading. What we have to realize is that the ‘book’ is for visually impaired people, instead of sighted people, which means the ‘book’ exists for the needs of blind people. So in my work, all the elements I used are not for sighted people.

My book is designed for the entertainment as well as education of blind people. Maybe, it could be understand as a mural, but in fact, it is also a book that can actively give blind people knowledge and confidence to overcome the difficults their might need to face.

image 11

Zhiqing, Yu. Undergraduate collection *Talking with Friends*, a book for blind children, 2010. Shanghai, China. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

2. Paper and paper folding

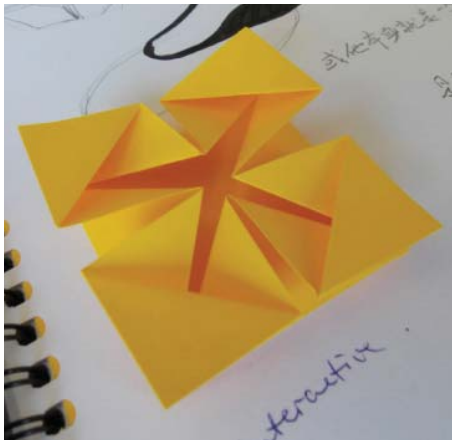


image 12
Prototypes. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

Ever since I was a child, I have had a very special feeling for paper. This is not only because Chinese people first invented paper, but also because I have a deep passion for making hand-made books and for paper folding. I remember that I spent most of my childhood in my hometown folding, cutting and pasting different kinds of paper into various shapes and forms (image 12). The most exciting time for me was every Friday afternoon, because Mum always bought me lots of colourful paper on that day. Sometimes my parents would feel a bit worried about their little daughter playing with paper all the time. Even now paper folding is still a predominant activity in my adult life. The reason I have chosen the phrase ‘paper folding’ instead of paper engineering is not just because I do not think I am good enough to be called paper engineer, but because I want to let everyone know that making a book for blind children is not hard or profound. It can be very relaxing and happy.

The historical story about paper is that it was invented by Ts’ai Lun around 105 A.D. Doctor Lao Kan and Shih Chang-ju (1968) discovered that “the oldest paper in the world in the ruins of a watchtower in Tsakhortei, south of the Bayan Bogdo Mountains, in the modern Ning-hsia area” (Lao & Shih, 1968, p. 18). Fifty years later, Sir Aurel Stein

and Dr. Sven Hedin, two great archaeologists, found a number of pieces of “very thin, yellowish”, “vegetable fibre paper in a tomb in Pa-ch’iao, Sian” (Heller, 1978, p. 185); and consequently believed the fibres to be made during the Han dynasty (202 B.C.-9 A.D.). Almost all the evidence suggests that China was the first country that invented paper.

Paper plays an extremely important role in printing media, especially in the creation and production of books. You would never sell a stack of paper, some ink and mucilage to anyone who wants to buy a book. If paper had never been invented, there would never have been any books, journals, newspapers, or magazines sold around the world. The portable lightness and flexibility of paper has not only made it easier to record and disseminate information, but it has resulted in the creation and production of numerous formats, many of which can be shared around and enjoyed in public and in private. For me, papers have different characters and feature much like people, as they are made from different kinds of materials. Because of this, I decided to explore range of paper stock in making this tactile scroll book and the shapes symbolic of the text.

My tactile scroll book is constructed from paper and consists of a number of three-dimensional shapes that are designed to represent key elements from the narrative (Magnusson & Rassmus-Gröhn, 2005). It is clear that paper is just paper, and paper could not stand for knowledge alone. However, if there are words on it, then it can be

used as a book for sighted people. For eyesight disabled people, when characters of words are made of different shapes and patterns, they can be read by the touch system in a viaually disabled person's body. With the help of teachers and classmates as well as their parents, eyesight disabled people could read a book made from paper and characters of different shapes and patterns. It is understood that even though there is something wrong with the eyesight of a visually impaired person, their touch system is still sound. Through touching the characters, they would have an impression in their mind about the object they are touching. Meanwhile, if at the touching moment, there is introduction of the concept of the object they are touching by teachers, then visually impaired people can remember the object (D'Angiulli, Kennedy, & Helle, 1998). Thus, as a result, they can learn about the world gradually with the help of tactile scroll books and teachers as well. Word by word, phrase by phrase, they would build up their own understanding of the world.

3. Culture & Mandarin

Because of the limitation of English translations of Chinese research documents, I chose to read Chinese academic papers and books. In the following section, some of the quotations are my translations from ancient Chinese to modern Chinese and finally into English. Because I am not a scholar of ancient Chinese, all the translations are based on the degree of ancient Chinese language I acquired during my undergraduate

study. So, while the translation might not be very precise, the main meaning should be correct.

The development of society in China is like a spiral rising upwards. Since the great Cultural Revolution (1966-1976) Chinese people have gradually started to pay attention to their own culture. Nowadays, the phrase ‘humanistic concern’ is talked about more often, not just in relation to our daily life, but also in relation to art. Also, because China is becoming economically stronger, Chinese people are able to return to focusing on their culture instead of thinking about basic needs such as food.

Culture means the arts and other manifestations of human intellectual architectural achievement regarded collectively as the ideas, customs, and social behaviour of a particular people or society (Oxford English Dictionary, 2013). Language is one of the most important parts of culture and is the main subject I will discuss in this section.

While engaged in this research, I drew on my Chinese cultural background. I developed a symbolic language or symbolic form for making tactile scroll books. In this design research abstract concepts such as Chinese Hanzi are turned into a visible forms, so that, eyesight disabled people could have an imagined tactile concept with the help of teachers.

The ancient Chinese documenting tool Hanzi is one of the oldest scripts in the world. The characters were used to be read, and many dialects existed because of different regions. Then a standard pronunciation system was made to guide the correct use of Hanzi, which is now understood as Mandarin (Wang, 2008). The history of Hanzi is more than 4500 years old. It has been in use dating back to late Shang dynasty (Xu, 1963), and is still used by Chinese people today. The development of the script form includes oracle bone inscriptions, large seal script, small seal script, official script, and regular script. At the present, there are about 150,000 pieces of oracle bones that have been found of which 4,500 are characters (Wang, 2008). The main structure of the modern Chinese that we use today is based on the small seal script that was developed and unified by King Qin Shi Huang of the Qin dynasty (Wang, 2008). Hanzi, or Chinese characters, are very different from English or other Western writing forms. It is a type of ideograph that came about from linking pictures and ideas (Wang, 2013). Chinese characters are more like symbols than letters (Wang, 2013). The formation of Chinese characters contains pictographic, knowing, echoism, self-explanatory, conversion, and metonymic features (Wang, 2008). In this study, I use the pictographic feature in formulating my design works. In the formation of a pictograph, most Chinese characters (Mandarin) are formed from two parts, one of which represents the pronunciation and the other the meaning of the word (Wang, 2013). One of the most significant features of Chinese is that the character forms are usually made by adding another simple character or radical,

for example the word ‘村’, or ‘cun’, which means ‘village’. The part of ‘木’ (wood) represents the meaning of this word which means the material used to build up the village while the other part ‘寸’ represents the pronunciation of this character.

As I stated before, the other five features of Chinese characters, namely, knowing, echoism, self-explanatory, conversion, and metonymy (Wang, 2008), which are the other six ways of the formation of Chinese Hanzi, were not considered for this project. I will now describe how I developed and tested some simple structured characters based on my research into Hanzi. In my work, some of the patterns, such as ‘tree’, are experienced as pictorial, and the others are pure abstractions for a western audience, however all the patterns which are created in my work are abstract forms based on Chinese characters.

