中西合璧字体对于多语言设计的研究

Guim Cid, Lai Fan

北京科技大学

密　　级： 公开

加密论文编号：

论文题目：中西合璧字体对于多语言设计的研究

学　　号： S20121882

作　　者： Lai Fan Guim Cid

专业名称： Artistic Design

2015年11月09日

中西合璧字体对于多语言设计的研究

Research on Chinese and Latin Typography For Multilingual Design

研究生姓名：Lai Fan Guim Cid

指导教师姓名：覃京燕

北京科技大学械工程学院

北京100083，中国

Master Degree Candidate: Lai Fan Guim Cid

Supervisor: Professor Qin, Jingyan

School of Mechanical Engineering

University of Science and Technology Beijing

30 Xueyuan Road, Haidian District

Beijing 100083, P.R.CHINA

分类号：　　　　　　　　密　　级：公开

UDC：　　　　　　　　单位代码：10008

北京科技大学硕士学位论文

论文题目： 中西合璧字体对于多语言设计的研究

作者： Lai Fan Guim Cid

指　导　教　师： 覃京燕　　教授　**单位：** 北京科技大学

指导小组成员：　　　　　　**单位：**

单位：

论文提交日期：2015年 11月 09日

学位授予单位：北 京 科 技 大 学

Acknowledge

First of all, I would like to thank to Life itself, for allow me to be here in China tasting the savor of one half of my roots.

For giving me the opportunity to live this amazing experience, I would like to express my sincere and honest gratitude to the Chinese Government, through the Chinese Scholarship Council.

For opening the doors to the opportunity to come here, I thank with all my heart to Mr. Li Baozhang, who with his lovely kindness also opened for me the doors of his home here in Beijing. My family and I will be forever in debt with him. I extend this acknowledge to his wife and his son.

I wish to express my gratitude for their guidance and support to the staff of the International Office of USTB. For all the patience a teacher can have with a student, and for understanding that despite all efforts not everyone is born to speak Chinese language, special thanks goes to Prof. Li Baoming.

I also want to acknowledge the guidance offered by the staff of the Department of Industrial Design of USTB. My special gratitude goes to my supervisor Prof. Qin Jingyan for her unconditional support and her passion for knowledge and excellence, which served me as example in my study time here.

For taking me as a little sister, special thanks to Mrs. Xiao Qing. For sharing a divided soul between China and Chile, all my gratitude to Miss Xiaoxi Song.

For believing in my skills as a designer and offering a space to put in practice all the knowledge collected in this research, special thanks to Mr. Teddy Hu.

For explain me about their culture and traditions, thanks to my Chinese classmates and friends. For sharing the experience of being a foreign in China, my deep gratitude to all the dear friends I met here from all around the world. We were strangers and now we are family, no matter where we are. To my friends in Chile, many thanks for keeping in touch despite the distance, I miss you everyday.

To my family, specially to my mother, my father and my brother, I really have no words to compensate their respect for my decision to come to China along with their sacrifice of supporting my absence during so long. Only love.

And for holding my hand with sweet tenderness and encourage me to finish this research giving the best of me, special gratitude to my beloved Roman. He is the unexpected treasure I happen to found during my academic journey here.

Abstract

Overcome language barriers to communicate effectively among all of us is one of the great challenges that comes along with the cross-cultural conditions we are experiencing nowadays. In this context, Multilingual Communication emerges as a multivariate social expression of the human constitution, fulfilling complex communicative functions. The expression of Multilingualism can also be appreciated inside the development of several categories of Design.

In Linguistics, the Chinese language belongs to the category of logographic system where written forms are characters. Languages based on Latin alphabet, belong to the category of phonographic systems, where written forms are letters. At the same time, Typography understands written forms as elements which works in two levels: firstly, on a visual level as a graphic component inside a design; and secondly, on a linguistic level as a medium to communicate a verbal message. Under these circumstances, the interaction between the visual and the linguistic is even more amplified in the case of Multilingual Design including Chinese language and Latin-based languages. Typography then, plays a fundamental role to resolve the formal differences between the graphemes of these two language systems, by administrating intrinsic graphic attributes of each written form in order to facilitate the transmission of their respective semantic meaning.

The first aim of this thesis is to present a descriptive and comparative study of written forms of Chinese language and Latin-based languages, focusing the attention in recognize their principles and differences in terms of Typography. A second aim of this study is to reach a deep comprehension on the wide range of existing typographic styles for Chinese and Latin-based languages, to use them in visual coherence when they are combined in Multilingual Design. The result of this research is intended to provide future reference applicable in a wide range of specific branches of Design, such as: Graphic Design, Corporative Identity Development, Logo Design, Signal Design, Packaging Design, Information Design and Web Design, etc, all of them regarding the design of written forms at some point.

Keywords: Chinese Language, Latin-based languages, Typography, Multilingual Design.

中文摘要

为了我们之间能够有效沟通，克服语言障碍是当今在跨文化环境中交流的巨大挑战之一。在这个背景下，多种语言交流的现象使人类社交变成非常的多元化，并使交际与沟通功能变得充实而复杂。多种语言的表达也可在发展各种设计过程中发挥作用。

在语言学里，中文属于符号语言体系，并以字符为其书面表达形式。而使用拉丁字母的语言则属于表音语言体系，并通过字母作为其书面表达形式。与此同时，在字体设计中，将文字作为元素的使用可分为两种：第一，在视觉方面，文字属于设计作品中的图形或图案; 第二，在语言方面，是一种口头沟通和交流的方式。在这种情况下，视觉和语言之间的互动在多语言设计中更加广泛，包括中文与拉丁语系的语言。那么，字体设计在解决这两种语言体系中字形之间的差异起着根本性的作用。因为，它使用每个文字形式固有的图形属性，以促进其各个语义的表达。

本论文的第一目的是以描述及比较的方式介绍中文与拉丁语系的文字及书写形式的研究。重点关注并识别他们之间在字体设计方面的原理和差异;第二目的是深刻理解现有的中文及拉丁语系语言的大量字体及文字风格，以便当我们将它们组合在多语言设计的过程中，获得并使用他们的视觉连贯性。希望这项研究的结果为广泛专业设计工作提供参考，如：平面设计、企业识别发展、包装设计、信号设计、信息设计及网页设计等。从某种程度来说，这些设计工作都与文字有关。

关键词： 中文, 拉丁文, 字体设计, 多语言设计。

Preface

"The Chinese fine writing darts upon the mind like a vivid flash,
a force and a beauty, of which Alphabetic language is incapable"
—Dr. Robert Morrison
(1782–1843)

As a foreigner, arriving to China can be very exciting. As a tourist, one can go straight to see The Great Wall and delight with its impressive presence and long history. As a resident, one quickly realizes that the real wall between China and other countries is actually the language.

I belong to a family where my father has Chinese roots while my mother has Latin American origin. I grow up in a multilingual environment, listening Spanish everyday all around me, but also Cantonese in the voice of my father. In our house in Chile, the furniture and ornaments were often brought from the distant China, and with them a wide variety of enigmatic written scripts, containing secret meanings that I was incapable to decipher. Despite we lived so far away, in my house we used to eat Mooncakes every year, as it is the tradition. And I devoured them passionately, as if each bite will allow me to magically understand the encrypted contents of the Chinese characters these cakes had stamped on its surface.

Half of my lifetime already passed, and here I am in Beijing, presenting the result of my research on Chinese and Latin Typography oriented to Multilingual Design. After five years of living in this huge capital city, I still have issues dealing with the spoken language barrier. During all this time, excluded from any verbal interaction, I have been focused in the appreciation of visual aspects instead. Beijing is a truly beautiful place.

It still marvels me to realize that even when Chinese people differ in spoken dialects, they are all united by one common millenary writing system. My deep wish is that the foundings explained in this thesis can be a little contribution to realm its coexistence with Alphabetic forms, enhancing the quality of cross-cultural communication. And I also humbly hope, that these foundings could be somehow close to make justice to the exceptional magnificence of Chinese characters.

Table of Contents

Acknowledge..I
Abstract III
中文摘要 V
Preface..VII
List of Figures and Tables XI
1 General Introduction 1
  1.1 Research Background.. 1
    1.1.1 Multilingual Communication 1
    1.1.2 Typography.. 2
    1.1.3 Writing Systems 3
  1.2 Problem Statement 3
  1.3 Objectives.. 4
  1.4 Methodology 4
  1.5 Significance.. 6
  1.6 Literature Background.. 6
2 History Overview.. 9
  2.1 Brief History of Chinese Typography 9
  2.2 Brief History of Latin Typography 24
3 Typographic Principles 39
  3.1 Principles of Chinese Characters.. 39
    3.1.1 Chinese Characters Structure.. 39
    3.1.2 Typographic Variants 47
    3.1.3 Paragraph Structure 48
  3.2 Principles of Latin Typography.. 50
    3.2.1 Letterform Structure 50
    3.2.2 Word Structure 56
    3.2.3 Typographic Variants 58
    3.2.4 Paragraph Structure 61
4 Designing Text in Multilingual Contexts.. 67
  4.1 Reading Direction.. 67
  4.2 Type Size.. 68
  4.3 Paragraph Length 68
  4.4 Paragraph Combination.. 69
  4.5 Paragraph Alignment.. 70
  4.6 Line Width.. 70
  4.7 Line Spacing.. 71
  4.8 Type Detailing.. 72
    4.8.1 Numerals.. 72
    4.8.2 Punctuation Marks.. 74
5 Typefaces for Multilingual Design 77
  5.1 Conceptual Approaches.. 79
  5.2 Examples of Matching Typefaces 80

5.2.1 Combinations for Songti & Serif 81
5.2.2 Combinations for Heiti & Sans Serif 83
5.2.3 Other Combinations 85
6 Conclusion 87
References 89
作者简历及在学研究成果 93
独创性说明 95
关于论文使用授权的说明 95
学位论文数据集 1

