The developments of book materials, technologies and design in China from antiquity to today.

Xuan Zhang
EVOLUTION OF THE CHINESE BOOK

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Thesis presented by

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Figure 1-1
A whirlwind book
ABSTRACT

This thesis traces the development and evolution of Chinese book design, from its rudimentary beginning to its present form. The design, materials and technologies of Chinese books have undergone tremendous changes during at least 3500 years.

In order to put the knowledge of Chinese book design history into a form that is accessible as well as comprehensive to audiences who study book design or work in a design field, I have chosen to apply information design to help teach it. Three major research strategies were adopted in this thesis: (1) a quantitative collection and examination of the information that from the authoritative books, articles and projects of book design; (2) 20 case studies of representative books. These book examples have been collected from different dynasties and clarified by the various book styles; (3) construction of the project database and interactive website. The database is linked to each part of the website, and the audience would be allowed to pinpoint the source.

This thesis aims to stimulate the audiences’ interests, and to guide them through a scientific visualization of Chinese book design, which finally helps them to learn more about it. Moreover, this thesis aims to provide a new perspective in a history pedagogy, which could promote teaching efficiency.

KEYWORDS: Book Design, Materials, Technologies, Information Design, Database
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Concept map of thesis outline
INTRODUCTION

What is a “book”? Senior scholars have different views. According to Shen Xu’s Shuo Wen Jie Zi, the book began with the bundle (bamboo and wooden slips). The Chinese book has undergone many interesting and dramatic changes since remote antiquity, if by the word ‘book’ is meant any written or printed material put together in a convenient and portable form so as to compose a material whole for the purpose of recording thought or action and of transmitting ideas or knowledge. According to the research, the development of Chinese book design was generally experienced in four stages: Bone, Bundle, Scroll and Codex. Moreover, each stage has totally different styles, which includes the book content, materials, bindings, writing orientation and instruments, either handmade or printed and commercially bound.

My interests began when I took an undergraduate book design course. My book design project was used in the Chinese national courses in art and design, and it also won the national design award. Moreover, I helped my advisor to prepare her lecture about book design as a teaching assistant during my graduate studies. Beyond that, I taught package design and structures for undergraduates, which had similar features with book binding structures. Those valuable experiences extremely motivated my interests and passion for book design.

Through scientific studies, research and my own experience of book design, I noticed that a controversial phenomenon exists in book design courses. Students always paid more attention to how to design a creative book instead of the deep research and understanding of book design history and its theoretical background, which caused their designs to be very superficial.

Design could not be processed smoothly and deeply without the fundamental theories. The students have to read more books and do more relevant research in a very limited time. That is why I have chosen to apply the information design to help teach about the history of book design.

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After the preliminary research study, I found that many books separately presented the book materials, book bindings, cultural and historical papers and projects. Also, the aspect of book design about materials or bindings was linked to a certain kind of literature, which allowed them to make the cross-comparison study, such as the International Dunhuang Project. However, there is still a gap in the book design field. Obviously, those kinds of information are still included in different books and different projects, which is hard for the students to learn quickly and effectively. I did not find any form that has put these kinds of information together, and in any form of visualization.

To sum up, my thesis traces the development and evolution of the material and appearance (binding, book content and writing orientation and instruments) of the Chinese book, from its rudimentary beginning to its present form. Also, I am comparing its developments with those of other cultures. Only its physical structure is comprehensively included in my research scope. As to the invention of the development of printing, layout and typography, which are very complicated subjects, I will briefly refer to them as auxiliary background information, which supports the main subjects of my thesis.

Also, this thesis aims to stimulate the audiences’ interests, guiding them through a well-organized tool, an information visualization of Chinese book design, to find their own specific interests. The visualization is based on research and information that extracted from different books, articles, projects, etc. All the materials and information used in the final visualization will be collected together as a particular database. The desired result is to link the database to each spot in the visualization. If the audiences are interested in specific information, they can use this link to pinpoint the source. It will provide the users another option to study the history of the Chinese book design further.

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3 IDP is a ground-breaking international collaboration to make information and images of all manuscripts, paintings, textiles and artifacts from Dunhuang and archaeological sites of the Eastern Silk Road freely available on the Internet and to encourage their use through educational and research programs. It was collaborated by British Library, British Museum and The National Library of China, etc. The various book formats discovered among the Dunhuang document collection provide a wealth of information previously out of reach to scholars.
Figure 1-4
Whirlwind book rolled up for storage. The roller at the center of the document is the equivalent of the spine of a leafed book, holding all the pages in place.
Figure 1-5 Oracle bone
Figure 1-6 Bamboo slips
Figure 1-7 Scroll with wood head
Figure 1-8 Codex – thread book
Chapter 1
The clarity of book styles

“IT was rare for one dynasty to transition smoothly into the next, as is depicted in history timelines, since dynasties were often established before the overthrow of an existing reign, or continued for a time after they had been defeated.”

“Chiang Kai-shek and retrocession”.
Overview

In China, scholars have been arguing: When were the books produced initially? What was the original form? From antiquity to present, how many development stages did Chinese book design history experience, and how to distinguish them? Moreover, speaking of the clarity of Chinese book design stages, the transition of China’s dynastic history is part of the background knowledge that is worthwhile to be mentioned. In this chapter, a brief and instructional background of Chinese dynasties and specific book design stages of China will be discussed.

Figure 1-10 Oracle bone
## Figure 1-11

Comparison of each dynasty’s years

The order is according to the years the dynasty occupied, and the whole rectangular map show the sum of all Chinese dynasties.
Demarcating the Chinese dynasties

China, one of the countries that can boast having an ancient civilization, has a long and mysterious history of almost 5,000 years. Records show that Yuanmou is the oldest hominoid in China, and the oldest dynasty is the Xia Dynasty. In the long history of China, there emerged many eminent people that have contributed to the development of the whole country and to the enrichment of China’s history. Among them, there are emperors like Li Shimin (emperor Taizong of the Tang), philosophers like Confucius, great patriotic poets like Qu Yuan, and so on.

Chinese society has progressed through five major stages: primitive society, slave society, feudal society, semi-feudal and semi-colonial society, and socialist society. The rise and fall of the great dynasties forms a thread that runs through Chinese history, almost from the beginning. Since the founding of the People’s Republic of China on October 1st, 1949, China has become a socialist society. (Figure 1-11 and Figure 1-12 demonstrated the detailed dynasties and time of ranges from antiquity Xia Dynasty to today.)

From the perspective of design teaching, the Chinese dynastic history is extremely complex, which it is difficult for audiences to understand its development at a glance. Moreover, it is also not conducive for students to gain those kinds of knowledge quickly. Apparently, information design will be a great solution to solve this problem, it is the practice of presenting information in a way that fosters efficient and effective understanding of it. Therefore, in this section, how to apply information design into the development of Chinese dynasties and book evolution is the main discussion point.
Figure 1-12
Geographic map of most important dynasties
**Delimiting the different styles of the development of Chinese books from BC 1500 to today.**

Through preliminary research, the fact was found that the most authoritative books agree that the Chinese books evolution was clearly divided into several stages, but there is still controversy in how many stages it has experienced, three or four? Based on the research and data obtained, the evolution of Chinese book is divided into three stages, but four styles are included. In the other words, the Chinese book evolved from its primary form to a formal form and finally to a mature form, and it can further be divided into: knot and oracle bone, bundle, scroll, and codex.

In addition, for the sake of information design, clarifying the information of development process of Chinese books in accordance with the existing classified stages, which these sorted categories are proposed in order to have a functional vocabulary of the different stages of the Chinese book design. Normally, this categorization method is called diagrammatic in information design field.

In the following discussion, books’ development process and corresponding characteristics will be introduced systematically.
Figure 1-13 Knot numbers
Primitive Form of Chinese Book: Knot and Oracle Bone (from antiquity to Shang Dynasty 1766 – 1046 BC)

In Chinese book design history, there were many changes with very rich and complicated content. During antiquity, books were not like today’s books that use paper. The evolutionary order of book carriers was rope, wood, bark, walls, pottery, bones, metal, stone, etc., before books finally embarked on the road of paper.

Knot
In antiquity, ancestors used rope and knots, wood, bark, bones, stones, etc., as carriers to help them record some kind of experience, spread knowledge, record an events, and so on. While the knot can be understood as the initial form of books, it was still considered as a book material more than a real book. And the knot was just an auxiliary memory that help people to make note, far from being symbolic language. The knot, however, provided the inspiration for the emergence of pictographic writing.
Oracle is reflected the extremely rich and colorful social life in the late Shang Dynasty, especially in science and technology, not only plays an important role in the history of ancient world’s science and technology development, but also witnessed the outstanding contribution our ancestors made to human civilization and progress.”


Oracle Bones

Oracle bones (or oracle books) are one of the primary forms of ancient books, and also the primary form that first appeared in ancient text called Oracle scripts. The shapes of Chinese books have important historical significance. In the Shang and early Chou Dynasties, writings were inscribed on oracle bones and tortoise shells or cast in bronze.

In his book, History of Chinese Oracle Bones, a famous historian, Houxuan Hu, said, “The so-called oracle is that the Yin emperors used shells and animal bones for writing a few notes and text inscriptions in the late Shang Dynasty.” The late Shang Dynasty is an important historical period in ancient China, from the initial stage of prosperity to the heyday. After the oracle bone was invented, the understanding of Shang society became increasingly divers. Because the book’s form was influenced by characters and carriers, the appearance of Shang Dynasty’s oracle bones had groundbreaking significance in Chinese book history and character history.
“The origin of the book, should be traced back to the wooden and bamboo slips, compiling in a book rope, and gathering the single slips into an integrated book, just like present codex as a general.”

Tsuen-hsuin Tsien.
Written on bamboo and silk: the beginnings of Chinese books and inscriptions.
The University of Chicago Press. USA, 1962.

Formal Form of Chinese Book:
Bundle and Scroll (from Western Zhou Dynasty 1046 – 771 BC to Sui Dynasty 581 – 618 AD)

It is the Spring and Autumn Period (770 BC – 476 BC) that Chinese formal books appeared in quantity. It is said that Confucius (5510 BC – 476 BC) had censored the Six Classics. During the Warring States Period (475 BC – 221 BC), knowledge was no longer confined in the upper classes, and spread widely to other social classes, especially to the literati and minor officials. Following the social upheaval and the emergence of the “hundred schools of thoughts”, private writings appeared in bulk and contributed the rapid development of formal books. In the past and present, a large number of scholars have believed that the Chinese formal form of book began with bundles.

Regular book forms are mainly affected by material constraints; the use of different materials resulted in different forms of books. The development order of materials is: bamboo, wood, silk, and paper. Paper appeared in the Western Han Dynasty, and it was transformed in the Eastern Han Dynasty. At that time, the paper was only used for handwritten books, because woodblock printing had not been invented. The formal form books include bundles (bamboo slips and wooden slips) and scrolls (whirlwind book, silk book, scroll paper).
Bundle: Bamboo Slips, Wooden Slips, Silk Manuscript

Bundle is a generic term for books that use bamboo and wood as the materials for book-making. This style was firstly used in the Zhou Dynasty (10th century BC) and Spring and Autumn period, which was a turning point for Chinese books. The most prevalent period for bundles was from the Qin Dynasty (221 BC to 206 BC) through the Han Dynasty (206 BC to 220 AD).