3.1 Character formation test:

According to haptic theory, touch is of great significance to the human perception system (Krajnc, Knoll, Feiner, & Traar, 2011). Through touch, eyesight disabled people can have a feeling of the general structure of an object. It is acknowledged that Chinese characters are ideographic words, which link the picture and the meaning the words represent. As a matter of fact, eyesight disabled people can easily recognize Chinese characters with the help of their teachers, friends and parents as well.

In this part, a number of simple Chinese words are tested by the sighted people to see whether there is great difficulty of sighted people in recognizing the meaning of Chinese characters (image 13, 14, 15, 16,). For example image 15, this character formation means mountain, when I showed this image to them, people could understand or guess the actual meaning of it. This part is designed to explore the formulation rule that governs the Chinese characters.

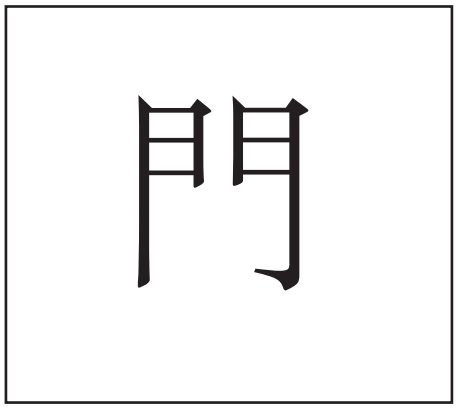


image 13
Character formation test - Door. 2013. Wellington, New Zealand

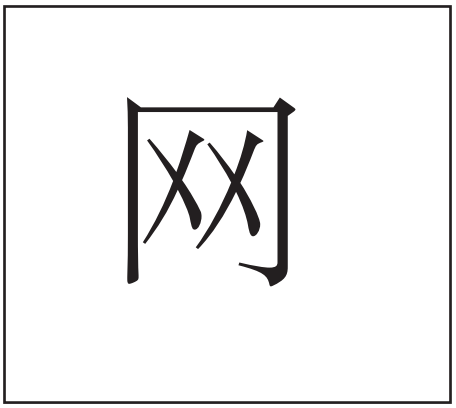


image 14
Character formation test - Net. 2013. Wellington, New Zealand

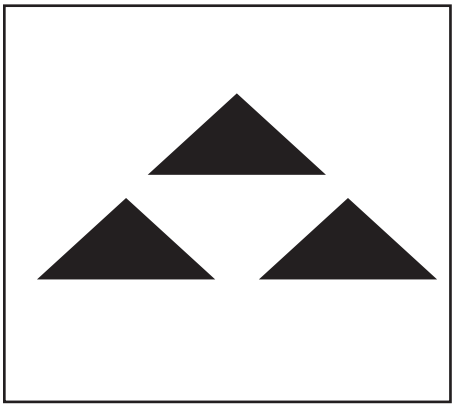


image 15
Character formation test - Mountain. 2013. Wellington, New Zealand

image 16

Character formation test - Umbrella.

