

GUIDELINES TO DEVELOP PRODUCT FORMS  
FROM CHINESE CALLIGRAPHY

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GUIDELINES TO DEVELOP PRODUCT FORMS  
FROM CHINESE CALLIGRAPHY

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Submitted to

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December 16, 2005

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THESIS ABSTRACT  
GUIDELINES TO DEVELOP PRODUCT FORMS  
FROM CHINESE CALLIGRAPHY

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“Global Westernization” is the most prominent characteristic of the 20<sup>th</sup> century. World culture, design and art form lean towards the West. Western products, like German products can be seen in markets all over the world. But where are the Chinese products? As an Industrial Design thesis, this research was conducted to study the product design from the perspective of Chinese culture. From the heritage of Chinese culture, calligraphy was chosen in this study. The relationship between product form and the aesthetics of Chinese calligraphy was studied. The emphasis of this research was to create a link between contemporary product form design and traditional Chinese calligraphy. Comparisons among the four different styles of Chinese calligraphy and their uniqueness were the goal of this research. Once the guidelines are set, product designers can

incorporate these elements into their designs. They can not only design a Chinese product, but also a Kai-style product or a Cao-style product. China's population is about 21.3% of the world's population; therefore, Chinese-focused products will have a huge potential market. In this thesis, the guidelines were applied to one product that was replicated four times, with each utilizing a distinct calligraphy style to demonstrate how the transformation was carried out.

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## 1. INTRODUCTION

### 1.1. Problem Statement

“Global Westernization” is the most prominent characteristic of the 20<sup>th</sup> century. World culture, design and art form lean towards the western. (Translated from 「全球西化」是二十世紀最大的特徵，是整個文化、設計與藝術形式一面倒向西方的時代。)(馮永華, n.d.)

Wen (as cited in Clunas, 1988) mentioned that most modern Chinese do not know how to appreciate the elegant aesthetic and the practical usage of antique Chinese furniture. They are losing their appreciation of the original Chinese beauty. This could be a crisis of Chinese culture. Each culture should have its own character and thus, the products designed by the particular designer should reflect the elements of one’s own culture. Moreover, products are indispensable in our daily lives; therefore, they should represent their own culture. “Otto Wagner, an architect and protagonist of Viennese Jugendstil – a late and predominantly rectilinear manifestation of Art Nouveau – wrote in 1895, representing this view that all modern forms must correspond to new materials and the new requirements of our time, if they are to fit modern mankind”(Sparke, 1986, p. 42). Although there is information on aspects of Chinese design, traditional Chinese aesthetics are not yet reflected in contemporary products. From the books and articles found, there was no in-depth discussion about the Chinese aesthetic and its relation to product design.

## 1.2. Need for study

Products are an essential element in our daily lives, and the way of living is a part of one's culture. For this reason, it is important for a designer to design a product based on the users' cultural background. The study of culture is very broad, and the first image that the user has of a product is based on its appearance. Therefore, the study of the aesthetic elements of a culture was needed.

According to statistical data from the National Bureau of Statistics of China (n.d.), the population of China (excluding Hong Kong, Macau and Taiwan) was approximately 12.8 billion at the end of 2001 and the world's population was approximately 60 billion. In other words, China's population was 21.3% of the world's population. With such a large population, products that meet their needs will have a huge potential market. Therefore, there is a great need to develop products that are Chinese-focused.

Each culture should have its own character and thus, a product designed by a particular designer should reflect the elements of his or her own culture. Moreover, since the products are indispensable in our daily lives, those used should be of their own culture. They can also play the role of communicator to the people of different cultures. Products from all over the world are brought to the world's market where cultural exchange will enable people from different countries to know each other better.

From the books and articles found, there was no in-depth discussion about the Chinese aesthetic and its relation to product design. However, there were some that were somewhat related, but they were merely discussions. Therefore, a more in-depth research

on the relationship between Chinese culture and contemporary product design was needed. In this research, Chinese calligraphy was chosen as the focus among the other Chinese heritages. This focus created a checklist for industrial designers to design products called the Chinese products, the Kai-style products, or the Li-style products.

There are four benefits of this research. The first benefit is to help designers design products based on Chinese aesthetics. Secondly, this research will help product developers gain the Chinese market. Thirdly, it will enhance the aesthetic appreciation of Chinese product. Finally, this research will make Chinese products unique.

### 1.3. Literature Review

Products are an essential element in our daily lives, and the way of living is a reflection of one's culture. For this reason, it is important for a designer to design a product based on the user's cultural background. "Design is, therefore, an important medium of communication which expresses the values of the system within which it functions"(Sparke, 1986, p.205). Culture study is very broad, and the first image that the user has about a product is based on its appearance. "All kinds and levels of cultural values, whether those manifested in, for example, political ideology, in various social and cultural activities, or in the economic status quo, find their way into the designed artifact by one means or another and those artifacts communicate those values in tangible and visual form"(Sparke, 1986, p.205). Therefore, this research focused on studying the aesthetic elements of a culture.

There are books about design and culture. In *An Introduction to Design & Culture* (1986), Penny Sparke analyzed the design culture in Great Britain, Sweden, USA, Germany, Italy, Finland and Japan. Another book, *USDesign 1975-2000* (2001), claimed that the designers readily adapted everyday imagery from American popular culture, from jellybeans to Disney characters to Sears products. These books show that product design based on cultures has been widely discussed; however, none of them talked about Chinese culture in product design.

There are some websites about cultural awareness in China and Taiwan. The homepage of 上海善古居室藝術設計有限公司 (n.d.) mentioned about the spirit of the Chinese antique furniture which emphasizes the nature and the environment with the spirit of integration of heaven, earth and human. This webpage does not talk about the contemporary product design from the aspect of the Chinese aesthetic, and also, it does not mention about how to apply the Chinese spirit into the product design. On the other hand, this article reveals that it is possible to convert the abstract Chinese thought into the concrete or specific visual form of an object. The same circumstances occur again in the book written by Craig Clunas entitled *Chinese furniture*, “The clue to the work’s true status lies in its title. It is a *jing*, a ‘classic’, on a par with the classic texts underpinning the various ideological systems of Confucianism, Taoism and Buddhism. It is meant to be arcane and hard to interpret; it is meant to be the timeless, secret inner teachings of the carpenter’s art, not a mundane guide to practical action, which was transmitted orally and learned by experience” (Clunas, 1988, p.12). It is shown that from the early age, Chinese had not only their own aesthetic view, but the furniture they made had a strong pragmatic value:



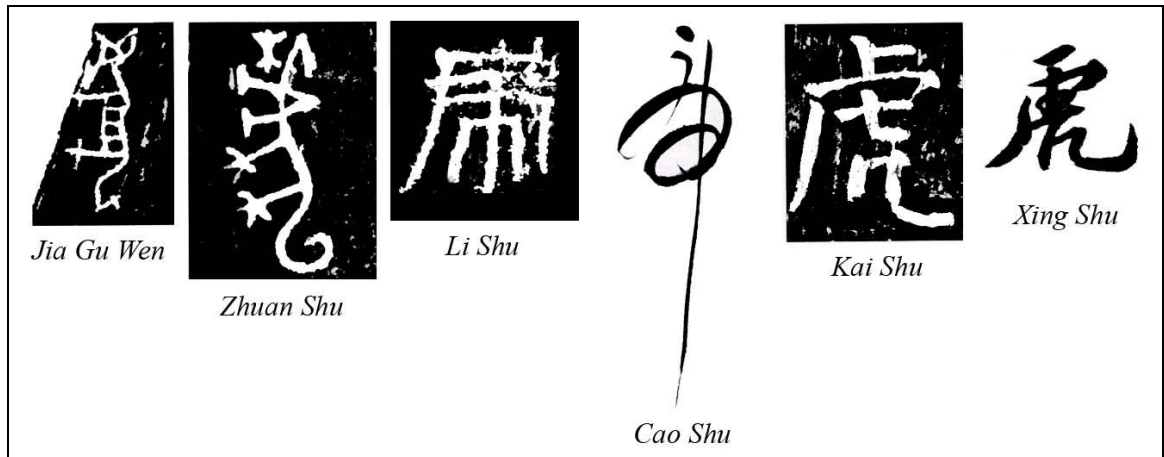
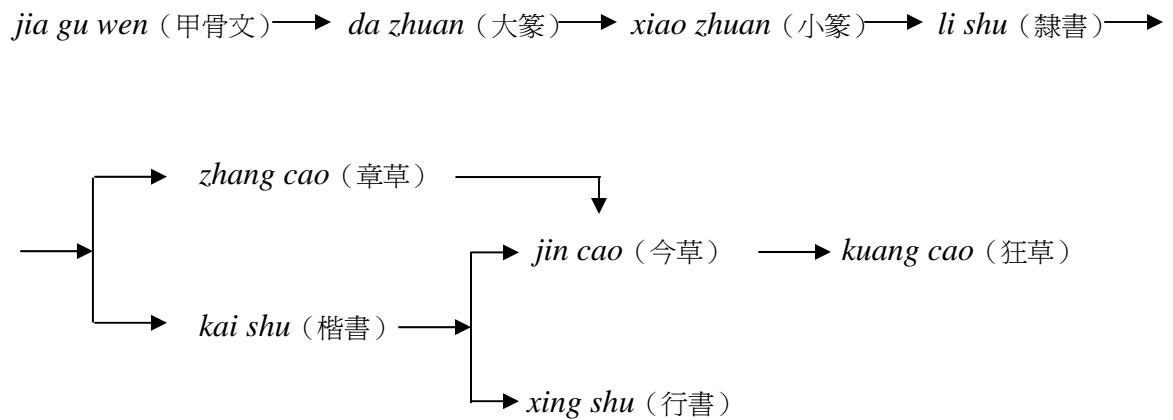
Treatise on Superfluous Things, by Wen Zhenheng (1585-1645):

When the men of old made tables and couches, although the length and width were not standard, when placed in a studio or room, they were invariably antique, elegant and delightful. Whether sitting, lying or leaning back, there was no way in which they were not convenient. In moments of pleasant relaxation, they would spread out classics and histories on them, examine paintings and calligraphy, display ancient bronzes, dine or take a nap – all these were possible. The men of today make them in a manner which merely prefers carved and painted decoration to delight the vulgar eye, while the antique pieces are cast aside, causing one to sigh in deep regret (Clunas, 1988, p.11).

According to Wen, most modern Chinese do not know how to appreciate the elegant aesthetic and the practical usage of the antique furniture. They are losing this aspect of their culture and the appreciation of the original Chinese beauty. This could be a cultural crisis. Fortunately, today there are designers who are starting to be aware of this problem.

The heritage of the 5,000 years of Chinese culture included Chinese calligraphy, Chinese painting, paper sculpture and antique furniture. Chinese calligraphy is not just a form of writing but it is a fascinating art form. With the strength, the speed, the intensity, the transition and the rhythm of the way of manipulating the brush, Chinese calligraphy clarifies lines just like the rhythm in music, and it has become the spirit of different art forms and the performing art (Translated from 運筆的輕重、疾澀、虛實、強弱、轉折頓挫、節奏韻律，淨化了的線條如同音樂旋律一般，它們竟成了中國各類造形藝術和表現藝術的靈魂) (徐海燕 & 江奇勇, 1994, p.49). In my proposed research I studied Chinese calligraphy as an example of Chinese culture.

Understanding the history of Chinese calligraphy is an essential tool in order to have a better appreciation of the aesthetic it represents. The development of the Chinese calligraphy is shown below:



*Figure 1-1*

The development of the Chinese words is from pictograph to stylization (Willetts, 1981). *Jia gu wen*, whose inspiration came from the natural, is the most pictographic. *Kai shu*, which is simplified and has an abstract form, is the most stylized (see *Figure 1-1*).

*Jia gu wen* (甲骨文), *da zhuan* (大篆), and *xiao zhuan* (小篆) can be categorized into *zhuan shu*. *Jia gu wen* was the engraved pictograph on bones and shell, and its character is thin and rigid, sharp and vigorous, straight and well-balanced (Translated from 瘦硬、尖刻、剛勁、正直、勻稱) (富強 & 柯林, 2003, p.9). *Da zhuan* is the general name of *zhou wen*, *gu wen*, *jin wen* and *shi gu wen*. *Jin wen* was engraved on bronze ware used in sacrifices and ceremony, so it is dignified, steady and neat (Translated from 端莊、穩重、規整) (富強 & 柯林, 2003, p.9). *Da zhuan* is more pictographic than *xiao zhuan* as it was developed before *xiao zhuan*. The character of *xiao zhuan* is slim, dense at the top and sparse at the bottom, like the appearance of the human body. It is a reflection of the beautiful form of the human body (Translated from 字形修長、上密下疏、與人體頗為相像 and 人體形態美的一種投射) (富強 & 柯林, 2003, p.9). Moreover, *xiao zhuan* has the aesthetic of well-proportioned, clean and succinct strokes (Translated from 線條勻稱、純淨簡約的美感) (富強 & 柯林, 2003, p.9).

During the Qin dynasty, a simplified form of words was created - *li shu*. The feature of *li shu* is thin and flat. The revolution of *li shu* not only reformed the style of words, but also ‘emancipated’ the characteristic of the brush and the movement of the fingers and the wrist. It elevated the rhythm of visual art, and even endowed the musical sense of time to the two-dimensional strokes (Translated from 隸書的革命性，不僅僅使改革了漢字之體，而且“解放”了毛筆的特性和指腕的運動。提高視覺藝術的節奏感，甚至使二維空間上的點畫具有了像音樂一樣的時間感) (富強 & 柯林, 2003, p.9).

*Zhang cao* (章草), *jin cao* (今草), and *kuang cao* (狂草) can be categorized into *cao shu*. *Cao shu* is a style that intensifies and enriches the expression of strokes in

Chinese calligraphy, and that is the key point to appreciate the beauty of *cao shu*

(Translated from 強化和豐富了漢字點畫符號的線條化表現能力，這是草書審美意義的關鍵所在)

(富強 & 柯林, 2003, p.11).

The cultural personalities of *xing shu* are practical and understandable. It suits both refined and popular tastes, and this is its artistic personality (Translated from 通俗易懂是行書的文化個性，雅俗共賞是行書的藝術個性)

(富強 & 柯林, 2003, p.12).

*Kai shu* is one of the symbols of the Tang culture. Its form is square, conscientious and careful, harmonious and moderate. *Kai shu* has an important effect on training a writer's quality of art and expression on the coordination of the eye, the mind and the hand (Translated from 唐楷是唐文化的標誌之一 and 楷書形體方正謹嚴，和諧適度。對書寫者眼、心、手三位一體的藝術素質和表現力的訓練，都有著重要作用)

(富強 & 柯林, 2003, p.13). There is a distinct difference between the *kai shu* of the north and that of the south. The militarism of the north culture made the style of northern *kai shu* simple and unadorned, and virile and energetic (Translated from 質樸雄健) (富強 & 柯林, 2003, p.13), whereas the southern *kai shu* was beautiful and elegant (Translated from 秀麗典雅) (富強 & 柯林, 2003, p.13).

The above shows the different styles of Chinese calligraphy and their unique features. The main spirit in Chinese calligraphy is nature, as mentioned by 富強 and 柯林 (2003) that it is harmonious between human and nature. Every rhythm of life in nature can be reflected in the creation of Chinese calligraphy (Translated from 人與自然是和諧的。大自然中所有生命的律動，都可以體現在書法的創作中) (富強 & 柯林, 2003, p.15). Chiang Yee

(1973) also claimed that not only the separate strokes but the structure of the whole character is basically inspired by nature.

The appreciation of Chinese calligraphy involves the strokes, the power of writing, and the writer himself. 富強 and 柯林 (2003) explained that Chinese calligraphy includes three levels. The first level is the strokes, which are formed from the way of writing. The second level is *yi xiang*, from the power of the writing, which includes the power of lines, the word structure and the structure of the entire piece. The third level is *yi jing*, which is the state of mind closely related to the writer's personality, culture and self-cultivation (Translated from 書法包含三個層面：一、點畫線條，由筆法產生。二、意象，由筆法所帶來的氣勢所形成，包括點畫之勢、結字之勢、章法之勢。三、意境，與書寫者個人的性格、文化和人生修養息息相關) (富強 & 柯林, 2003, p.15). “Every stroke must be well shaped and beautiful in itself, and form, in combination with other strokes, form a satisfying pattern. But the judgment of a character's excellence depends largely upon the degree to which it possesses the vitality of a particular natural object” (Yee, 1973, p.113). The way of judging a piece of calligraphy is firstly, by the power of the brush; secondly, by the usage of the ink; thirdly, by the structure or the form of the words; and finally, by *qi yun*-rhythmic vitality (Translated from 鑑賞：一、筆力，二、墨法，三、結體（間架結構，含造型之意）四、氣韻) (富強 & 柯林, 2003, p.41).

Chiang Yee (1973) stated that:

The beauty of Chinese calligraphy is essentially the beauty of plastic movement, not of designed and motionless shape. A finished piece of it is not a symmetrical arrangement of conventional shapes, but something like the coordinated movements of a skillfully composed dance – impulse, momentum, momentary poise, and the

interplay of active forces combining to form a balanced whole, Neatness, regularity, and exactitude of outline, such as are found in English or Chinese printing types, are not desirable qualities in Chinese calligraphy (p.117). Chinese prefer asymmetrical balance, for the reason that it seems to possess more movement (p.118).

The beauty of Chinese calligraphy is built on its development from the pictograph to the ordered ways of strokes and structural forms, which are their moderate strokes, free structure and perfect overall arrangement (Translated from 漢字書法的美建立在從象形基礎上演化出來的線條章法和形體結構之上，即在它們的曲直適宜，縱橫合度，結體自如，佈局完滿) (徐海燕 & 江奇勇, 1994, p.47).

Chinese calligraphy, which was influenced by Confucianism, developed the beauty of moderation. Moreover, it was also influenced by the Tao whose thought of the *Yin Yang* was reflected in the calligraphy as *Dong Jing* (動靜)-movement and still, and *Gang Rou*(剛柔)-vigorous and soft (富強 & 柯林, 2003). “Dignity and animation are two opposite qualities; the existence of one suggests the want of the other. Not until the two are placed in juxtaposition in such a way as to mutually complement one another will beauty and goodness be brought into being in a piece of art.”(Chang, 1975, p. 309)

Chinese art has its own spirit. “The active operative force in a work of art, as well as in the whole universe, is *Qi*(氣)-the all-pervasive ether, the dynamic energy, the ‘breath’ of life that permeates, animates, and motivates all things” (Fong, 1984, p.4).

Within the research, there is much information about the history and the aesthetic of Chinese calligraphy. However, none of them is related to modern day product design. To build a bridge between Chinese calligraphy and contemporary product design, it is important to understand Chinese culture. Therefore, Chinese culture was studied.