The long, narrow strips of wood or bamboo typically carry a single column of brush-written text, each with space for several tens of Chinese characters. For longer texts, many slips were bound together in sequence with thread. Each strip of wood or bamboo is said to be as long as a chopstick and as wide as two.
Figure 1-17 Guodian Chu Slips
The earliest surviving examples of wood or bamboo slips date from the 5th century BC during the Warring States Dynasty. They are called the Guodian Chu Slips. The Guodian Chu Slips were unearthed in 1993 in Tomb No. 1 of the Guodian tombs in Jingmen, Hubei Province.

The tomb is located in the Jishan District’s tomb complex, near the Jingmen City in the village of Guodian, only nine kilometers north of Ying, which was the ancient Chu capital from about 676 BC until 278 BC, before the State of Chu was overrun by Qin. The tomb and its contents were studied to determine the identity of the occupant: an elderly noble scholar and teacher to a royal prince. There are about 804 bamboo slips in total in this cache, including 702 strips and 27 broken strips. The bamboo slip texts consist of three major categories, which include the earliest manuscripts of the received text of the Tao Te Ching, one chapter from the Classic of Rites, and content from the Classic of History.
Silk Manuscripts

The storage of bundle books also used an innovative method because of its particular material. For example, when an article was finished, the last strip would be used as a roller, and rolled forward from the end, which the same as the volume curtain. Next, the bundle book had to be strapped with rope, and then stored in a bag or basket. This storage method really played a vital role for the formation of later generation books. The appearance and long-term popularity of silk manuscripts were all based on the formation of bundle books.
In addition to the bamboo slips, another representative book form was used during this period, silk manuscripts. The sericulture was very popular in China in ancient times and widely used to make clothing and decorative items. Characters and images written or drawn on silk are called silk manuscripts. They were popular from the Eastern Zhou Dynasty to the Wei and Jin dynasties. So far, as silk manuscripts have been found, they are rolled up or folded up for preservation in ancient times.

During the Warring State period, bamboo slips and silk manuscripts were used simultaneously until the Eastern Han Dynasty (771 – 256 BC), and the widespread use of silk was from the Warring States Dynasty to the Three Countries Dynasty, namely the fourth century BC to the third century AD.
Figure 1-21 Scroll books
Scroll: Whirlwind Book

Because bamboo was cumbersome and silk was expensive, the invention of paper marked the beginning of the end of its use as a writing material. Ts’ai Lun, is generally credited as being the inventor of paper in 105 AD, during the West Han Dynasty. However, despite the gradual increase of the use of paper from the second century after Christ, the form of the book did not materially change from scrolls. Silk and paper coexist for 500 years, and bamboo and paper coexisted for 300 years. With the promotion of paper, it became more and more convenient and inexpensive. Paper and scrolls were used widely in the public and officially. In the Wei –Jin Dynasty, the development and utilization of scroll books reached its peak.

Because paper did not come in long pieces like silk, it was pasted together to form long strips, like the Egyptian papyrus. Being thicker than the usual modern Chinese paper, it could be rolled in the same way as silk. The representative scroll books are The History of Three Countries, The History of Late Han, The History.
Figure 1-23 Finishing the butterfly binding
“Book form from its primitive form to the formal form, then to the mature form, is indicating its history, which is also the history of culture and the development of society, with connotations of philosophy and aesthetics.”

Yongde Yang and Jie Jiang. 
The Four Thousand Years History of Chinese Book Design. 

Mature Form of Chinese Book: 
Codex (from Tang Dynasty 618 – 907 AD to Today)

Chinese books have gone through the early forms, formal forms, and gradually transitioned to the mature form, the codex. It includes Chinese pothi binding, concertina binding, whirlwind binding, sewn binding, butterfly binding, back-wrapped binding, and thread binding. The Chinese book of traditional production methods, due to the Western culture shock and advanced printing technologies, the books’ form has changed again, including paperback, hardcover book and other simple forms. Because of the irreversible trends of social development and technological advances, the tendency of book design can be predicted that more and more new forms will be invented in the future.
Pothi Binding

This Pothi binding was used on Buddhist classics in ancient India where these classics were written on Pattra leaves in Sanskrit. Since this Indian book-binding style introduced into ancient China, it had been changed into Chinese Pothi binding, and named vividly according to its appearance and source. Chinese Pothi binding was popular in Central China of the Sui and Tang dynasties and mostly existed in some books which were engraved and printed by the ethnic minorities, such as Tripitaka in Tibetan, Mongolian and other languages.
Concertina Binding
Concertina binding comes into being by folding the long written sheet of paper repeatedly into booklet, which evolved from scroll binding. Compared with scroll, it is more convenient for reading. This form of binding appeared in the Tang Dynasty. Since the Song Dynasty, it got a Chinese name of Jing Zhe Zhuang (in Chinese, “Jing” means stura, “Zhe” means folding and “Zhuang” means binding), because this binding style was used for many Buddhist sutras.
The pages of a whirlwind bound book curl up when unfurled, suggestive of the circular movement of air in a whirlwind. This is very possibly how this book format got its name.
Whirlwind Binding
Whirlwind binding is probably the most unusual of all the binding formats in the evolutionary process that ultimately replaced the scroll with thread bound book. Its unique structure reveals more about its place in the history of bookbinding than any other format, and the textual content of the examples found so far give us an indication as to why this evolutionary process took place. It was a step in the development of book forms, and once more suitable forms were developed, whirlwind bound books were no longer needed.
Sewn Binding

This special sewn binding style found in Dunhuang documents was used in the Tang Dynasty, but it became prevalent in the Qing Dynasty. A few pages are piled up in order, and then folded into a section. The subsequent procedures are piling up a few sections, binding these sections together by sewing along the middle creases of the pages, and finally making a cover for the book. Thread is visible from the inside of the book rather than the outside.
**Butterfly Binding**

This is one of the early binding styles for printed books. Its core area was kept inside, so both the left and right leaves looked like a butterfly when the book was turned over. That is why it is called butterfly binding. It was popular in the Song and Yuan dynasties and continued to be used into the early Ming Dynasty. The difference between butterfly binding, the thread binding, and wrapped-back binding is that the whole core area of each page is pasted leaf by leaf.
The method of back-wrapped binding is to fold the printed leaves in form of a folio, keeping the core area outside, and bind the leaves together by a paper twist left on the margin and wrap the spine with a cover. Books in the Yuan and Ming dynasties were often bound in this style.
Thread Binding

Thread binding has the same way of folding pages as the back-wrapped binding. The steps are as follows: first, expose the spine of the book; then add covers on both sides; thirdly, dig holes on the spine and threaded into a volume. That is why it is called thread binding. It has been the most common binding form of Chinese ancient books since the middle Ming Dynasty.
This binding style is called “interleaving for treasuring old” and “gown binding” too. First, cut the interleaving paper to size. It should be larger in all dimensions than the book. Lay the leaves one by one onto the interleaving sheets. Fold in the edges of the interleaving paper outside the leaves in level with the book edges so that it is of the same thickness. Insert the paper twists into both interleaving paper and leaves to stitch them together. The old, darkened leaves, like gold, are edged with new white paper, like jade, so it is called “jade set in gold” binding. This repairing and binding style is usually for repairing the books with narrow margins.
“Socrates said that anyone could buy philosopher Anaxagoras ‘book’ in the market, which was a papyrus roll.”

Feng Gao.

*Western Books Reform.*

*Peng Pai News. June. 2015*

**Foreign Book Styles**

In order to offer the reader a better understanding of context, some brief cross-comparison of Eastern and Western Books is necessary.

Studies of ancient Western books systems and the origins of rolls and codices cannot bypass the problems. Those two book binding forms are the most important forms in Western book design history. What are the major historical events whose deep social forces promoted the development of the system of Western books? In a book by Colin H. Roberts, an ancient papyrus documents scientists, The Birth of Codex, it is stated that church history was a major changing factor in terms of the book system. In fact, some scholars claim that the codex replaced the roll. This seems to be due to the conditions of social regime technology.
Figure 1-32. The ancient roll details (William A. Johnson book Book-rolls and Scribes in Oxyrhynchus)
Roll
The standard book form of ancient Western books is rolls. In ancient Greece and Rome, the most popular material for rolls was Egyptian papyrus. Sometimes, sheepskin or leather was polished, bleached, and made into parchment. However, according to the literature and unearthed discoveries, papyrus rolls were the mainstream book binding form in the classical era. The standard practical form of roll production is to stick 20 fixed-size papyrus leaves together. The texture of papyrus fiber is smooth in the horizontal direction, and it has good absorption on the front (recto). The vertical texture is relatively coarse, and it is called reverse (verso). Professional writing workers (scribes) wrote text in columns, often together with a female reading sentences, and other symbols are marked with replication. If there was not enough space, then they glued some pieces of papyrus leaf to the end of the roll. The length of one papyrus is very impressive. The total length of a roll is usually 6–10 meters. However, according to more recent scientific findings and projections, these rolls could be up to 15 and even 23 meters long.

In fact, written records had a variety of text carriers in Greece and Rome, such as ancient Greek pottery, ancient Roman wooden slips, and stone inscriptions. However, complex and intellectual products like 'classics' (poetry and academic texts) are different from letters, contracts, and daily bookkeeping. Rolls were accepted as the absolutely authoritative book form.
Codex

The modern Western book binding form is no longer the roll but the booklet. A book with this form is called a codex. This form of book emerged during Sui-Tang Dynasty. A number of papyrus leaves or parchment were stacked together, folded in the middle, fixed, bound from fold place, and covered for protection. Generally speaking, this is the origin of today’s modern books. Especially from the beginning of the 4th century, in terms of the production of Western books, the proportion of codex books was increasing, while traditional roll books were gradually declining. After entering the Middle Ages, this codex book form dominated the Western book design field and completely replaced the roll.

The famous Codex Vaticanus and the Codex Sinaiticus are parchment codex books from the 4th century. They respectively have 1600 and 1460 pages, which could accommodate the whole Christian Bible. However, the length of books before the 3rd century did not exceed 150 pages. In other words, the production of codex books became highly sophisticated with advanced technologies until 4th century, and before the 3rd century, the astonishing capacity of codex books may not have been recognized.
Conclusion

The evolution of Chinese books has at least 3500 years of development history. Correspondingly, the history of Western book design also experienced huge reforms. This chapter introduced the fact that the materials and forms of Chinese and Western books have undergone tremendous changes throughout history. What other changes are worthy of attention? What kinds of historical and social environments generated these changes, and how did they do so? In the next chapter, the specific details of each book style will be discussed through the examples of a number of representative books, both Chinese and foreign.
Figure 2-1 Evolution of Chinese book binding schematic in International Dunhuang Project.
Chapter 2
The components of book design

“Though largely forgotten today, methods and rules upon which it is impossible to improve, have been developed over centuries. To produce perfect books, these rules have to be brought back to life and applied.”

Tschichold Jan,
The Form of the Book (1991),
Hartley & Marks, Sep 1st, 1991
Overview

Book design is the art of incorporating the content, style, format, design, and sequence of the various components of a book into a coherent whole.