List of Figures and Tables

Figure 1: Banpo inscriptions, c. 4770–4290 BC. 9
Figure 2: Oracle Bone Script, Shang Dynasty...10
Figure 3: Oracle Bone Script 甲骨文 (*Jiǎgǔwén*)..10
Figure 4:《散氏盘》Bronze Script, Late Western Zhou..11
Figure 5: Bronze Script 金文 (*Jīnwén*)..11
Figure 6:《石鼓文》*Stone Drum*, Big Seal Script, Qin dynasty...12
Figure 7: Big Seal Script 大篆 *Dàzhuàn*...12
Figure 8:《嶧山刻石》*Yishan Stele*, Small Seal Script. 13
Figure 9: Small Seal Script 小篆 *Xiǎozhuàn*...13
Figure 10:《曹全碑》*Cao Quan Monument*, Clerical Script, Han dynasty...........................14
Figure 11: Clerical Script 隶书 *Lìshū*...14
Figure 12:《急就章》Cursive Script, Han dynasty..14
Figure 13:《自叙帖》Cursive Script, Tang dynasty..15
Figure 14: Cursive Script 草书 *Cǎoshū*. 15
Figure 15: Regular Script in the calligraphy of Zhong Yao (钟繇), Late Eastern Han............16
Figure 16: Regular Script 楷书 *Kǎishū*. 16
Figure 17:《兰亭序》*Preface to the Orchid Pavilion Gathering* (reproduction),
Running Script, Tang dynasty. 17
Figure 18: Running Script 行书 *Xíngshū*. 17
Figure 19:《齊書》*Book of Qi,* Songti, Ming dynasty..18
Figure 20: Songti 宋体. 18
Figure 21: Song type design by William Gamble, 1859. 19
Figure 22: Zhengkai, Cuti, Fangsongti and Songti, the most popular typefaces by 1920s......20
Figure 23: Fangsongti 仿宋体..20
Figure 24: Fragment of the earliest known printed specimen for Heiti...................................21
Figure 25: Heiti 黑体..21
Figure 26: Fragment of a printed specimen for Xin Weiti, 1974. 22
Figure 27: Xin Weiti 新魏体...22
Figure 28: The 22 symbols in Phoenician writing system..24
Figure 29: Greek inscriptions, carved marble, c. 403 BC. 24
Figure 30: Roman inscriptions from Pompeii Stadium, Italy..25
Figure 31: Carolin Minuscules. 25
Figure 32: Blackletter calligraphy in Latin Bible, England, c 1407...25
Figure 33: Bembo. 27
Figure 34: Garamond...27
Figure 35: Fragment of Caslon’s specimen, 1734...27
Figure 36: Caslon...28
Figure 37: Baskerville. 28
Figure 38: Didot...29
Figure 39: Antique..29
Figure 40: A revival of Medieval calligraphy in Kelmscott Press Mark.................................30
Figure 41: *Moulin Rouge: La Goulue*, poster by Toulouse-Lautrec, 1891. 30
Figure 42: Akzidenz Grotesk...31
Figure 43: Futura. 32
Figure 44: Fragment of Gill Sans’s specimen, 1935. 32
Figure 45: Gill Sans...33
Figure 46: DIN...33
Figure 47: Times New Roman...34

Figure 48: Palatino. 34
Figure 49: Optima. 35
Figure 50: Courier. 35
Figure 51: Adrian Frutiger's grid system applied to Universe typeface. 36
Figure 52: Univers. 36
Figure 53: Helvetica. 37
Figure 54: Structure of Chinese characters. 39
Figure 55: Example of Chinese characters formed by Radical repetition. 43
Figure 56: Chinese characters in different variations of spatial structure. 45
Figure 57: Chinese Centre Line defined by several Weight Center Points. 46
Figure 58: Example of weight variations on Chinese typography. 47
Figure 59: Example of width variations on Chinese typography. 47
Figure 60: Reading Direction for Chinese characters. 48
Figure 61: Top alignment for Chinese characters in vertical arrangement. 48
Figure 62: Alignment values for Chinese characters in horizontal arrangements. 49
Figure 63: Line Spacing in Chinese paragraphs. 49
Figure 64: Alignment values for Chinese characters in horizontal arrangements. 51
Figure 65: X-height, ascender, descender and related lines in Letterform anatomy. 52
Figure 66: Examples of different styles of Serifs. 53
Figure 67: Examples of Ligatures. 53
Figure 68: Examples of Kerning. 57
Figure 69: Example of Word Spacing. 58
Figure 70: Examples of Roman typefaces. 59
Figure 71: Examples of Italic and Oblique typefaces. 60
Figure 72: Examples of weight wariations on Latin Typography. 60
Figure 73: Examples of width wariations on Latin Typography. 61
Figure 74: Vertical Reading Direction for Latin words. 61
Figure 75: Alignment values for Latin texts in horizontal arrangements. 62
Figure 76: Extreme and slight degree of Raggeness in Left alignment. 63
Figure 77: Alignment values for Latin texts in horizontal arrangements. 64
Figure 78: Example of excess of hyphenation. 64
Figure 79: Example of a *widow* (1), an *orphan* (2) and a *hypho* (3). 65
Figure 80: Line spacing in Latin paragraphs. 66
Figure 81: Different paragraph lengths between Chinese and Latin-based languages. 68
Figure 82: Comparison of paragraph lengths between Chinese and English. 69
Figure 83: Stainer's proportion 1:2 for parallel paragraphs. 69
Figure 84: Wang's proportion 1:1:1 for parallel paragraphs. 70
Figure 85: Wang's model for Line alignment. 71
Figure 86: Wilhelm's model for Line alignment. 72
Figure 87: Variations for Arabic numerals. 73
Figure 88: Collator, designed by Vince Lo. 78
Figure 89: Xin Gothic, designed by Sammy Or et als. 78
Figure 90: Songti & Caslon (Xiaofeng Wang). 81
Figure 91: Songti & Coranto (Keith Tam). 81
Figure 92: Songti & Modern Serif (Henry Steiner). 82
Figure 93: Songti & Trajan (Xiaofeng Wang). 82
Figure 94: Heiti & Akzidenz Grotesk (Roman Wilhelm). 83
Figure 95: Heiti & Futura (Henry Steiner). 83
Figure 96: Heiti & Helvetica (Xiaofeng Wang). 84
Figure 97: Heiti & Myriad (Official Comitee Beijing Olimpics 2008). 84
Figure 98: Fangsongti & Times New Roman (Xiaofeng Wang). 85
Figure 99: Kaiti & Garamond (Henry Steiner). 85
Figure 100: Youyuanti & Gotham Rounded (Yifang Cao). 86

Table 1: Strokes of Chinese Characters..40
Table 2: Basic strokes and compound strokes variants in Chinese characters. 41
Table 3: List of Kanxi Radicals. 44
Table 4: Optical relation between Type Size and Number of Stokes......................................46
Table 5: Description of different parts in Letterforms structure. 55
Table 6: Optical relation between Type Size and white space. 56
Table 7: Different representations for Numerals. 74
Table 8: Differences in punctuation marks between Chinese and Latin-based languages.......75

1 General Introduction

1.1 Research Background

1.1.1 Multilingual Communication

Overcome language barriers to communicate effectively among all of us is one of the great challenges that comes along with the cross-cultural context we are experiencing nowadays. Parallel to rising worldwide migration process and the galloping technological advances in international communication, interrelations between individuals, groups, institutions and societies who use different languages continue to increase dramatically. To face this complex multilingual situation there are two possible lines: one is promoting the adoption of a lingua franca (with the most likely choice today being the English language) or promoting multilingual communication in its various forms and potentials of permitting mutual understanding [1].

In the first approach, we need to deal with the fact that even when bilingual or multilingual individuals in the world outnumber the monolingual [2], Mother tongue is still the first choice to interact with the world. Our perception and understanding of what is being said in our mother tongue is never 100% accurate, thus, our understanding of what is being said in a foreign language is far from being perfect. People are more confident and more secure when they use their own language in any comprehension or expression process.

In the second approach, Multilingual Communication is understood as a multivariate social expression of the human constitution, where multilingualism fulfills complex communicative functions, in which general linguistic qualities manifest themselves in specific forms, and in which individual and collective, static and dynamic, systematic and cultural aspects of different languages are united [1].

The majority of the earlier studies in Multilingualism have focused on spoken language and *Code-switching* in conversation, phenomena variously called *Code-mixing*, *Code-shifting*, *Language Alternation* or *Language Interaction*. Nonetheless, a much smaller body of research has concerned itself with the phenomena of *Written Multilingualism*. To some extent, the existing conversational theories and models can be applied to written material, although the written medium itself possess specific questions and problems that the researchers have to take into consideration [3].

Sebba (2012) determines that at least two models can be recognized in linguistics as *written multilingualism*, in which different languages can alternate within the same textual composition:

(1) *Parallelism*. This is where there are “twin texts” each with the same content, but in different codes or languages. In parallel texts, there are usually visual cues, which signal that the two texts have similar content. These cues include such features as symmetrical placement of languages about a horizontal or vertical axis, and use of *matching fonts* for similar content in different languages. Parallelism is the norm for bilingual signage, and its apparent function is to give the reader a choice of languages. However, in some cases, such text may be designed for a collective multilingual reading than rather than for a single monolingual reader.

(2) *Complementarity*. Where two or more textual units with different content are juxtaposed within the framework of a textual composition. The juxtaposed texts may be monolingual internally, or they may contain a mixture of languages, for instance, code-switching. Texts like this which are composed of smaller units with different languages or languages mixtures, seem to assume a reader who is bior multiliterate or who at least has sufficient reading competence in both languages[3].

Approaches to written mixed-language discourse are encouraged to contemplate three key aspects: (1) the study of mixed-language discourse needs to be situated within a broader field which deals with the semiotics of mixed-language text in the broad sense; (2) the production and reading of mixed-language written text needs to be studied within a literacy framework; and (3) visual and spatial elements of the written form potentially provide important contextualization cues and therefore need to be included in any framework which seeks to do justice to the semiotic of written mixed-language text, even though they may not be relevant to all such text[3].