Bond, Michael Harris (1991) stated that:

Contemporary Chinese student in Taiwan tend to value inner development, individualism, a future perspective, and mastery over nature rather than the traditional Chinese values of inner development, collectivism, focus on the past, and submission to nature. There young Chinese prefer a moderate and balanced life combining action, contemplation, and enjoyment. They accept social restraints, are concerned for others, and wish to preserve good traditions. They consider that sensuous enjoyment, sheer meditation, and silent submission to external forces should be avoided. (p.38)

The sense of self:

1. Chinese people consistently describe themselves in less positive terms than Americans do (but more positively than the Japanese do).
2. Chinese think of themselves using more group-related concepts (such as, being attentive to others) than Americans do; and they see their ideal “self” as being closer to their social (or interpersonal) self than Westerners do. In describing themselves, Chinese employ more terms that relate to family roles (grandson, daughter, and elder brother).
3. Chinese describe themselves using the same features of personality that they use to describe other people. These features assess at least whether a person is: socially oriented or self-centered; competent or ineffective; expressive or conservative; self-controlled or impulsive; optimistic or pessimistic.

The moderation of the Chinese is shown in the fact that they present themselves as possessing both positive and negative features. This conception of the self probably reflects their society’s need for modesty and balance. (pp.33-34)

Although there is information related to the Chinese aesthetic in the field of design, none of it teaches about how to incorporate the essence of Chinese culture into the contemporary product design. In the study, I found that there is no in-depth discussion of the Chinese aesthetic and its relation to the product design. This review proposes an extensive research with an emphasis on the comparisons among the four different styles of Chinese calligraphy and the uniqueness of each style. The result will be a checklist for industrial designers to design products that are so called the Chinese-products, or even the Zhuan-style products, the Li-style products, the Cao-style products, and the Kai-style-products.

#### 1.4. Objectives of Study

- To study the aesthetic elements of Chinese culture through the beauty of Chinese calligraphy.
- To apply the Chinese aesthetics to product design.
- To apply the abstract spirit of Chinese art into product design.
- To develop a checklist for industrial designers to design products that are so called the Chinese products, or even more specifically the Kai-style products, the Li-style products.
- To develop design principles of how to transfer the aesthetic elements of Chinese calligraphy into product design.
- To transform the 2D image of Chinese calligraphy into the 3D form of a product with the illustration of a series of design.



## 1.5. Definition of Terms

*Qi* 氣– the all pervasive ether, the dynamic energy, the “breath” of life that permeates, animates and motivates all things.

Calligraphy – Chinese calligraphy, written by using a Chinese brush made of fur.

*Bu Bai* 布白– means ‘arrangement of space’. In calligraphy the ‘empty’ spaces of the imaginary squares are full of invisible muscles joining stroke with stroke. We expect these empty spaces to exhibit some inherent harmony with the strokes.

*Fen Jian* 分間– means ‘relative division’. The Chinese character is always written in an imaginary square which, for the purpose of analysis, is convenient to divide into two or four parts, and more practically divided into nine-fold squares. This has been generally utilized.

*Qi Yun* 氣韻– rhythmic vitality. It is a poetical rather than a philosophical concept, and it has no literal definition.

*Da Zhuan* – Great Seal Script. It is a synthesis of the variants of Ku-Wen (Ancient Script), whose arrangement and interrelation of the lines of the characters differ in every example, but each has its own value and beauty.

*Xiao Zhuan* – Small Seal Script or Lesser Seal Script, has a standard character for each object and action; compared to the Great Seal, the forms are simple and not confusing

*Li Shu* – Clerical Script, invented for official purposes, was much more convenient than Seal writing. It has firm, decorative characters, and the varied shapes of the

stroke transform the circular, curved and rounded lines of Small Seal into a square, a polyangular and a straight shape or line.

*Kai Shu* – Regular Style. It has an inflexible regularity of design.

*Xing Shu* – Running Script allows for freer handling and more vivid movement. The strokes and patterns of *xing shu* are designed and executed as carefully as those of *kai shu*. However, they are written in a quicker manner.

*Cao Shu* – Cursive Script means ‘rough essays’ or ‘rough draft’, something written quickly and perhaps carelessly.

## 1.6. Assumptions

This study was conducted based on the following assumptions:

- I. Chinese culture is getting increasing attention from all over the world.
- II. Product design which possesses the characteristic of Chinese culture will gain more market value.
- III. Most designers did not apply Chinese aesthetics when they designed their products.
- IV. When the Chinese calligraphy aesthetics is applied to product design, people’s attention and interest will be aroused.
- V. Through this research, designers who do not know how to write Chinese calligraphy can also design products which possess the characteristics of the four styles of Chinese calligraphy.

- VI. People who do not understand Chinese culture are able to differentiate between Chinese-products and non-Chinese products.
- VII. We can have a product with a strong characteristic of Chinese style by incorporating Chinese calligraphy art into product design.

### 1.7. Scope and Limits

This study was conducted based on the following scope and limits:

- I. In terms of the time frame, this study focused on Chinese calligraphy ranging from the beginning of the ancient script to the Tang dynasty.
- II. The approach was on Chinese aesthetics through the four styles of Chinese calligraphy. The application was demonstrated through a series of design of a product.
- III. Due to time limitation, the research of obtaining a formula on how to transform a two-dimensional Chinese calligraphy into a three-dimensional product design was not in-depth.
- IV. The focus was on the shape of Chinese calligraphy, which included the thickness, the movement and the arrangement of the strokes.
- V. In this research, I emphasized the breadth and not the depth of the four different styles of Chinese calligraphy. And in the process, I included as much detail as possible.

## 1.8. Procedures and Methodology

This research was exploratory and developmental. The procedure and methodology mentioned below was applied to different styles of Chinese calligraphy, including *Kai Shu*, *Cao Shu*, *Li Shu*, and *Zhuan Shu*.

### I. Study the Chinese calligraphy strokes

Method: Select the main strokes from each style of Chinese calligraphy and analyze the following: the thickness of the stroke which is caused by the pressure of the writer's brush on the paper) 粗細 (提按頓挫), the movement of the brush strokes from the moment the brush touches the paper until it leaves the paper 筆勢 (起筆收筆), and the curvature of the sides of each stroke 曲度 (包括筆畫兩側之曲度).

### II. Marshal the criteria of the beauty of Chinese strokes

Method: Study the related literature and apply it to the analysis, and then generate new rules that can be used in a 3-D design.

### III. Study of the proportion of Chinese words

Method: Using some words from different styles of Chinese calligraphy, examine the proportion of these words, to see if there is a difference among them. If there is a

difference, find out and explain it. If they are the same, then a generalization of the proportion can be drawn. Data needed: Numerical ratio that represents the good proportion in calligraphy.

#### IV. Study of the proportion of the whole piece of writing

Method: First, study the arrangement and the composition between the adjacent words and the rows in the calligraphy pieces. Then, study the relationship between each row to form a whole piece. Data needed: *Figure* indication of the well proportioned calligraphy.

V. To develop a checklist for industrial designers to design products called the Chinese-products, or even the Zhuan-style products, the Cao-style products, the Li-style products, and the Kai-style products

Method: Draw conclusions from the above study and what I have learned from my research, and then form a checklist for designing products from each calligraphy style.

#### VI. Transform the elements from 2-D into 3-D designs

Method: Illustrate by a series of design of a product. Using the characteristics of the four different styles of Chinese calligraphy, design the product that corresponds to each

style. There will be a total of four product styles in the series and each of them has the characteristic of its original style.

This research will be divided into four sections which are *zhuan shu*, *li shu*, *cao shu*, and *kai shu*. Each section will examine the history and the characteristic of a particular style. The characteristic of the style includes the analysis of the thickness, the movement, and the curvature of the strokes. It also includes the structure and proportion of the particular style. From the characteristic of each style, the relationship between the surfaces of a product is then generated. Finally, a checklist to design a product from the style will be listed.

## 2. ZHUAN SHU or SEAL SCRIPT

### 2.1. History of *Zhuan Shu*

*Zhuan shu* is the oldest style in Chinese Calligraphy. It has a simpler brushwork than the other calligraphy styles; however, the structures of the characters are very decorative. It can be divided into three categories: *jia gu wen*, *da zhuan*, *xiao zhuan*. *Jia gu wen* or oracle-bone writing, which is the oldest recognizable character, was used three thousand years ago. It was the engraved pictograph on animal bones and tortoise shells dating from the fourteenth to the eleventh centuries B.C. Oracle-bone writing served mostly as the record of divination between a human ruler and the supernatural world (Harrist & Fong, 1999). The characters in *jia gu wen* were thin and stiff, sharp and vigorous, straight and well-balanced (Translated from 瘦硬、尖刻、剛勁、正直、勻稱) (富強 & 柯林, 2003, p.5). *Da zhuan* or Big Seal style was the general name of *zhou wen*, *gu wen*, *jin wen* and *shi gu*. It had so many different names or styles because the Chinese character system was not unified at that time and neither was China. People from different places adopted *da zhuan* and did slight local variations of it. *Da zhuan* was identified with the bronze inscriptions of the Shang and Chou dynasties (ca.1600-256B.C.) (Harrist & Fong, 1999). The Chinese character system was not unified until the Qin dynasty (221-206 B.C.), when the feudal states of China became united under one

Emperor. He then ordered his Prime Minister, *Li Si*, to unify the scripts of the various states, and as a result, *xiao zhuan*, the Small Seal was created. It was a simplified and standardized style which was less pictographic and more suitable for universal use. It was characterized by thin wiry lines, regulated spacing, and stylized abstract forms (Harrist & Fong, 1999).

## 2.2. Characteristic of *Zhuan Shu*

Among the different categories of *zhuan shu*, *xiao zhuan* has been chosen to represent the *Zhuan* style in this research.

The character of *xiao zhuan* is slim, dense at the top and sparse at the bottom, like the appearance of the human body. It is the reflection of the beauty of the human body (Translated from 字形修長、上密下疏、與人體頗為相像 and 人體形態美的一種投射) (富強 & 柯林, 2003, p.9). Moreover, *xiao zhuan* has the aesthetic of well-proportioned, clean and succinct strokes (Translated from 線條勻稱、純淨簡約的美感) (富強 & 柯林, 2003, p.9). It has thin wiry lines, regulated spacing, and stylized abstract forms (Harrist & Fong, 1999).

### 2.2.1. Thickness of the stroke

The lines in *xiao zhuan* are thin, wiry and even in thickness. The pressure of the brush on the paper is very even. The movement of writing *xiao zhuan* is very similar to drawing lines with even thickness. Furthermore, it has a lot of repetitions and parallel strokes (see *Figure 2-1*).





Figure 2-1

### 2.2.2. Movement of the brush strokes

There are four types of strokes in *xiao zhuan*, and each of them is written at a constant speed. Also, they have rounded edges at the beginning and at the end of the stroke (王冬齡, 1986).

The method of writing each stroke is as follows:

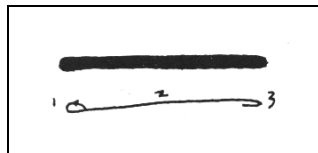
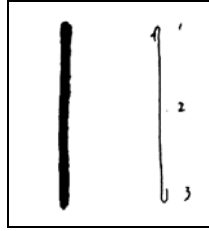


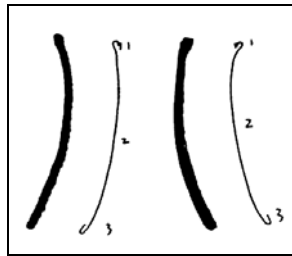
Figure 2-2

1. Place the brush on the paper and move it slightly to the left. Turn it around to move it to the right.
2. Continue moving to the right with constant pressure on the paper.
3. Turn the brush around to the left and lift it away from the paper.



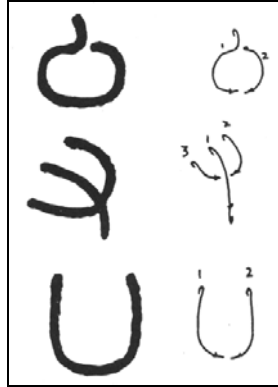
*Figure 2-3*

1. Place the brush on the paper and move it slightly upward, and then turn it around to move downward.
2. Continue the downward movement with constant pressure on the paper.
3. Turn it around in an upward direction and lift it away from the paper.



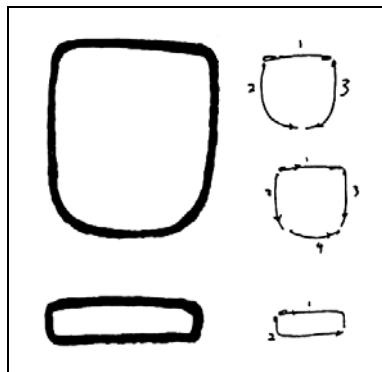
*Figure 2-4*

1. Place the brush on the paper and move it slightly upward. Next, turn it around to move downward.
2. Continue the curve movement with constant pressure on the paper.
3. Turn the brush around in an upward direction and lift it away from the paper.



*Figure 2-5*

1. Place the brush on the paper and move it slightly in the opposite direction of the stroke movement. Then turn it around to move towards the direction of the stroke.
2. Continue the movement in the desired direction with constant pressure on the paper.
3. Turn the brush around and lift it away from the paper.



*Figure 2-6*

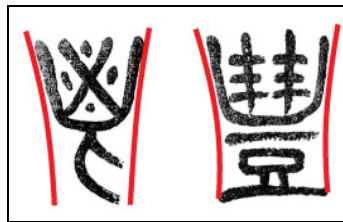
1. Place the brush on the paper and move it slightly in the opposite direction of the stroke movement. Turn it around to move towards the direction of the stroke.
2. Continue the movement in the desired direction with constant pressure on the paper.

3. The numbers indicated in the figure show the sequence of each stroke. The middle stroke or the top stroke is always the first in sequence. However, the left, the right and the bottom strokes are usually the last.

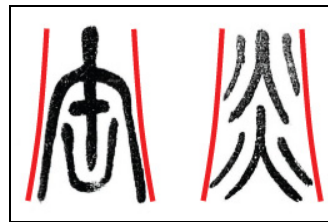
### 2.2.3. Curvature of the strokes

The characters in *xiao zhuan* are mostly taper bottom or taper top with concave curves or convex curves on both sides.

1. Taper bottom with concave curves: the apex of each curve does not exceed the tangent of the bottom point (see *Figure 2-7*).
2. Taper top with concave curves: the apex of each curve does not exceed the tangent of the top point (see *Figure 2-8*).
3. Taper bottom with convex curves: the apex of each curve does not exceed the tangent of the top point (see *Figure 2-9*).
4. Taper top with convex curves: the apex of each curve does not exceed the tangent of the bottom point (see *Figure 2-10*).



*Figure 2-7*



*Figure 2-8*

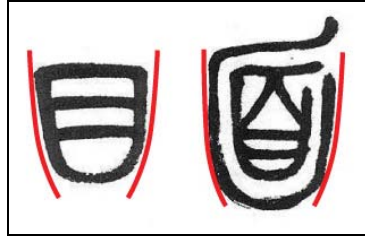


Figure 2-9

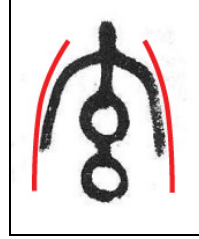


Figure 2-10

Most circular shapes look like squares or rectangles with big fillet edges instead of perfect round shapes. Most squares or rectangles have big fillet in each corner, where the two bottom corners have bigger fillets than the two top edges (see *Figure 2-11*).



Figure 2-11

#### 2.2.4. Structure and proportion

In general, the characters in *xiao zhuan* are portrait rectangle. The strokes are evenly spaced. In addition, some characters in *xiao zhuan* have symmetrical forms while none of the characters in the other styles has them.

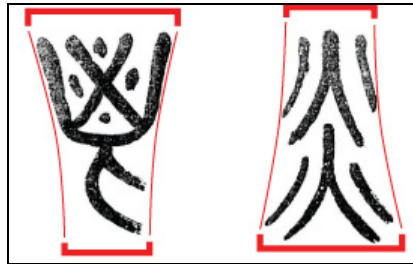
*Xiao zhuan* has regulated spacing. However, in most cases, the space in the upper portion of a single character is more likely to be crowded than the space in the bottom portion. This makes the form look slim and tall.

Since the center of gravity of each character is located in the middle, the character looks stable and steady.

The height to width proportion of most characters in *xiao zhuan* is approximately 3 to 2 (see *Figure 2-12*). Furthermore, the proportion between the top and the bottom is narrow width / wide width = 1/2–1/1.125 (see *Figure 2-13*).



*Figure 2-12*



*Figure 2-13*

### 2.3. Relationship between Surfaces in *Zhuan* Style Product

The edges between the adjacent surfaces are fillets, with no sharp edges or corner. The radius of the fillets should be constant in a single edge between two surfaces.

## 2.4. Developing Design Guidelines for *Zhuan* style products

### A. Overall principle:

- I. All edges are fillets.

### B. Overall shape:

- II. Height: Width = 3: 2.

- III. Symmetrical.

- IV. Taper bottom or taper top with concave curves or convex curves on both sides.

- Taper bottom with concave curves: the apex of each curve does not exceed the tangent of the bottom point;
- Taper top with concave curves: the apex of each curve does not exceed the tangent of the top point;
- Taper bottom with convex curves: the apex of each curve does not exceed the tangent of the top point;
- Taper top with convex curves: the apex of each curve does not exceed the tangent of the bottom point.

- V. Proportion between top and bottom = Narrow width/wide width = 1/2–1/1.25.

### C. Details:

- VI. The proportion between the details is: bottom portion > upper portion.

- VII. Most circular shapes look like squares or rectangles with big fillet edges instead of perfect round shapes.

VIII. All curves and lines are continuous, without sharp angles or corners.

IX. The shapes or lines are repeated and each of them is parallel to one another.



### 3. *LI SHU* or CLERICAL SCRIPT

#### 3.1. History of *Li Shu*

During the Qin and Han dynasties (221B.C.-A.D.220), *li shu* developed because of growing demands for official records and historical documents. It first evolved in a draft form of seal script, written quickly with a brush and ink on wood and bamboo slips, and later on silk and paper. Refined as an official script, it came to mark orthodoxy for imperially sanctioned texts, which were often engraved on monumental stone stelae. In its developed form, *li shu* featured modulated brush lines with sweeping horizontal strokes ending in sharp tips, and distinctive down-sweep strokes to the right. The transition to brush and ink opened new modes of artistic expression explored in later periods (Harrist & Fong, 1999).