In the history of Chinese book design, rope, wood, stone, jade, metal, bamboo, silk, paper, and other materials were used in different types of textual carriers involving binding form. Chinese book design also includes the pens and inks related to woodblock printing, typography, writing orientations, and book content.

In addition, in order to briefly introduce the importance of different components of Chinese book design, twenty case studies of representative books will be introduced as examples to demonstrate the components of book design and illustrate the chronological evolution of book design. These book examples are from different dynasties and clarify various book styles. The reason for choosing these twenty examples as the main content for analysis is to make the development process of Chinese book design more systematic and intuitive for my readers, rather than only analyzing the historical facts without any information about design skills.
Writing orientation

Among the many book design components, writing orientations and book contents, materials, and binding structures are the main subjects in my thesis. Additionally, these components have interplayed with each other from antiquity to present, and many researchers and designers have studied the relationships between them. How did the materials act as deciding factors for the writing orientation? Does book content influence the selection of binding structure to some degree? Why are a few Chinese cities like Hong Kong and Macau still using ancient writing orientations? What is the role book content plays during the development of Chinese writing orientations? These types of issues reveal that, regardless of the subject, they cannot develop and reform independently.

First, let us consider how the writing orientation has changed from ancient to current times. In ancient China, characters were written vertically, which is closely related to the early writing materials. The earliest writing materials were very elongated oracle bones. It is obvious that lettering vertically was much more convenient than horizontally. Another reason for vertical writing is that, before the invention of paper, Chinese ancestors wrote on narrow bamboo and wooden slips with ink brushes from top to bottom. This is because the calligraphy, especially the running script, has uninterruptible strokes that need to be written from top to bottom. Thus, the early Chinese writing orientation formed a solid ancient style that moved from top to bottom, right to left. Although paper was invented in the West Han Dynasty, the previous habit of writing Chinese characters was inherited. Furthermore, when woodblock printing and movable type were invented in the Sui and Song dynasties, the vertical writing orientation remained invariable.
In the late Qing Dynasty, some intellectuals studied Western culture from different perspectives, and they often cited foreign languages, Arabic numbers, and new punctuations, which caused the vertical reading habit to become increasingly inconvenient. Therefore, intellectuals began to advocate the reform of Chinese characters and promote alphabetic writing and changing the traditional way of writing to the horizontal orientation. In 1892, one of the most famous Chinese linguists, Lu Ganzhang, published his book Elementary Glance, which was the first Chinese book to use a horizontal writing orientation. It includes fifty-five horizontally engraved Chinese characters and the corresponding phonetic Chinese alphabet. It was a reform of Pinyin in the late Qing Dynasty.

In January 1915, Chinese students organization from America was founded in the Shanghai Science Society of China magazine “Science.” They adopted horizontal writing “in order to insert the formulas of mathematics, physics and chemistry.” The main reasons given are the following: there was no Chinese character written from right to left, all of the characters were written from left to right, and the left and horizontal direction with the writing of Chinese characters was the same. All of the formulas in science books are written horizontally from left to right. This is consistent with how formulas are written in physics and chemistry. With the Chinese vertical writing orientation, it was also very inconvenient to cite foreign place and people names, which used the
horizontal writing orientation. In addition to these two trials, there many books that experimented with the use of the horizontal writing method. Particularly, on 4 May 1919, the New Culture Movement emerged in China, which was a shift toward political mobilization and away from cultural activities and a move toward a populous base rather than an intellectual elites base. Many of the political and social leaders of the next decades emerged at this time. Scholars like Chen Duxiu, Lu Xun, and Hu Shi, had classical educations but began to lead a revolt against Confucianism. They called for the creation of a new Chinese culture based on global and Western standards, especially in terms of democracy and science.

Through those types of adjustments and experiments with writing orientation, the Chinese newspaper, Guangming Daily, formally revised the vertical writing method to the horizontal orientation on 1 January 1955, which marked the formal beginning of modern reading and writing methods in Chinese books. Meanwhile, from this starting point onwards, modern Chinese book design and writing orientations had a relatively standardized form.

Although there were many experiments that proved that horizontal reading is more efficient than vertical reading, vertical reading is still using in Hong Kong, Macau, Taiwan, and even Japan. For instance, on 5 February 1952, at the conference of Chinese Characters Reform and Research Commission,
Guo Moruo, a famous scholar, writer, and educator, proposed that the Chinese “must use the writing way from left to right.” He said, “For the physiological phenomenon that the vision of horizon is much wider than vertical. According to the experiment, the eyes straight up can see 55 degrees, down 65 degrees can be seen, totally is 120 degrees. While it horizontally can see 90 degrees outward and 60 degrees inward, totally is 300 degrees. It should minus the repeated 50 degrees of inside and outside. Finally, there are 250 degrees’ horizontal field of view can be seen, which reveal that the horizontal orientation of text could reduce the vision loss.” Additionally, a famous Japanese designer, Kohei Sugiura, conducted an experiment about eyeball movement. The human eyeball is surrounded and rotated by six muscles. Reading horizontally from the left to right only requires the use of two muscles, while the eye needs to use all six muscles in order to read vertically.
Origins and Evolution of Written Language

Written language is the precondition for book production. Long before the written language was in use, the spoken language was developed during people’s working cooperation and was used to express ideas and feelings. However, the use of the spoken language was restricted by time and space. Gradually, string knots, notches on wood, and other methods were used to record events by ancient people. However, these devices could not record or reflect the original language. On the contrary, as records, symbols, and expressions of the spoken language, the written language can go beyond the limits of time and space. Our intelligent ancestors created Chinese characters. From ideographs in early days to the standardized system that we know today, Chinese characters took a long time to evolve and develop. The formation of the written language was a necessary precondition for book production.

Figure 2-6
1. Pottery symbols of the New Stone Age (ca. 5,600 BC – 6700 BC), unearthed in the 1950s at the Banpo Site in Xi’an.
2. Colorful painting symbols of the New Stone Age (ca. 4,000 BC), unearthed in the 1970s at the Ledu Liuwan Site, Qinghai Province.
Figure 2-7
Pottery symbols of the New Stone Age (ca. 4,500 BC), unearthed at the Dawenkou Site, Shandong Province. They have possessed the characteristics of pictographic and ideogram.

Figure 2-8
Inscriptions on tortoise shell created 8,000 years ago.
Book Content

To some degree, book content is a deciding factor that affects the utilization of different types of materials, binding structures, and writing orientations. Because Chinese people used the vertical writing orientation from 1500 BC until the early twentieth century, this research focuses on the connections among book contents, materials, and forms of binding.

During the Shang Dynasty, bamboo and wooden slips were widely used for different types of books with different content. During that period, most content was just text with rare illustrations or other elements. Even though a few illustrations were needed, people could not engrave or draw them on bamboo slips because the bamboo slips were very
narrow and could crack, so illustrations could not be drawn on them appropriately. The Qin bamboo slip, “Zhi Men,” reliably demonstrates this phenomenon. After silk was invented and widely using as a writing instrument in the Eastern Zhou Dynasty, this situation of book content was improved greatly. Collections of characters and images written or drawn on silk are called silk manuscripts. Because silk is flat, the limitations for illustration were reduced. That is why the illustration styles in silk manuscripts are diverse. Graphics, and texts, different layouts, and so on are elements that made the illustrations of silk manuscripts become indispensable.

The silk manuscripts that have been found were rolled or folded for preservation. The scroll binding of silk manuscripts also mark an extremely important era in Chinese book history.
When paper was invented in 105 AD during the Western Han Dynasty, it provided great and flexible opportunities in terms of the selectivity of material. For example, when paper was first invented, only the royal family could use it for official books. Even though the use of paper was widespread during the Wei-Jin Dynasty, there were still differences between royal books and public books. For example, as is well-known, most ancient Chinese emperors preferred the color yellow for things like clothing, furniture, etc. This enthusiasm for the color yellow was also reflected in the paper. They used stained yellow paper because of the Yin-Yang superstition; they believed that the yellow color would bring luck and stable political regime for them. This means that the normal public was not allow to use yellow paper. This created a clear distinction between royal and public books.
Geographic and cultural spread and Communication

In addition to Chinese book materials, bindings, writing orientation, and book contents, those who explore the knowledge and stories behind those fundamental components, will probably be surprised that there were many interesting changes along with the developments and evolution of Chinese book design. When new materials and binding structures were invented in a specific place or area, they could not spread widely due to geographical limitations. In addition, the acceptance of the public played an important role during different time periods.
The development of book-making technologies

During two thousand years from the Shang and Zhou dynasties to the Sui and Tang dynasties (16th Century BC – 7th Century AD), a tremendous amount of books had been produced by engraving and hand-written methods, which encouraged the progress of civilization and the development of society.

Block printing
As the time went by, these methods did not keep up with the demands on the wide spreading of books. To meet the increasing demand for books, a great invention in the history of book production – block printing was invented.

Block printing is much more efficient than engraving and hand-written methods for the book production, which actually enabled wide and rapid dissemination of knowledge. The invention and application of block printing indicated a new era of the Chinese book history.

Movable type
Bronze inscriptions, which were made by movable type in the Western Zhou Dynasty, and seals which was in use over two thousand years ago, have proved that ancient Chinese people had possessed the technique of movable type. Having suffered from the heavy cost of time and labor of making wood blocks, Bi Sheng (970 – 1051) invented clay types in the Northern Song Dynasty. Subsequently Wang Zhen (1271 – 1368) invented wooden types in the Yuan Dynasty. Other metal types such as copper and tin types were then used for book printing in the Ming and Qing dynasties. The invention of movable type printing was also a major breakthrough in Chinese book history.
EVOLUTION OF THE CHINESE BOOK 66

Oracle Scripts

Oracle, also known as “Qi Wen,” the Yin Ruins text or “shells animal bones text.” Oracle records reflected that the political and economic situation in the Shang Dynasty, China mainly refers to the late Shang Dynasty, the royal family used it to divine the good and bad fortune memo and carved on tortoise shells or animal bones, the content were generally the result of divinations. After the demise of the Shang Dynasty and Zhou Dynasty was onwards, oracle also used for a short period, which is the important information and research of social history for Shang and Zhou dynasties.

Analysis of book examples

The preliminary research and analysis showed that is necessary to find the most representative books and analyze their materials, bindings, and content. Demonstrating an intuitive access that allows the audience to understand the research point: How does the content suit or not suit its material and binding structure? Answering such questions will help people better understand the history of Chinese book design and acquire deeper knowledge about the physical make-up of books.
Material – Oracle bones
Oracle bones are pieces of turtle shell or bone, normally from ox scapulae or turtle plastrons, which were used for pyromancy – a form of divination – in ancient China, mainly during the late Shang dynasty¹.

The vast majority record the pyromantic divinations of the royal house of the late Shang dynasty at the capital of Yin (modern Anyang, Henan Province); dating of the Anyang examples of oracle bone script varies from 15th – 11th centuries BC to 1200 – 1050 BC.