2013. Wellington, New Zealand

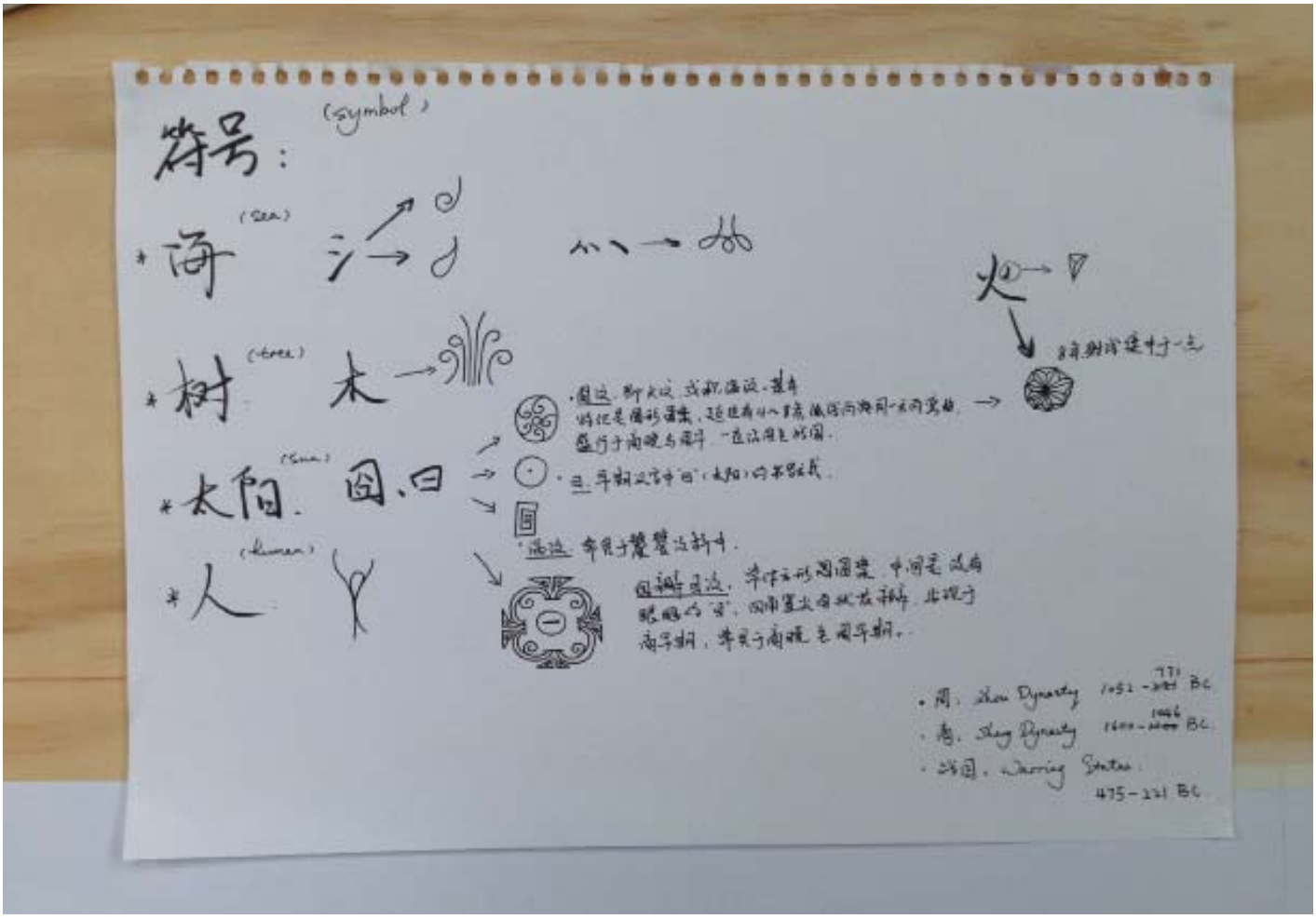


image 17

Character formation test. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

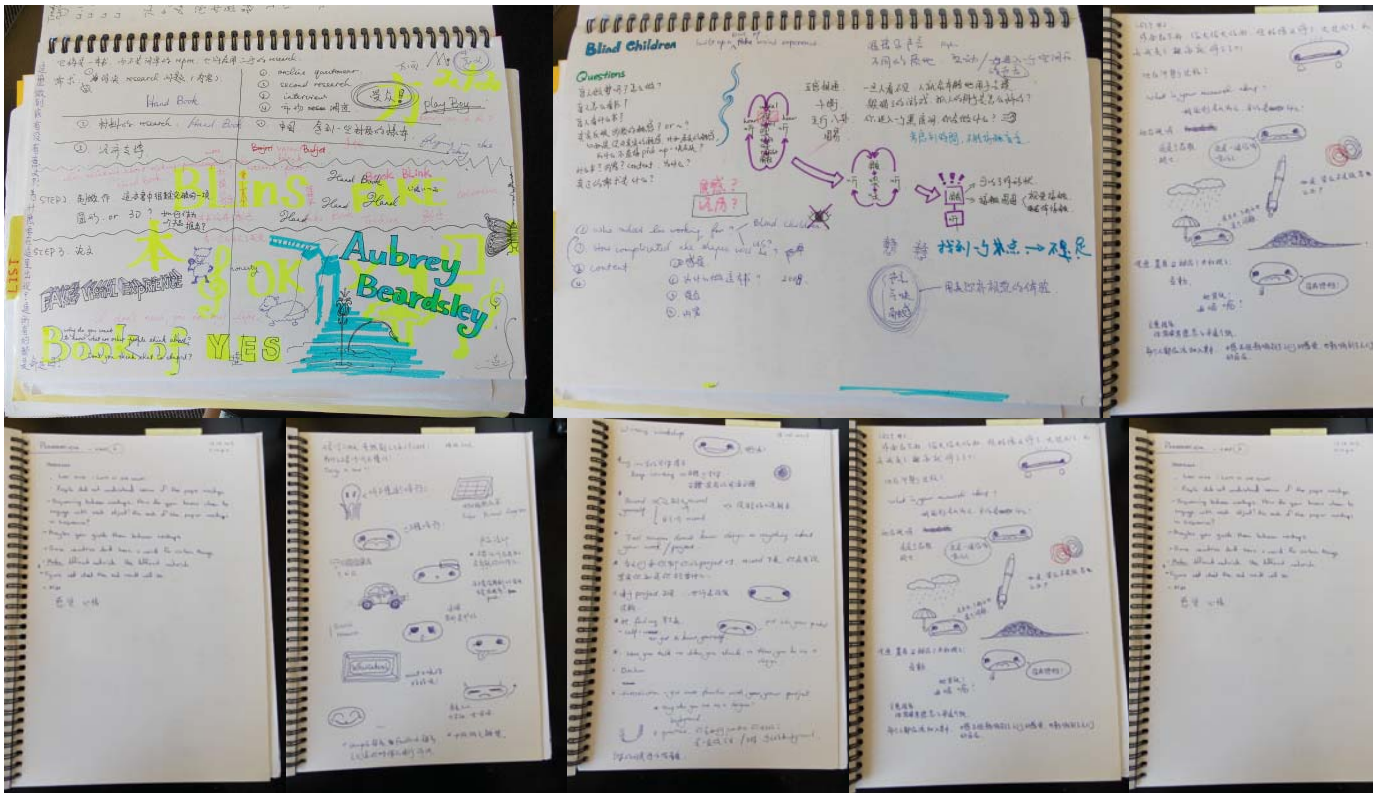


image 18

Brainstorm of character formation test. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

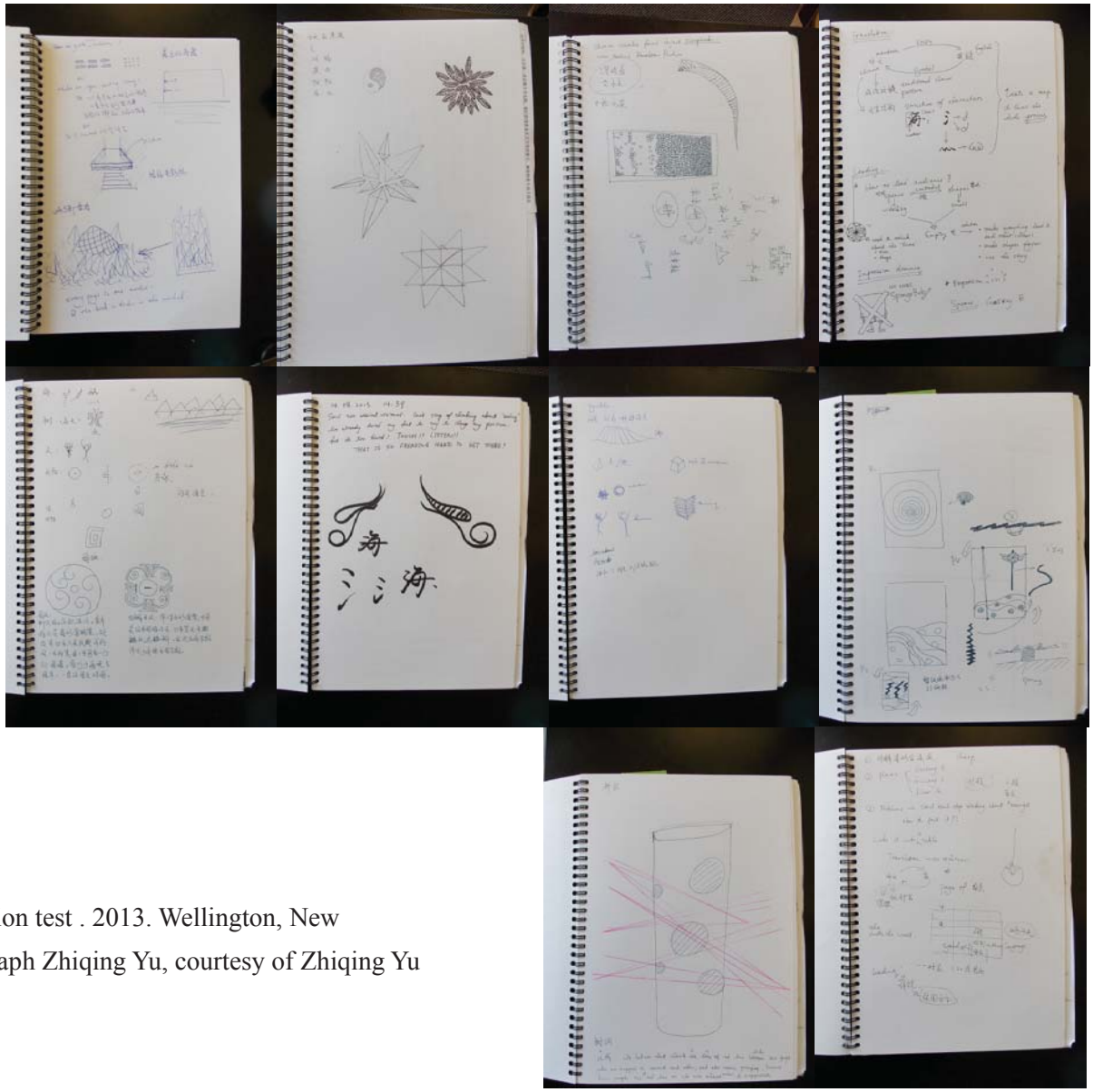


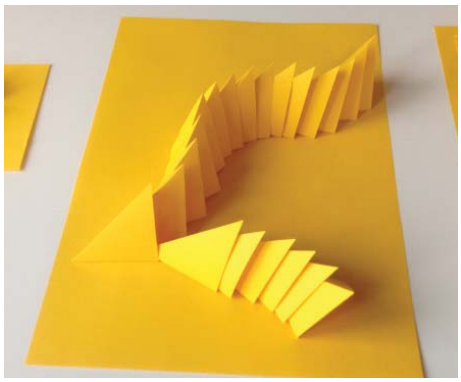
image 19

Character formation test . 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

3.2 Key words test

This test is designed to help eyesight disabled people build a link between sense of touch and the meaning of the words which are recreated by shapes. According to haptic theory, eyesight disabled people have the ability to recognize words through touching.