*Li shu* is a far easier and clearer writing that marked a turning-point in the development of modern characters, now more and more abstract and far from the original pictographs (Lavarini & Franco, 1998). It was developed from the *Zhuan*, so some of the characters in *li shu* had the traces of *Zhuan*. The development of *li shu* was the most significant revolution in Chinese calligraphy (Translated from 經過隸變，漢字形體發生了巨大的變化，可以說是漢字歷史上最大的一次文字改革) (戴小京 et al., 2004, p.20). The rounded shapes and curves in *zhuan shu* were changed into square shapes and straight lines.

Pictographic Chinese calligraphy became symbolic in *li shu*. However, the Chinese characters did not change much in the latter two thousand years.

### 3.2. Characteristic of *Li Shu*

The styles in *li shu* varied from one tablet to another. Among them, Cao Quan Bei was chosen to represent the *Li* style in this research.

The uniqueness of *li shu* is that most of the characters are in landscape rectangular shapes. They have the gesture of expanding to the left and to the right with a lot of transverse movement. Another obvious characteristic is that there is an accent stroke which is called a ‘swallow-tail’ (燕尾) stroke, or a sweeping horizontal stroke with a sharp tip in most of the characters. Besides being the main stroke, it is also the longest stroke in each word.

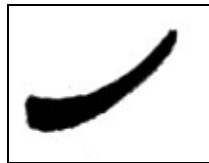
#### 3.2.1. Thickness of the stroke

Unlike *zhuan shu*, the writing of *li shu* utilizes the movement of the wrist. The thickness in most of the strokes changes from the beginning to the end of the strokes. The most outstanding stroke in *li shu* is the modulated brush lines with sweeping horizontal strokes ending in sharp tips. The middle of the stroke is thinner than both ends. On the right, there is a knife-shape sharp tip. The thickest point on the left of the sharp tip is either of the same thickness or thicker than the left end of that stroke (see *Figure 3-1*).

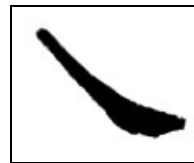


*Figure 3-1*

As mentioned earlier, the characters in *li shu* have the gesture of expanding to the left and to the right. There are two types of strokes that contribute to this characteristic: the inclining-leftward stroke (see *Figure 3-2*) and the sweeping-rightward stroke (see *Figure 3-3*). The inclining-leftward stroke has a rounded shape at both ends with the left end being thicker than the right end. The sweeping-rightward stroke has a thicker end on the right. The falling right stroke has a sharp tip after the thickest point, similar to the right end of the sweeping horizontal stroke.

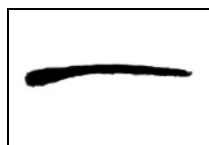


*Figure 3-2*

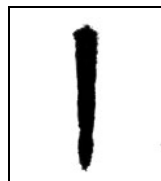


*Figure 3-3*

The left end of almost all the horizontal strokes is thicker than the right end. The strokes become thinner when the brush is moved to the right (see *Figure 3-4*). In the vertical stroke, the top end is thicker than the bottom end in most characters (see *Figure 3-5*).



*Figure 3-4*



*Figure 3-5*

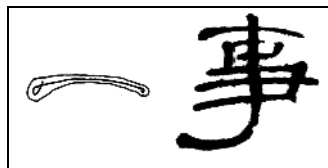
### 3.2.2. Movement of the brush strokes

The method of writing each stroke is as follows:



*Figure 3-6*

4. Place the brush on the paper and move it slightly to the lower left. Then turn it around and press it to create the desired thickness of the starting point.
5. Move the brush to the right in a slightly upward direction while lifting it slightly to make the stroke thinner.
6. Then press it on the paper again while continuing the movement to the lower right.
7. After achieving the desired thickness, which can be the same or thicker than the starting point of the stroke, lift the brush gradually to create a sharp tip.



*Figure 3-7*

1. Place the brush on the paper and move it slightly to the lower left. Then turn it around and press it to create the desired thickness of the starting point.
2. Move it to the right in a slightly upward direction while lifting it slightly to make the stroke thinner.

3. Turn the brush around to make a rounded shape at the end of the stroke, and then lift it away from the paper.



*Figure 3-8*

1. Place the brush on the paper and move it slightly upward. Then turn it around and press it to create the desired thickness of the starting point.
2. Move it downward with constant pressure on the paper.
3. Pause slightly to make a rounded shape at the end of the stroke, and then lift the brush away from the paper.



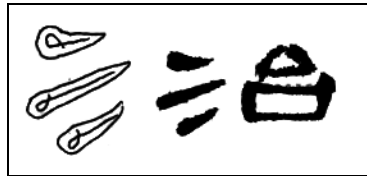
*Figure 3-9*

1. Place the brush on the paper and move it slightly upward. Then turn it around and press it to create the desired thickness of the starting point.
2. Move it along the curve with increasing pressure on the paper.
3. Turn it around to make a round or square shape at the end of the stroke, and then lift the brush away from the paper.



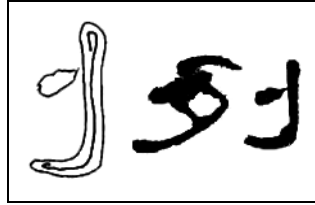
*Figure 3-10*

1. Place the brush on the paper and move it slightly to the upper left direction. Then turn it around and press the brush to create the desired thickness of the starting point.
2. Move it along the curve with increasing pressure on the paper.
3. After achieving the desired thickness which has to be thicker than the starting point of the stroke, lift the brush gradually to create a sharp tip.



*Figure 3-11*

1. Place the brush on the paper and move it slightly in the opposite direction to where it will be going. Then turn it around and press it to create the desired thickness of the starting point.
2. Move it to the right in a slightly upward direction while lifting it slightly to make the stroke become thinner.
3. Gradually lift the brush away from the paper to create a sharp tip.

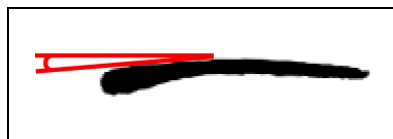


*Figure 3-12*

1. Place the brush on the paper and move it slightly upward. Then turn it around and press it to create the desired thickness of the starting point.
2. Move it downward with constant pressure on the paper
3. Turn it 90 degrees with a smooth transition and lift it slightly to make the stroke thinner.
4. Turn it around and lift it away from the paper.

### 3.2.3. Curvature of the strokes

The horizontal strokes are slightly convex towards the top. The angle of the convexity does not exceed five degrees (see *Figure 3-13*). The sweeping horizontal strokes with sharp tips are not exactly horizontal; they go down slightly on both sides. The angles of the upper curvature on both ends do not exceed ten degrees (see *Figure 3-14*).

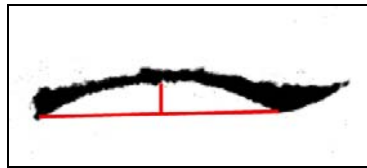


*Figure 3-13*



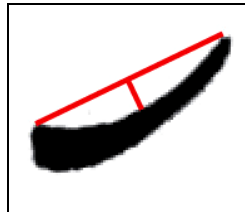
*Figure 3-14*

The bottom curvature of the sweeping horizontal stroke with a sharp tip which can be described as the distance from the apex of the curve to the line drawn from the two bottom point is approximately  $1/8$ – $1/11$  of the distance between the two bottom points (see *Figure 3-15*).



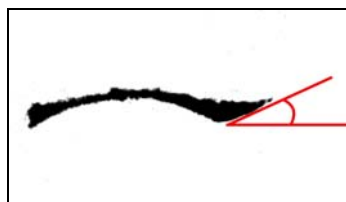
*Figure 3-15*

The curvature of the inclining-leftward stroke which can be expressed by the distance from the apex of the curve to the line drawn from the two ends is between the range of  $1/2$  and  $1/12$  of the distance between two ends (see *Figure 3-16*).



*Figure 3-16*

The oblique angle of the sharp tip is between 25–45 degrees (see *Figure 3-17*).



*Figure 3-17*

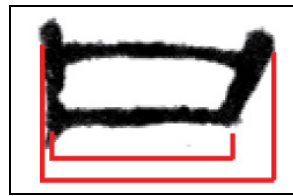


### 3.2.4. Structure and proportion

The quadrangles in *li shu* are landscape rectangles. The height to width proportion is around 1.7:3.0, with a tolerance of 0.3 on each side (see *Figure 3-18*). Most of the rectangles are taper-bottom. The width of the bottom is around 4/5 of the width of the top. In some cases, the top right of the rectangle may have a round or square bulge out corner. All of the four corners have small fillets (see *Figure 3-19*).



*Figure 3-18*



*Figure 3-19*

Because the spaces between the strokes are well-balanced, the words appear stable. The characteristic of the structure in *li shu* is that the strokes in the center or the middle are closer to one another and the strokes in the outer space are more spacious (Translated from 內緊外松) (戴小京 et al., 2004, p.145).

Unlike *zhuan shu* or *kai shu*, the characters in *li shu* are in the form of landscape rectangles. They have the posture of stretching to the left and to the right.

### 3.4. Relationship between Surfaces in *Li* Style product

The edges between the two adjacent surfaces can be fillet. The cross-section of each face or form can be slightly convex.

### 3.5. Developing Design Guidelines for *Li* style products

#### A. Overall principle:

- I. All shapes have the gesture of expanding to the left and right.

#### B. Overall shape:

- II. Height: Width = 1.7:3.0, with a tolerance of 0.3 on each side.
- III. Asymmetrical.
- IV. Emphasis of the sweeping horizontal shape with a sharp tip and / or the sweeping rightward and inclining leftward shapes.
- V. The sweeping horizontal shape with a sharp tip goes down slightly on the left and right sides. The angles of the upper curvature on both ends do not exceed ten degrees (see *Figure 3-14*).
- VI. The bottom curvature of the sweeping horizontal stroke with a sharp tip: the distance from the apex of the curve to the line drawn from the two bottom point is approximately 1/8–1/11 of the distance between two bottom points.
- VII. The oblique angle of the sharp tip is between 25–45 degrees.
- VIII. The inclining-leftward shape is round at both ends but the left ends are thicker than the right ends.
- IX. The sweeping-rightward shape has a thicker end on the right. Moreover, the falling right shape has a sharp tip after the thickest point, which is similar to the sharp tip of the sweeping horizontal stroke.

- X. The curvature of the inclining-leftward line: the distance from the apex of the curve to the line drawn from the two ends is between the range of  $1/2$  and  $1/12$  of the distance between two ends.
- XI. The horizontal lines are slightly convex towards the top. The angle of the convexity does not exceed five degrees.

C. Details:

- XII. Round shape at the left end of the transverse shape, and top end of the vertical shape.
- XIII. The left end of the horizontal shape is thicker than the right end. Its thickness gradually becomes thinner when it approaches the right end.
- XIV. The top end of the vertical shape is thicker than the bottom end. Its thickness gradually becomes thinner when it approaches the bottom end.
- XV. Circles are oval in shape with the top wider than the bottom, or the left wider than the right.
- XVI. The shapes in the center or the middle are closer to one another and the shapes in the outer space are more spacious.

## 4. CAO SHU or CURSIVE SCRIPT

### 4.1. History of *Cao Shu*

*Cao shu*, which began at the end of the Qin dynasty and formalized in the Han dynasty, was used as a convenient, fast-paced writing style. At that time *li shu* was still in use. So *cao shu* was basically the elliptical and auxiliary styles of the *li shu*. It was used for drafting, or corresponding in emergencies. Since then, *cao shu* had begun to develop (沈樂平, 2002).

Since *Cao shu* was formed from the basis of *li shu*, they complement each other in development. *Cao shu* can be divided into three basic styles: *zhang cao*, *jin cao*, and *kuang cao*. The art of *cao shu* was beginning when *zhang cao* was formed. It gradually got out of the *li* style strokes as *kai shu* came into existence, developed, and well-formed. In *jin cao*, the strokes between the upper and lower characters always interlinked with each other, and the components on one side of the character was mutually used by the two characters (沈樂平, 2002).

During the Tang dynasty, famous calligraphers such as Zhang Xu, and Huai Su, wrote *jin cao* in a more unbridled, audacious and emotional style that was known as *kuang cao* or wild cursive style. Commonly performed while the writer was inebriated, *kuang cao* was written in spontaneous, fluid strokes in what might be described as a mad

dance of joyous delirium (Harrist & Fong, 1999). The strokes in *kuang cao* were interlinked, complicated and highly changeable. Some characters were big but others were small. *Kuang cao* had a strong sense of movement and rhythm. (沈樂平, 2002)

#### 4.2. Characteristic of *Cao Shu*

In this research, I have chosen a masterpiece by the well-known calligrapher, Huai Su, to represent the *cao shu*. It is entitled “Zi Xu Tie”, which means self narration.

Among all the styles of Chinese calligraphy *cao shu* is the most expressive (沈樂平, 2002). It intensifies and enriches the expression of lines in the Chinese characters, and this is the key point for the appreciation of its beauty. (Translated from 強化和豐富了漢字點畫符號的線條化表現能力，這是草書審美意義的關鍵所在) (富強 & 柯林, 2003, p.11)

##### 4.2.1. Thickness of the stroke

From the proportion of the thickness of the strokes and the size of the characters, the strokes in *Cao shu* are relatively thin. However, within the thin strokes, there are many variations.

The line weight always indicates the movement or the speed of the brush. The thinnest lines are the connecting lines which link two strokes to form one continuous stroke. They are written in high speed. The thickness of the line changes while the brush

is moving. So, from the thickness of the stroke, we can tell how fast the calligrapher moved the brush.

#### 4.2.2. Movement of the brush strokes

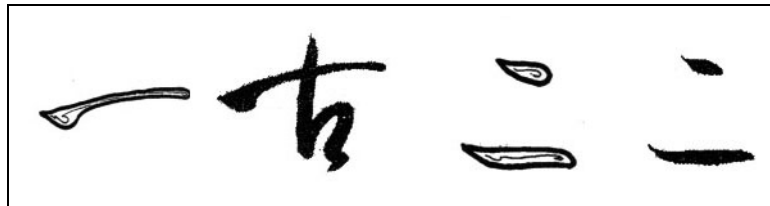
Begin writing by placing the brush on the paper and move it against the direction of the movement of the stroke. This means that the tip of the brush is hidden in the stroke which indicates vigor and power. The gesture is powerful and the form looks sparse. The writer's intention is direct and the characters are written fast. Both the dry strokes and the moist strokes mix very well in the work. The characters are rounded and powerful, bold and unconstrained (Translated from 逆落藏鋒，筆力剛健，勢縱形疏，意率字疾，燥潤相雜，字勢圓勁，姿態豪放) (范潤華, 2002, p.55). None of the two strokes is parallel to each other.

*Cao shu* has a very strong sense of movement and momentum. It is also romantic (范潤華, 2002).

It has its own rules of simplified characters or strokes. Different strokes are linked together in a transaction. A writer can link two or more different strokes together or even write the whole piece of calligraphic work in one stroke with many continuous transactions. This is the difference between *kai shu* and *cao shu*. On the one hand, all the strokes in *kai shu* are separated, but on the other hand, *cao shu* has all or almost all strokes linked together. The transaction from one to another is performed by lifting the brush away from the paper and pressing it on the paper. According to the terminology of

Chinese calligraphy, there is *Qi*, the all pervasive ether, in the transaction or the whole piece of calligraphy.

The method of writing each stroke is as follows:



*Figure 4-1*

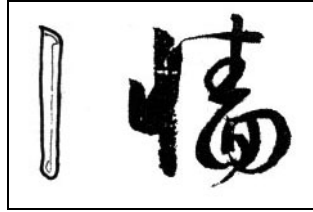
8. Place the brush on the paper and press it towards the lower right direction.
9. Pause for a little while and then lift it and move it to the right.(Variations can be made by increasing the pressure of the brush on the paper while moving it to the right to make the right end thicker than the left end)
10. Turn the brush around at the end and lift it off the paper.



*Figure 4-2*

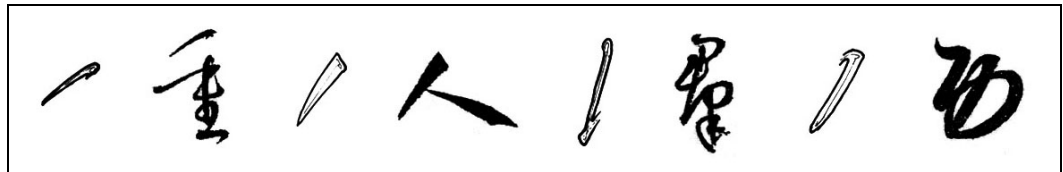
1. Place the brush on the paper.
2. Press it towards the lower right direction and move it back to the center of the starting point.
3. Move it downward with the same or more pressure on the paper.

4. After getting to the mid-point of the entire stroke, lift the brush off the paper while moving it towards the end of the stroke.



*Figure 4-3*

1. Place the brush on the paper.
2. Press it towards the lower right direction and move it back to the center of the starting point.
3. Move it downward with the same or less pressure on the paper.
4. Turn it around at the end and lift the brush off the paper.



*Figure 4-4*

1. Place the brush on the paper.
2. Press it towards the lower right direction and move it back to the center of the starting point.
3. Move it along the curve while decreasing the pressure on the paper.
4. Lift the brush off the paper while moving it towards the end of the stroke or at the end of this stroke start writing the next stroke.





*Figure 4-5*

1. Place the brush on the paper.
2. Press it towards the lower right direction or the lower left direction depending on the stroke.
3. Turn it around and lift it off the paper while moving towards the next stroke.



*Figure 4-6*

1. Place the brush on the paper.
2. Move it towards the lower right direction while increasing the pressure on the paper.
3. Turn it around at the end of the stroke and lift it off the paper. Alternatively, lift the brush off the paper while moving towards the end of the stroke to create a sharp tip.



Figure 4-7

1. Place the brush on the paper.
2. Press it towards the lower right direction and move it back to the center of the starting point .Alternatively, press the brush while moving it along the curve.
3. Move the brush along the curve while decreasing the pressure on the paper.
4. Lift the brush off the paper while moving it towards the end of the stroke or connect it to the next stroke.



Figure 4-8

1. Place the brush on the paper.
2. Pause slightly and then move the brush along the curve.
3. Turn it around and pause slightly again.

4. Continue moving it along the next curve or lift it off the paper while moving towards the end of the stroke.



Figure 4-9

1. Place the brush on the paper and press it towards the lower right direction.
2. Pause for a little while and then lift it and move it to the right.
3. Turn it around and pause slightly.
4. Continue moving the brush along the next curve or lift it off the paper while moving towards the end of the stroke.

#### 4.2.3. Curvature of the strokes

*Cao shu* changed the Chinese characters from square to round shapes (Translated from 打破了方塊定式，字形變方爲圓) (范潤華, 2002, p.55). Basically the strokes have a variety of curvatures and they are not straight. Even the transverse or the vertical strokes are curved to some extent. They are written in a clockwise direction. However, there are still some strokes that are written in an anti-clockwise direction.