1.1.2 Typography

Directly related with the third point previously described, under the perspective of Design the means by which an idea is written and given visual form is known as Type[4]. In the practice of Design, typographic forms are considered as unique elements to visual communication because they are also understood in their dual role. On a formal level, they function as shape, texture, point and line. But also, these forms must communicate a verbal message as well as function effectively as graphic elements in a composition[5]. When typographic elements are managed only with regard to their verbal meaning, the design can lack visual impact; and contrariwise, when type is manipulated with a treatment that enhances its message, that message is perceived on a sensory as well as an intellectual level [5] . Therefore, *designing text* means to shape text *visually* and *linguistically*. Unfortunately, very often in this practice both aspects of a text are considered apart form each other [6] .

In typographic communication, the interaction between the visual and the linguistic is even more amplified when two or more written languages are represented [7] . Typography involves multilevel factors such as language, art, culture and technology, among others. As the essential elements of visual communication, designers are encouraged to complete the study on language text, culture, ideological and psychological level, and then create the reader's intuitive comprehension towards information in order to provide an accurate reading experience [8] .

1.1.3 Writing Systems

In Linguistics, writing systems in the world can be differentiated along two dimensions. First is the size of the speech segments that are represented by the basic graphic units, and second is weather the graphic units encode speech only, or both speech sound and meaning. The term *grapheme* refers to the basic unit in a script that corresponds to the smallest segment of speech represented in the writing. The Chinese language belongs to the category of logographic writing system and its graphemes are *characters*. Languages based on Latin alphabet, such as English or Spanish belong to the category of phonographic writing systems, where graphemes are *letters* [9] .

1.2 Problem Statement

As pointed out by Sebba (2012), "when a reader sees multilingual written information, styles provide context for interpreting the content of the text" [3] . Chinese language and Latin-based languages differ in the very nature of their respective writing systems. Studies in this topic refers either only to Latin Typography, or, only to Chinese Typography, and if both, that is mostly in the form of separated descriptive analysis, without pointing out a practical solution to resolve formal differences under a unified typographic model.

In the aim to overcome this fundamental divergence, this thesis is to present a descriptive and comparative study of Chinese and Latin Typography that focus its attention in recognize their intrinsic principles, and secondly, in identify the structural differences they present in terms of typographic attributes and how to equate them.

On the other hand, advances in technology had allowed appearance of new typography styles as never before, setting designers in a very exciting environment to develop their skills in favor of reaching a better multicultural communication. A deep comprehension on the wide range of existing typographic styles is therefore crucial to use them efficiently as contextualization cues inside multilingual contexts according to the specific requirements of any design project, in formal coherence for the meaning of each piece of content as well as among themselves.

This is the second motivation of this thesis research, in where the ultimate objective is to identify equivalent typefaces applicable to the combined use of Chinese and Latin Typography in Multilingual Design.

1.3 Objectives

[1] To understand the basic principles of Chinese and Latin Typography focusing the attention on recognize essential differences between them.

[2] To recognize solutions to equate the behavior of Chinese and Latin Typography combined in multilingual contexts.

[3] To identify equivalent typefaces applicable to the combined use of Chinese and Latin Typography in Multilingual Design.

1.4 Methodology

Many typefaces in use today are based upon designs created in earlier historical epochs, and the characters themselves have a lineage that extends back thousands of years. An appreciation of typography naturally involves understanding how written language developed [4] . According this concept of Ambrose et al (2006), and to cover the necessary background to understand the essential principles of each writing system, this research begins with brief resumes for the history of Chinese and Latin Typography, with special emphasis on the apparition and evolution of different typographic styles, as explained and illustrated in Chapter 2: *History Overview*.

To understand the principles of Chinese and Latin Typography, a fundamental source was the *Descriptive Framework for Chinese-English Bilingual Typography* of Tam (2012). Presented as a “common language for further discussion on multilingual typography", the framework of Tam describes two main categories of typographical characteristics: *Graphical Attributes* and *Spatial Attributes*, with a total of seventy-six typographic attributes founded in the combined use of Chinese and English language. Tam established that from a total of seventy-six attributes mapped according their semantic value, thirty are directly transferable between the two systems, while twenty-five are language-specific and have no exact equivalence in the counterpart. As long as English is a Latin-based language, this framework can logically be extended to other languages sharing the same alphabetic writing system. Typographic attributes extracted from the framework of Tam were used as a reference to construct a parallel structure to describe the principles Chinese and Latin Typography.

In addition, typographical attributes already selected are complemented with the relevant points founded in the typographic study *Chinese & Latin Typography* of Wang (2013). In Wang (2013), the principles of Chinese and Latin Typography are first described and then compared in a *type* level as well as *paragraph* level, with emphasis in how to balance or accent their differences when they are combined in multilingual design. The conclusions of Wang represent another important source for the construction of this parallel structure.

Other relevant typographical aspects not covered by Tam or Wang are also included to describe typographic principles, extracted from related literature and online resources in Design, Typography and Linguistics. The result of this process is explained in Chapter 3: *Typographic Principles*.

As consequence of identifying intrinsic typographic principles for each writing system, the recognition of fundamental differences emerged. Practical solutions on how to equate the different behaviors of Chinese and Latin-based languages when combined in multilingual contexts were extracted from relevant literature and presented as general reference in Chapter 4: *Designing Text in Multilingual Contexts*.

For the third objective of this research, which is the identification of matching typefaces, the studies of Steiner (1995), Wilhelm (2009), Cao (2012), Tam (2012) and Wang (2013) were analyzed, in order to identify and understand the logical approaches they used to pair typefaces for two different systems. By studying the examples these designers already proposed, the aim was to compile these approaches to serve as a logical guideline to find new matching typefaces applicable in Multilingual Design. The result of this process is explained in Chapter 6: *Typefaces for Multilingual Design*.

1.5 Significance

This master thesis research is intended to provide future reference for the use of Chinese and Latin typography combined in multilingual contexts, applicable in a wide range of specific branches of Design, such as: Graphic Design, Corporative Identity Development, Logo Design, Signale Design, Packaging Design, Information Design and Web Design, to name the most relevant, all of them regarding the design of written forms at some point. The notions described in this study are neutral, practical and flexible enough to be considered for the treatment of multilingual text contents in any of these specific categories.

Understanding the basic notions on how to equate typography attributes and styles will also provide indirectly the fundaments to create a better sense of unbalance or contrast in the use of multilingual texts, following to the specific requirements of a given project.

1.6 Literature Background

This thesis makes use of well-sampled data collection and hypothesis, in relevant books and research papers from different areas of knowledge. For Multilingual Communication they include Tucker (1999), House et al (2004) and Sebba (2012). For Chinese Language, with emphasis in its history and linguistics aspects focused in its writing system they include Norman (1988), Chen (1999), Gao (2000), Liu et al (2003) and Gu (2012). For general notions of Graphic Design and Information Design, they include Munari (1966), Weber (2010) and Evans et al (2013). For history and fundamental principles of Latin Typography, they include Ambrose et al (2006), de Jong et al (2009), Felici (2012) and Bosler (2012). For history and fundamental principles of Chinese Typography, they include Dang (2000), Reed (2004), Ji (2006), Cao (2009), Zhao (2011), Liao (2012) and Shi (2013). All the relevant literature for Chinese Typography, with the exception of Reed, was found in Chinese language, and as long as the proficiency in Chinese reading comprehension of the author of this thesis is more than questionable, their role in this research is acting as an indispensable visual reference, more than a source for information. For the comparison between Latin and Chinese Typography, they include Steiner (1955), Wilhelm (2009), Tam (2012), Cao (2012), Zhao (2012) and Wang (2013). When the data in the available literature do not meet the need of the study, online resources were consulted.

In this research, the Chinese names for a wide variety of concepts from Western typography were collected from different sources; when discrepancies for the nomenclature of some of these concepts in Chinese language were found, the approximate translation to the precise concept in English was selected in the first place, and secondly, the Chinese translation founded in the most recent publication.

2 History Overview

2.1 Brief History of Chinese Typography

Chinese is the only language with a graphic origin that is commonly used in the world today. For many decades, historians have been debating about the origins and early times of Chinese writing. This debate most likely will continue as China unearths additional archaeological discoveries. There are, however, two major general agreements about the earliest Chinese written language. The former recognizes this system had possessed an extended and complex pre-history while the latter recognizes an undeniable and vital link between the symbols of drawings and painting with the development of Chinese as a graphic writing system, which began with a long and slow accumulation of pictorial images. Initially, words simply occurred without any grammatical order, as seen in pottery graphs of pre-history Chinese between the sixth millennium BC to the Shang dynasty (sixteenth to eleventh centuries BC) [10].

Among the most relevant archeological discoveries are worth to mention the tentative evidences for an early form of Chinese dating from 6600–6200 BC found at Jiahu, Henan province; several thousand carving from 6000–5000 BC found at Damaidi, Ningxia province; the Neolithic signs from 5800–5400 BC found at Dadiwan, Gansu province; pictographs from 4770–4290 BC found at Banpo, Shaanxi province; graphs from 4020–3635 BC found at Jiangzhai, also in Shaanxi province; and, the painted pottery from 3300–2000 BC made by the Majiayao culture found in Gansu and Qinghai provinces [10].

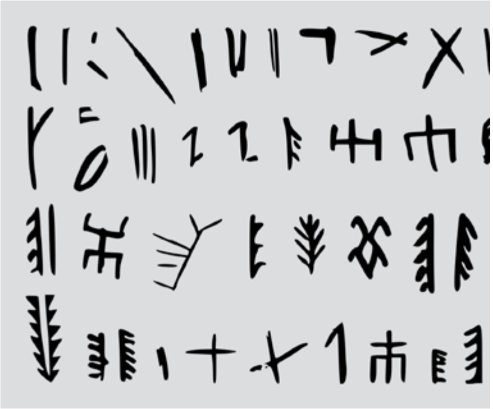


Figure 1: Banpo inscriptions, c. 4770–4290 BC.

More complex signs were found in Liangzhu pottery, dating from 3400–2250 BC. Many historians concluded that this was the proto Chinese writing before it became standardized, systematized and stabilized, a process which took over ten more centuries to complete. On the other side, some scholars thought that the inscriptions in these archeological pieces could be not be recognized as writing because they were found in isolation rather than in sequences that were representative of the spoken language [10].