¹ Shang Dynasty
The Shang dynasty or Yin dynasty, according to traditional historiography, ruled in the Yellow River valley in the second millennium BC, succeeding the Xia dynasty and followed by the Zhou dynasty. The classic account of the Shang comes from texts such as the Book of Documents, Bamboo Annals and Records of the Grand Historian.
Wooden tablet with a map

Fangmatan wooden tablet map was unearthed in 1986 in the Warring States tombs Tianshui, Gansu province, which was the earliest known map in China and worldwide.

Fangmatan wooden tablet map totally had seven pieces, and there were four of them were painted on wooden tablet. Even though it was wetting in the tombs over 2,000 years, it was still intact, and had the clear handwriting lines. Those kinds of evidence also from another angle proved the robustness of wood as a writing material.
Material – Wood
From the Shang Dynasty to the Eastern Jin Dynasty (1600 BC – 420 AD), wood acted as one of major carriers for documents or books beside oracle bones. There was a saying “to write on bamboo and silk, to engrave in bones and woods” in Mozi².

Binding Structure – Wooden tablet
Wooden tablet is one of the regular book form in ancient China. When the bamboo slips was popular at that time, the wooden tablet was also used as the text carrier. If the tablet did not write the text, so called “tablet”, if he wrote the word called “slips.”

2  Mozi was a Chinese philosopher during the Hundred Schools of Thought period (early Warring States period). Born in Tengzhou, Shandong Province, China, he founded the school of Mohism that argued strongly against Confucianism and Daoism. His philosophy emphasized self-restraint, self-reflection and authenticity rather than obedience to ritual. During the Warring States period, Mohism was actively developed and practiced in many states but fell out of favour when the legalist Qin Dynasty came to power.

3  Qin Dynasty
The Qin dynasty was the first imperial dynasty of Ancient China, lasting from 221 to 206 BC. Named for its heartland of Qin, in modern-day Gansu and Shaanxi, the dynasty was formed after the conquest of six other states by the Qin state, and its founding emperor named Qin Shi Huang, the First Emperor of Qin.
Guodian Chu Slips

The Guodian Chu Slips were unearthed in 1993 in Tomb no. 1 of the Guodian tombs in Jingmen, Hubei Province, and dated to the latter half of the Warring States period (453 BC – 221 BC).

The tomb is located in the Jishan District's tomb complex, near the Jingmen City in the village of Guodian, and only 9 kilometers north of Ying, which was the ancient Chu capital from about 676 BC until 278 BC, before the State of Chu was overrun by Qin. The tomb and its contents were studied to determine the identity of the occupant; an elderly noble scholar, and teacher to a royal prince. The prince had been identified as Crown Prince Heng, who later became King Qingxiang of Chu. Since King Qingxiang was the Chu king when Qin sacked their old capital Ying in 278 BC, the Chu slips are dated to around 300 BC. There are in total about 804 bamboo slips in this cache, including 702 strips and 27 broken strips. The bamboo slip texts consist of three major categories, which include the earliest manuscripts of the received text of the Tao Te Ching, one chapter from the Classic of Rites, content from the Classic of History and other writings.
Material – Bamboo
Bamboo and wooden slips were one of the main media for literacy in early China. The long, narrow strips of wood or bamboo typically carry a single column of brush-written text each, with space for several tens of Chinese characters. For longer texts, many slips may be bound together in sequence with thread. Each strip of wood or bamboo is said to be as long as a chopstick and as wide as two chopsticks.

Binding Structure – Bundle: Bamboo slips
All single bamboo or wooden slips were connected with strings to form an integrated book. This style was used from the Shang and western Zhou dynasty to the Wei and Jin dynasties, nearly spanning a long time of 14 centuries.

4 Western Zhou Dynasty
The Zhou dynasty was a Chinese dynasty that followed the Shang dynasty and preceded the Qin dynasty. Although the Zhou dynasty lasted longer than any other dynasty in Chinese history, the actual political and military control of China by the dynasty, surnamed Ji, lasted only until 771 BC, a period known as the Western Zhou.
Painting on Silk: Tai Yi on the Move (206BC—25AD)
Western Han Dynasty (206BC—25AD)
Ink and colors on silk
Dimensions: L: 43.5cm; W: 45cm
Unearthed from Han Tomb No.3 at Mawangdui, Changsha City, Hunan Province in 1973
Taiyi on the Move

The painting on silk known as Taiyi on the Move is a sorcerer’s rendering related to the deity Taiyi. In the upper center of the drawing is a strange god with antlers, who might be the god Taiyi, based on a vertical, two-line inscription on his left side, or the god of land according to the Chinese character “She” written under his armpit. Below him are two other deities, one on each side. Directly under him is a blue dragon with a yellow head, on either side of which is another dragon. The painting depicts deities on the move and is suffused with a mythological atmosphere. There is mixed response in the academic world about how to interpret this painting. Some scholars believe that the painting was used by the tomb occupant to pray to Taiyi for the victory before he led his army on expeditions in his lifetime. Historical documents show that the word “Taiyi” first appeared in the mid-Warring States period, in books such as the Elegies of Chu (Chuci). By the Han Dynasty, Taiyi had become the supreme deity. The excavation of this painting proves that worship of Taiyi had become popular after the mid-Warring States period.

Material – Silk

Characters and images written or drawn on silk are called silk manuscripts, which were popular from the Eastern Zhou Dynasty to the Wei and Jin dynasties. So far as the silk manuscripts had been found, they were rolled up or folded up for preservation in ancient times.
Figure 2-28, 29, 30
Binding structure – Scroll
Binding Structure – Scroll
This kind of binding style was influenced in form by silk manuscripts and bamboo or wooden slips. It was the most popular binding form during the period from the Northern and Southern Dynasties to the Five Dynasties, until Western Han Dynasty⁵.

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⁵ Western Han Dynasty
The Han dynasty was the second imperial dynasty of China. Spanning over four centuries, the Han period is considered a golden age in Chinese history. It was founded by the rebel leader Liu Bang, known posthumously as Emperor Gaozu of Han. The Western Han or former Han was during 206 BC to 9 AD.
Figure 2-32
Silk book
Western Han Dynasty
48 cm x 150 cm red-painted silk
Hunan Provincial Museum,
Book Copied on Silk – Divination by Astrological and Meteorological Phenomena

The main front part has six columns of drawings and words, among which the third and the fourth changed sequence when they were pieced together again. There are four columns of divination words at the end of the second half. As to the relationship between these two parts, experts generally believe that they are probably two divination books of the same kind.

The first part of this Divination centers round the drawings and the words further explain them. The objects of divination are all expressed through drawings or with further explanations of words. Though seemingly in disorder, the contents of this part still show priority, beginning with divination by floating clouds, the sun, the moon and the stars. The objects of divination in the second part are all described in words. There are three augurs that appear in the first part: “Beigong”, “Ren” and “Zhao” – all are family names of the augurs. The first part has two noteworthy points: “different divination results with the same drawing” and “different drawings with the same divination result”.

To deal with this, the compiler arranged the two drawings of the same divination result either in vertical columns of upper and lower positions or in horizontal order of left and right to keep the different drawings, and respectively indicated the source of each drawing. There are more cases of different drawings with the same divination result than cases of different divination results with the same drawing. A reasonable explanation for this phenomenon is that drawings are more susceptible to alteration than words. This is why the compiler attached such great importance to the differences in the drawings of different editions. It is certain that the drawings were done first and the words were added later. This silk book as we see today can be taken as a fairly edited and almost foolproof final version of that time.
Figure 2-34 The spread of silk in China
Silk Road

The Silk Road or Silk Route is an ancient network of trade routes that were central to cultural interaction through regions of the Asian continent connecting the West and East from China to the Mediterranean Sea.

The Silk Road derives its name from the lucrative trade in Chinese silk carried out along its length, beginning during the Han dynasty (207 BCE – 220 CE). The Central Asian sections of the trade routes were expanded around 114 BCE by the Han dynasty, largely through the missions and explorations of Chinese imperial envoy, Zhang Qian. The Chinese took great interest in the safety of their trade products and extended the Great Wall of China to ensure the protection of the trade route. King Qingxiang of Chu. Since King Qingxiang was the Chu king when Qin sacked their old capital Ying in 278 BC, the Chu slips are dated to around 300 BC. There are in total about 804 bamboo slips in this cache, including 702 strips and 27 broken strips. The bamboo slip texts consist of three major categories, which include the earliest manuscripts of the received text of the Tao Te Ching, one chapter from the Classic of Rites, content from the Classic of History and other writings.
Buddhism prevailed in Sui – Tang Dynasty, so there were a huge amount of different sutra versions with various binding forms. Such as Tang Dynasty version Si Yi Fan Tian Sutra, it totally had fifteen booklets. Furthermore, this is just one form of this sutra, it also has many other different versions for the same sutra, which also used different materials and binding structures.

Material – Paper

When the scholars of the Mediterranean and Roman Empire were using the Egyptian papyrus and parchment for writing, Chinese people had invented hemp paper by using the plant’s fibers in the early Western Han Dynasty. From the point of view of the ancient paper that has been found, paper was invented in what is known as Guanzhong, Shan’xi today, which was the capital of the Western Han Dynasty. However, the period of the Western Han Dynasty was the period during which paper-making was explored, because paper mills were not founded yet, there was no mass production to satisfy social needs.
Binding Structure – Pothi Binding

This Pothi binding was used on Buddhist classics in ancient India where these classics were written on pattra leaves in Sanskrit. After the binding technique was introduced from India, it changed into the Chinese method, named for its appearance and source. The method was prevalent in Central China during the Sui and Tang⁶ dynasties, used in books created by ethnic minorities, such as Tripitaka in Tibetan, Mongolian and other languages.

6 The Tang dynasty was an imperial dynasty of China preceded by the Sui dynasty and followed by the Five Dynasties and Ten Kingdoms period. It was founded, who seized power during the decline and collapse of the Sui Empire. The dynasty was briefly interrupted when Empress Wu Zetian seized the throne, proclaiming the Second Zhou dynasty (690–705) and becoming the only Chinese empress regnant.
The Spread of Paper

In this part, I use the spreading development of paper as an example with which to briefly explain the meaning of geographic and cultural spread and communication in my thesis. The invention of paper is one of the most important milestones of human civilization, and paper is the most progressive mediums and carriers of human communication and writing. The Han Dynasty wanted to use the intellectuals to enlightened the public. The imperial college and county schools were founded, and most scribes were accustomed to making notes and quotations in books when they taught traditional Chinese studies. This phenomenon caused writing materials like bamboo and silk to not keep pace with the increasing demand since the Spring and Autumn dynasties. It was extremely necessary to create new writing materials in order to adapt to the needs of society.

When the scholars of the Mediterranean and Roman Empire were using the Egyptian papyrus and parchment for writing, Chinese people had invented hemp paper by using the plant’s fibers in the early Western Han Dynasty. From the point of view of the ancient paper that has been found, paper was invented in what is known as Guanzhong, Shan’xi today, which was the capital of the Western Han Dynasty. However, the period of the Western Han Dynasty was the period during which paper-making was explored, because paper mills were not founded yet, there was no mass production to satisfy the needs.