In *cao shu*, there is a variety of methods to start writing a stroke. One method is similar to the starting point in *zhuan shu*, which is rounded in shape (see *Figure 4-10*). The next method is similar to the starting point in *kai shu*, which is at an angle. This will

be explained in the next chapter (see *Figure 4-11*). The last method is a sharp tip that shows the movement of the brush tip (see *Figure 4-12*).



*Figure 4-10*



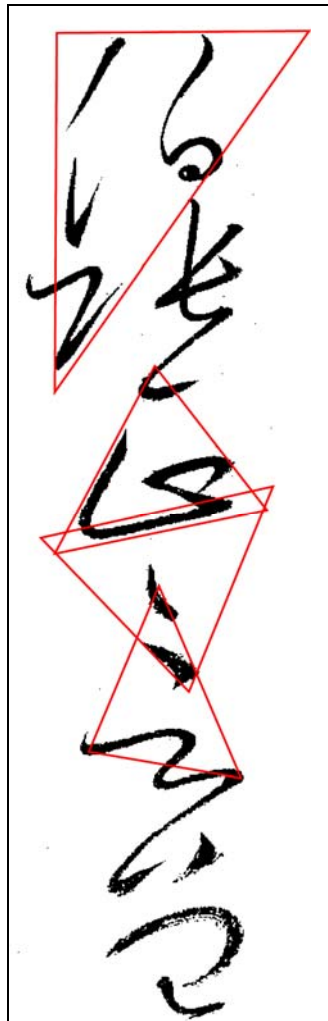
*Figure 4-11*



*Figure 4-12*

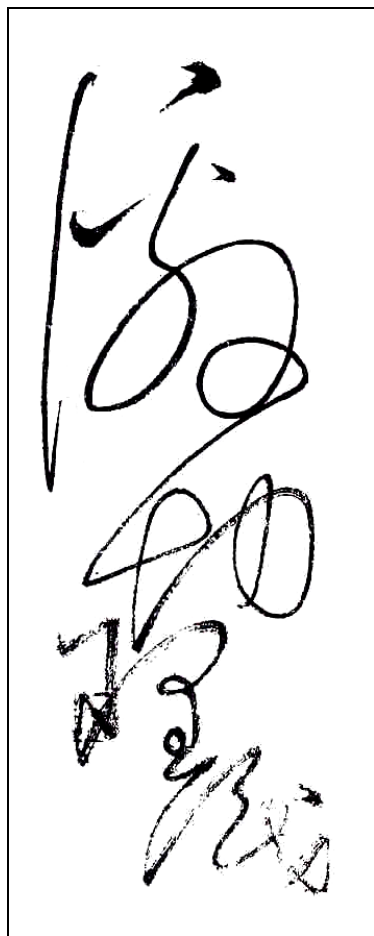
#### 4.2.4. Structure and proportion

The basic method of performing the triangular plane composition is to make one of the adjacent characters bigger and the other one smaller. In “Zi Xu Tie”, the writer split apart the components and broke down the structure of a character to form a series of triangular planes composition (see *Figure 4-13*). 許洪流 (2002) mentioned that the writer of “Zi Xu Tie” had successfully manipulated the composition of the triangular planes.



*Figure 4-13*

As *cao shu* was developed from *zhuan shu*, it has rounded portrait shapes in most of its characters. The density of a character is spread out to the surrounding space; therefore *cao shu*'s characters are spacious. This makes them look thin but powerful, spacious and bright (see *Figure 4-14*).



*Figure 4-14*

The structures of *cao shu* and *kai shu* are very different. The space between the strokes and the characters are dramatically different. While some spaces can be very crowded with thick strokes or high density strokes, others can be spacious with strokes that are far apart from each other. This creates a lively sense of movement, speed, and emotion (see *Figure 4-15*). The red circles in *Figure 4-15* indicate the space between the strokes.



*Figure 4-15*

Another interesting fact about *cao shu* is that the center of gravity of the characters is not necessarily at the center. It can be at the bottom left, top right, or top left.

The imbalance of each character livens up the work and forms a piece of well-balanced Chinese calligraphy art.

In order to appreciate a piece of *cao shu*, one has to look at the whole piece and not at a specific character. Not a single character can be separated or drawn from the other characters in the work because they are linked together to form a complete work of art. The characters are not aligned in a horizontal direction. In *jin cao* and *zhang cao*, the characters are aligned in a vertical direction, but in *kuang cao*, they do not line up in either direction. Therefore, the characters of the chosen piece in this research, “Zi Xu Tie”, which is a piece of *kuang cao*, are not aligned in either direction. They correspond with the adjacent characters and the size of each character is varied and scattered. This characteristic combines all the characters in the calligraphy into one complete piece of work (范潤華, 2002).

#### 4.4. Relationship between Surfaces in *Cao* Style Product

The relationship between the surfaces in the *Cao* style is much freer than the relationship in the other styles. The joint of any two surfaces can be a fillet with multiple radii. The radius can be increasing or decreasing gradually, or even superseding mutually. Also, the cross-sections of each form or surface can be curved.



#### 4.5. Developing Design Guidelines for *Cao* style products

##### A. Overall principles:

- I. All the lines are curved.
- II. Curves are smooth and continuous.
- III. Sense of movement in each shape or line.

##### B. Overall shape:

- IV. Proportion: more on vertical than horizontal.
- V. Smooth curve outline.
- VI. Asymmetrical.

##### C. Details:

- VII. Triangular arrangement between details.
- VIII. At least one end of the curved shapes has a sharp tip.
- IX. Thickness of every curve or shape is not constant.
- X. None of the two lines is parallel to each other.
- XI. No perfect circle.
- XII. The thickness of the product is not constant.
- XIII. The joint of two surfaces can be a fillet with multiple radii. The radius can be increasing or decreasing gradually, or even superseding mutually.
- XIV. The cross-sections of each form or surface can be curved.
- XV. Each shape or form does not have to be aligned.

## 5. *KAI SHU* or STANDARD SCRIPT

### 5.1. History of *Kai Shu*

The standard script which was developed in the Han period began as a refinement of *li shu*. It did not have the modulated sweeping strokes or the uniform wirelike corners of *zhuan shu*. The inner brushwork and architectonic structure of the characters were developed in order to produce legible characters that replaced *li shu* as the formal script used for official writing and monumental stelae (Harrist & Fong, 1999).

The development of *kai shu* can be divided into several phases. It was created during the Han dynasty (Lavarini & Franco, 1998), and was formulated in the Three Countries period. The representative work for this period is “Xuan Shi Biao”, written by the famous calligrapher, Zhong You.

The characteristic of *kai shu* became fully developed during the South North Dynasty. The representative calligraphy then was Wang Xizhi.

There is a distinct difference between the *kai shu* of the north and that of the south. Wei Bei *kai shu* is the North Dynasty calligraphy. The militarism of the northern culture made not only the style of northern *kai shu* simple and unadorned, but also virile and energetic (Translated from 質樸雄健) (富強 & 柯林, 2003, p.13). The beauty of Wei Bei is

bold, resolute, and majestic, while the atmosphere is solemn and respectful (Wang, 2003). However, the calligraphy from the south is beautiful and elegant ( Translated from 秀麗典雅) (富強 & 柯林, 2003, p.13).

The development of *kai shu* reached its peak in the Tang dynasty which was rich in Chinese calligraphy (富強 & 柯林, 2003). According to an edict of the Tang dynasty, calligraphy was a part of the selection of talent and the evaluation of a person. The entire society valued calligraphy seriously. So there were many great calligraphers and calligraphy theorists at that time (Wang, 2003).

From Wei Jin to the South North dynasty, the popular scripts were *kai shu*, *xing shu* and *cao shu*. Specialists of all scripts appeared in the Tang dynasty.

In the early Tang dynasty, Tang Tai Zong, the second emperor, loved Wang Xizhi's calligraphy. Due to the emperor's influence, many calligraphers at that time studied his calligraphy. However, in the middle Tang dynasty, a great calligrapher, Yan Zhenqing, changed the style of the calligraphy from the early Tang dynasty. His calligraphy works were solemn, dignified, and tremendous. After him, another famous calligrapher, Liu Gongquan, created another style, which was thin but full of energy. Yan's style is sinew and Liu's style is bone (Wang, 2003).

The theories of calligraphy boomed in the Tang dynasty. Tang Tai Zong pointed out that the spirit was the soul of calligraphy and the mind was the muscle. Ouyang Xun explained the eight methods of the character Yong (Yong Zi Ba Fa). His 'thirty-six

methods' was the representative work of the structural theory of *kai shu* that significantly influenced the theoretical research thereafter (富強 & 柯林, 2003).

## 5.2 Characteristic of *Kai Shu*

Known as the standard style of writing, the characteristic of *kai shu*, which is the most common in today's printing, is upright and square.

In this research, I used the tablet called "Jiu Cheng Gong Bei" (九成宮碑) written by the master calligrapher, Ou Yang Xun, from the Tang dynasty to represent *kai shu*.

The form of *kai shu* is square, conscientious and careful, harmonious and moderate. It has an important effect on training a writer about the quality of art and the expression from the coordination of the eye, the mind and the hand (Translated from 楷書形體方正謹嚴，和諧適度。對書寫者眼、心、手三位一體的藝術素質和表現力的訓練，都有著重要作用) (富強 & 柯林, 2003, p.13). The strokes in *kai shu* are complicated and the lines are full of variations.

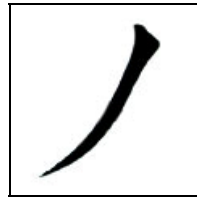
### 5.2.1. Thickness of the stroke

There is much variation in the thickness of the strokes. The transverse strokes are thinner than the vertical strokes (see *Figure 5-1*). The descending left strokes have thick and angular starting points at the top right and sharp tips at the bottom left (see *Figure 5-2*). The descending right strokes have thin starting points that are at the top left. They are the thickest at about 4/5 of the length of the stroke measured from the left. They have

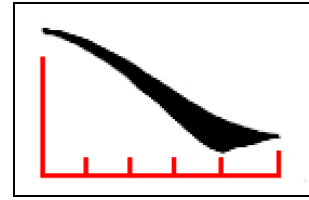
sharp tips at the right (see *Figure 5-3*). Most of the strokes, especially vertical strokes and descending left strokes, have a thick angular starting point (see *Figure 5-4*).



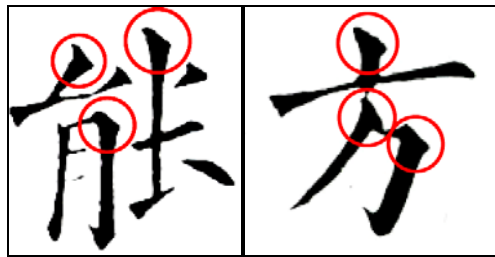
*Figure 5-1*



*Figure 5-2*

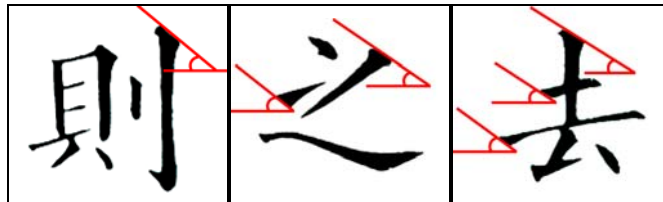


*Figure 5-3*



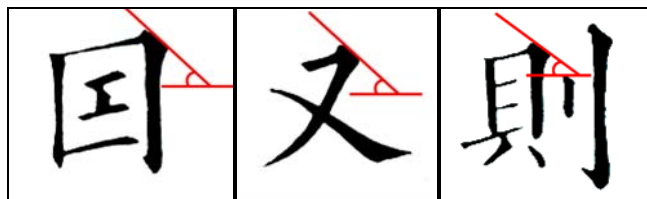
*Figure 5-4*

Most of the strokes have an angle between 30 degrees and 45 degrees at the starting point which is at the top or on the left (see *Figure 5-5*).



*Figure 5-5*

The top right corner has a thick 30 degrees to 45 degrees diagonal corner (see *Figure 5-6*).

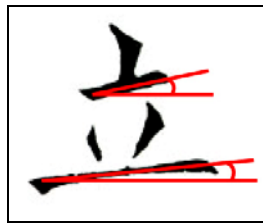


*Figure 5-6*

### 5.2.2. Movement of the brush strokes

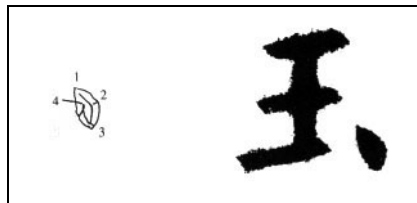
The movement of the brush in *kai shu* is slow and careful; sometimes pausing to get the desired thickness or angle.

The transverse strokes are not perfectly horizontal. The left ends are always lower than the right ends and they are oblique at an angle of not more than 20 degrees from the horizontal base (see *Figure 5-7*).

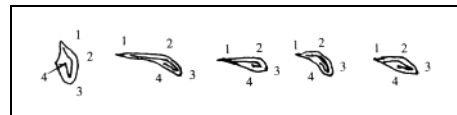


*Figure 5-7*

The method of writing each stroke is as follows:



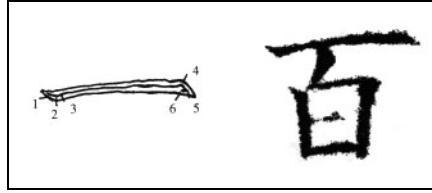
*Figure 5-8*



*Figure 5-9*

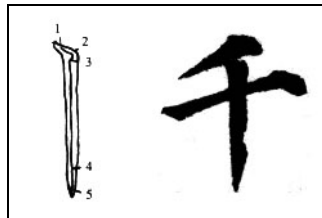
1. Place the brush on the paper at position 1.
2. Press it while moving it to position 2 to create the desired thickness.
3. While maintaining the same pressure on the paper, move the brush to position 3.
4. Lift the brush off the paper gradually while moving it to position 4.

*Figure 5-9* shows the variations of the stroke.



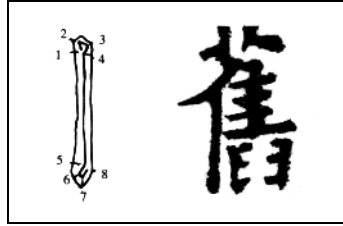
*Figure 5-10*

1. Place the brush on the paper at position 1.
2. Press it on position 2 to create the desired thickness of the starting point.
3. Slightly lift it while moving it to position 3 to create a thinner shape in the middle.
4. Press the brush on the paper gradually while moving it from position 3 to position 4.
5. Slightly lift it at position 4 and press it at position 5.
6. Lift the brush off the paper while moving it to position 6.



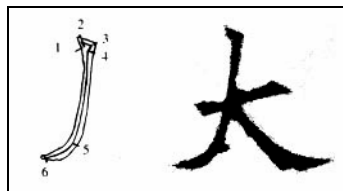
*Figure 5-11*

1. Place the brush on the paper at position 1.
2. Press it on position 2 to create the desired thickness of the starting point.
3. Move it to position 3 in order to write a straight stroke in the middle of the starting point.
4. Gradually lift it while moving it to position 4.
5. Lift the brush off the paper while moving it to position 5.



*Figure 5-12*

1. Place the brush on the paper and move it slightly upward.
2. Press it on position 2 to create the desired thickness of the starting point.
3. While maintaining the same pressure on the paper, move the brush to position 3.
4. Move it to position 4 in order to write a straight stroke in the middle of the starting point.
5. Maintain the same pressure on the paper while moving it to position 5.
6. Slightly press the brush on position 6 to create the desired thickness of the ending point.
7. While maintaining the same pressure on the paper, move the brush to position 7.
8. Lift it off the paper while moving it to position 8.

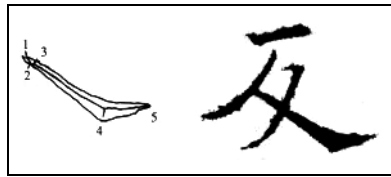


*Figure 5-13*

1. Place the brush on the paper and move it slightly upward.
2. Press it on position 2 to create the desired thickness of the starting point.
3. While maintaining the same pressure on the paper, move it to position 3.

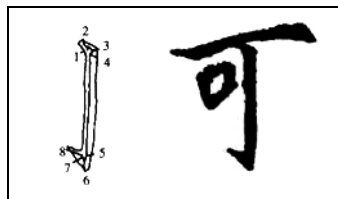


4. Move it to position 4 in order to write a straight stroke in the middle of the starting point.
5. Slightly lift the brush to create a thinner shape and, while moving it to position 5, press it to the paper to increase the thickness of the stroke again.
6. Gradually lift it off the paper while moving it to position 6.



*Figure 5-14*

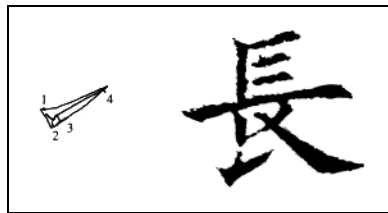
1. Place the brush on the paper and move it slightly in the opposite direction from the flow of the stroke.
2. Turn it around and press it on the paper while moving it from position 3 to position 4.
3. After achieving the desired thickness, which is thicker than the starting point of the stroke, lift the brush gradually to create a sharp tip.



*Figure 5-15*

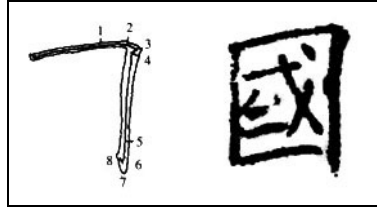
1. Place the brush on the paper and move it slightly upward.
2. Press it on position 2 to create the desired thickness of the starting point.

3. While maintaining the same pressure on the paper, move it to position 3.
4. Move it to position 4 in order to execute a straight stroke in the middle of the starting point.
5. Maintain the same pressure on the paper while moving it to position 5.
6. Slightly decrease the pressure on the paper while moving the brush to position 6.
7. Turn it around and move it to position 7.
8. Press the brush on the paper on position 7 and lift it off the paper while moving it to position 8.



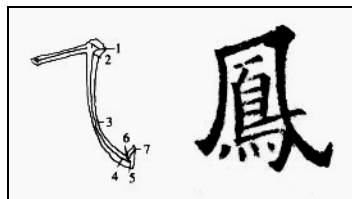
*Figure 5-16*

1. Place the brush on the paper.
2. Press it on position 2 to create the desired thickness of the starting point.
3. Move it to position 3 in order to execute a straight stroke in the middle of the starting point.
4. Gradually lift the brush while moving it to position 4 and finally lift it off the paper to create a sharp tip.