(1) Fire



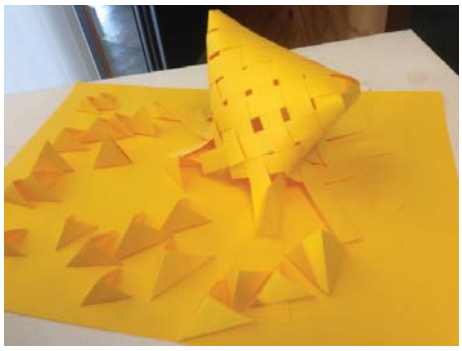


image 20

Key words test - Fire. 2013.

Wellington, New Zealand.

Photograph Zhiqing Yu, courtesy o

Zhiqing Yu

(2) Sun

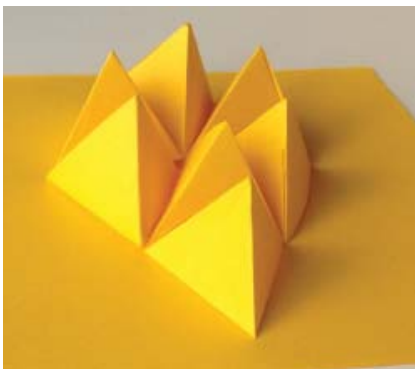


image 21
Key words test - Sun. 2013.
Wellington, New Zealand.
Photograph Zhiqing Yu, courtesy of Zhiqing Yu

(3) Flower/happiness

image 22
Key words test - Flower/happiness. 2013. Wellington, New Zealand.
Photograph Zhiqing Yu, courtesy of Zhiqing Yu

(4) Dry

image 23

Key words test - Dry. 2013.

Wellington, New Zealand.

Photograph Zhiqing Yu, courtesy o

Zhiqing Yu

(5) House

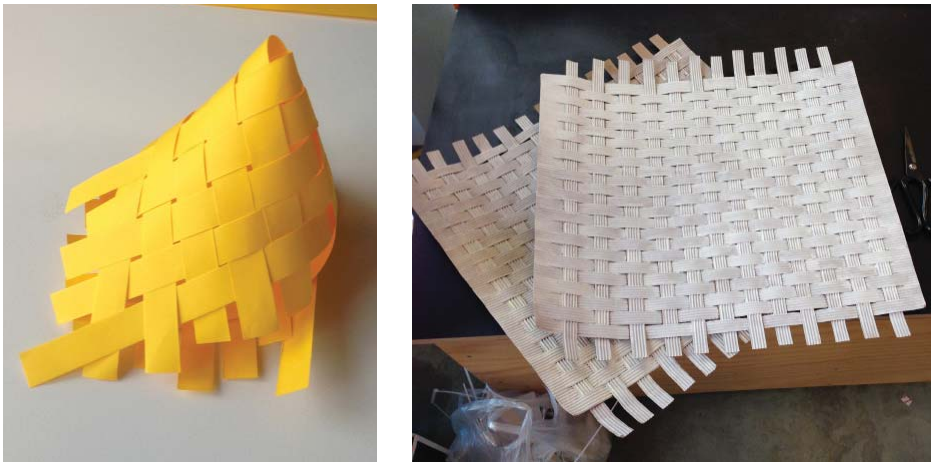


image 24

Key words test - House. 2013.

Wellington, New Zealand.

Photograph Zhiqing Yu, courtesy o

Zhiqing Yu

(6) Hero

image 25

Key words test - Hero. 2013. Wellington, New Zealand.
Photograph Zhiqing Yu, courtesy of Zhiqing Yu

(7) Dragon

image 26

Key words test - Dragon. 2013. Wellington, New Zealand.
Photograph Zhiqing Yu, courtesy of Zhiqing Yu

4. Idea generation

The idea generation of this design research is to encourage visually impaired children aged from 4 to 7 years old, and who have the ability to read better. Further more can blind children aged 4 to 7 years old understand the different quality of materials? Eriksson (1999) states that children begin to start building an understanding of the different quality of materials around age one.

For children who are from 4 to 7 years old, pictures are quite important in their reading materials (Yu, 1997). During the reading process, a 2D book with pictures does not satisfy the demands of eyesight disabled children. They want material to touch and feel instead. Therefore, in my design research, I created tactile image to replace those pictures which could just be seen by eyes. I changed 2D images into 3D through paper folding. All tactile pictures could be ‘read’ and ‘scanned’ by finger tips (Walhof, 1996).

5. Storytelling

5.1 Research of storytelling

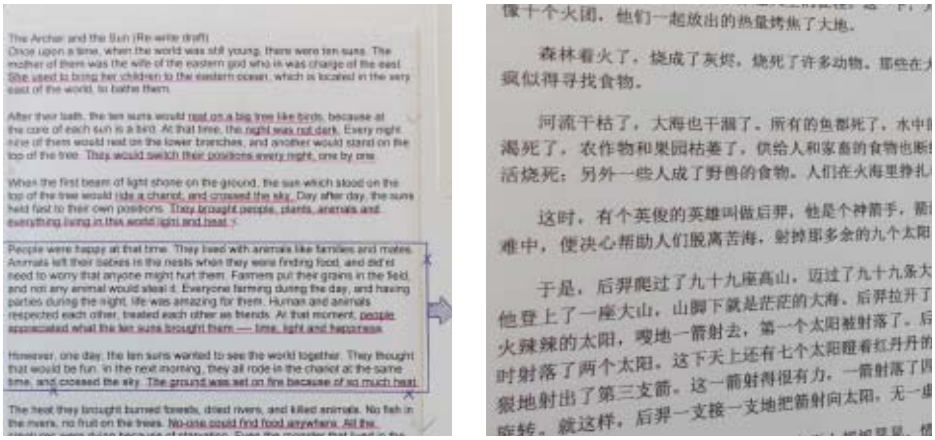
In general, children's early education relies on story telling treading aloud of educational literature from teachers and parents. Stories, such as legends can be considered as one of the best literary forms to empower children to be independent and confident. Legends, in particular, play a significant role in troubled children's therapeutic process by providing a good foundation for their later development. The personality development of blind children seems to be much harder than normal children because of the disability of their body is challenging. As Bull and Rumsey (1988) point out "Growing up with a visible physical impairment in many cultures has been shown to place children at risk for low self-esteem, peer rejection, withdrawal, and future adjustment difficulties" (Bull & Rumsey, 1988; Harper, 1991; Wright, 1983, as cited in Harper 1997). In particular, there are some similarities between the development of blind children and the development of troubled children, such as a lack of self-confidence (Walker, 2009), the difficulty for them to be accepted in a social circle (Lai, 2013), and low self-awareness (Walker, 2009). Further, Vision 2020 reported that only 10% of blind people could read Braille. If eyesight disabled people are not well educated at an early age to use the touch system in their bodies, it will be hard for them to gain an ability in reading Braille through using the sense of touch in their bodies. Consequently, helping vision-impaired people develop a sophisticated touching capability when they

are young becomes extremely important. Nowadays, a lot of textbooks or reading systems designed for visually impaired people do not distinguish young eyesight disabled people from adult eyesight disabled people. In fact, it is very difficult to educate adult eyesight disabled people as they have become so dependant on using their eyes through out their lives. For young visually impaired people it is easier for them to develop a touching and reading system. Therefore this research aims to build up a reading system for young visually impaired people.