The inscriptions that showed steady consistency to the early development of Chinese writing was incised signs from the pottery originated by the Dawenkou culture in 2800–2500 BC, found in Shandong province. This was the first time that the unearthed inscription could be directly linked to the Longshan culture, the recognized ancestral link to the Shang dynasty (1600–1046 BC), during which time the first undisputed Chinese writing appeared [10] .

The earliest form of Chinese writing that the majority of scholars have agreed upon is *Oracle Bone Script* (甲骨文 *Jiǎgǔwén*), primarily used in the royal house of the late Shang dynasty mostly in the form of short divinatory texts. These words were inscribed with sharp objects in the front plates (plastrons) of turtle shells or in the shoulder bones (scapula) of oxen. The people of the Shang dynasty threw these inscriptions into a fire and interpreted the broken marks on the bone after it was burnt, attempting to cast their fortune. After many centuries, even thousands of years of accumulated vocabulary and expansion of structural base, the Oracle Bone Script represented a mature written language [9] [10] [11] .

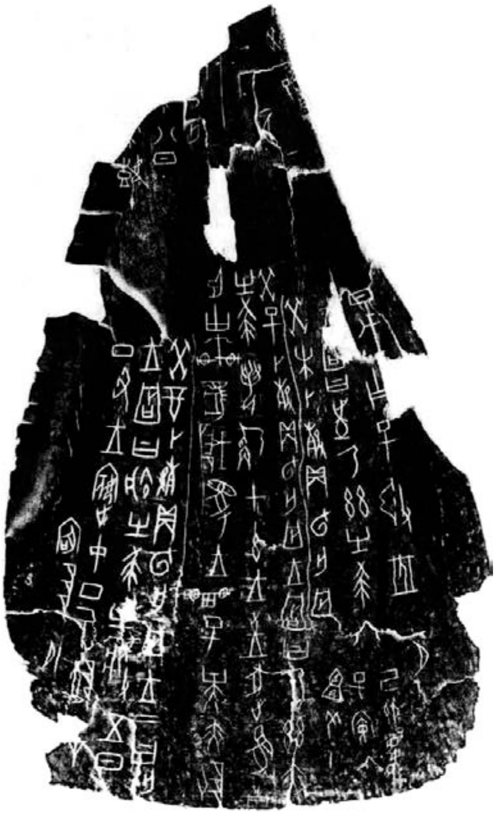


Figure 2: Oracle Bone Script, Shang Dynasty

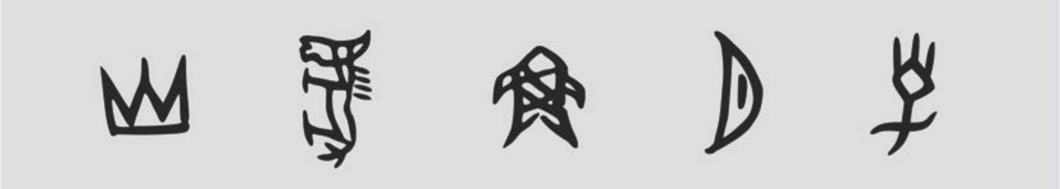


Figure 3: Oracle Bone Script 甲骨文 (*Jiǎgǔwén*).

This process of simplification occurs due to the growing importance and use of writing as society became more complex, and to the need to simplify and rationalize the linear structure of the graphs as their use became even more prevalent. The more truly representational a graph is, the more difficult and time-consuming it is to depict. This is pointed as the main reason why there is a natural tendency for such a graphs to become progressively simplified and stylized, allowing the writing system to mature and to become more widely used. As a result, pictographs gradually tend to lose their obvious pictorial quality. In general, a tendency to straighten out the strokes and to convert earlier rounded strokes to sharper angles can also be observed [11] .

From the same period there also exist a number of inscriptions in bronze vessels of various sorts, commonly known as *Bronze Script* (金文 *Jīnwén*), which was in use during the period containing the Late Shang dynasty, Western Zhou dynasty, Spring & Autumn period, until some point between the end of the Warring States period and the beginning of the Qin dynasty (1300–221 BC) [12] . Initial bronze inscriptions of Shang period are very short, consisting of only a few characters, in a relatively uniform style compared to Oracle Bone Script. By the early Western Zhou dynasty (eleventh century–771 BC), Bronze Script forms are quite similar to those found on vessels dating from the Shang period. It is in the Western Zhou where many graphs began to show signs of simplification and linearization, changing rounded elements into squared ones, solid elements into short line segments, thick and variable width lines into thin ones with uniform width, subsequently, it shows a tendency toward greater regularity. Bronze Script has come to be considered the representative script of this period [9] [10] [11] .

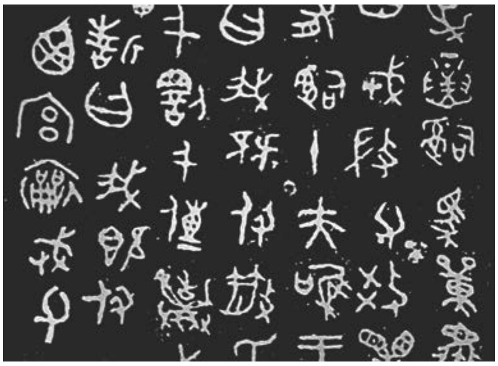


Figure 4:《散氏盘》Bronze Script, Late Western Zhou.

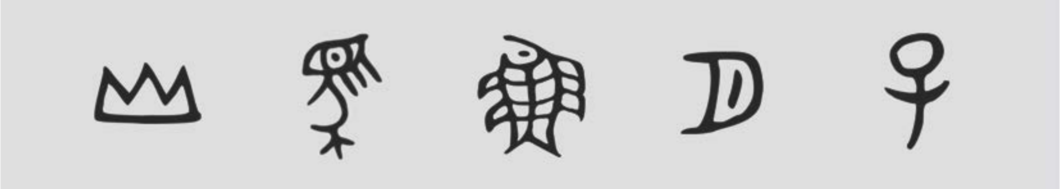


Figure 5: Bronze Script 金文 (*Jīnwén*).

By the beginning of Eastern Zhou (770–221 BC), Chinese script became less pictorial as the strokes from which the characters were composed became fully linearized, the curved lines straightened, and disconnected lines were connected. During the Warring States period (475–221 BC), the characters in bronze inscriptions already had evolved in a vertically elongated, rectangular script. The typical script used in daily writing evolved in local styles cultivated independently of one another, crystallized in what are called the *Scripts of the Six States* [9] [10] [11].

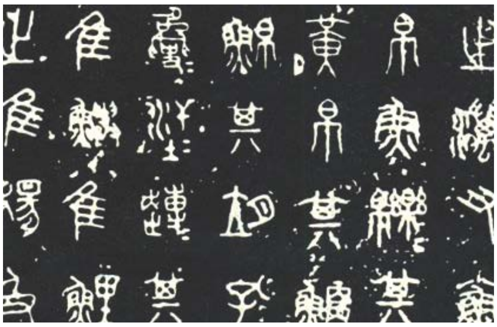


Figure 6:《石鼓文》*Stone Drum*, Big Seal Script, Qin dynasty.

In connection with Bronze Script, another sort of writing called *Zhou Script* (籀文 *Zhòuwén*), better known as *Big Seal Script* (大篆 *Dàzhuàn*) should be mentioned [11]. Traditionally considered as a derivative style of Bronze Script, Big Seal Script emerged during the Western Zhou and it was still in use until the Qin dynasty (1122–221 BC). During the Spring & Autumn period as well as in the Warring States period, the application of Big Seal Script was not limited to bronzes but also applied in carved inscriptions on stones [12] [13]. The graphic style of Big Seal Script features a clear structure composed by thick and powerful strokes in rounded and abstract shapes. Among all the existing samples of this style, the piece known as "Stone Drum" (石鼓文 *Shígǔwén*) is one of the most famous. Due to its distinctive features, Big Seal Script was used as the foundation for the square based written expression of Chinese language [12]. It should be noted that some controversy still surrounds the origin of this script form, where some recent scholarship tends to basically identify it as the same as *Western Zhou Bronze Script* [11].

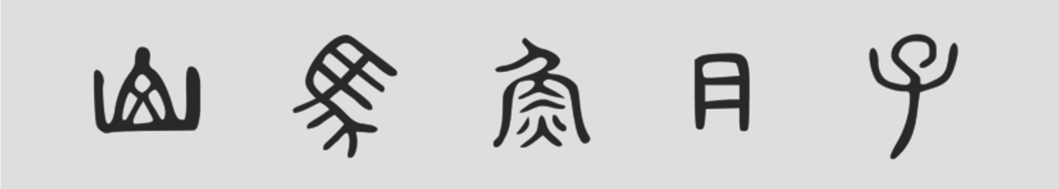


Figure 7: Big Seal Script 大篆 *Dàzhuàn*.

On the eve of the first great imperial consolidation under the Qin dynasty (221–206 BC), the Chinese script in the course of its history of over a millennium had evolved far away from its primitive pictorial roots and was undergoing a process of rapid diversification over the two or three centuries preceding the unification of the entire country. The next major development in the history of Chinese script took place when the first emperor of the Qin dynasty put into effect a script reform, stipulating the style known as *Seal Script* (篆书 *Zhuànshū*) as the standard script. This measure was part of a series of standardization policies for such as things as weight and measures, currency and legal statutes, mandatory throughout the whole new Qin empire in order to unify it. The script which was adopted under the Qin dynasty existed in two different forms, a more complex standard form referred as *Small Seal Script* and a simplified demotic form referred as *Clerical Script* [11].

The former style *Small Seal Script* (小篆 *Xiǎozhuàn*), also known as *Standard Style* (正体 *Zhèngtǐ*), was the official and more formal variety of Qin dynasty script and its name makes reference to its widespread use on seals. The Qin seal script directly descended from the bronze inscriptional style Big Seal Script of the Western Zhou dynasty. In the course of its development, Small Seal Script had taken on a more regular and balanced appearance without, however, changing to such a degree that its ultimate pictographic origins became totally obscured. The character structure in Small Seal Script is more simplified and uniform than the one its predecessor displays, transforming its morphology from rounded to squared throughout strokes of regular width. This transition is considered as the first simplification of Chinese characters [9] [11] [12].