*Figure 5-17*

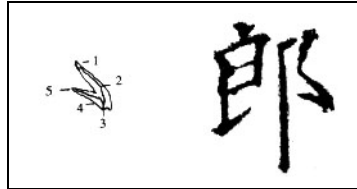
1. Start with the transverse stroke (see *Figure 5-17*).
2. Press the brush on position 3 to create the desired thickness of the upper right corner.
3. Move it to position 4 in order to execute a straight stroke in the middle of the starting point.
4. Maintain the same pressure on the paper while moving it to position 5.
5. Slightly press the brush on position 6 to create the desired thickness of the ending point.
6. While maintaining the same pressure on the paper, move it to position 7.
7. Lift it off the paper while moving it to position 8.



*Figure 5-18*

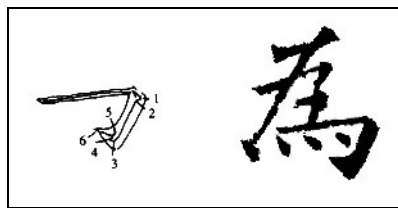
1. Press the brush on position 1 to create the desired thickness of the upper right corner.
2. Move it to position 2 while decreasing the pressure on the paper.
3. Slightly lift it while moving to position 3 to create a thinner shape in the middle.

4. Press it on the paper gradually while moving it from position 3 to position 4.
5. Pause at position 5 and turn the brush around to position 6.
6. Press it on the paper on position 6 and lift it off the paper while moving it to position 7.



*Figure 5-19*

1. Place the brush on the paper.
2. Press it while moving it from position 1 to position 2.
3. Continue increasing the pressure and pause at position 3.
4. Turn the brush around at position 4 and gradually lift it while moving it to position 5 and finally lift it off the paper to create a sharp tip.



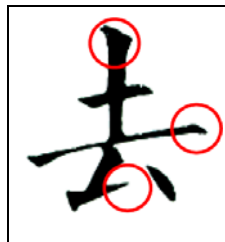
*Figure 5-20*

1. Place the brush on the paper.
2. Press it on position 2 to create the desired thickness of the starting point.
3. Move it to position 3 in order to execute the straight stroke in the middle of the starting point.

4. Gradually lift it while moving it to position 4 and finally lift it off the paper to create a sharp tip.

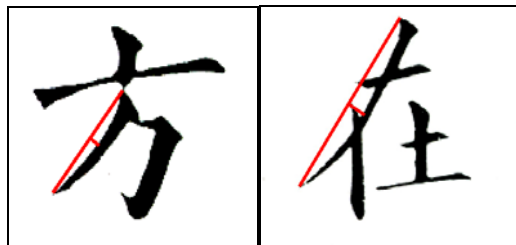
### 5.2.3. Curvature of the strokes

The shape of the beginning of the strokes is at a diagonal angle. The shape at the end of the strokes is either sharp or at a diagonal angle (see *Figure 5-21*).



*Figure 5-21*

Most of the strokes in *kai shu* are straight or slightly curved. The descending left strokes have a very small curvature. The depth of an apex which is the distance measured from the apex to the straight line connecting two ends, does not exceed  $1/7$  of the length of the stroke (see *Figure 5-22*).



*Figure 5-22*

#### 5.2.4. Structure and proportion

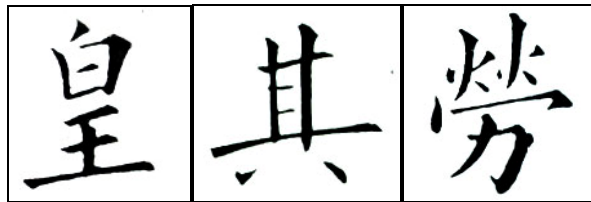
The structures of *kai shu* are distinguished by the arrangement of their individual strokes (Translated from 以點畫組合為特性) (范潤華, 2002, p.56).

Individual structure: the center of gravity has to be steady. The major stroke plays an important role in the character (see *Figure 5-23*).



*Figure 5-23*

Up and down structure: this structure is composed of the upper and lower part or the upper, middle and lower part. The center of gravity of all parts has to be on the same vertical line (see *Figure 5-24*).



*Figure 5-24*

Left and right structure: this structure is composed of left and right part or left, middle and right part. It has two different cases: firstly, the left is longer and less dense than the right; secondly, the right is longer and sparser than the left (see *Figure 5-25*).



Figure 5-25

Surrounded structure: this structure can be divided into whole surrounded or half surrounded types. In this structure, it is important to keep the outside surrounded strokes and the inside strokes in proportion (see Figure 5-26).



Figure 5-26

In general, the height to width proportion of *kai shu* is approximately 2:1.6–2:1.7 (see Figure 5-27).



Figure 5-27

### 5.3. Relationship between Surfaces in *Kai* Style Product

According to the angular and sharp characteristics in *kai shu*, the relationship between the surfaces is chamfer instead of fillet. A chamfer has an angular form.

Furthermore, x and y setbacks of the chamfer can be the same or different according to the need of the product form.

#### 5.4. Developing Design Guidelines for *Kai* style products

##### A. Overall principles:

- I. The form is very angular.
- II. The form has a stable appearance.
- III. All edges are chamfers.

##### B. Overall shape:

- IV. Height: width ratio is approximately 2:1.6–2:1.7.
- V. Upright and square.
- VI. Transverse lines are not perfectly horizontal. The left ends are always lower than the right ends and the transverse lines are oblique, at an angle not more than 20 degrees from the horizontal base.
- VII. Lines are either straight or with small curvature.
- VIII. The top right edges have a thick 30 degrees to 45 degrees diagonal corner
- IX. Asymmetrical

##### C. Details:

- X. All shapes have sharp tips on one side
- XI. Transverse lines are thinner than vertical lines



- XII. Descending left shapes have thick and angular starting points and sharp tip at the bottom left ends.
- XIII. Descending right shapes have thin starting points at the top left ends and the thickest width around  $\frac{4}{5}$  of the shape length measured from the left. The tip at the right is sharp.
- XIV. Most of the shapes have an angle between 30 degrees and 45 degrees at the starting points which is the top or the left of the strokes
- XV. Most of the shapes are thick and angular at the end(s) or corner(s)
- XVI. There are no round circles
- XVII. The transverse lines are not perfectly horizontal. The left ends are always lower than the right ends and the transverse lines are oblique, at an angle not more than 20 degrees from the horizontal base.
- XVIII. Lines are either straight or slightly curved. The depth of an apex, which is the distance from the apex to the straight line connecting two ends, does not exceed  $\frac{1}{7}$  of the length of the stroke.

## 6. APPLICATION RESULTS

In this chapter, the guidelines developed in the previous chapters will be applied to the design of a smell recorder to help illustrate the uniqueness and characteristics of each calligraphy style, and to demonstrate how the transformation is carried out.

The purpose of this product is to help people remember the smell that they would like to keep in memory, and to share the smell between two products via a network. This product records, emits and transfers smells, sounds and images.

### 6.1. Performance criteria

Major Functions – Record and emit smells and transfer data through the network

Integrated Functions – Record sounds, record images, portable

Uses – Travel and daily life

Scenarios – Beach, botanical garden, Valentine...

Target Market – Age 20–35

## 6.2. Specification

1. This product has to be portable, so that users can bring it anywhere to record smells, and to smell the scents that were previously recorded.
2. This product has to have the following features in order to provide all the above functions:
  - I. Smell sensor
  - II. Smell emitter
  - III. Camera lens
  - IV. LCD screen
  - V. Speaker
  - VI. Earphone jack
  - VII. Microphone
  - VIII. Seven buttons: On/Off, Record, Play/Pause/Stop/Enter, Next/Fast forward, Previous/Rewind, Volume/Intensity up and Volume/Intensity down.
  - IX. Smell cartridges compartment
  - X. Memory card compartment
  - XI. Rechargeable battery
  - XII. Power plug-in ( recharge battery )

To provide the product functions and the above features, a reasonable size for this product is around the palm size.