Legends are beneficial for troubled children's development as they allow them to see the world in particular ways. One feature common to most legends, as Sturgess and Locke (2009) claim, is that stereotypes influence powerfully across different cultural backgrounds in determining modes of representation in popular literary texts. That is, legend stories always have a conventional narrative routine, In the story 'The sun and the archer', on which my tactile narrative is based, the human hero needs to conquer lots of natural challenges in order to save the world. According to studies investigating reading accuracy and response times, children can make inferences from counterfactual information in a fairy story as they can from stories based on the real world (Bowyer-Crane, Snowling 2008). And, as Walker (2009) asserts, troubled children are much more likely to immerse themselves in situations similar to their own lives. I argue that the same is so for blind children. In associating themselves with the hero characters of the legends, they learn morals and values and how to deal with their

own inner problems in their real lives. For instance, there is a paragraph which is told as ‘The light shined into Hou Yi’s eyes, so he could hardly see. However the hero hadn’t given up. His arrows kept shooting toward the suns until he finally had shot eight more of them down’. In this paragraph, blind children are likely to immerse themselves into the situation, and get the information that as long as they insist, they will be able to achieve what they want.

5.2 Original text



The Archer and the Sun (Re-write draft)

Once upon a time, when the world was still young, there were ten suns. The mother of them was the wife of the eastern god who in was charge of the east. She used to bring her children to the eastern ocean, which is located in the very east of the world, to bathe them.

After their bath, the ten suns would rest on a big tree like birds, because at the core of each sun is a bird. At that time, the night was not dark. Every night, nine of them would rest on the lower branches, and another would stand on the top of the tree. They would switch their positions every night, one by one.

When the first beam of light shone on the ground, the sun which stood on the top of the tree would ride a chariot, and crossed the sky. Day after day, the suns held fast to their own positions. They brought people, plants, animals and everything living in this world light and heat.

People were happy at that time. They lived with animals like families and mates. Animals left their babies in the nests when they were finding food, and did'nt need to worry that anyone might hurt them. Farmers put their grains in the field, and not any animal would steal it. Everyone farming during the day, and having parties during the night, life was amazing for them. Human and animals respected each other, treated each other as friends. At that moment, people appreciated what the ten suns brought them — time, light and happiness.

However, one day, the ten suns wanted to see the world together. They thought that would be fun. In the next morning, they all rode in the chariot at the same time, and crossed the sky. The ground was set on fire because of so much heat.

The heat they brought burned forests, dried rivers, and killed animals. No fish in the rivers, no fruit on the trees. No-one could find food anywhere. All the

像十个火团，他们一起放出的热量烤焦了大地。

森林着火了，烧成了灰烬，烧死了许多动物。那些在火
疯似得寻找食物。

河流干枯了，大海也干涸了。所有的鱼都死了，水中
渴死了，农作物和果园枯萎了，供给人和家畜的食物也断
活烧死；另外一些人成了野兽的食物。人们在火海里挣扎

这时，有个英俊的英雄叫做后羿，他是个神箭手，箭
难中，便决心帮助人们脱离苦海，射掉那多余的九个太阳

于是，后羿爬过了九十九座高山，迈过了九十九条大
他登上了一座大山，山脚下就是茫茫的大海。后羿拉开了
火辣辣的太阳，嗖地一箭射去，第一个太阳被射落了。后
时射落了两个太阳。这下天上还有七个太阳瞪着红丹丹的
狠地射出了第三支箭。这一箭射得很有力，一箭射落了四
所转。就这样，后羿一支接一支地把箭射向太阳。无一虚

image 27
Storytelling - Original text.
2013. Wellington, New Zealand.
Photograph Zhiqing Yu, courtesy of Zhiqing Yu

后羿射日 (ancient Chinese)

逮至尧之时，十日并出。焦禾稼，杀草木，而民无所食。 猰貐、凿齿、九婴、大风、封豕希、修蛇皆为民害。 尧乃使羿诛凿齿于畴华之野，杀九婴于凶水之上，缴大风于青邱之泽，上射十日而下杀猰貐，断修蛇于洞庭，擒封豕希于桑林。 万民皆喜，置尧以为天子。

后羿射日 (modern Chinese)

⠠⠠ ⠠⠠⠠ ⠠⠠ ⠠⠠⠠⠠

世界年轻时，天空曾一齐出现十个太阳。他们是东方天帝的儿子。他们的妈妈常把十个孩子放在世界最东边的东海洗澡。洗完澡后，他们像小鸟那样栖息在一棵大树上。

那时候，人们在大地上生活得非常幸福和睦。人和动物像邻居和朋友那样生活在一起。人们感恩于太阳给他们带来了时辰、光明和欢乐。

可是，有一天，这十个太阳想到要是他们一起周游天空。这一下，大地上的人们和万物就遭殃了。十个太阳放出的热量烤焦了大地。

这时，有个年轻英俊的英雄叫做后羿，他是个神箭手。他决心射掉那多余的九个太阳。于是，后羿爬过了九十九座高山，迈过了九十九条大河，穿过了九十九个峡谷，来到了东海边。后羿登上高山拉开弓弩，瞄准天上火辣辣的太阳，嗖地一箭射去，第一太阳被射落了。

后羿射掉了九个太阳。剩下的太阳害怕极了，躲进大海里去了。

天上没有了太阳，立刻变成了一片黑暗。人们祈求天帝，让太阳出来。但天帝太生气，所以他让第十个太阳白天出现，晚上沉入大海。

The Archer and the Sun

Once upon a time, when the world was still young, there were ten suns. They were the god’s sons. Their mother used to bring them to the eastern ocean to have bathes. After their bathes, ten suns rested on a big tree like birds.

At that time, the night was not dark. People were happy. They lived with animals like families and mates. Everyone appreciated what the suns brought them. However, one day, the ten suns went out to see the world together, because they thought that would be fun. The ground

was set on fire because of too much heat. The heat they brought burned forests, dried rivers, and killed animals. No fish in the rivers, no fruit on the trees. No-one could find any food anywhere. All the creatures were dying because of starving.

Finally the young hero, Hou Yi, decided to fight with the suns. Hou Yi was a skilful archer. He made up his mind; he would shot off all but one of ten suns. He climbed over ninety-nine mountains, crossed ninety-nine rivers, went through ninety-nine canyons, and finally came to the eastern ocean. He climbed up the tallest mountain in the middle of the ocean; aimed at one of the suns, and shot it down.

The other suns were scared badly, and even glowed more light and heat than before. The light shined into Hou Yi's eyes, so he could hardly see. However the hero hadn't given up. His arrows kept shooting toward the suns until he finally had shot eight more of them down. The last sun was so alarmed; it dropped into the ocean, and never came back again.

Without the sun, the world was so dark. People could barely make a living anymore. They prayed to the god to let the last sun rise back into the sky. However the god was very angry that human kind killed his sons, so he decided punish people. He let the last sun rising just during the day; so that during the dark night, all the beasts came out to kill people and animals.

Findings V

1. Design work

It’s a basic human right – everyone has the right to access information.

Royal New Zealand foundation of the Blind

1.1 Symbols

In this section I will explore and analyse a number of word formulations. From analysing the following words, people can see how words are formulated to present meaning and educate visually impaired people.