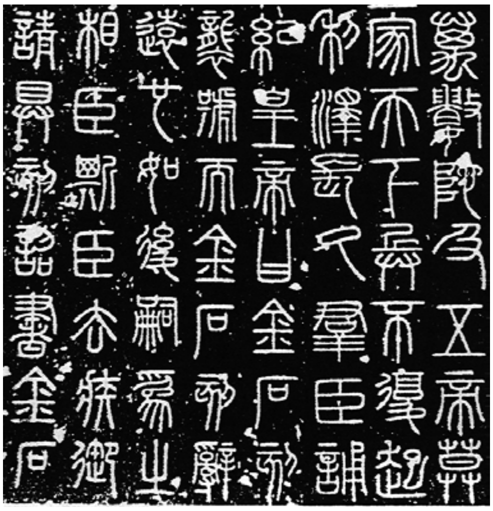


Figure 8:《嶧山刻石》*Yishan Stele*, Small Seal Script.

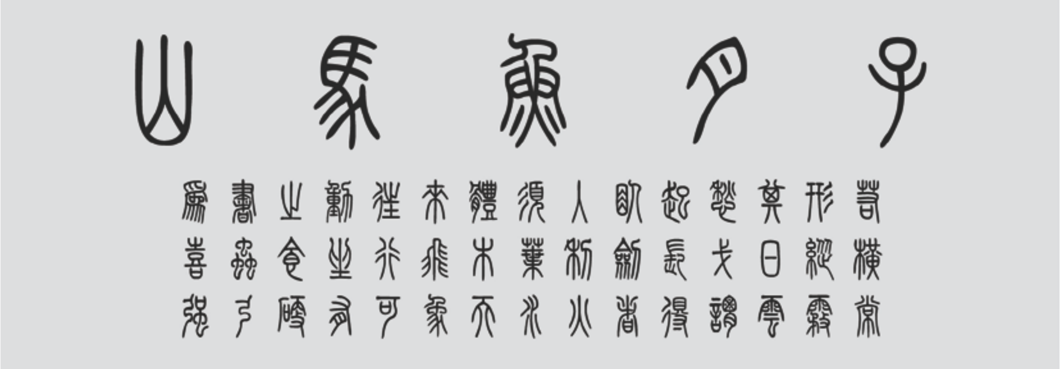


Figure 9: Small Seal Script 小篆 *Xiǎozhuàn*.

The latter demotic form of writing used in the Qin dynasty *Clerical Script* (隶书 *Lìshū*) takes its name from its association with various types of clerks employed by the government. Clerical Script was also known as *Vulgar Style* (俗体 *Sútǐ*) and served an auxiliary role, mainly for occasions where ease of writing outweighed consideration or formality [9] [11].

The forms of Chinese writing used up until the end of the Qin dynasty belong to the so-called *Old Scripts* or *Ancient Scripts* (古文字 *Gǔwénzì*) in literature of Chinese linguistics. With the end of the Qin dynasty and the beginning of Han (206 BC), Clerical Script gradually replaced Small Seal Script as the official form of writing, event that marks the beginning of Modern Chinese writing system. In the early Western Han (206 BC–24 AD), the Clerical Script was still very similar to the one used in the Qin dynasty, but by the first century BC it evolved with a progressive tendency toward a more stylized and abstract representation, losing its earlier pictorial aspect through the use of a rather more ondulant and regular style of brushwork. This Han version of Clerical Script is considered as the classical form of this style, and it is still widely practiced by modern calligraphers [9] [11].

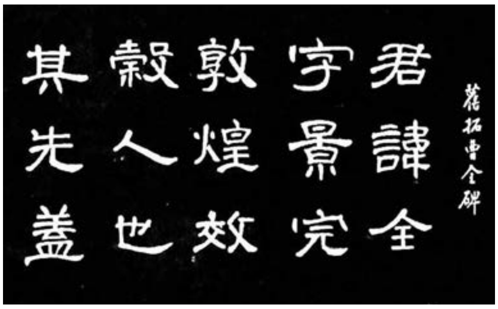


Figure 10:《曹全碑》*Cao Quan Monument*, Clerical Script, Han dynasty.

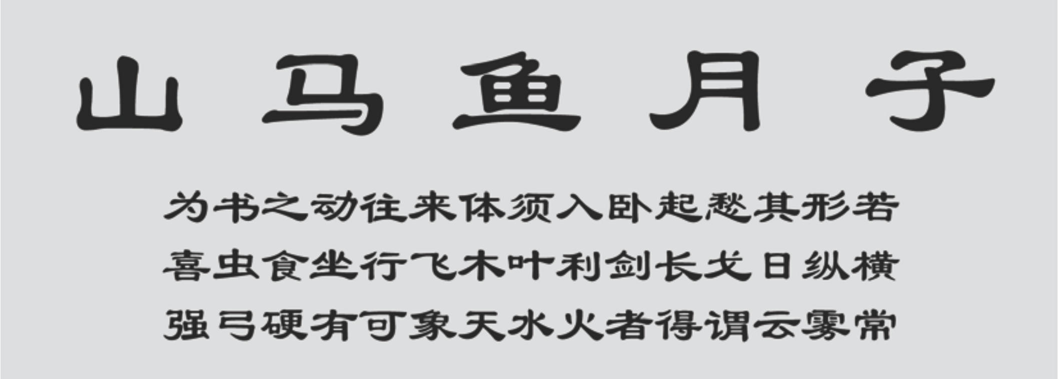

山马鱼月子
为书之动往来体须入卧起愁其形若
喜虫食坐行飞木叶利剑长戈日纵横
强弓硬有可象天水火者得谓云雾常

Figure 11: Clerical Script 隶书 *Lìshū*.

Several other variant styles, most notably *Cursive Script* and *Regular Script*, developed from Clerical Script after it replaced Small Seal Script as the formal style [9] [13].

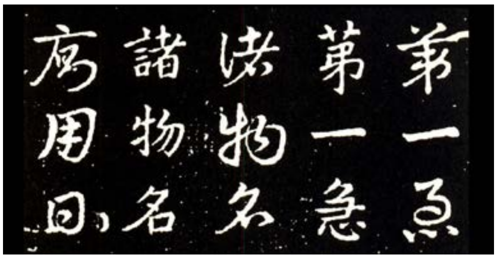


Figure 12:《急就章》Cursive Script, Han dynasty.

The emergence of *Cursive Script* (草书 *Cǎoshū*) during the Eastern Han dynasty (25 AD－220 AD) represents the next important development in the history of Chinese writing. Cursive Script, also know as *Fully-Cursive Script*, is a calligraphic script derivate from Clerical Script and it is considered as the cursive handwritten form for Chinese characters. The roots of this style can already be observed in the Qin demotic script, where some individual forms are written in an especially flowing and abbreviated fashion. In Cursive Script, an acceleration of the writing speed can be clearly appreciated in the tendency to connect one stroke with the next, freely joined together in order to obtain maximum velocity and convenience. A fully-fledged expression of this style is consolidated in the latter part of the first century BC, only shortly after the mature development of the classical Han Clerical Script. Both scripts, Clerical and Cursive were widely used during the Han dynasty, the former as the formal and official script and the latter serving as an auxiliary and informal means of writing drafts and letters [11] [14].

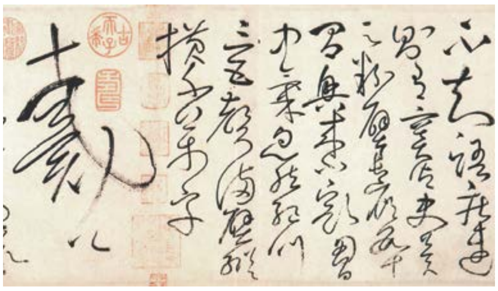


Figure 13:《自叙帖》Cursive Script, Tang dynasty.

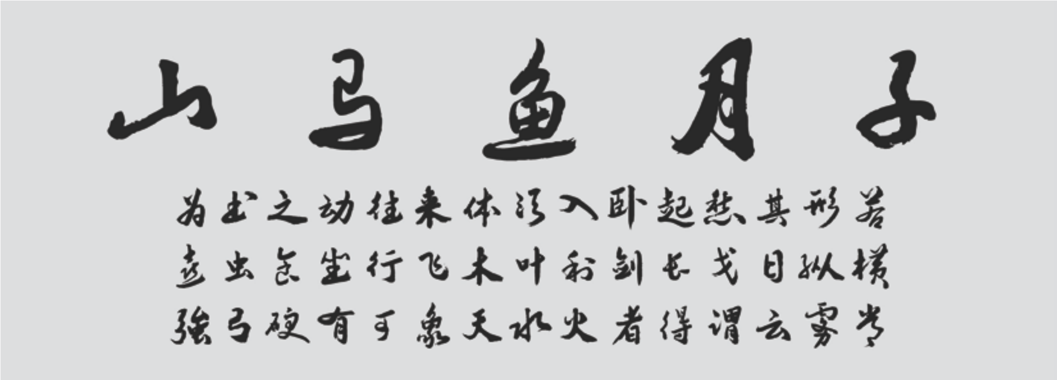


Figure 14: Cursive Script 草书 *Cǎoshū*.

The Eastern Han dynasty also saw the beginnings of systematic study of the Chinese script, with the appearance of the “Shuowen Jiezi” (说文解字 *Shuōwén Jiězì*), literally meaning “Explaining and Analyzing Characters”. This piece was a dictionary written in the year 100 AD by Xu Shen (许慎 *Xǔ Shèn*), who based his analysis in 9.353 Chinese characters written in Small Seal Script, this style being the oldest variety of writing known until that time. The work of Xu Shen is considered the first elaborated theory of script development, which has the remarkable accomplishment of describing the principles to guide graphic analysis for almost two millennia, including contemporary research with considerable relevance [11] .