### 6.3. Sketches

#### 6.3.1. *Zhuan* style



*Figure 6-1. Zhuan style -- form developing sketches*

6.3.2. *Li style*

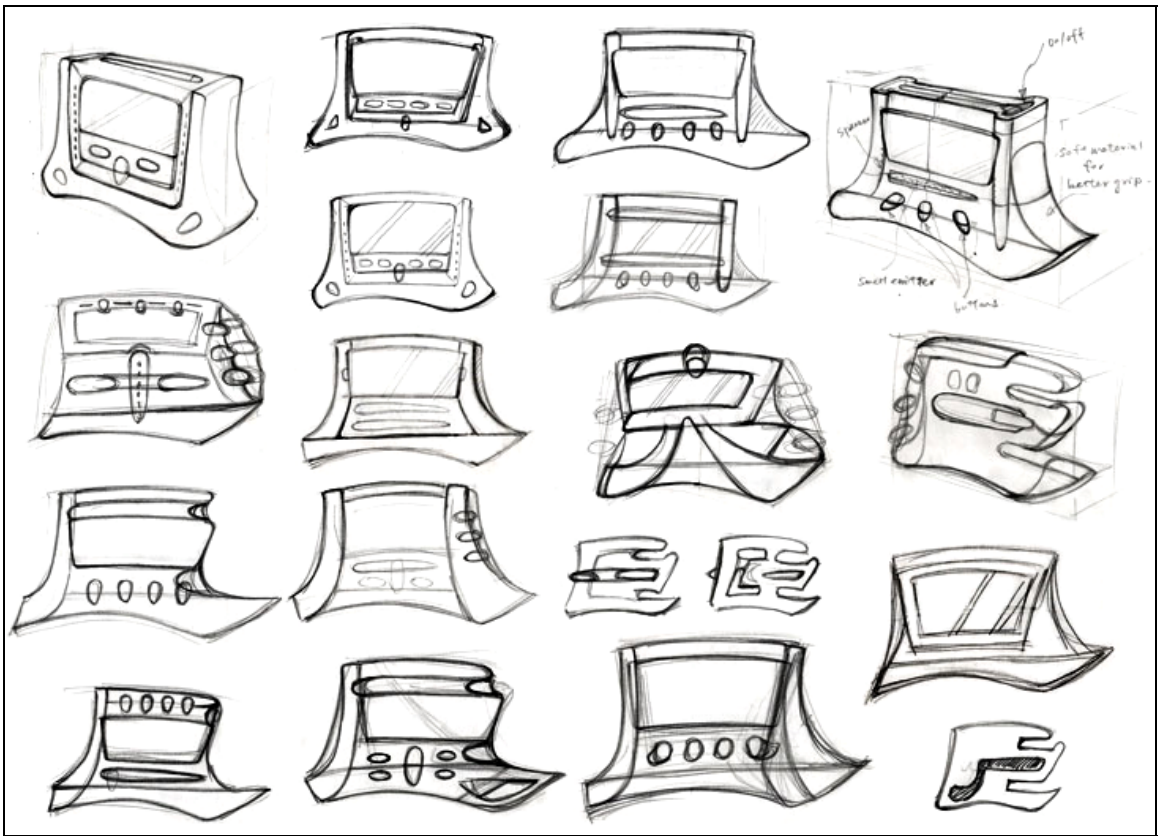


Figure 6-2. *Li style* -- form developing sketches

6.3.3. Cao style

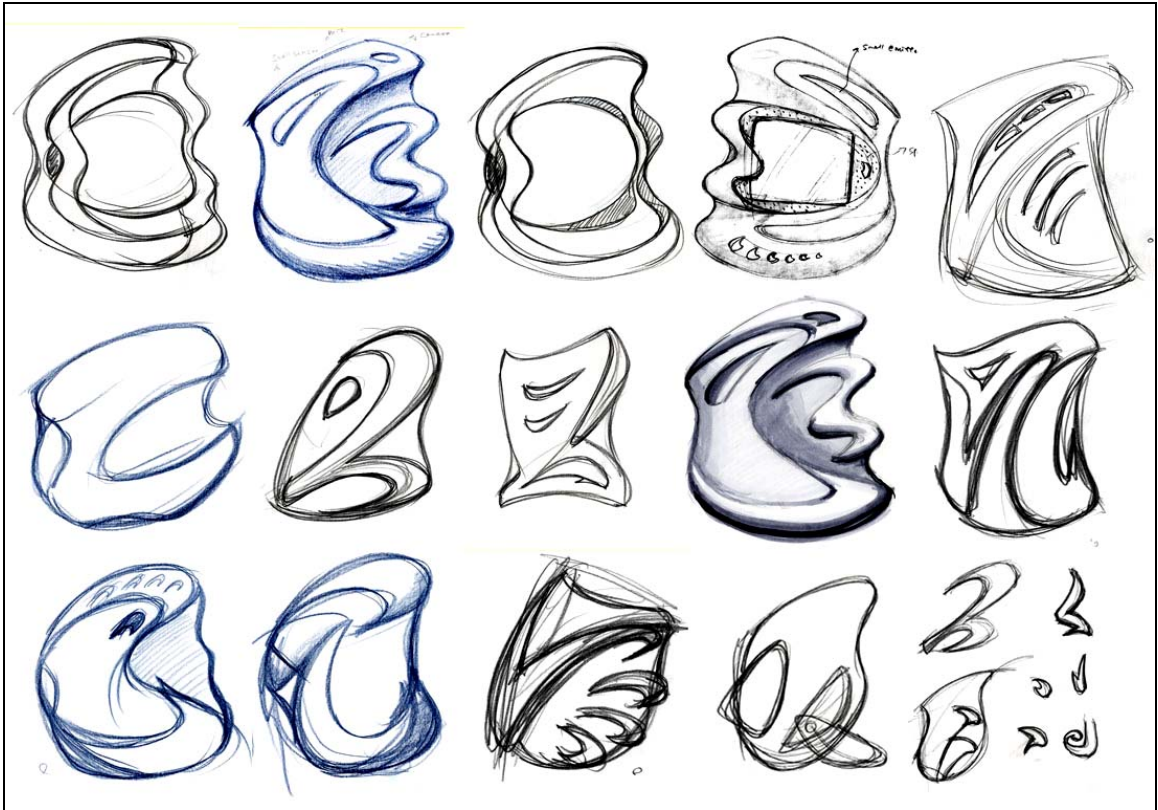


Figure 6-3. Cao style -- form developing sketches

6.3.4. Kai style

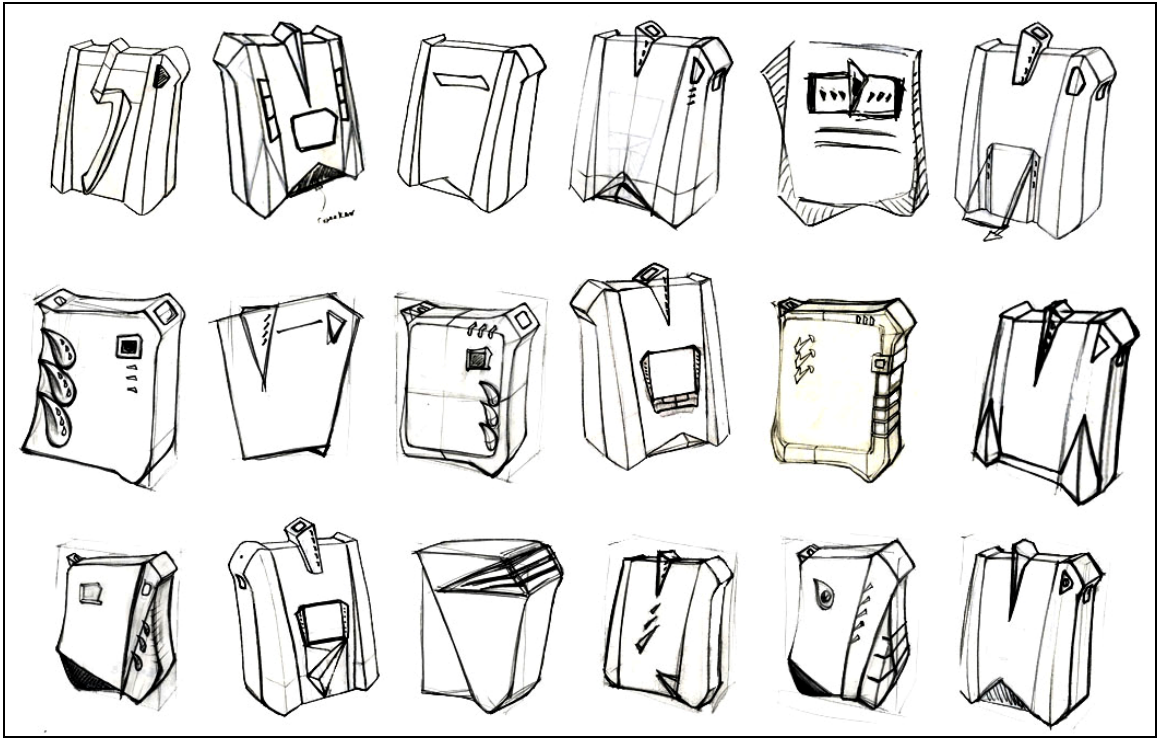


Figure 6-4. Kai style -- form developing sketches

## 6.4. Sketch models

### 6.4.1. *Zhuan* style



*Figure 6-5. Zhuan style -- form study model made of foam (front)*



*Figure 6-6. Zhuan style -- form study model made of foam (back)*



6.4.2. *Li style*



*Figure 6-7. Li style -- form study model made of foam (front)*



*Figure 6-8. Li style -- form study model made of foam (back)*

6.4.3. *Cao style*



*Figure 6-9. Cao style -- form study model made of foam (front)*

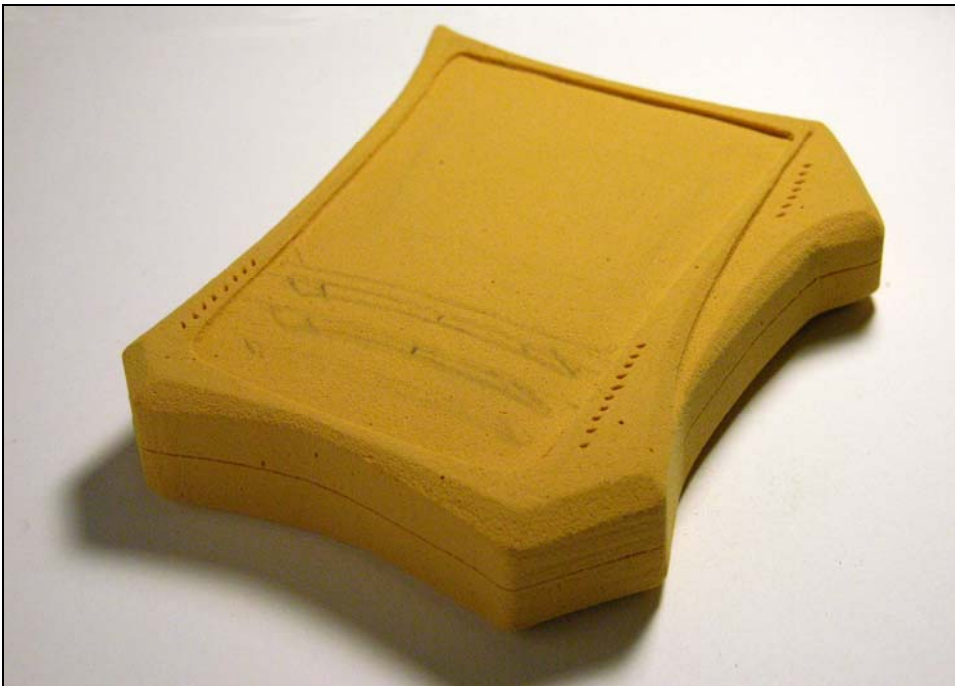


*Figure 6-10. Cao style -- form study model made of foam (back)*

6.4.4. *Kai* style



*Figure 6-11. Kai style -- form study model made of foam (front)*



*Figure 6-12. Kai style -- form study model made of foam (front)*

## 6.5. Control drawings

### 6.5.1. *Zhuan* style

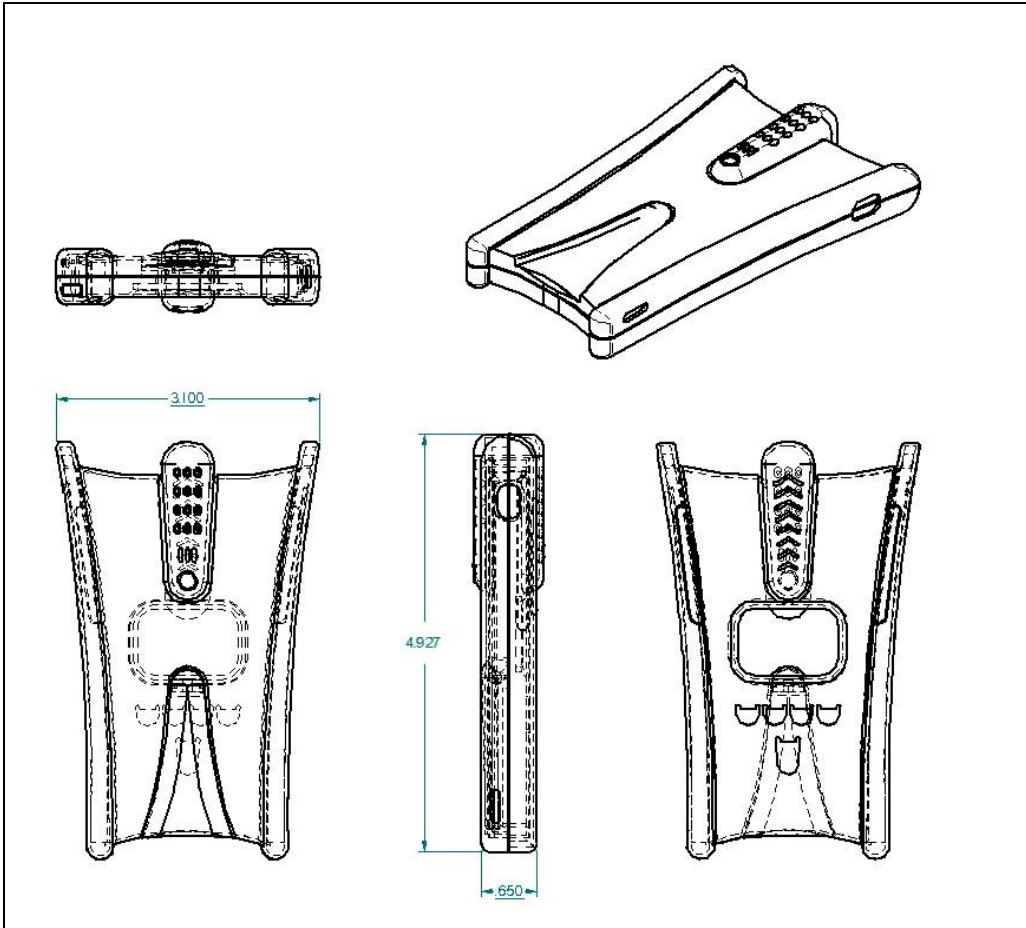


Figure 6-13

6.5.2. *Li style*

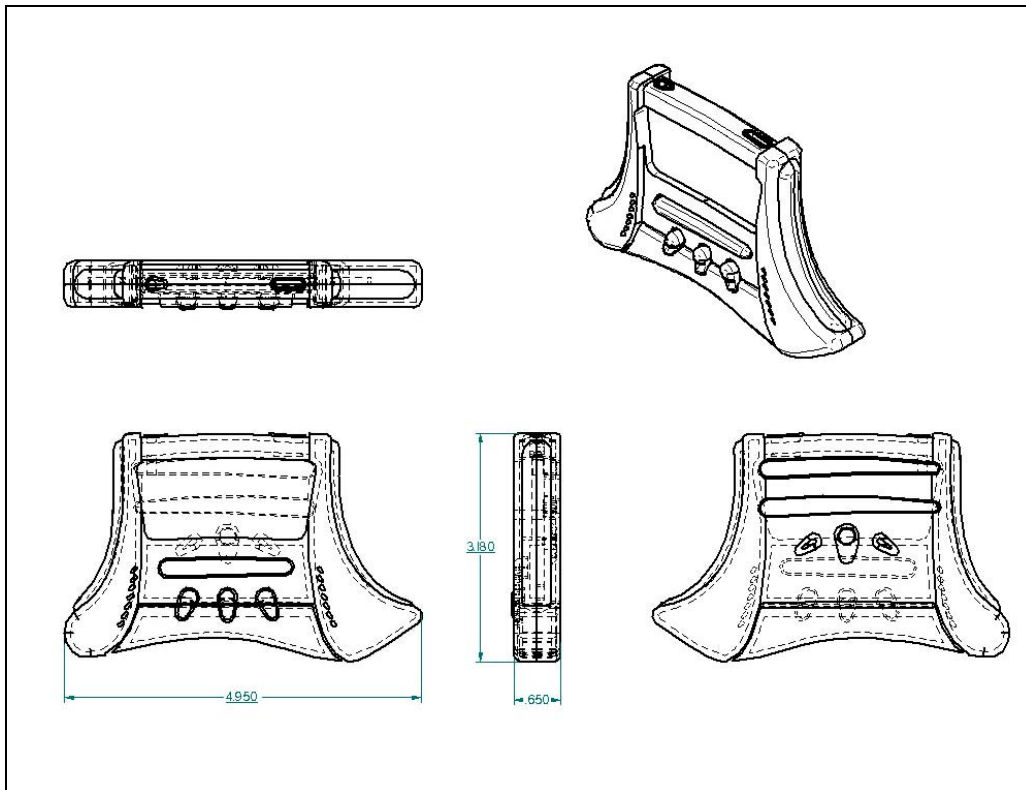


Figure 6-14

6.5.3. Cao style

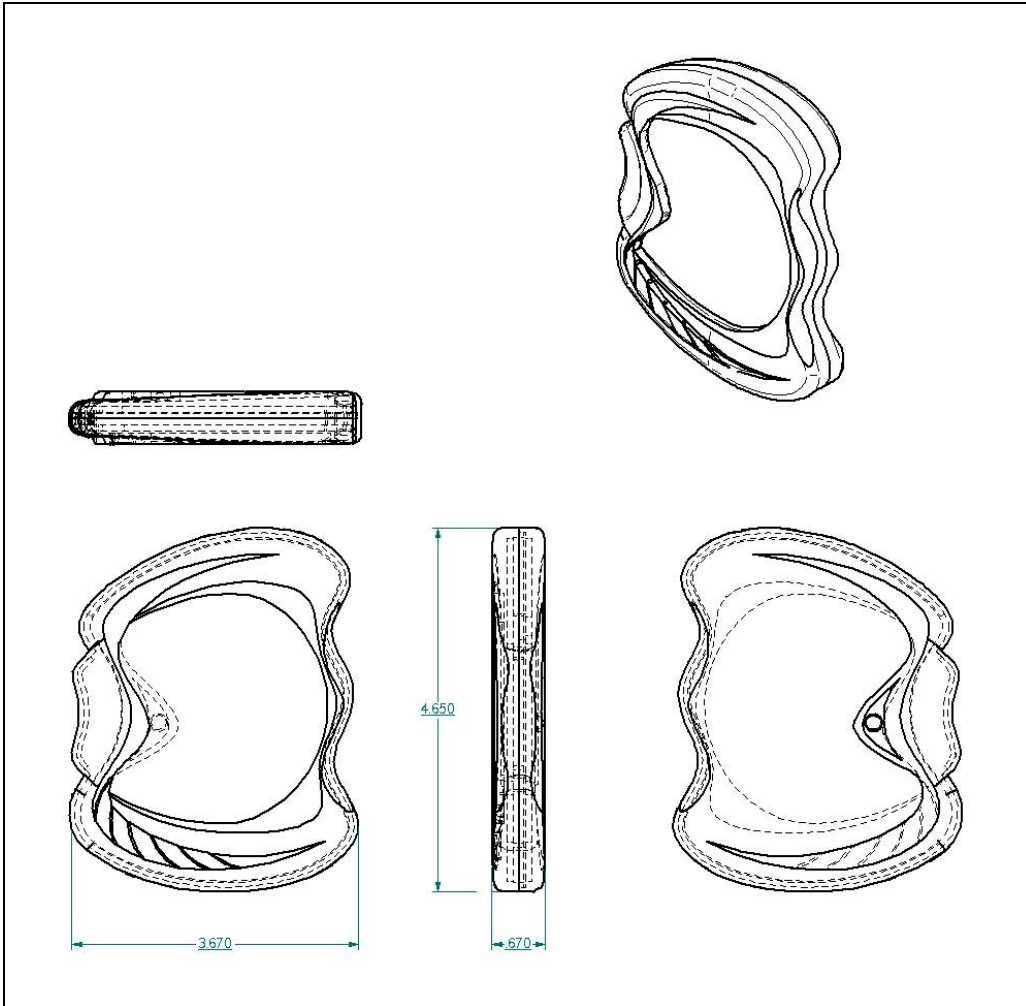


Figure 6-15

6.5.4. Kai style

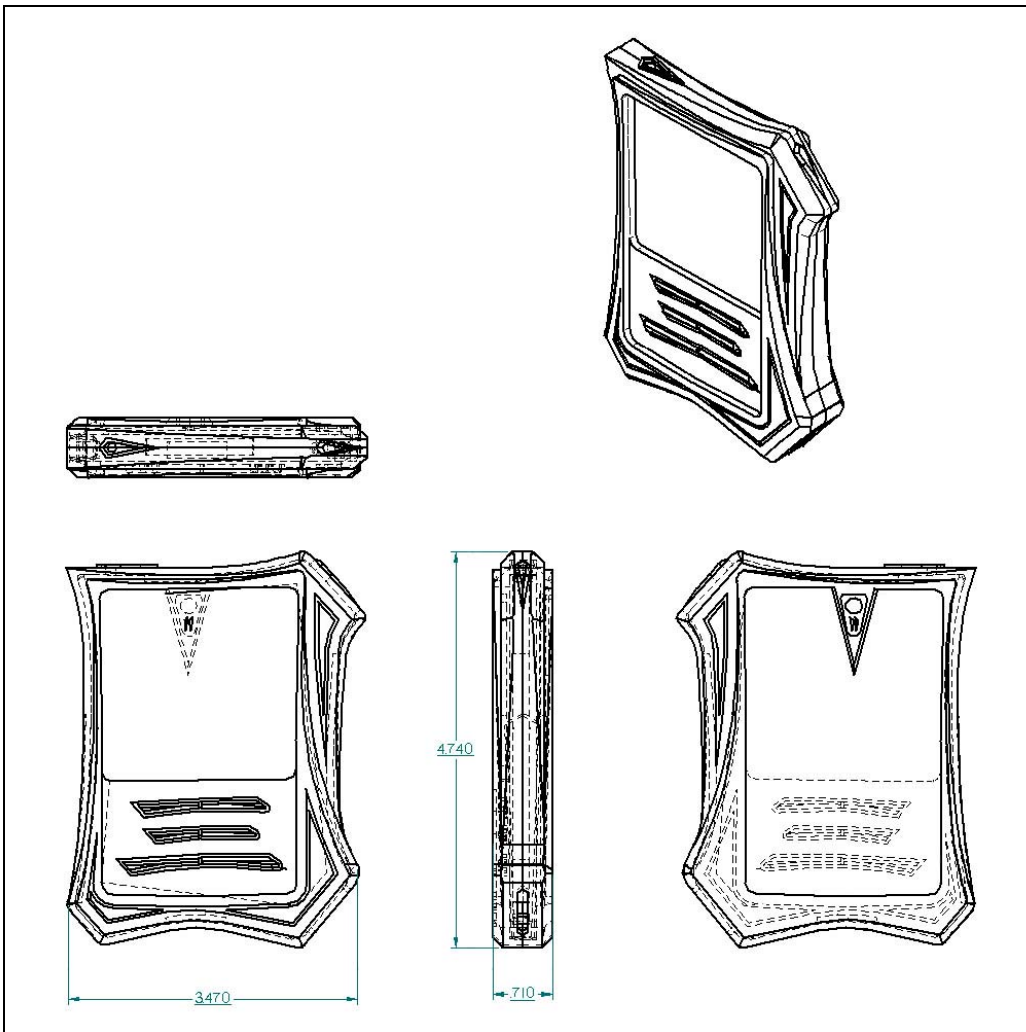


Figure 6-16

## 6.6 Final models

### 6.6.1. *Zhuan* style

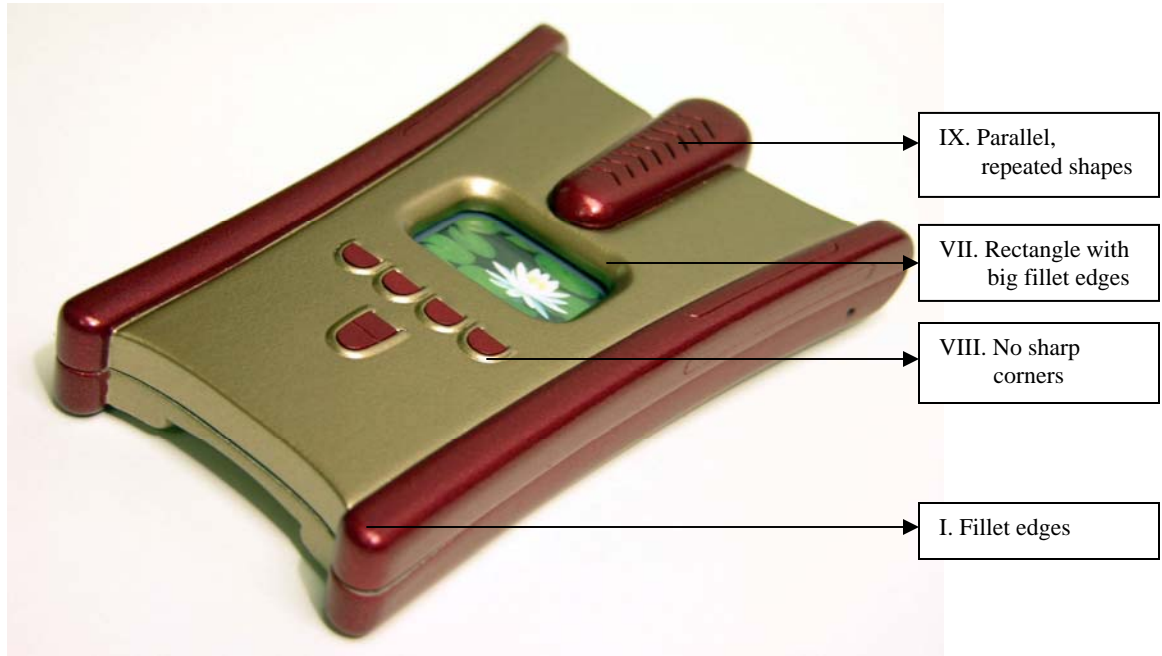


Figure 6-17

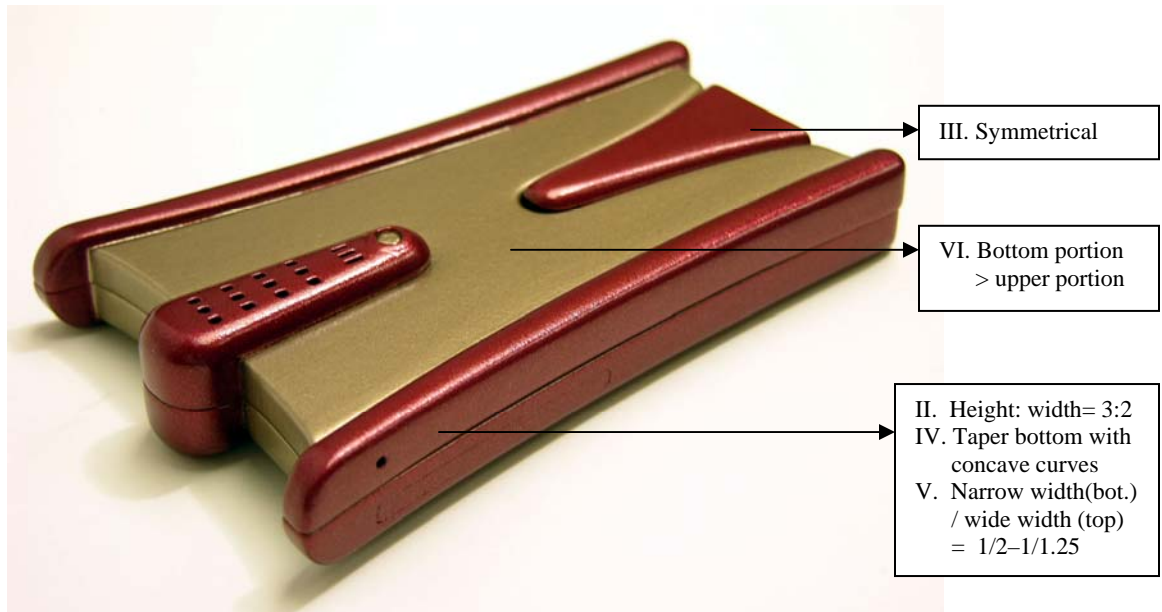


Figure 6-18



6.6.2. Li style

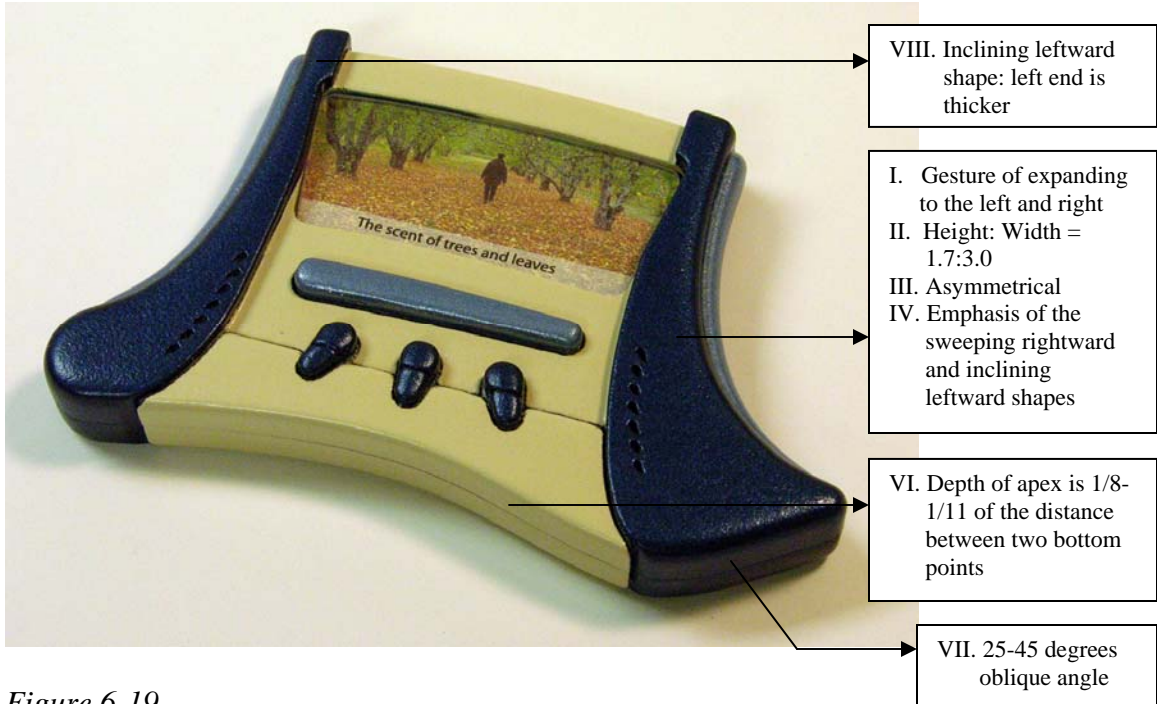


Figure 6-19

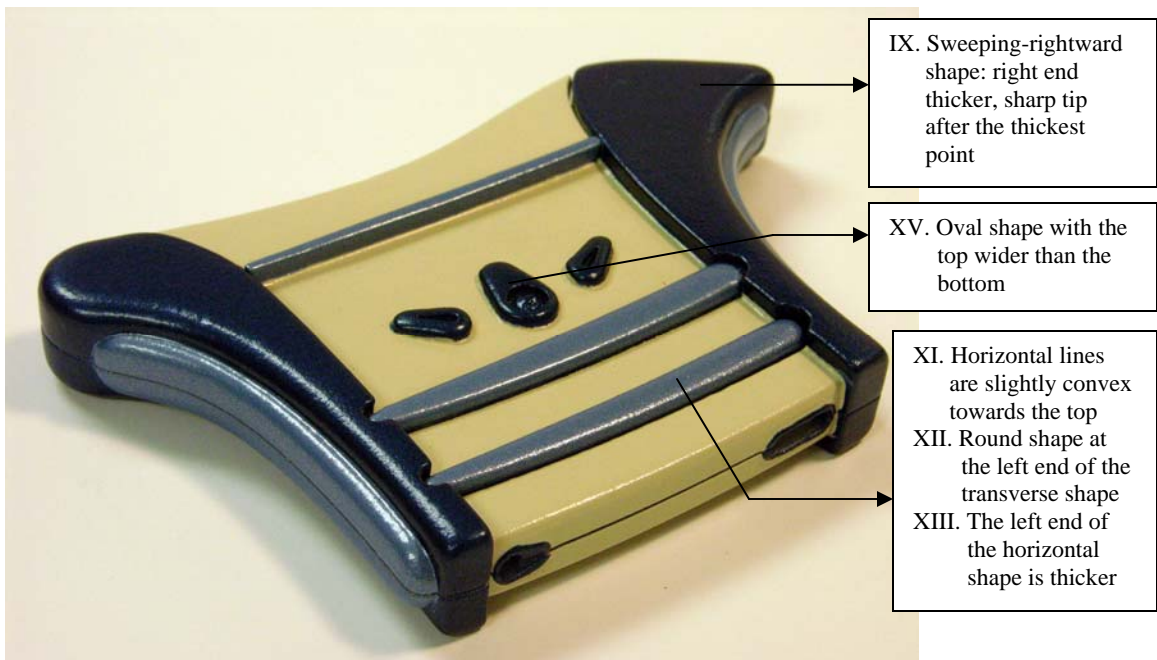


Figure 6-20

6.6.3. Cao style

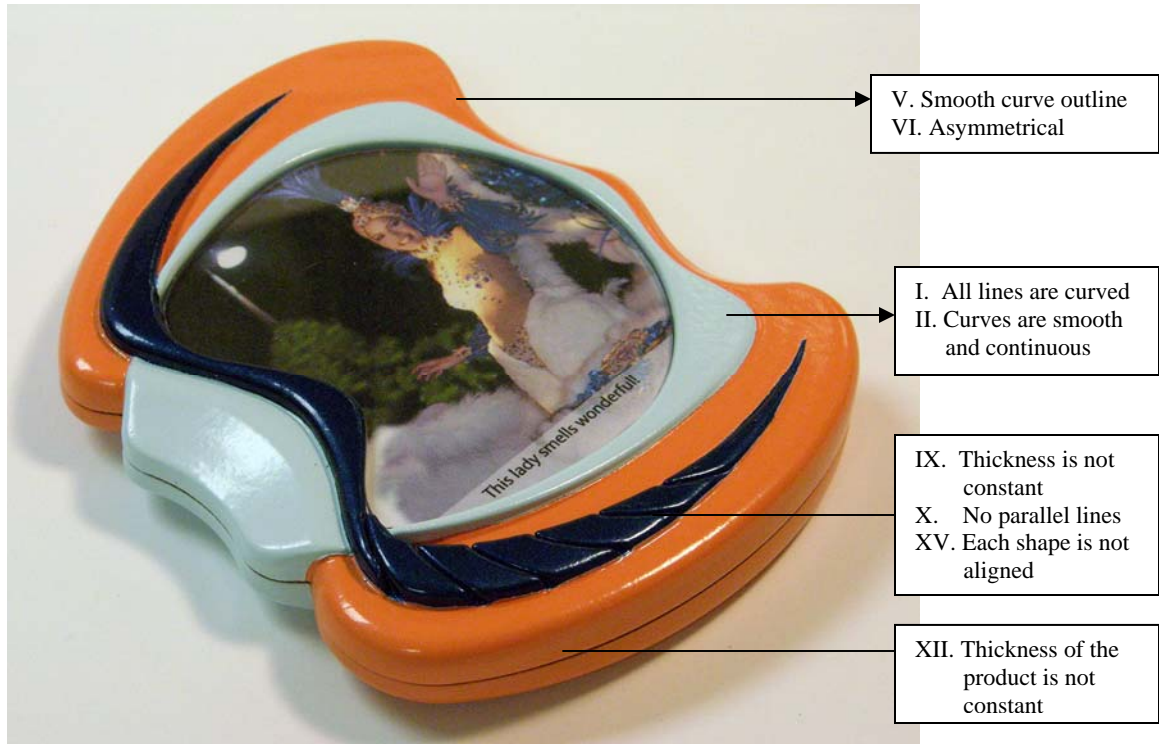


Figure 6-21

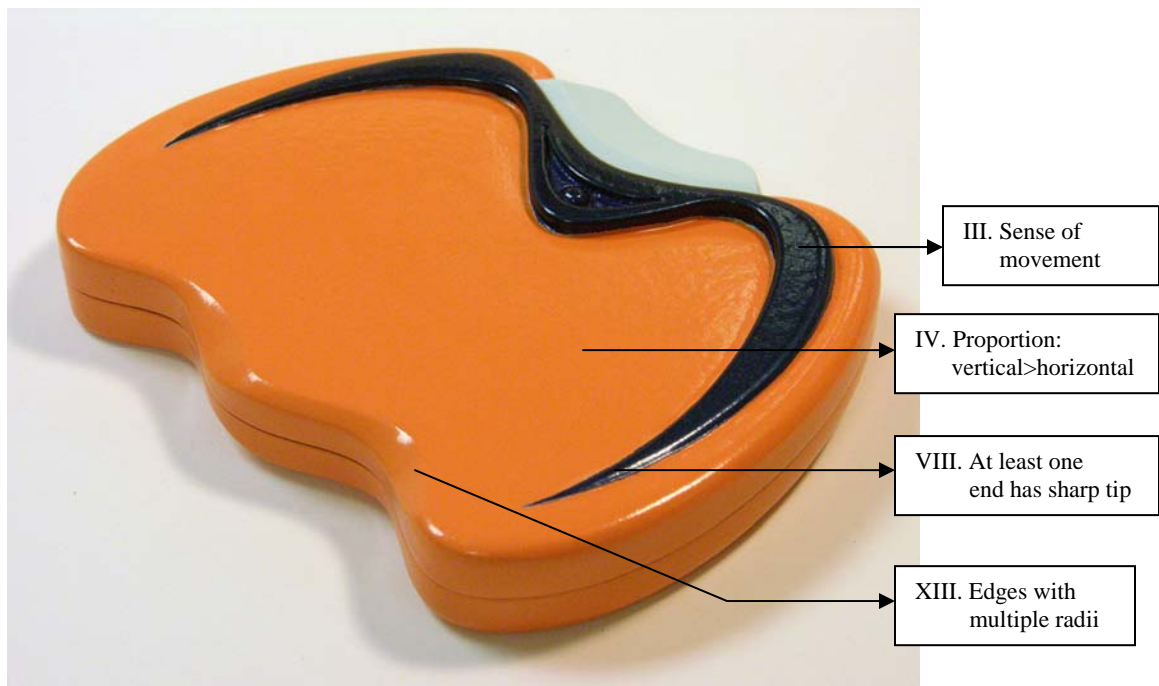


Figure 6-22

6.6.4. Kai style



Figure 6-23

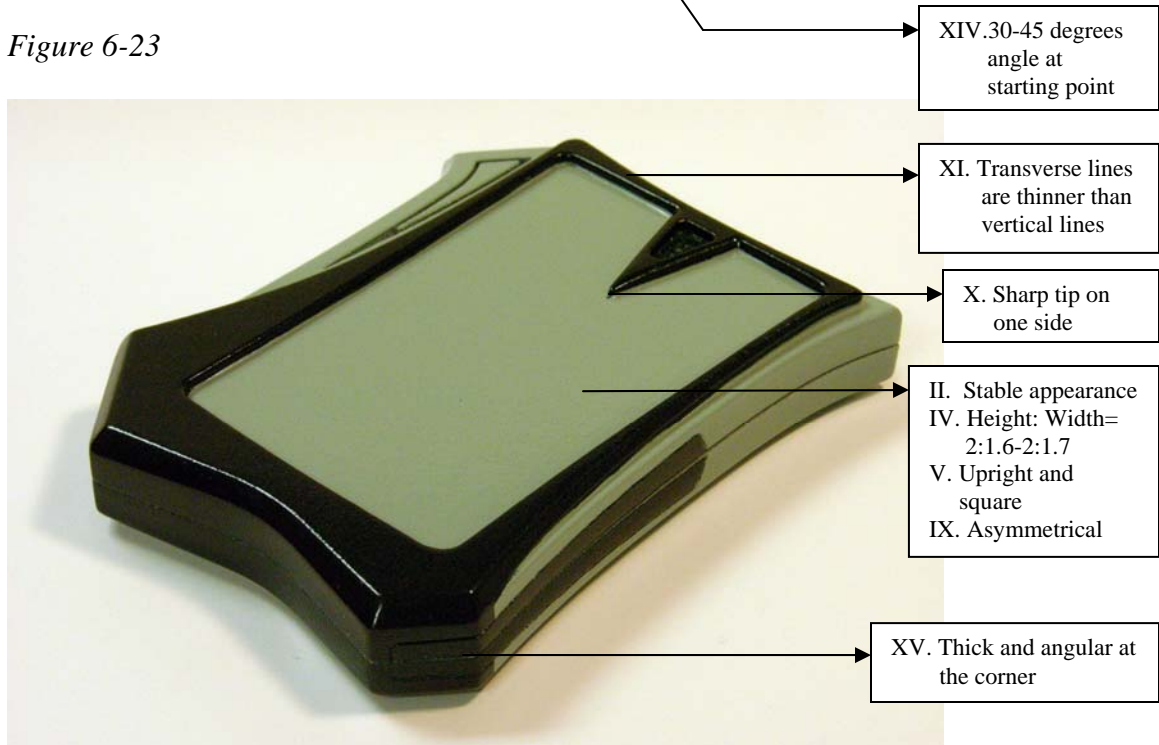