(1) Sun and fire

① **Design work**

The idea of sun and fire in my design work came from both the sun’s shape and form and the Chinese character. In Chinese, ‘日’ means ‘sun’. In ancient China, there were a few patterns by which to represent sun. In this instance, I chose the ‘jiong pattern’ (image 28), which had been widely used in Warring State (470-211 B.C.), as the outline model of the sun. The inside shape is taken from a part of Chinese character ‘火’,which means fire, and is representative of the beak of a bird, which you can see illustrated in image 29. The reason for this is because in ancient China people believe that there was a bird in the core of the sun (Fang, 2009).

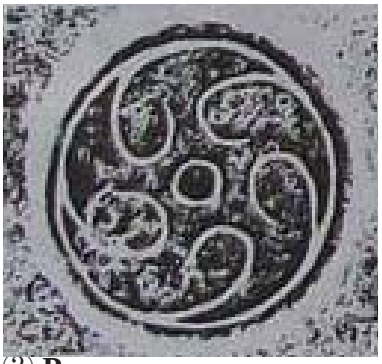


image 28
Design work - Jiong pattern. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

② **Paper:**

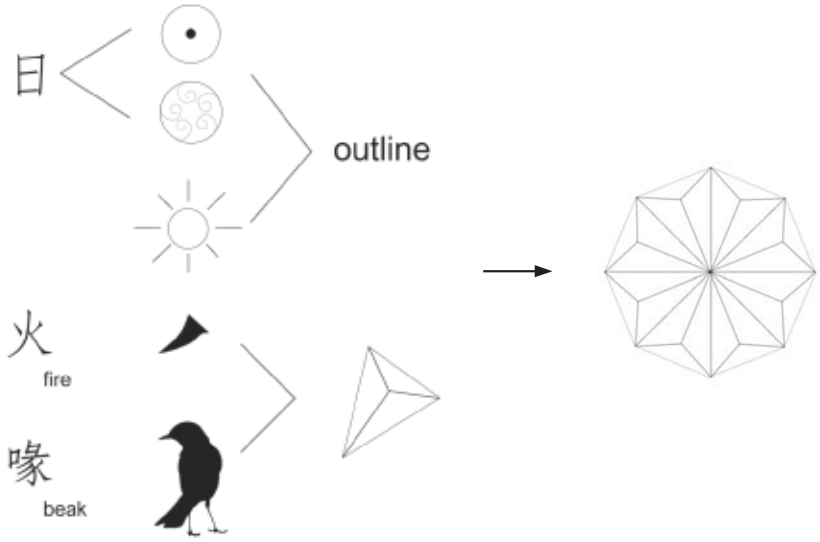


image 29
Design work - Design process - Su
& fire. 2013. Wellington, New Zea
land. Photograph Zhiqing Yu, cour
tesy of Zhiqing Yu

When I tested the materials for making the ten suns, I used ordinary drawing paper, which is around 100gsm. During the development and refinement of the tactile book narrative, the size of the suns became

gradually bigger; however, the strength of this drawing paper cannot satisfy the need to build a strong tactile scroll book. Then I decided to use paper-board, which is about 250gsm. This paper stock is stronger than drawing paper, but also has some limitations, the biggest being that it is extremely heavy. When the whole shape needed to be fixed onto the wall, I had to use extra adhesion (image 30).

(2) Ocean

image 30

Design work and process - Sun & fire. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

① **Design work**

The form of the ocean is mainly inspired by Chinese characters and the radicals in Chinese characters. The function of radicals in Chinese characters is quite similar to etymon in English Meaning, and this part of Hanzi (Chinese characters) represent the meaning of each character (Wang 2008). As is illustrated in image 31, both 氵 and are radicals, and both of them represent water. This means that as long as one of these two parts appears in a character, the meaning of that character has to be relevant to water, for example, 河 which means river, and 蒸 which means steam. Also another idea in foming the pattern of water is the medium itself. I therefore used the Hanzi (Chinese character) 水. As I stated before Hanzi is a kind of symbolic language, so in this case I used the traditional form of Hanzi 水 in developing the form for the pattern as well as the form of the ocean.

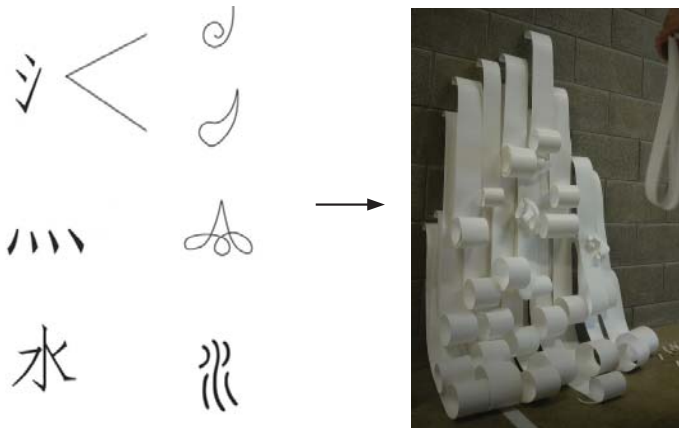


image 31

Design work and process - Ocean. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy o Zhiqing Yu

② **Paper**

Yapo paper is a kind of plastic synthetic paper which is covered by plastic film on both sides. This type of paper is very hard to fold, and is waterproof. I cut it into a few small long pieces, and its shape suddenly became much like a wave. Additionally, I chose two different thicknesses which are 150gsm and 230gsm to represent the different weights and strengths of the ocean (image 32,33).

image 32

Design work and process - Ocean. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

image 33

Design work and process - Ocean. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

(3) Tree

① **Design work**

The form of tree is from a part of the Chinese character 树, which means tree, and which can be seen in image 34. The part that I used for my design output means wood.

② **Paper**

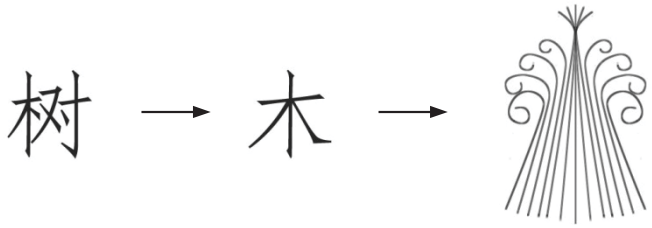


image 34
Design work and process - Tree. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

In modelling the tree, I first chose PPC rendering paper, which is 118gsm. Earlier prototypes used silk-rice paper and Tibetan Paper. Both these two types of papers are traditional Chinese papers. The reason why I finally decided to use PPC rendering paper is because it is stronger than any kind of traditional Chinese rice paper, either steamed or un-steamed, which are two traditional processes for making rice paper. Also touching this paper recalls the experience of feeling a plant's surface which initially formed appropriate for the symbol for 'tree'. However, the biggest limitation in manipulating and modelling this paper is that it is hard to fold, especially when creating a big piece such as the tree, which is around 1600 x 1000 mm. The reason might

probably be because this is a kind of composite paper mixed with plastic (image 35).

image 35
Design work and process - Tree. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

(4) Flower

① **Design work**

The shaping are form of the pattern for flower is quite similar to the ocean; I used a part of the Chinese character of the word flower, which can be seen in image 36.

image 36

Design work and process - Flower. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

② **Paper**

I suppose printing paper is one of the most familiar papers for designers. The reason why I chose paper stock to make the flower is because the price of this type of paper is reasonable (image 37).

image 37

Design work and process - Flower. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

(5) Starving

① **Design work**

During this design research, I found that using shape to describe feeling was one of the hardest tasks I set myself. I was not able to design this until the whole design had been completed. I used brainstorm to found out some key words which describe the feeling of starving (image 39). I wrote down all the Chinese phrases, which describe starving, I could think about. Eventually, the one I decided to use is ‘rib’.