In the latter part of the Eastern Han dynasty (206 BC－220 AD), another form of script known as *Regular Script* (楷书 *Kǎishū*) began to emerge, also derivating from the Clerical Script in its classical Han form, as mentioned before. Regular Script represents a further evolution toward a more regular and convenient form of writing in which the smooth and wavelike strokes of Clerical Script are transformed into straighter lines and sharper angles. This evolution was influenced by the development of new wood printing techniques along with cursive forms of writing. Some transitional scripts between Clerical and Regular style are to be found in certain late Han, but a fully mature Regular Script does not appear until the time of the Eastern Jin dynasty (317–420 AD). By the Southern and Northern dynasties (420–589 AD), Regular Script emerges as the standard form of the Chinese script and replaces Clerical Script for all ordinary purposes, becoming later quite popular in the Sui dynasty (581–618 AD) and Tang dynasty (618–907 AD), being in this last period where the style reaches its maturity. Since its emergence, Regular Script has been unbrokenly used and its forms represent the basis for all the modern forms of writing in China. [9] [11] [12] [13] .

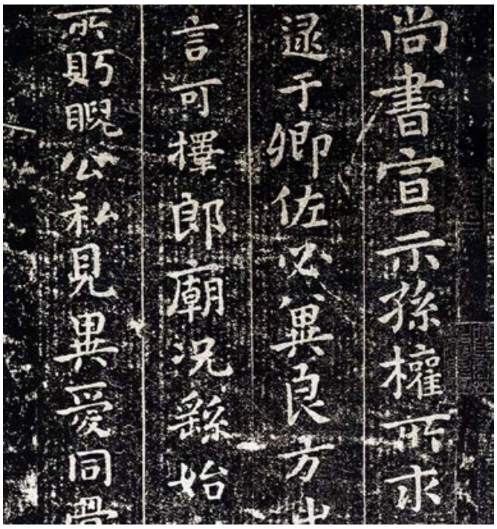


Figure 15: Regular Script in the calligraphy of Zhong Yao (钟繇), Late Eastern Han.

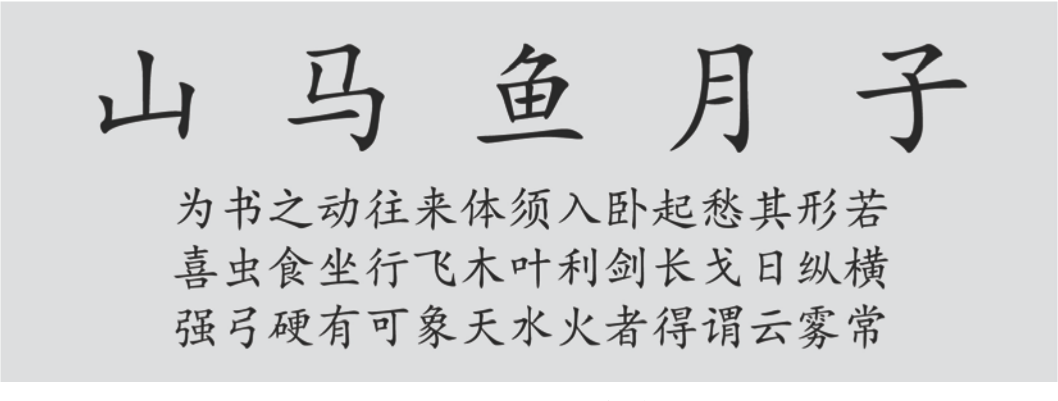

山 马 鱼 月 子
为书之动往来体须入卧起愁其形若
喜虫食坐行飞木叶利剑长戈日纵横
强弓硬有可象天水火者得谓云雾常

Figure 16: Regular Script 楷书 *Kǎishū*.

Another form of writing in connection with Cursive Script and Regular Script can already be seen in materials from the late Eastern Han dynasty (25 - 220 AD). This style is known as *Running Script* (行书 *Xíngshū*) or *Semi-Cursive Script*, which is considered as the intermediate space between Cursive and Regular scripts. As long as in cursive forms older elements of the Clerical Script were eliminated and also further simplifications and abbreviations were adopted, cursive characters tend to a more flowing appearance, therefore, its readability is low and its practicality is reduced. This is undoubtedly the reason why Running Script emerges, adopting many features of Cursive Script writing while its basic outlines remains much closer to Regular Script. In comparison to both Cursive and Regular scripts, Running Script results much less codified, making it more useful to the average person as a means of drafting documents and writing personal letters. Running Script becoming popular during the Jin dynasties (265–420 AD), and, by the Tang dynasty (618 - 907 AD) was one of the two prevalent writing styles along with Regular Script [11] [12]. The calligraphic piece known as “Preface to the Orchid Pavilion Gathering” (兰亭序 *Lántíng Xù*) made by Wang Xizhi (王羲之 *Wáng Xīzhī*) in the year 353 AD was written in Running Script, and is considered as unrivaled in the history of Chinese calligraphy. This work was written by its author at a gathering at the Lanting Stream in Shanyin, Kuaiji, nowadays the modern Shaoxing, Zhejiang [13] [15].

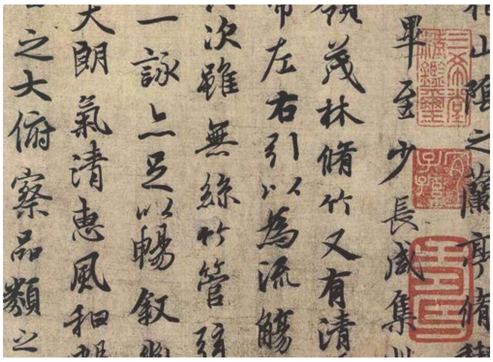


Figure 17:《兰亭序》*Preface to the Orchid Pavilion Gathering* (reproduction), Running Script, Tang dynasty.

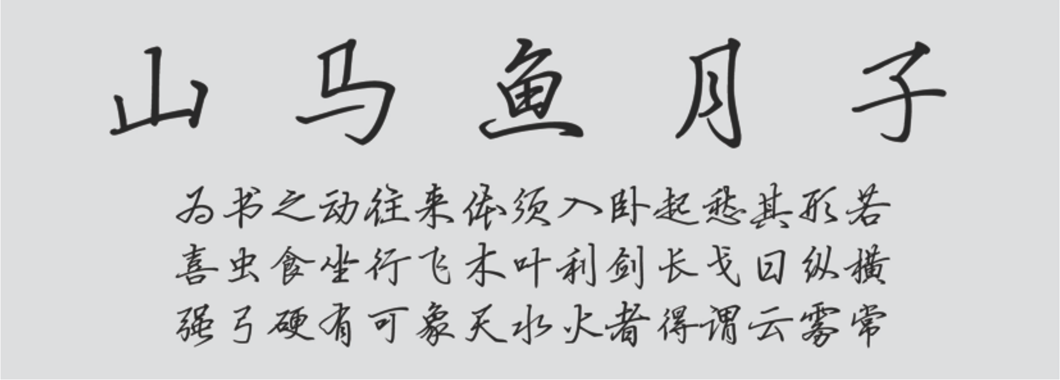
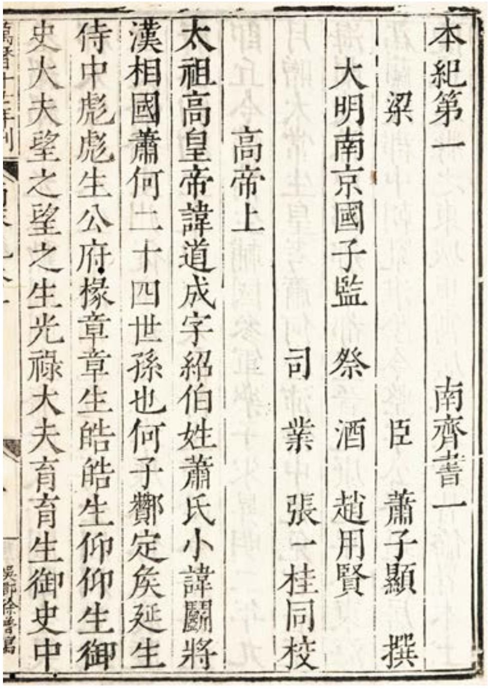

山 马 鱼 月 子
为书之动往来体须入卧起愁其形若
喜虫食坐行飞木叶利剑长戈日纵横
强弓硬有可象天水火者得谓云雾常

Figure 18: Running Script 行书 *Xíngshū*.

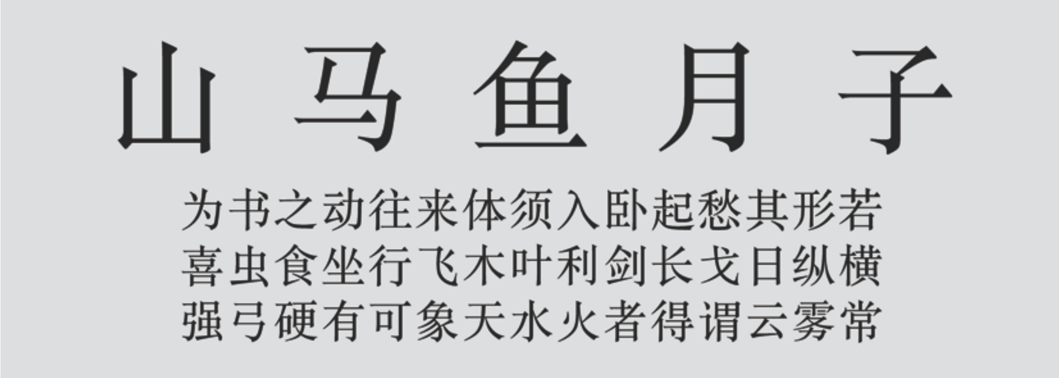
During the Song dynasty (960﹣1279 AD) takes place the appearance of the first movable type printing system in the world, created by Bi Sheng (毕昇 *Bì Shēng*) between the years 1048﹣1048. Records from the period collect detailed explanations of this new invention. Sheng elaborated individual clay pieces for each character, then burn them to make them more resistant by transforming them into porcelain, to finally cover them with a layer of iron plate. These pieces were arranged together inside frames, forming a compact surface where the ink paste was applied. After warming the frame with fire, smooth boards were pressed over the surface, capturing the melted ink[16].