Figure 6-24

## 7. DISCUSSION AND CONCLUSIONS

The intention of this thesis was to seek a probable approach to transform the aesthetic elements from Chinese calligraphy into product forms design. In this research, four styles of Chinese calligraphy (*zhuan shu*, *li shu*, *cao shu*, and *kai shu*) are used to help design products that have Chinese inspired characteristics. Four design guidelines are developed based on the four styles. Four product forms are then designed to demonstrate the application of these guidelines.

The design guidelines are developed by evaluating each style. Designers may use only a partial checklist to design a product form according to their needs. However, the more conformity to the guidelines, the more character of the particular style the product would have. Designers may also use a combination of guidelines from different styles and apply it to a product form design. Since there are four guidelines and 10 to 16 items in each guideline, many different combinations are possible.

Although the application results have been tested on some individuals in an informal test, it would be valuable to use a large focus group to match the design of other product forms to the calligraphy styles. This may help further validate the relationship between each style and each form.

Suggestion for future research:

Based on these studies, the idea of how the human brain conceives three-dimensional forms from visual recognition and the brain's cognitive process should be further researched with the possibility of creating a guideline for designers. Calligraphy or other two-dimensional art form can be used as an example to show what the brain's recognition process is and how the brain transform the two dimensional image into three-dimensional form. This could lead to a systematic method for transforming a two-dimensional image to a three-dimensional form. Such a method would be greatly helpful to designers.