② **Paper**

This paper is a modern replacement for flock-dusted paper, as I was not able to find original flock-dusted paper stock in New Zealand. The feature of this paper is that it is very light. I stuck it onto a piece of paperboard, which is around 100gsm in order to make it stronger.

image 38
Design work and process - Starving. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

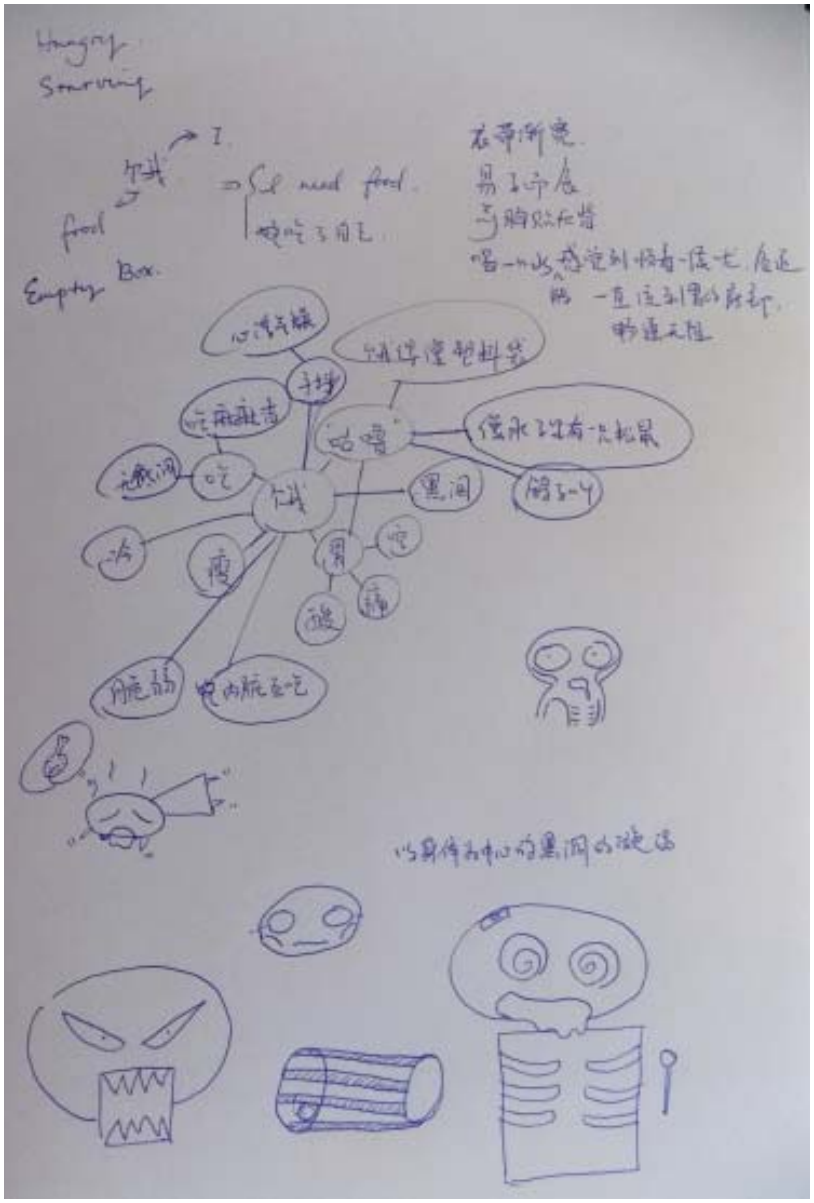


image 39

Design work and process. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

(6) House:

① Design work:

The method for forming the pattern to represent the concept of house is quite similar to mountain. The Chinese character illustrated means house, and shows how I transformed this character into an abstract shape (image 40).

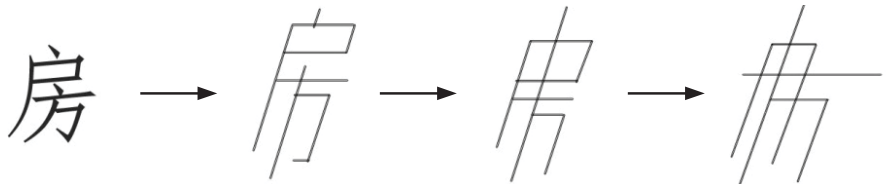


image 40

Design work and process - House. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy o Zhiqing Yu

② Paper:

In making prototypes for house, I chose Yupo paper (image 41).

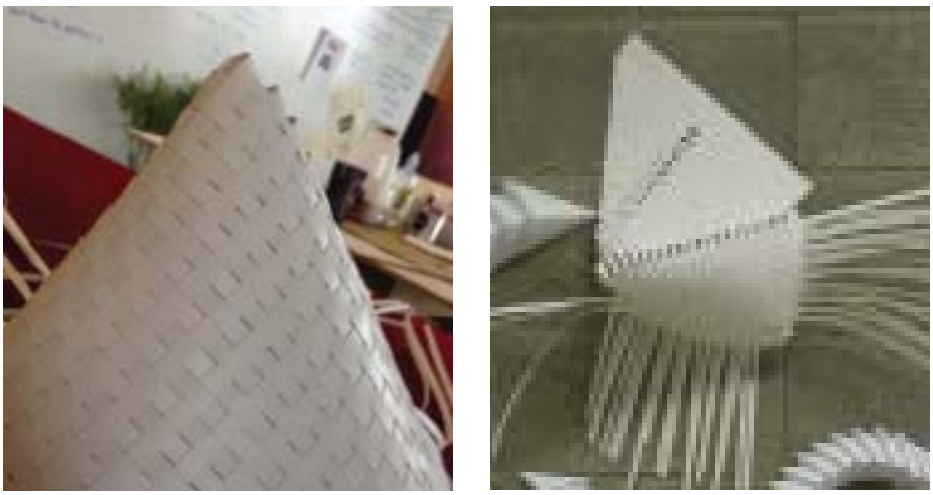


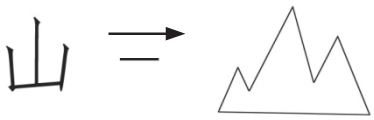
image 41

Design work and process - House. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy o Zhiqing Yu

(7) Mountain

① **Design work**

The Chinese character for mountain is '山'. It is not hard to tell from this illustration in that this character is from the shape of mountain. In this part, the Chinese character mountation is used to let the visual impaired children build up a link between the image and the meaning.