本紀第一　南齊書一
梁　臣　蕭子顯　撰
大明南京國子監　祭　酒　趙用賢
司　業　張一桂同校
高帝上
太祖高皇帝諱道成字紹伯姓蕭氏小諱鬬將
漢相國蕭何二十四世孫也何子酇定侯延生
侍中彪彪生公府掾章章生皓皓生仰仰生御
史大夫望之望之生光祿大夫育育生御史中

Figure 19:《齊書》*Book of Qi*, Songti, Ming dynasty.

Evolving from Regular Script, the next relevant style emerged also during the Song dynasty, and it was called *Songti* (宋体 *Sòngtǐ*) taking its name from the period where its appearance occurs. Nevertheless, it was not until the Ming dynasty (1386﹣1644 AD) that Songti matured as style. In the period of woodblock printing, lettering workers progressively simplified the shapes for this script, in order to shorten the carving steps. Songti is the result of this simplification: a new style expressed in fine horizontal strokes and wide vertical strokes obtaining a strong contrast, with small triangles added at the end of horizontal strokes[12].



山 马 鱼 月 子

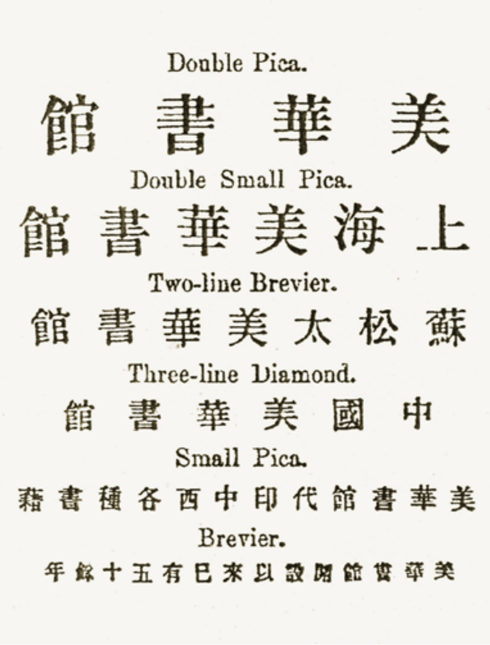
为书之动往来体须入卧起愁其形若
喜虫食坐行飞木叶利剑长戈日纵横
强弓硬有可象天水火者得谓云雾常

Figure 20: Songti 宋体.

The appearance of Songti reflects the great impact that woodblock printing had in China, from its development in the early Tang dynasty (618–907 AD). The proliferation of this xylographic technique started during the Song dynasty (960–1279 AD), spreaded widely during the Yuan (1271–1368 AD) and the Ming (1386–1664 AD) dynasties, reaching its climax under the Qing dynasty (1644–1912 AD). Consequently, by before the nineteenth century, China already had a significant national reading public that allowed the appearance of a modern publishing industry [17].

Western-style printing technologies of lithography and movable type were introduced to China in the beginning of the nineteenth century, by European missionaries organizations that established their locations in Macao, Canton, Hong Kong and Shanghai. They took to China not only new religious trends from Europe and United States, such as Protestantism and Catholicism, but also new printing technologies to spread them. Habituated to more than 1.000 years of printing culture based in woodblocks, Chinese readers at that time had a very strong conservative attitude opposed to any innovation in the writing system. Therefore, it was not until middle 1870s that new printing technologies started to slowly replace Chinese xylography [11] [17].

Engraved typecasting of Chinese characters sets for movable type printing began in the 1810s, produced under the technical expertise of foreign missionaries, such as Joshua Marshman (1768–1837), Robert Morrison (1782–1834), Samuel Dyer (1804–1843), Richard Cole and William Gamble (1830－1886), being this last the one to achieve the most suitable type font in both technical and aesthetic aspects required at that moment. The typecast made by Gamble, *Song Type* (宋体 *Sòngtǐ*), also known as *Meihua Type* (美华体 *Měihuátǐ*) after the Chinese name for the American Presbyterian Mission Press APMP (美华书馆 *Měihuá Shūguǎn*) who commissioned its production was by 1879 the only kind in use in Chinese or foreign printing firms [17] [18].



Double Pica.

美華書館

Double Small Pica.

上海美華書館

Two-line Brevier.

蘇松太美華書館

Three-line Diamond.

中國美華書館

Small Pica.

美華書館代印中西各種書籍

Brevier.

美華書館開設以來已有五十餘年

Figure 21: Song type design by William Gamble, 1859.

From the late nineteenth century on, the city of Shanghai was unquestionably the single most important center of Chinese publishing industry, being the host of the heartquarters for many book publishers, for instance, Commercial Press (商务印书馆 *Shāngwù Yìnshū Guǎn*) and Zhonghua Book Company (中华书局 *Zhōnghuá Shūjú*), among others [17] . Between 1908 and 1921, Chinese typographers, led by the Commercial Press, searched widely for alternatives to replace the missionary fonts, and by the middle of 1920s, four main styles all regarded by Chinese superior to the Western-created fonts, had come to dominate Chinese language printing. These styles were *Zhengkai* (正楷 *Zhèngkǎi*) and *Cu Ti* (粗体 *Cūtǐ*), developed by Commercial Press typographers or by traditional calligraphers in their employ; *Fangsongti* (仿宋体 *Fǎngsòngtǐ*), developed by Zhonghua Books, and *Song* (宋 *Sòng*), which, despite its popularity, its authoring still remains unknown [17] .

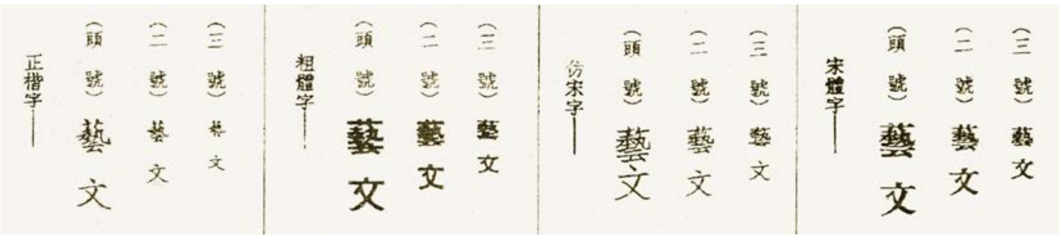

正楷字
（頭號）藝文
（二號）藝文
（三號）藝文
粗體字
（頭號）藝文
（二號）藝文
（三號）藝文
仿宋字
（頭號）藝文
（二號）藝文
（三號）藝文
宋體字
（頭號）藝文
（二號）藝文
（三號）藝文

Figure 22: Zhengkai, Cuti, Fangsongti and Songti, the most popular typefaces by 1920s.

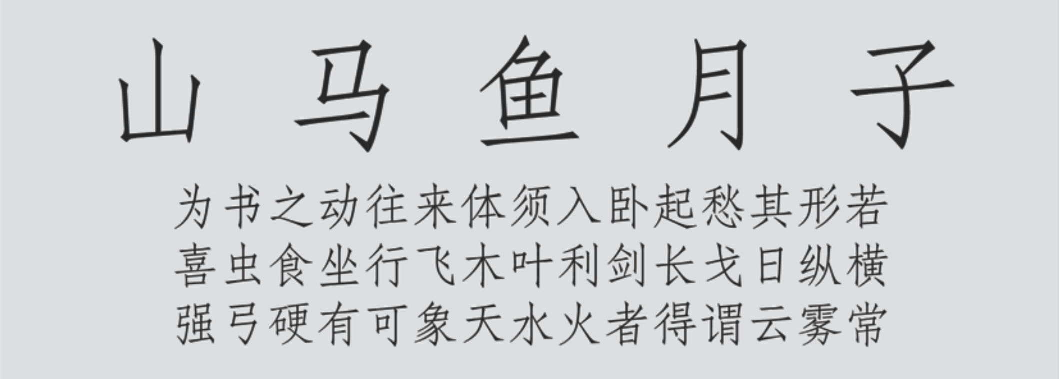

山马鱼月子
为书之动往来体须入卧起愁其形若
喜虫食坐行飞木叶利剑长戈日纵横
强弓硬有可象天水火者得谓云雾常

Figure 23: Fangsongti 仿宋体.

A growing interest toward Western typography started to appear, and it is believed that at some point of the early 20th century, Chinese characters were there merged with foreign models, resulting in the apparition of an hybrid style known as *Heiti* (黑体 *Hēitǐ*). There is no accurate literature confirming the exact origin of Heiti. Some scholars indicate that Heiti was created not in China, but in Japan or somewhere else abroad. Nevertheless, Heiti still remains as the most modern Chinese type in history. The basis of Heiti combines the structure of Regular Script with the clear and squared proportions of Songti, in flat horizontals and straight vertical strokes of constant thickness, devoided of any ornamentation [12] [13] [16] .

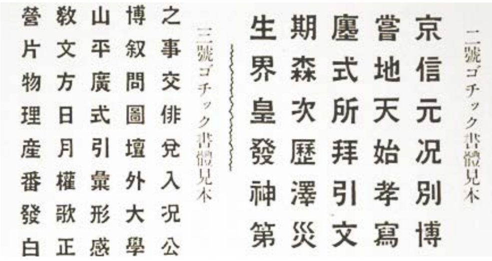

一號ゴチック書體見本
京信元況別博
嘗地天始孝寫
慶式所拜引文
期森次歴澤災
生界皇發神第
二號ゴチック書體見本
之事交俳兌入況公
博敘問圖壇外大學
山平廣式引彙形感
敎文方日月權歌正
營片物理産番發白

Figure 24: Fragment of the earliest known printed specimen for Heiti.