During the Western Han Dynasty, the government still used the bamboo slips as writing instruments. Because a large amount of Western Han bamboo slips and silk manuscripts have been found by archaeologists.
During the reign of Han Emperor Xian, the paper-making process was improved to a relatively higher level, which further enhanced the quality of paper. Paper became white, delicate, and soft. During the periods of the Wei-Jin and South-North dynasties (over two hundred years later), the use of paper was widespread and common for people. Additionally, the technology of paper-making was further improved and the area in which it was used also gradually spread and was concentrated in south and southwestern areas instead of Shanxi and Henan Luoyang. Socio-economic culture and education reached a culmination during the Han Emperor He period. Government agencies, schools, and a large number of scholars urgently needed paper, which pushed the paper mills to research and develop higher quality paper. The most famous paper, Cai Lun paper, was produced in this historical context. By the 8th century AD, Chinese paper-making technology had spread to West Asia (the late Tang Dynasty). It spread to Europe in the 12th century (Song Dynasty), and was gradually promoted worldwide, which made great contributions to Chinese and global developments in science and culture. In addition, according to Communication History of Ancient Chinese Culture the Chinese, China’s paper-making technology spread to Japan (AD 610), India (AD 710), Samarkand (AD 715), Baghdad (AD 739), Egypt (AD 900), Spain (AD 1100), France (AD 1189), Germany (AD 1391), England (AD 1494), Russia (AD 1586), British North America (AD 1690), etc.
Figure 2-40 The spread map of Han and Tang’s Papers in worldwide
As the original region of the invention of paper, the Guanzhong area of Shan’xi (a province of China) undoubtedly occupied a high position in the developmental history of Chinese paper-making. Therefore, experts from the Shan’xi Provincial Institute of Archaeology claimed that “this area might be the birthplace of paper.” Chinese paper was improved and enhanced by Cai Lun, and paper handicraft industry was formed in Luoyang, Henan Province. Therefore, the Chang’an area and Luoyang city were extremely crucial and glorious regions in the early stages of the development of Chinese paper.
Figure 2-41
The traditional process of paper-making in the Han Dynasty
The process of paper-making nowadays

1. Cut the bamboo
2. Cut the bamboo again in pieces
3. Rinse the bamboo
4. Select the bamboo
5. Cook the bamboo
6. Pulverize the bamboo
7. Beating
8. Papermaking
9. Drying

Figure 2-42
The process of paper-making nowadays
Figure 2-43
Han Gan, Night-shining White, Tang, 8th century (Tang Dynasty), Scroll, ink on paper
Tang Dynasty:  
Night-shining White

The horse is often seen in painting and ceramics art. The most beautiful horse portraits date from the period of the Tang Dynasty (618 – 907 AD).

Night-Shining White was the name of a horse with a very muscular chest. It derived its name from its shimmering moon white fur. It was the favorite horse of Emperor Xuanzong, the most powerful emperor of the Tang Dynasty.

Night-Shining White posed for his portrait between 740 AD and 756 AD. It was often painted by Han Gan, the famous horse painter who worked at the court of Emperor Xuanzong, painted. But it was also by other Tang painters ‘portrayed’ and once sung by the best court poet of the Tang Dynasty, Du Fu.
Figure 2-45
Sutra, Five Dynasties
Five Dynasties:
Sutra
As mentioned before, Buddhism prevailed in Sui – Tang Dynasty, so there were a large amount of different sutra versions with various binding forms. This situation also continued to the later dynasties, especially in Five Dynasties.7

Material – Hemp paper
Han Dynasty’s hemp paper was an important invention. Cai Lun improved it as the book’s materials in the Eastern Han Dynasty, which has became one of the most significant inventions of ancient China. There were number of hemp papers in Han Dynasty, such as white hemp paper, yellow hemp paper, hemp with texture paper, mulberry paper and so on, but the main categories were white and yellow hemp paper.

Binding Structure – Concertina Binding
Concertina binding comes into being by folding the long written sheet of paper repeatedly into booklet, which evolved from scroll binding. Compared with scroll, it is more convenient for reading. This form of binding appeared in the Tang Dynasty. Since the Song Dynasty, it got a Chinese name of Jing Zhe Zhuang, because many sutras were used to be bound in this style.

7 The Five Dynasties and Ten Kingdoms period, also called Five Dynasties, was an era of political upheaval in 10th-century imperial China. During this period, five states quickly succeeded one another in the Chinese Central Plain, while more than a dozen concurrent states were established elsewhere, mainly in south China. The era started with the fall of the Tang dynasty in 907 AD and ended with the founding of the Song dynasty in 960.
The manuscript of Kanmiu Buque Qieyun

Old Chinese accounts of whirlwind binding are very rare. However, there was a trail of clues left by a Tang dynasty (AD 618-907) rhyme dictionary called Kanmiu buque qieyun (Corrected rhymes), by Wang Renxu. Although it is still not known when the first whirlwind books were made, evidence suggests that it was probably during late Tang dynasty. The manuscript of Kanmiu buque qieyun in the Gugong Museum has a colophon that indicates it was copied and bound AD 749.
Binding Structure – Whirlwind Binding
Whirlwind binding is probably the most unusual of all the binding formats in the evolutionary process that ultimately replaced the scroll with thread bound book in Sui and Tang dynasties. Its unique structure reveals more about its place in the history of bookbinding than any other format, and the textual content of the examples found so far give us an indication as to why this evolutionary process took place. But although whirlwind binding was an established form of binding in its own right, it was purely transitory. It was a step in the development of book forms, and once more suitable forms were developed, whirlwind bound books were no longer needed.

8 Late Tang Dynasty
In history as Later Tang, was a short-lived imperial dynasty that lasted from 923 to 936 during the Five Dynasties and Ten Kingdoms period in the history of China. The first three of Later Tang’s four emperors were ethnically Sinicized Shatuo. The name Tang was used to legitimize itself as the restorer of the Tang dynasty (618–907). Although Later Tang officially began in 923, the dynasty already existed in the years before, as a polity called Jin (907–923).
Figure 2-52
Meng Xi Bi Tan (Dream Pool Essays), official publication (Xiangxiang, Hunan Province), Dade 9 (1305 AD), Yuan Dynasty.
Yuan Dynasty:
Meng Xi Bi Tan (Dream Pool Essays)

The Dream Pool Essays or Dream Torrent Essays was an extensive book written by the Han Chinese polymath, genius, scientist and statesman Shen Kuo (1031 – 1095) by 1088 AD, during the Song dynasty (960 – 1279) of China. Although Shen was previously a highly renowned government official and military general, he compiled this enormous written work while virtually isolated on his lavish garden estate near modern-day Zhenjiang, Jiangsu province. He named the book after the name he gave to his estate, the “Dream Brook”. The literal translated meaning is Brush Talks from a Dream Brook, and Shen Kuo is quoted as saying:

“Because I had only my writing brush and ink slab to converse with, I call it Brush Talks.”

Binding Structure – Butterfly Binding

Butterfly binding played a pivotal role in the history of Chinese bookbinding. The popularity of this form of book in the Song dynasty (AD 960-1279) marked the end of the scroll and the beginning of the folded leaf book.

Indeed, butterfly binding was the first Chinese book format to depart completely from the concept of the scroll. Although both concertina and whirlwind bound books had characteristics of the leaf book, they were both strongly influenced by the scroll and still shared many of the its features. Butterfly binding, on the other hand, managed to break away from this bookbinding tradition, starting on a new direction for the making of Chinese books.

It is one of the early binding styles of printed books. Its core area was kept inside, so both the left and right leaves looked like butterfly on the wing when the book was turned over. That is why it is called butterfly binding. It was popular in the Song and Yuan dynasties and went down into the early Ming Dynasty. The difference between butterfly binding and the thread binding and wrapped-back binding is that the whole core area of each page is pasted leaf by leaf.

Yuan Dynasty

The Yuan dynasty was the empire or ruling dynasty of China established by Kublai Khan, leader of the Mongolian Borjigin clan. Although the Mongols had ruled territories including today’s North China for decades, it was not until 1271 that Kublai Khan officially proclaimed the dynasty in the traditional Chinese style. It was the first foreign dynasty to rule all of China and lasted until 1368.
The book is an explanation of the ‘Ba Gua’ used in the Yi-ching in Ming Dynasty⁹ (I Ching or Classic of Changes, also known as the Book of Divination).

According to this Chinese world view, the universe is run by a single principle, the Tao, or Great Ultimate. This principle is divided into two opposite principles—Yin and Yang. All phenomena can be understood using yin-yang and five associated agents, which affect the movements of the stars, the workings of the body, the nature of foods, the qualities of music, the ethical qualities of humans, the progress of time, the operations of government, and even the nature of historical change.

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⁹ The Ming dynasty, or the Great Ming, also called the Empire of the Great Ming, was the ruling dynasty of China for 276 years (1368–1644) following the collapse of the Mongol-led Yuan dynasty. The Ming, described by some as “one of the greatest eras of orderly government and social stability in human history,” was the last dynasty in China ruled by ethnic Han Chinese. Although the primary capital of Beijing fell in 1644 to a rebellion led by Li Zicheng (who established the Shun dynasty, soon replaced by the Manchu-led Qing dynasty), regimes loyal to the Ming throne – collectively called the Southern Ming – survived until 1662.
An Illustrated Gazette of Overseas States (Hai Guo Tu Zhi)

An Illustrated Gazette of Overseas States was written by Wei Yuan, the first book that comprehensively and systematically introduced world history and geography, published in 1843 in the Qing Dynasty.10

Binding Structure – Sewn Binding
A special binding style found in Dunhuang documents was used in the Tang Dynasty. A few pages are piled up in order and then folded into a section. The subsequent procedures are piling a few sections up, binding these sections together by sewing along the middle creases of the pages, and finally making a cover for the book. Thread is visible from the inside of the book rather than the outside. More importantly, the arrangement of the pages in a sewn binding is totally different from traditional arrangements but similar to the modern style.

10 The Qing dynasty, officially the Great Qing, also called the Empire of the Great Qing, or the Manchu dynasty, was the last imperial dynasty of China, ruling from 1644 to 1912 with a brief, abortive restoration in 1917. It was preceded by the Ming dynasty and succeeded by the Republic of China. The Qing multi-cultural empire lasted almost three centuries and formed the territorial base for the modern Chinese state. The dynasty was founded by the Jurchen Aisin Gioro clan in Manchuria.
Shanghai Magazine

Between the fall of the Qing Dynasty and the establishment of the People’s Republic, China experienced a wave of social and political change that at times resulted in an identity crisis as Chinese citizens were sandwiched between centuries-old traditions and an influx of Western trade and influence. Commercial art and design of this period, especially magazine and book covers, which reflected this duality as experienced by many Chinese artists fighting for a new modern aesthetic that maintained a recognizable national flavor.

Aimed at members of the growing urban middle class in the 1920s and 30s, most notably in Shanghai. These book designs reached a greater and more diverse public than traditional painters.
Binding Structure –

Paperback (perfect binding)

This new book form so called paperback mainly developed in Modern China, along with foreign plate making, printing technology that spread into China, and they were produced and developed rapidly. Those kinds of factors made the traditional Chinese woodblock printing technique and thread binding gradually declined, which finally formed the specific characteristics of the book in that period.