② **Paper**

In prototyping mountain, I chose aper-board, which is about 250gsm again (image 42).

image 42

Design work and process - Mountain. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

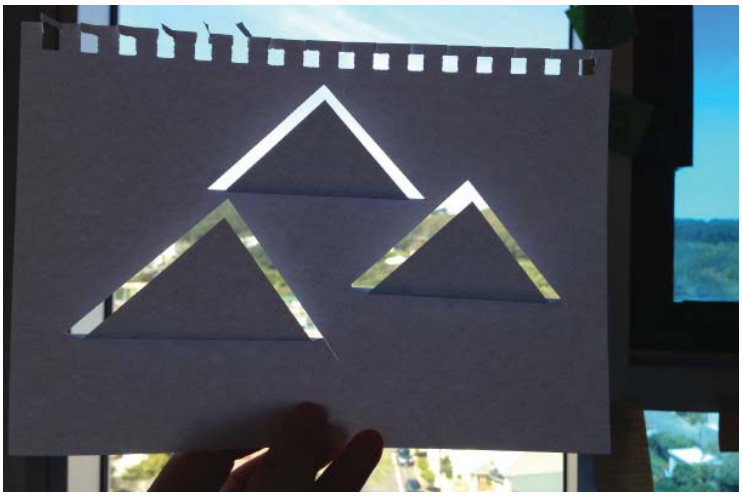


image 43

Design work and process - Mountain. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

In this design development, I incorporated a lot of my own Chinese cultural knowledge. The hardest part in the design process was how to link the forms together. When I started making the trim size models, I realized that linking one group of forms to another was extremely difficult due to the changing size, scale and format of the book. In ancient times, both Chinese and Egyptians produced cliff paintings as well as scroll texts; and the ancient Chinese used the scroll up until the Qing dynasty. Both the cliff paintings and the scrolls were probably created for sighted people. As a matter of fact, cliff paintings and the scrolls enable the visually disabled people to touch the object and then link the image with the words therefore, they are suitable for educating visually impaired children too (Veltman, 2002). For blind people linking became a very awkward problem, because they use their hands to discover the environment from one point to another. During the process of testing and refinement, I found that people touched the character forms from top to bottom, similar to reading the type setting of traditional Chinese books. The way people scanned the narrative also made me consider putting in some arrow marks for guidance. This made me think about how to use the legend story to link each character form into groups, which is explained in image 44. In order to help visually impaired children have a logical sense of the story a row of arrows is used to illustrate what order the content comes in.

Additionally, as I have mentioned above, unsighted people rely on sighted people to help them have a better understanding of the

environment. Therefore, during the education and reading process of visually impaired people, the help of teachers, friends and parents as well could not be ignored.

image 44

Design work and process - Design process. 2013. Wellington, New Zealand

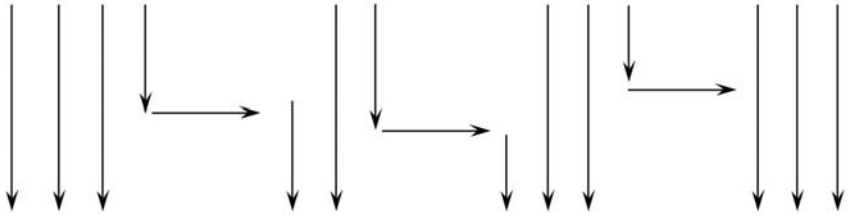


image 45

Design work and process - Design process. 2013. Wellington, New Zealand

Conclusion VI

The great Argentine poet, novelist, essayist, translator and scholar of blind literature Jorge Luis Borges once said that what he lost when he lost his eyesight was just the surface, meaningless things, but he still could not stop thinking about words and roses. If there is somewhere is called paradise then it has to be looked like a library(Borges, 1964). I was a lonely kid when I was young, so books became my only friends. I could never imagine a life without books. On completing this research, I feel empathy for blind people that they have so little ‘reading’ literature. No one has the right to deprive the blind of the right to read, especially blind children.

The sense of touch is a key capability for blind children. It is exceedingly important for visually impaired people to develop this skill early on, because touching plays such a significant role in their daily lives, their work lives, and even their social lives. It seems to be quite necessary for blind children to build up a kind of touch system, such as how to discover the environment through touch, and how to use their sense of touch to become familiar with the environment. At the same time, some theorists argue that visually impaired people might not be able to easily gain an overall concept of a complex shape. However, with the help of sighted people, visually impaired people can have a complex shape of what they are touching. Therefore, touch needs guidance from vision, or to put it another way in that unsighted people need help from sighted people to integrate separated information for them. To conclude, the aim of this research is to help visually impaired

children build up and enhance their sensory capability and to help give them more of a chance to deal with sighted people.

However there are still some limitations in my research. Because this project was developed for an extremely special group which means that I was not able to do any interviews with any visually impaired children or their parents, my design work was not tested by any visually impaired person. Additionally, because of the limited range of paper stock in New Zealand, some parts of my design output are not as polished as I expected. Lastly, as a second language speaker, I faced many challenges during the literature review; and also because my research is highly related to my cultural background, I had to read a few books and journals in Chinese.

My Chinese translation may not be very accurate which may hinder the understanding the design and content of the research design. However despite a light understanding of what the translation has to explain, I hope that this design research could be useful for eyesight disabled people. It will be wonderful if in the future, more and more people could pay attention to blind people, so as to create more products for this special group of people, such as a sensory garden which can allow blind people to experience the environment.

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List of images

image 1
Blind children in Blind Children School in Tibet, Tibet, China, 2006. Courtesy of Wang Shi.

image 2
Shanghai Blind Children's School, Shanghai, China, 2007. Courtesy of Zhiqing Yu.

image 3
Blind, Sophie Calle, Wellington, New Zealand, 2013. Courtesy of Zhiqing Yu.

image 4
Blind, Sophie Calle, Wellington, New Zealand, 2013. Courtesy of Zhiqing Yu.

image 5
Blind, Sophie Calle, Wellington, New Zealand, 2013. Courtesy of Zhiqing Yu.

image 6
Blind, Sophie Calle, Wellington, New Zealand, 2013. Courtesy of Zhiqing Yu.

image 7
Tactile mural, Alex J. Brien & Matthew Chenard, Watertown, the United State, 2012. Courtesy of Alex J. Brien and Matthew Chenard.

image 8
Please Touch the Art, Ann Cunningham, Iowa, the United State, 2009. Courtesy of Anna Cunningham.

image 9
How to make tactile pictures understandable to the blind reader, Yvonne Eriksson, Bangkok, Thailand, 1999. Courtesy of Yvonne Eriksson.

image 10
What lies beneath, Gabby O'Connor, Auckland, New Zealand, 2011. Courtesy of Gabby O'connor.

image 11
Zhiqing, Yu. Undergraduate collection Talking with Friends, a book for blind children. 2010. Shanghai, China. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 12
Prototypes. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 13
Character formation test - Door. 2013. Wellington, New Zealand.

image 14
Character formation test - Net. 2013. Wellington, New Zealand.

image 15
Character formation test - Mountain. 2013. Wellington, New Zealand.

image 16
Character formation test - Umbrella. 2013. Wellington, New Zealand.

image 17
Character formation test. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 18
Brainstorm of character formation test. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 19
Character formation test . 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 20
Key words test - Fire. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 21
Key words test - Sun. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 22
Key words test - Flower/happiness. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 23
Key words test - Dry. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 24
Key words test - House. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

7image 25
Key words test - House. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 26
Key words test - Dragon. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 27
Storytelling - Original text. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 28
Design work - Jiong pattern. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 29
Design work - Design process - Sun & fire. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 30
Design work - Design process - Sun & fire. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 31
Design work - Design process - Ocean. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 32
Design work and process - Ocean. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 33
Design work and process - Ocean. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 34
Design work and process - Tree. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 35
Design work and process - Tree. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 36
Design work and process - Flower. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 37
Design work and process - Flower. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 38
Design work and process - Starving. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 39
Design work and process. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 40
Design work and process - House. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 41
Design work and process - House. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu.

image 42
Design work and process - Mountain. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

image 43
Design work and process - Mountain. 2013. Wellington, New Zealand. Photograph Zhiqing Yu, courtesy of Zhiqing Yu

image 44
Design work and process. 2013. Wellington, New Zealand.

image 45
Design work and process. 2013. Wellington, New Zealand.