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## APPENDICES



Figure 7-1. Sample of Zhuan Shu



Figure 7-2. Sample of Zhan Shu

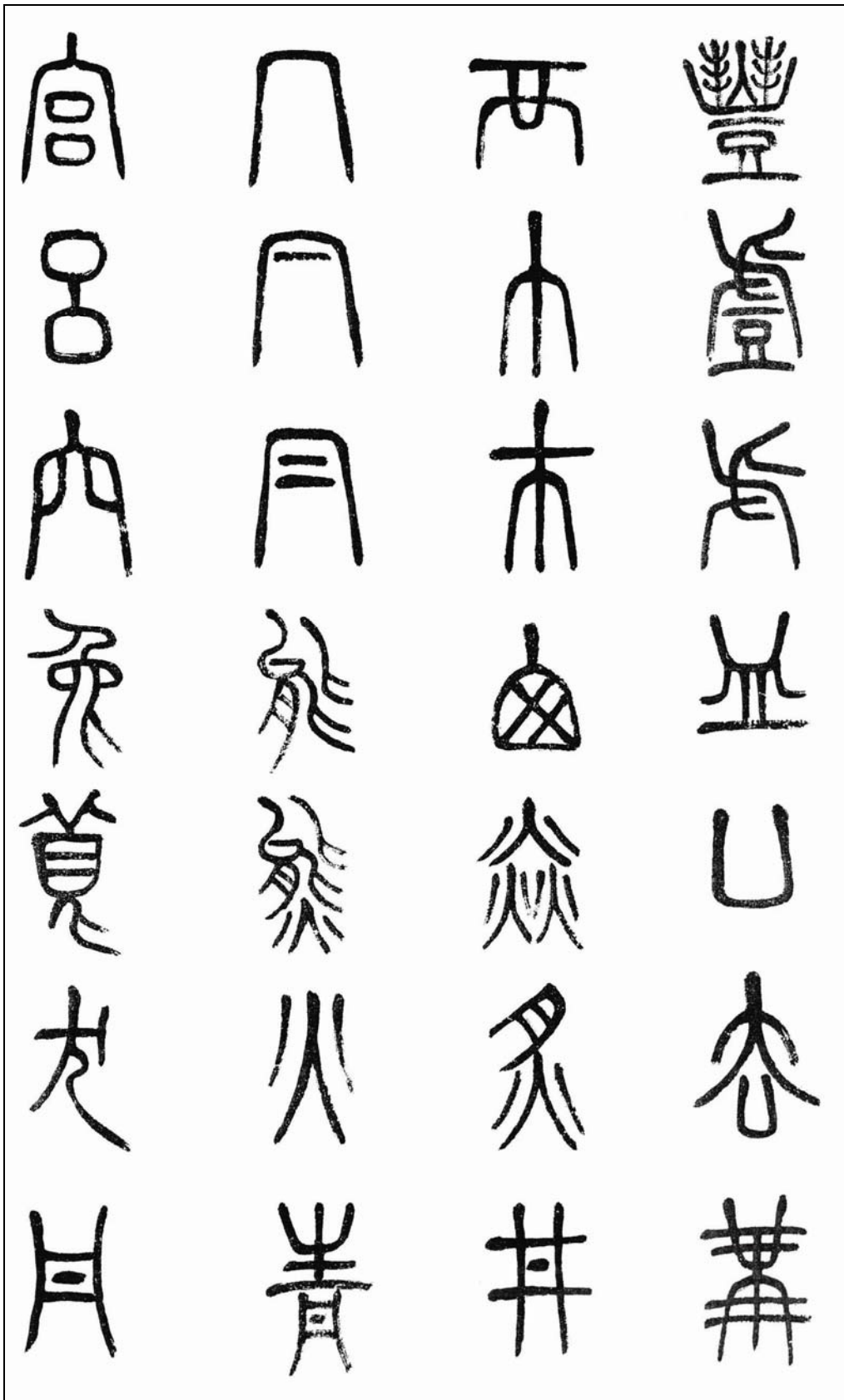


Figure 7-3. Sample of Zhan Shu

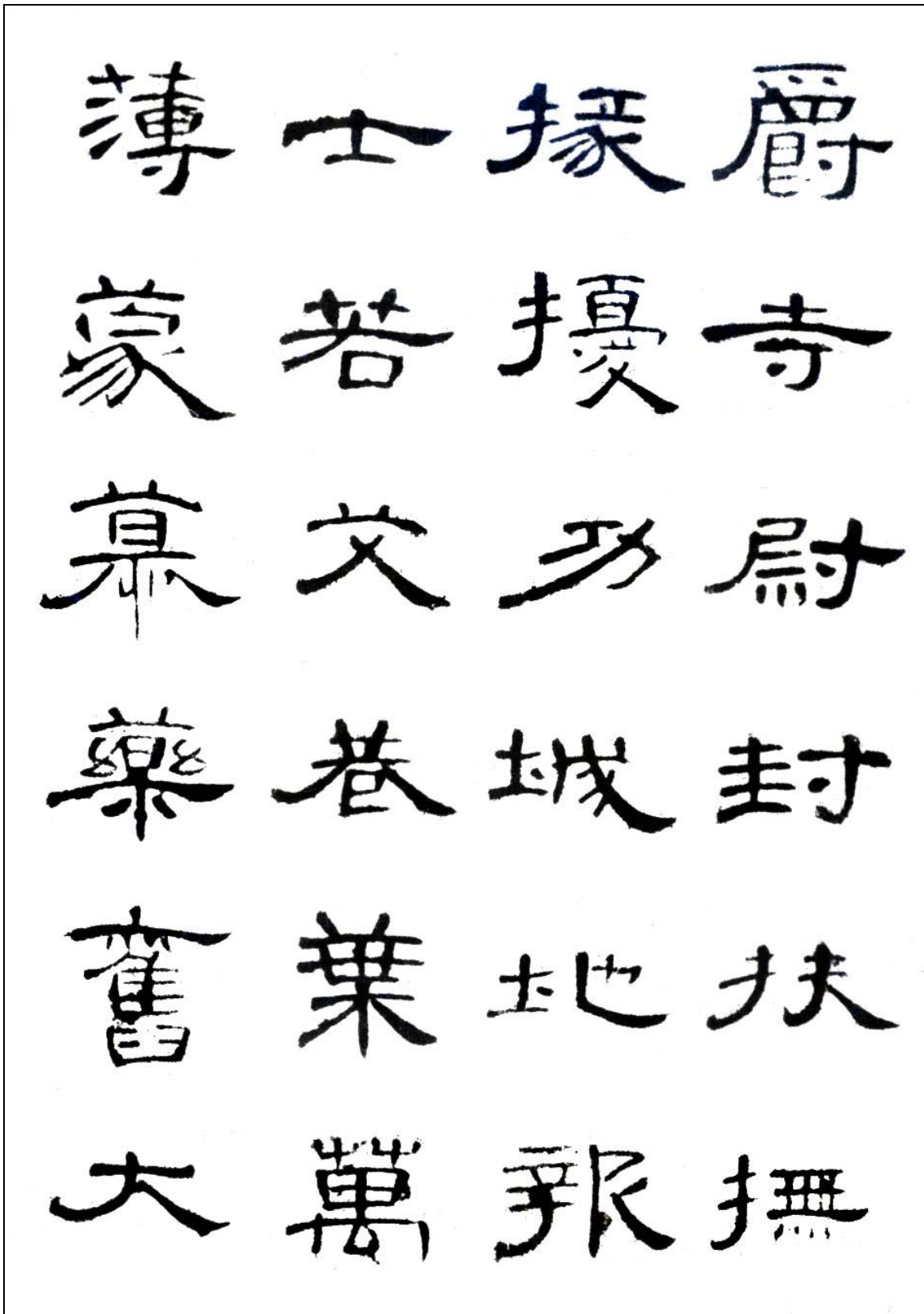


Figure 7-4. Sample of Li Shu

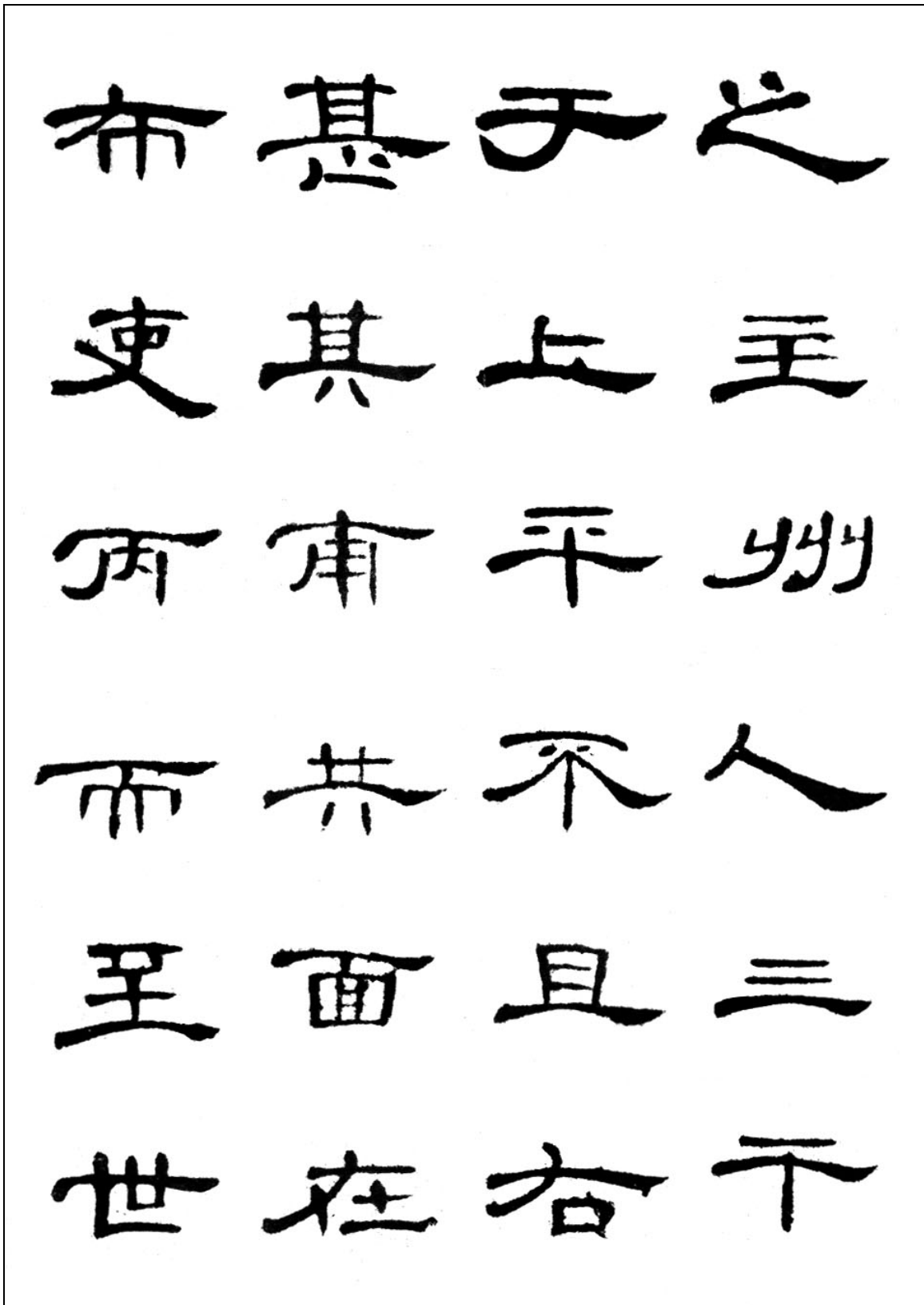


Figure 7-5. Sample of Li Shu

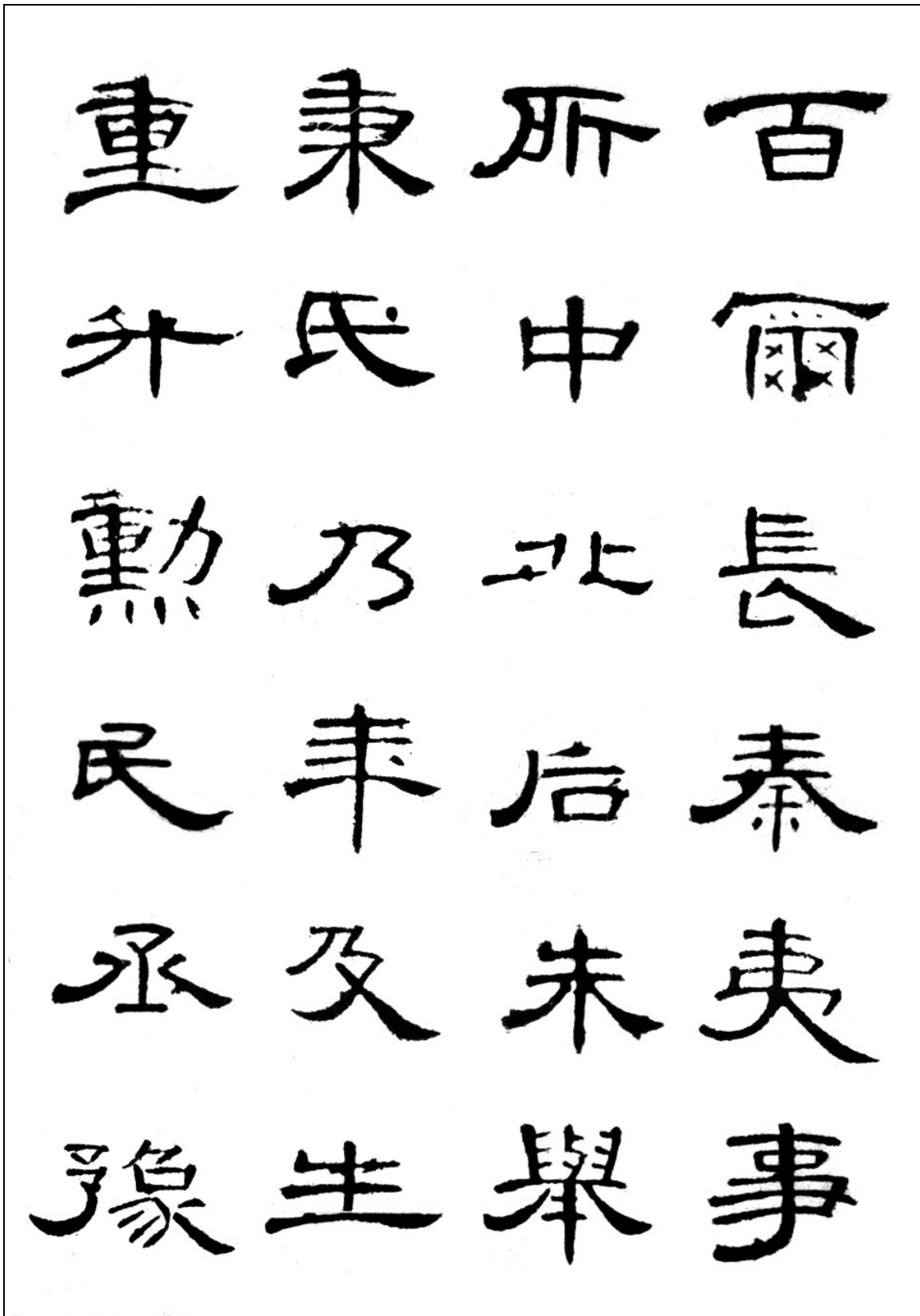


Figure 7-6. Sample of Li Shu

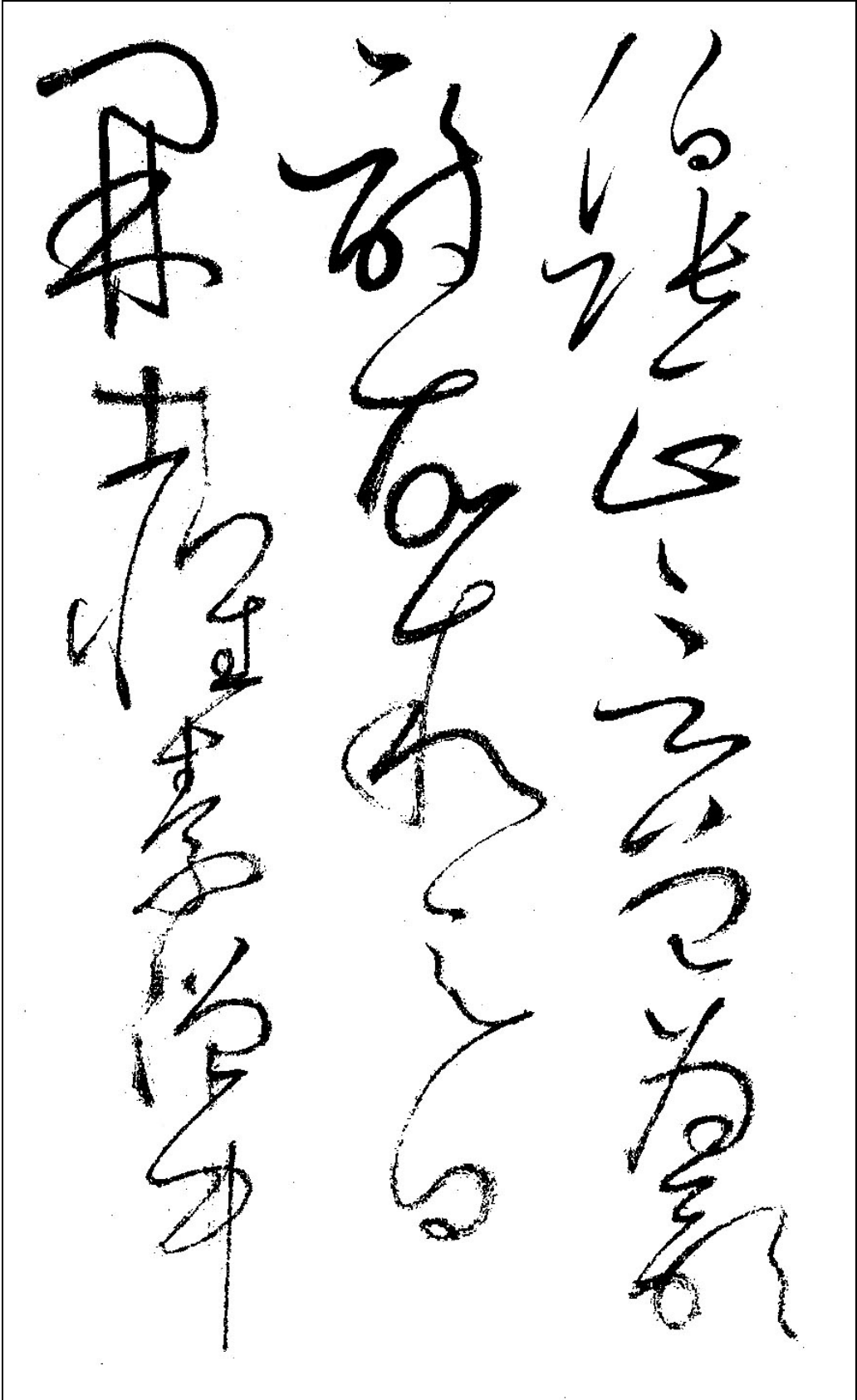


Figure 7-7. Sample of Cao Shu



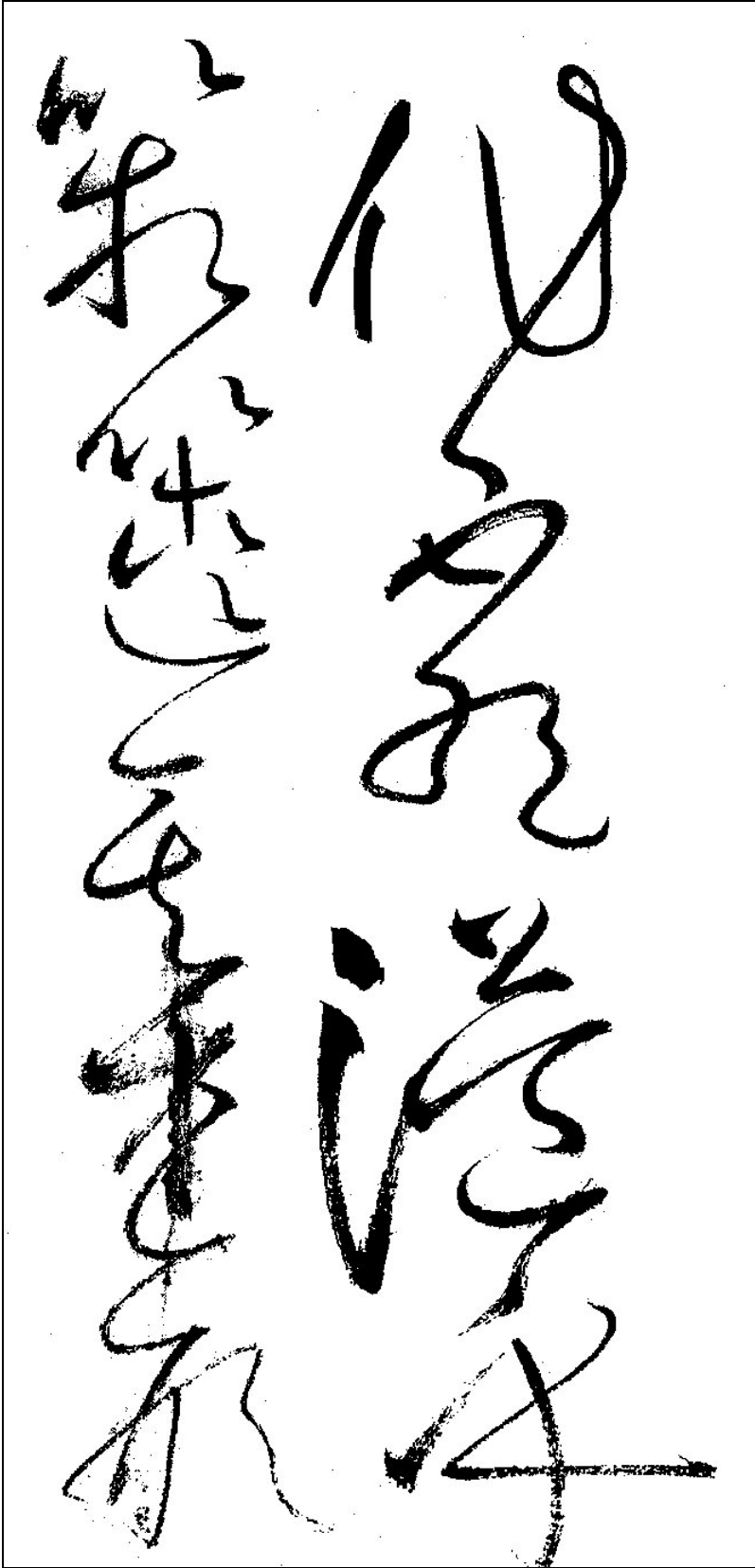


Figure 7-8. Sample of Cao Shu

則重勞事貴因循  
何必改作於是斲  
彫為樸損之又損  
去其泰甚膏其頹

Figure 7-9. Sample of Kai Shu

維貞觀六年孟夏  
之月皇帝避暑  
乎九成之宮此則  
隨之仁壽宮也冠

Figure 7-10. Sample of Kai Shu