Perfect binding, is a popular binding method that cut the book block in the side, then apply the glue on the spine, which finally sticks the book pages and cover firmly. This binding is very similar to the traditional back-wrapped binding.
Cao Xueqin Kite Art

This book designed by Jian Zhao who is the professor of Tsing Hua University, China. Because this book was full of traditional cultural Chinese elements, and creative binding style and layout, he won the prize of “most beautiful book of the world 2006” in Leipzig, Germany. It is definitely one of the most representative book since Chinese economic reform in 1979, but also combines the ancient binding structure.

This is a book in addition to the academic, artistic, historical and cultural value in itself, it also was the most striking and commendable book design work, which I think its design concept is very novel, unique, and the binding form was simple, elegant, and overall cohesion in thick books of traditional Chinese culture in classical artistic beauty. I think that is the deciding factor that it could won the title of “the world’s most beautiful book”. Its drawings of Cao Xueqin representing all types of kites, of his making. Their making is detailed at the rhythm of the verse and the rhymes.
Professor Jian Zhao said that it is the performance of a traditional Chinese folk art, so he preferred to give this whole a design position, which is reflected the unique Chinese cultural qualities, presenting the wisdom of the Chinese people to express the concept of thinking method, and meanwhile give full play to the features of book language.

For example, it used the old-type thread-stitched binding method, which he combined the bindings aesthetic qualities and modern design together to reflect the contents of the book. Specifically, because the main content of the book is kite art, while past practice often display pictures to show them in a certain traditional way. But Professor Jian Zhao believed that it is important for readers to have the feeling of flying, so he chose the dashed line to decorate it, and show the kites’ gestures from different angles, finally achieved a flexible structure in terms of design.
Figure 3-1  Lu Xun book design work
Chapter 3
The development trend of modern Chinese book design

“From the late Qing Dynasty to the early stage of Republic of China, while Chinese traditional books had been on the decline in the unprecedented culture change, modern books sprang up based on western modern industry producing technology and material.”

Jian Zhao.
The beginning of Chinese Modern Book Design Paradigm (1862 – 1937)
People’s Fine Arts Publishing House. October, 2011
Overview

The great boom in Chinese publishing in the early decades of the twentieth century was due, in part, to a general increase in literacy and also to a growing middle class in search of leisure pursuits. In response to this demand, publishing houses began to employ full-time designers. Advertising and book design were no longer done primarily by classically-trained painters and illustrators. Graphic artists began to explore the creative potential of book design as the field began to be recognized in its own right. The book designs during this period of experimentation exhibited great stylistic diversity.

Paperback and hardcover book forms mainly developed in modern China, along with the rapid spread of foreign plate-making and printing technology. These factors made the use of traditional Chinese woodblock printing techniques and thread books gradually decline, and finally, the characteristics of modern Chinese books design were established.

This chapter introduces the modern transition of Chinese book design. Representative book designers and books are demonstrated with scientific analysis. This can help the audience understand the changing factors and development trends of Chinese modern books.
**Paperback**

Paperback books can be divided into side stitch, saddle stitch (booklet making), perfect binding, spiral binding, and section sewn categories (figure 3-2).

**Side stitch**
Side stitch, is the binding method in which printed pages are folded into a book, iron wire is used to fix the pages together using nails, and finally, the book cover is added. This form of paperback books is normally used for general books.

**Saddle stitch**
Saddle stitch is a binding method in which printed pages are folded to form a book and iron wire is used in the middle of the fold to fix the pages to the book cover. With this binding method, the pages can be completely paved. It is easy to read. Current magazines and relatively thin books use this binding method.

**Perfect binding**
Perfect binding is a popular binding method in which that crop the book block in the side, glue is applied on the spine, which finally the book pages and cover are firmly stuck together. This binding method is very similar to traditional back-wrapped binding.

**Spiral binding**
This binding method involves using a spiral-shaped wire to bind individual pages together into the form of a book. It allows people to freely add or remove pages. It is generally used for calendars, photo albums, etc.

**Section sewn**
The section sewn binding method involves sewing each page together using thread and then using glue to fix the pages to the spine. The advantage of this binding method is that the content of the book can be fully read, the appearance is very strong, and it is effective for book protection.
Figure 3-2
Diagram of paperback binding methods

- Spiral binding
- Side stitch
- Saddle stitch
- Perfect binding
- Section sewn
Figure 3-3
Diagram of hardcover binding methods
Hardcover

Hardcover books are divided into rounded spine, square spine, and clothbound (figure 3-3). Hardcover binding methods are frequently used for books with plenty of pages, books that require long-term preservation, books that need specific aesthetics, and relatively important books. The front and back covers are made from rigid or semi-rigid materials.

**Rounded spine hardcover**
Rounded spine hardcover books have semicircular spines. This can make the whole book easy to read, and it also can improve the firm level of book block.

**Square spine hardcover**
Square or flat spine hardcover books, for the most part, are similar to rounded spine hardcover books, except the spine is not semicircular but flat.

**Soft-cover clothbound**
The soft-cover cloth binding method aims to reduce the weight of books, and change the hard surface into a soft surface. Soft-cover clothbound books use thin materials instead of heavy cardboard like general hardcover books. Usually, thick books use this type of binding.
Lu Xun and Chinese modern book design

Speaking of Chinese modern book design, we cannot avoid discussing Mr. Lu Xun, who is the most representative pioneer of Chinese modern book design. Lu Xun was the first person who paid attention to the practical book design for his own literary works. He unified the cover design, content layout, printing, binding, word and paper selection into a scientific design method after the May 4th Culture Movement. To some degree, he created a new book design trend in modern China.

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1 The May Fourth Movement was an anti-imperialist, cultural, and political movement growing out of student demonstrations in Beijing on May 4, 1919, protesting against the Chinese government’s weak response to the Treaty of Versailles, especially allowing Japan to receive territories in Shandong which had been surrendered by Germany after the Siege of Tsingtao. These demonstrations sparked national protests and marked the upsurge of Chinese nationalism, a shift towards political mobilization and away from cultural activities, and a move towards a populist base rather than intellectual elites. Many political and social leaders of the next decades emerged at this time.

Figure 3-4
Cover for Lu Xun, Sprout (1930)
Figure 3-5
Cover for Lu Xun, Literature and Art Study Quarterly (1930)
Lu Xun, Literature and Art Study Quarterly (February, 1930), from Lu Xun Yu Shu Ji Book Design (Shanghai: Shanghai Ren Min Press, 1981), p. 73.
In the history of modern Chinese culture and thought, Lu Xun (1881 – 1936) was worshiped as a god by others, and was regarded as a mentor by many. He was the first author who really paid attention to book design, and he wrote extensively about the book designs of his work. Therefore, in the history of modern book design, he has been placed among the pioneers, and Lu Xun and the designs of his design books is always a considerable subject for historians.

Lu Xun’s books are designed with the typical features of the literati. First of all, his works are simple, and many of his books have plain covers; in addition to the title and the signature block, there was nothing else. He loved to use stone decorative patterns from the Han Dynasty for the cover, and he even used ancient forms of packaging to bind foreign art collections. He preferred the books with deckle edges, he did not cut the edges of his books. He also liked to keep a very wide head for the layout in order to allow the reader to write their comments or experiences. Finally, he was really careful about details like type size, leading, punctuation, colors, and so on.

Lu Xun gave up studying medicine while he was studying literature in Japan because of he tried to arouse the Chinese people’s social consciousness at that time through his articles. Lu Xun’s book art allows us to vividly see the transition from traditional Chinese book designs and binding styles to a new modern form. It can be said that this was the beginning of modern book design art in China.

Most graphic designers at that time helped establish a new identity for their Chinese audience, one that displayed pride in national heritage while also promoting China as a modern, forward-looking country, even in this politically unstable period.

“What are some possible Chinese and foreign influences on the book design in 1926?”

Tao Yuanqing,
Lu Xun Yu Shu Ji Book Design
Shanghai: Shanghai Ren Min Press, 1981
Tao Yuan-qing and Chinese modern book design

A graphic designer known primarily for his use of indigenous motifs is Tao Yuan-qing (1893 – 1929), whose short but vibrant career made him an influential presence on the Chinese design scene of the 1920s. He was trained in China but like many other artists had an interest in Japanese design (which itself often drew from Chinese sources), and studied Western watercolor techniques. He worked closely with Lu Xun on several book covers, inspired by the writer’s ideas about re-discovering Chinese design sources.

His designs acted as a showcase for the re-discovered ancient arts of China, showing average consumers that the nation’s seemingly outdated art forms could be adapted to suit modern aesthetics. This reflected his belief that “only by continually referring to and integrating China’s traditional visual motifs could a design maintain strong emotional connections to traditional culture and project an authentic Chinese spirit” (Minick and Ping, Chinese Graphic Design in the Twentieth Century, 31).
The development trend of modern Chinese book design

In this thesis and the corresponding visualization project, the first discussion point is the historical development of Chinese book design, which can be demonstrated by using information design technologies. In addition, the current situation and future development treads of modern Chinese book design are also worthy of mention and emphasis. However, this thesis only focuses on the evolution and development of traditional books, and emerging digital technologies, like eBooks, are not included.

Through the winning situation of Chinese book design in "the world's most beautiful book" contest in Leipzig, Germany recent years, most of the Chinese books are still using the traditional book design approach, which is common but also special situation in modern Chinese Design.

Although since the May Fourth Movement, the Western advanced manufacturing technologies have had tremendous impacts and reformed traditional Chinese book design, Chinese designers from different generations have been seeking a balance between traditional Chinese culture and advanced foreign technology. The reforms of modern Japanese designs have been very successful since the Meiji Restoration, especially in the book design field. The book design style is very iconic, and they have high identifiability. They combined the Japanese homeland “He” culture and foreign culture into a very high level.

The following section analyzes the Chinese book examples that won the prizes in the World’s Most Beautiful Book Competition in Leipzig, Germany2, and it aims to predict the future development treads of Chinese book design.

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2 “World’s most beautiful book” competition represents the highest honor in today’s world book design community, there are four main criteria: First, the harmonious unity of form and content, between the character image; the second is the materialization of books and texture, highest standard level of printing; The third is creativity, encouraging imagination and personality; Fourth, focusing on the accumulation of history, reflecting the cultural heritage.
The selected binding methods of Chinese books in “World’s most beautiful book” in China

<table>
<thead>
<tr>
<th>Year</th>
<th>Book Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td><em>The Picture Book of Mei Lanfang’s Opera Portfolio</em></td>
</tr>
<tr>
<td>2005</td>
<td><em>The Earth</em></td>
</tr>
<tr>
<td>2005</td>
<td><em>The Series of Yeqing Zhu</em></td>
</tr>
<tr>
<td>2006</td>
<td><em>Cao Xueqin Kites</em></td>
</tr>
<tr>
<td>2007</td>
<td><em>No Cut</em></td>
</tr>
<tr>
<td>2008</td>
<td><em>The Latter</em></td>
</tr>
<tr>
<td>2008</td>
<td><em>The Sound of Ants</em></td>
</tr>
<tr>
<td>2009</td>
<td><em>China Memory – The Civilization and Treasures in 5000 Years</em></td>
</tr>
<tr>
<td>2010</td>
<td><em>The Book of Songs</em></td>
</tr>
<tr>
<td>2011</td>
<td><em>Explorations: Architecture Experience and Literature Imagination</em></td>
</tr>
<tr>
<td>2012</td>
<td><em>The Story of Paper-cut</em></td>
</tr>
<tr>
<td>2013</td>
<td><em>Ai Yi Wen Poetry</em></td>
</tr>
</tbody>
</table>

Figure 3-9
The selected binding methods of Chinese book design in “World’s most beautiful book.”
2004 – 2013
The Picture Book of Mei Lanfang’s Opera Portfolio

This book designed by Hebei Education Press and it won the prize of “most beautiful book of the world 2004” in Leipzig, Germany. Also, this is the first time Chinese book won the “world’s most beautiful book” award.

This book used Chinese traditional thread binding method, the book shell is gold blocking, the fonts is intaglio printing. In addition, the opening way is also a traditional way that from right to left. The readers could really feel the appreciation of designer’s ingenuity design experience from the paper’s color, weight, style and binding, even the packaging and other details.
“No cut” a book published in 2006, it won the “2006 world’s most beautiful books”, the judges gave the comment: “The Book used Bamboo paper, keep the edge-preserving for the sake of original texture of the paper. In particular, the book cover used effect of the sewing machine, two thin parallel red line through the cover, spine and back cover piece. The material is very ordinary, but the form and content are integrated.”

The binding of the book was designed with special experience for readers, which need them to read it with keep cropping the paper. The advantages of this could allow reads have time to break, to have expectations, rhythm and to make a lot of fun, and finally get a plain and elegant book.
Figure 3-15
No Cut Cover edge
Design: Yingchun Zhu
Author: Shijiu
Gu Press: Jiangsu Literature and Art Press
Categories: Literature
Publication Date: October, 2006
Japanese book design: Designing Design

Kenya Hara is a Japanese graphic designer and curator. He is a graduate of Musashino Art University. He has been the art director of Muji since 2001 and designed the opening and closing ceremony programs of the Nagano Winter Olympic Games 1998.

In 2001, he enrolled as a board member for the Japanese label MUJI and has considerably moulded the identity of this successful corporation as communication and design advisor ever since.

The book begins with several exhibitions that Hara organised and for which he devised the question that should be answered. In addition, in this book Hara said: “Designer’s work, not just design practice in the current environment, in order to find a suitable place for the design, re-design and configuration for designers, it is perhaps more important work.” This is my favorite definition for design. Hara’s design both sensible and rational, even if he believes that “flat”, is also part of three-dimensional structures. He found the design in life, refined design from life, and applied the design into life. And in his theory for book design, I think it not just simply visual communication, but almost all areas of visual design, whereas the book design has its own uniqueness. I believe that beauty
books also have five senses, which are vision, hearing, touch, smell taste of the five senses.

In Hara's book design works, he advocated ‘Minimalism’ and his stylistic characteristics is to use very less color, for example, he just used black and white in the cover and add one more red in the inside pages. And in his book cover design, he often used abstract graphics, minimalist photography, or only text to express the sense of his design inspiration. In Hara's book cover art, he really often simply to use text to present the book concisely. He believed that writing is a very important carrier to convey information and record books, as well as books' essential element. The cover is a very crucial part of a book, which expressed ethos and artistic content of the book. For example, the “Why Design” covers used the layout of text is fully reached in a graphical and classic layout. He used different sizes, different fonts, different image of the text to demonstrate the"minimalism" in perfect way.
History of Math Timeline by Charles and Ray Eames.
Men of modern mathematics poster
A massive timeline on the history of maths from 1000AD to 1960.
It displayed at the 1964 World's Fair in New York City.
Chapter 4

Information Visualization and Book Design

“The method is not the external form, but the soul of data.”

Georg Wilhelm Friedrich Hegel
Case study 1: Learning – Timelines: Sources From History

This timeline allows the users to explore collection items chronologically, from medieval times to the present day.

It includes a diverse combination of texts: those that allow glimpses of everyday life (handbills, posters, letters, diaries), remnants of political events (characters, speeches, campaign leaflets), and the writings of some of our best known historical and literary figures.

Also, an interesting point is that this timeline allows users to create their own timeline when they add some specific events as their favourite.
Case study 2:  
The Temple of Time by Emma Willard.

It was created by Emma Willard in 1846. The designer draws on the tradition of Renaissance “memory theaters,” mnemonic devices that allowed people to memorize in formation by imagining it as architectural details in a three-dimensional mental space. In other words, it is a method of memory enhancement which uses visualization to organize and recall information.

The entire chart is like a palace because the 3D visual effect. In this temple, it is very clear that the vertical columns represent centuries, with those on the right showing names of important figures from the Old World, while those on the left show figures from the New World. It is clear that the floor demonstrate a historical stream chart of different countries. However, one thing that made me so confused is the color meaning. For instance, as first I thought the different colors represent different countries like the pink color shows the history of Italy, while I still found that it also represent Germany. I begun to think about it probable distinguished by continents. Then China was found also by pink color. I am not sure what measurement or scale that the designer used to represent differences among those countries.
Case study 3:
The Histomap

This timeline was called The Histomap. It was designed in 1931 by John Sparks, which represented four thousand years of world history. And I found an interesting thing is that in the same period, Mr. Sparks designed a serial timeline with same technique.

This Histomap showed the significant historical events, relative power of contemporary states, nations and empires from about 2000 B.C. to 2000 A.D. with seven different civilizations—the Aegeans, the Egyptians, the Hittites, the Amorites, the Iranians, the Indians, the Huns, and the Chinese in a vertical format. Some civilizations bleed together, others are swallowed up.

The clearly labeled vertical axis shows the time, but I am really confused the author how to divided the horizontal axis. It's unclear what the width of the colored streams is meant to indicate.

Figure 4-3
The Histomap by Sparks. John B. 1931.
Case study 4
Typologies and Capacities

It is an interactive map allows a smooth navigation between all the projects and shows how different people are related to them. It becomes an intricate social network where every project, represented as a key node, is surrounded by its direct collaborators, which in turn can be linked to others.

Figure 4-4
Typologies and Capacities, 2006.
Visualization exploration

The initial exploration was a huge and static timeline. It has enough space allow me to present all the information on it. However, the most severe defect is that the relationships between each subject are really hard to present. Also, because of the numerous data, a graphic timeline without any hierarchies extremely challenged the legibility of my project. Then an interactive visualization have been considered, at least allowing the information to exist at different levels.
Figure 4-6
The chart of relevant Chinese dynasties and time periods
Visualization exploration one: Website – Scroll timeline

The first visualization was a scroll timeline, based on a website context. It was based on the four developments stages of the Chinese book design. The dynasty is a crucial and unique aspect of Chinese history. It is extremely worthwhile to use instead of the classical timeline. (Figure 4-6 The chart of relevant Chinese dynasties and time periods.)

It focused on the representative books and all of these books come from the relevant dynasties that are selected with purposes. And it will show interactive movements of each stage’s form through the clickable bars (figure 4-7).

<table>
<thead>
<tr>
<th>Dynasty</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wei Dynasty</td>
<td>220–266 AD</td>
</tr>
<tr>
<td>Jin Dynasty</td>
<td>266–420 AD</td>
</tr>
<tr>
<td>South–North Dynasty</td>
<td>386–589 AD</td>
</tr>
<tr>
<td>Sui Dynasty</td>
<td>581–618 AD</td>
</tr>
<tr>
<td>Tang Dynasty</td>
<td>618–907 AD</td>
</tr>
<tr>
<td>Song Dynasty</td>
<td>960–1279 AD</td>
</tr>
<tr>
<td>Yuan Dynasty</td>
<td>1271–1367 AD</td>
</tr>
<tr>
<td>Ming Dynasty</td>
<td>1368–1644 AD</td>
</tr>
<tr>
<td>Qing Dynasty</td>
<td>1644–1911 AD</td>
</tr>
<tr>
<td>Republic of China</td>
<td>1912–1949 AD</td>
</tr>
<tr>
<td>People’s Republic of China</td>
<td>1949–present</td>
</tr>
</tbody>
</table>
Firstly, the homepage looks like a book cover and it is clickable, then goes to the page one, which intuitively introduces these representative books and four development stages with color codes.

Furthermore, the audience could choose any stages of the Chinese book design or any representative books as they interested in, and it will detail the developed process and characteristics of the selected stage (figure 4-8). The most interesting part is that if the user clicks the book of Bundle stage, the animation will open this page as a real bundle book’s opening movements, as well as the part of codex also will open it like a real book’s page turning. The reason of this design is to give direct understanding of how the different stages’ book look like, even they do not have the access to touch the real book.
**Oracle Bones**

Oracle bones, also known as "I-ching", were the earliest and probably the most important form of writing in ancient China. They were used by high-ranking officials to seek divine guidance on important decisions. These bones were inscribed with symbols and then broken to interpret the ensuing cracks. The different patterns of cracks were interpreted to provide answers to various questions.

**Guodian Chu Slips**

Guodian Chu slips were discovered in present-day Huabei, China. They were found in 1993 in a tomb dating back to the late Spring and Autumn period (5th century BCE). These slips represent a unique form of writing that predates the use of paper. They were written in a script that is a precursor to modern Chinese characters.

**Material**

- **Oracle bones**
- **Bamboo**

**Binding Structure**

- None

**Territory**

- **Shang**
- **Western Zhou**
- **Chu State**

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**Evolution of the Chinese Book**

Timeline for the development of Book Materials, Technologies, and Design in China - From antiquity to today.

Figure 4-9 Page Five
Figure 4-10

Independent timeline of Binding Structures in the second level
**Second Level**

In addition to the full version of Chinese book design history time that showed before, an independent timeline of binding structures will be shown in the second level. The reason why this subject of binding structures was selected as another timeline is that it could offer optional version for the readers. As the thesis mentioned previously, the full version of timeline includes a huge amount of information: books examples, materials, binding structures and dynasties, even could contentiously add any other subjects (printing, publishers, readers, etc.). Those kinds of factors caused that people will probably feel hard to find their own interest, and separate their favorite part from others. It is a way to simplified the timeline of Chinese book design history, and aim to make it more effective and nice targeted.
So, this second level option could perfectly provide them an opportunity to select the specific subject, for now it could be the detailed and clear information of binding structures, materials, book examples and geographic territories.

In book binding structures (figure 4-10, 11), for instance, it chronologically shows the evolution of Chinese book bindings from 3500 years ago to today (Shang Dynasty – People of Republic China.) All of those binding structures were drawn by the author as the schematic, which intuitively help the audiences understand the development of Chinese book binding structures with a lot of fun. Additionally, it also shows the time range of each binding structures just like the content showed in the full version timeline.
CHAPTER 4 INFORMATION VISUALIZATION AND BOOK DESIGN

EVOLUTION OF THE CHINESE BOOK

** Binding Structures **

The evolution of Chinese books is divided into three stages: from the Shang Dynasty to the present, but four types are included. In other words, the Chinese book evolved from its primary form to a characteristic form and finally to a mature form, and it is further divided into oracle bone, bamboo, scroll, and codes.

** Chinese Pothi Binding **

- **Age:** 400 BC
- **Description:** This binding method was used on Buddha images and other oracle bone documents written on paper before the Han Dynasty. After the Han Dynasty, paper was invented, which made binding methods such as the bamboo slips unnecessary.

** Whirlwind Binding **

- **Age:** 300 BC
- **Description:** This binding method is similar to the bamboo slips, using a rotating coil to bind the pages together. It is generally used for calendars, photo albums, etc.

** Concertina Binding **

- **Age:** 200 BC
- **Description:** This binding method is similar to the bamboo slips, using a rotating coil to bind the pages together. It is generally used for calendars, photo albums, etc.

** Butterfly Binding **

- **Age:** 100 BC
- **Description:** This binding method is similar to the bamboo slips, using a rotating coil to bind the pages together. It is generally used for calendars, photo albums, etc.

** Back-wrapped Binding **

- **Age:** 100 BC
- **Description:** This binding method is similar to the bamboo slips, using a rotating coil to bind the pages together. It is generally used for calendars, photo albums, etc.

** Sewn Binding **

- **Age:** 100 BC
- **Description:** This binding method is similar to the bamboo slips, using a rotating coil to bind the pages together. It is generally used for calendars, photo albums, etc.

** Modern Chinese book binding **

- **Paperback **
  - **Spiral binding **
    - **Side stitch **
      - **Saddle stitch **
        - **Perfect binding **
          - **Section sewn binding **
            - **Hardcover **
              - **Rounded spine **
                - **Square spine **
                  - **Soft-cover clothbound **

** Earl’s Book Binding **

- **Paperback books can be divided into these three categories: soft cover, paperback with hardbound mapping, perfect binding, spiral binding, and various other categories. **

Spiral binding: a method using a spiral shape to bind documents page by page, suitable for books. It is generally used for calendars, photo albums, etc.

Saddle stitch: a binding method in which a booklet is folded in half and inserted into a hardback cover. It is generally used for notebooks.

Perfect binding: a binding method in which a booklet is folded in half and inserted into a hardback cover. It is generally used for notebooks.

Section sewn binding: a binding method in which a booklet is folded in half and inserted into a hardback cover. It is generally used for notebooks.

Hardcover: a type of binding where books are bound with a hard cover. It is generally used for books with a hard cover.
Visualization Exploration One: Website – Geographic timeline

The second explored visualization is based on a website context, and the intuitive part is the geographic maps of 16 Chinese dynasties from Shang Dynasty to present.

Based on the previous analysis, this list also is made by the four stages of the Chinese book. Each period has its own specific style, but it shifted overtime. During different time periods, most certain materials and binding styles were invented or been replaced by a relatively new material, they both had internal and external reasons. Because of those aspects, the geographic maps could help audience to understand the different stages in each dynasty intuitively. Also, they will understand the essential questions: how the specific book style changed and spread from one dynasty from another one? How many dynasties shared one style? Did the development and evolution of book style was changed by the territory of a dynasty relatively?

Moreover, because there is a huge amount of information in this subject, so a hierarchical website is a wise choice to organize them clearly. For example, the figure 4-12 shows that all the information is hided in the second level, which could click through the list on the left. The audience could choose any stages of the Chinese book design as they interested in, and it will detail the developed process and characteristics of the selected stage (figure 4-13).
EVOLUTION OF THE CHINESE BOOK

Timeline for the development of Book Materials, Technologies, and Design in China – From antiquity to today.
FIGURE 4-14 Page two

FIGURE 4-15 Page three
Also, more details are included in different hierarchies (see below figure4-14, 4-15, 4-16), the information contains the introduction of representative book, material, binding structures of each stage, and the history events of corresponding dynasties.
Figure 4-17
Main page of data library & Highlighted data page
CHAPTER 4 INFORMATION VISUALIZATION AND BOOK DESIGN

Websites


Link the book design to the data library

As the introduction mentioned in the beginning, this thesis aims to stimulate the audiences’ interests, guiding them through a well-organized tool, an information visualization of Chinese book design, to find their own specific interests. Moreover, the visualization is based on research and information that extracted from different books, articles, projects, etc. All the materials and information used in the final visualization will be collected together as a particular data library (figure 4-17). The desired result is to link the data library to each spot in the visualization and thesis book. If the audiences are interested in specific information, they can use this link to pinpoint the source. It will provide the users another option to study the history of the Chinese book design further.
Connecting the students

Obviously, the main targeted audience is the students who study in design major and intend to learn the history knowledge fast and efficient. So from the perspective of teaching, here is the discussion question: In what way does the peculiar history of how the book as evolved in China impact the way the student proposes to present its history through interactive media?

As one proposition was always mentioned in this thesis, the desired result is that the solution for the Chinese book design project could also apply to any other history project. It means that this thesis and corresponding information visualization is providing a study method scientifically. For instance, the way the visualization used to collect data from different sources is really helpful for student, which taught them how to do the research and organize a huge amount of data more easier. As we all known, making notes is the most traditional way that students are using in class. However, a common situation is existing both in Chinese and American class is that when a course was finished, only few students will re-read those notes. One of the reasons is that will be very hard to immediately pinpoint the specific information the student actually want to find. That is why this thesis claimed that the scientific study methods and data collecting skills have the extraordinary significance for students to improve the study efficiency.

Furthermore, the interactive media is playing an Irreplaceable role, not only in the design field, but also influences every field in the world including education. Some traditions will be replaced by new technologies is the irreversible tendency, just like the evolution and development of Chinese book materials, binding forms and technologies, etc. Student need to learn how to apply fresh knowledge into their own study instead of keep being an adherent of conservative method. This is not alarmism. The reason this thesis was considering this standpoint because through a wide range of interviews, a phenomenon was emerging: some students are really scared to touch new thing. For example, they really interested in this pedagogy when they realized that if really could help them. But after they known that it required a first level of coding, almost eighty percent student just gave it up and even did not want to try it. Whatever it takes, this is still a ideal intention to appeal the audiences to embrace the new thing.

As an old Chinese saying goes, “Give a man a fish, he eats for a day. Teach him to fish, he will never go hungry.” In this thesis, it probably could evoke some new thoughts and change the old thinking somehow. That is the highest goal this thesis strive to achieve finally.
CONCLUSION

This paper mainly discussed the developmental stages of Chinese book materials, technologies, and designs from 3500 years ago to today. It focused on the complete history of Chinese book design and aimed at audiences who study or work in the design or history fields and help them to understand the evolution and developments of Chinese book art.

In addition to the brief chronological introduction to each book style, a data library was also created as another research area of this paper. As Chapter 2 discussed, 20 book examples were selected as the most representative books to demonstrate the evolution of each time period. Those examples come from different books, articles, and projects, which means that a huge amount of data sources were cited in this paper. Readers can follow the instruction in order to find corresponding sources (books, websites, etc.) in the particular data library. The usage of this data library can not only be applied in this specific scope but also is can be used in any history project or those in other fields.

The Relationship between Chinese Book Design and Information Design

In Chapter 4, I have attempted to combine Chinese book design and information design, which makes the historical knowledge of Chinese book design more accessible for the audience by applying information design skills.

So, the question is which forms of information design have been used in this Chinese book design history project? Many diagrams and charts were used to create the supporting data, such as a bar chart of Chinese dynasty years, geographical maps of Chinese dynasty territories, the spreading routes of book-making materials, and a diagram about the usage of binding structures in specific competitions. This information is really helpful for collecting and organizing information about Chinese book design. Through the visualized explorations, I realized that, from the perspective of Chinese book design history, there is more qualitative data than quantitative data because of the nature of book design information. However, regardless of the diversity of data, information design can always provide appropriate forms to express the data clearly. Furthermore, these kinds of explored experiences not only brought some inspiration to Chinese book design but also were effective models for similar projects, which is exactly the attractiveness of information design.
The relationship between Chinese book design history and information design is just like the relationship between content and form in Marx’s Philosophy. The relationship of content and form may be described as a unity, as almost a transition of one into the other. However, this unity is relative. Of the two interrelated categories, content represents the mobile, dynamic aspect of the whole; form involves the stable connections of an object. The information of Chinese book design is the “content,” and the information design skill is the “form.” Because the relationship between content and form is synergistic, another conclusive question arose: What can information design learn from the Chinese book design during this interactive process?

Firstly, the author believes that the most obvious point is the Chinese book binding structures, which are also forms in terms of the historical content. In addition to the different kinds of structures themselves, it could also provide many inspirations and possibilities to information design, particularly in the selection of design forms. For example, in the first visual prototype, a scroll timeline would be used and finally animated for this history project. It will open with corresponding book binding methods.

For example, the part about scroll book style will open like a real scroll in order to intuitively show the audience a vivid opening movement rather than a static page. Additionally, the schematics of the binding structures were drawn by the author, which added some interesting points into a history project. From the point of view of information design, it can be said that an intuitive and meaningful method can sometimes stimulate the audience’s interests instead of using a traditional form. In addition, this will also benefit the effectiveness and legibility of the visualized information.

Secondly, one should be careful to select the appropriate form. Like the independent timeline of book binding structures (Figure 4-20), over 10 binding structures emerged in Chinese book design history. Apparently, each binding structure had specific features: materials, writing orientations, production technologies, word capacities, pages, weights, heights, and so on, which means that a correct selection should be made before making a book. The silk manuscript, for example, is a one-page book, regardless of the page size, and it will finally be folded (Figure 4-20). So, from the perspective of information design, this one-page form is obviously

not suitable for some projects that have a huge amount of text and images. This is because, even though the page size is not limited, in ancient times, silk was used instead of paper because it could be folded gently and smoothly without friction. Conversely, if lots of text, images, and diagrams must be presented in an information form, a scroll or concertina binding structure would be a good form to use. It can be said that scrolls have unlimited space. Finally it could be folded like a scroll and use a traditional Chinese scroll head (Figure 4-20) in order to hold the both ends, which could make it flat and avoid the risk of curly paper. The concertina binding is actually similar to an accordion. Each page can be folded without a strict limit of space.

Finally, an additional point needs to be mentioned—that the geographical spread and communication of the Chinese book materials and technologies could be added to this study in the future. A series of geographic maps could be created in order to show how the materials and technologies spread from one place to another. However, because of limited time, it was difficult to collect this kind of geographical data from antiquity to today. Sufficient time is needed in order to visualize such data in a suitable and comprehensive form.
Appendix A
Interviews
Design methods

Around the question about how to combine information design and book design knowledge together scientifically, much research, interviews, sketches and case studies were worked. Finally, the timeline was selected as the best form to perform the complex and plenty historical information.
Appendix B
Sketches
Data Collection

Since the timeline was already determined as the final project visualization, this approach was also choose to collect the data of book design in the data collection process, by also using hand-painted method. I think this is more conducive to modify the information anytime. Furthermore, I realized that I could use my hand-drawing skills to illustrate each binding structures of Chinese book design in the final visualization, because this is one of my advantages.

In addition, this information gathering method would benefit the interspersed contrast among those main subjects. For example, it will be obvious that what kind of new book material to be used, and what kind of binding structure is used simultaneously or replaced at the same time and space.

Those kinds of information that used in this physical time separately came from different design books, articles, projects, book reviews and website, etc., which will be mentioned in the latter section that about the evolution of Chinese book design data library.
Bibliography
Books


Websites


“Guo Dian Chu Slips”, http://www.purple.dti.ne.jp/bunbutsu/mokukan.html# <Page 72>