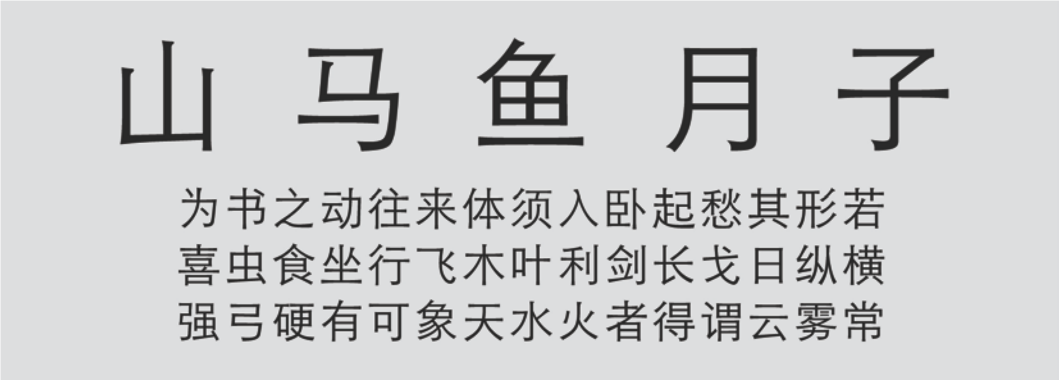

山 马 鱼 月 子
为书之动往来体须入卧起愁其形若
喜虫食坐行飞木叶利剑长戈日纵横
强弓硬有可象天水火者得谓云雾常

Figure 25: Heiti 黑体.

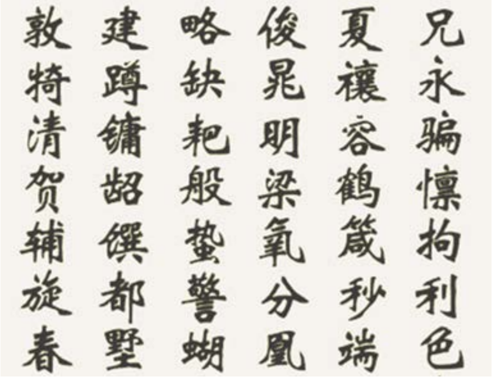
By the 1930s, Songti, Kaiti, Heiti and Fangsongti are the most important and representative typographies in China. Songti and Kaiti were frequently used in newspapers and magazines [16] .

At the same time, new variations on calligraphic and artistic styles appeared, and the use of typography start to be considered with even more attention. In this period, there was a great diversity in printed publications, in where both Chinese and Western typefaces were combined with different visual elements, such as paintings, illustrations and drawings, expressing innovation and freedom of creativity. A representative example of this development is the extensive creation of advertisement pieces for different products and services, which used calligraphic styles of great size in layouts never seen before, setting Chinese characters in horizontal arrangements imitating Western writing. These new combinations expressed a high visual sense of movement, inside balanced compositions [16] .

From 1950s to the middle of 1960s is considered as the period previous to the Cultural Revolution. At this time, in 1956, the State Council of China promulgated the *Scheme of Simplified Chinese Characters* (汉字简化方案), edited in 1964 as the *General List of Simplified Characters* (简化汉字总表). These events mark the beginning of the popularization of Simplified Chinese. The coexistence of Traditional and Simplified Chinese characters was quite frequent during this period. Afterwards, in Beijing and Shanghai fonts such as Songti, Kaiti and Heiti were restructured into the new standards to fulfill the demands of printing houses and editorials, in order to obtain Simplified Chinese versions for the four most important styles for Chinese writing: Songti, Fangsongti, Heiti and Kaiti [9] [16] .

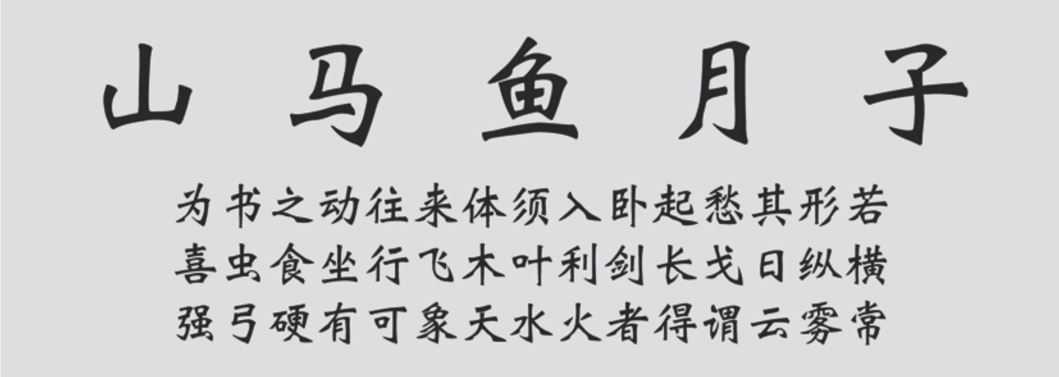
After the successful results obtained in this standardization process, the new priority was to improve the quality for headlines. Towards the end of 1950s, the typeface *Mouti* (牟体 *Móutǐ*) specially developed to be applied on headlines, started to popularize. Mouti takes characteristics from Heiti and it was created in eight variations of stroke thickness [16] .

At this point, the design of Chinese typography starts to include the participation of expert calligraphers. By the beginning of 1960s, designers in Beijing released a typeface of strong strokes called *Lishuti* (隶书体). During 1970s, the styles *Xin Weiti* (新魏体) and *Xin Kaiti* (新楷体) appeared in Shanghai, both created by calligraphers directly writing with brushes [16] .



敦建略俊夏兄
犄蹲缺晁禳永
清镛耙明容骗
贺龆般梁鹤懔
辅馔蛰氧箴拘
旋都警分秒利
春墅蝴凰端色

Figure 26: Fragment of a printed specimen for Xin Weiti, 1974.



山马鱼月子
为书之动往来体须入卧起愁其形若
喜虫食坐行飞木叶利剑长戈日纵横
强弓硬有可象天水火者得谓云雾常

Figure 27: Xin Weiti 新魏体.

However, during the period of the Cultural Revolution, typography research was putted on standby. In printing, the most used typefaces were Songti, Heiti, Fangsongti, Lishu and Weiti. For headlines, Heiti and Songti were often selected for the powerful thickness of their strokes to ensure the intensity of visual impact and the diffusion of the message. The aim of the period was to achieve a sublime beauty, a certain heroic tone, a eulogy to both strength and combative spirit, a combination of elements that can be noticed in the profuse production of propaganda posters from that time [16] .

During the middle of 1970s, started the digitalization of Chinese characters, along with the appearance of new technologies, such as systems for digital printing. Old printing systems based in metal letter-print were quickly replaced. A new step in the evolution inside the Chinese press industry occurred, this time with the assistance of computer software to increase the research in the field of typography, and therefore, to achieve notable improvements [16] .

From 1980s, companies dedicated to develop Chinese typography through digital media started to emerge. The market for typography development saw its expansion. More than ten companies, including Fangzheng (方正), Huawen (华文), Hanyi (汉仪), Huakang (华康) and Wending (文鼎), all of them with more than thirty years of experience nowadays, created in that period more than one hundred different typefaces, a production without precedents [16] .

In the 1990s, the accelerated grow of Chinese economy allowed a prosper development of the areas of artistic and graphic design, and with them, the creation of new typography styles. Text became a main element in visual communication, while typography design became a potential market. Companies began to put their interest in keep innovating Chinese typography, using diverse approaches and models for the evolution of artistic styles. Despite the differences between these companies, they manage to generate a creative atmosphere in this field [16] .

By the beginning of the XXI century, competition between press editorials became more intense. The labor of design that initially was restricted to publication covers, now was extended to design publications completely, generating a great demand for visual variations in typography. In this moment, it is evident that design typography for Chinese characters began to expand according to a market composed by different kinds of media, and consequently, by the taste of the public consuming them. Nowadays, Chinese typography design is a standardized labor, which is mainly focused in aesthetics, and the unification of style and formats. Despite there is not too much specialized professionals in this area, many people is actively participating in the innovation and design of new typography styles. The academic formation in this area is growing, according to this new start point for future developments [16] .

2.2 Brief History of Latin Typography

Letters, language and indeed typography develop and change over time as the dominant power inherits, alters, adapt and imposes its will on existing forms. The modern Latin alphabet is a result of this ongoing transition that has been performed over several millennia [4] .

The earliest standardized writing system is Cuneiform, which was developed in ancient Mesopotamia, the region that now is east of the Mediterranean, from about 4000 BC until about 100 BC. It began to die out as other language systems such as Aramaic (a Semitic language, precursor for Arabic and Hebrew) and Phoenician scripts spread out to the region [4] .

The Phoenicians lived in the eastern Mediterranean in what nowadays is Lebanon. They developed the basis of the modern Latin alphabet around 1600 BC, by giving form to a system of 22 signs or symbols that represented sounds rather than objects. The symbols could be put together in different combinations to construct thousands of words. Phoenician was written horizontally from right to left without spaces between words. This alphabet is the bedrock for many subsequent writing systems including Greek and Latin, and ultimately for the modern European alphabet that is used today [4] .

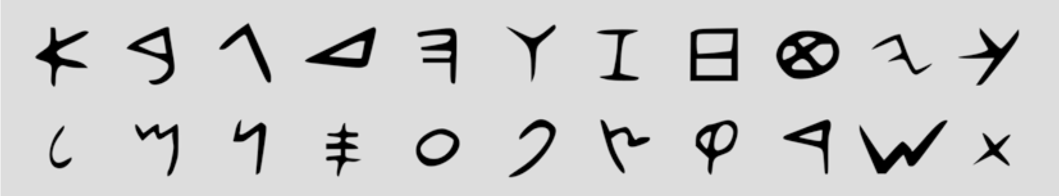


Figure 28: The 22 symbols in Phoenician writing system.

The Greeks adopted the characters of the Phoenician system, such as *aleph* (‘a’) and *beth* (‘b’), from which they developed their alphabet. Indeed, the word alphabet is the union of the Greek characters *alpha* and *beta*. By around 800 BC, the Greeks had added other characters to their alphabet. Writing became more standardized around 500 BC when the character set became fully recognizable, as that which are known today in both Greek and Roman forms [4] .

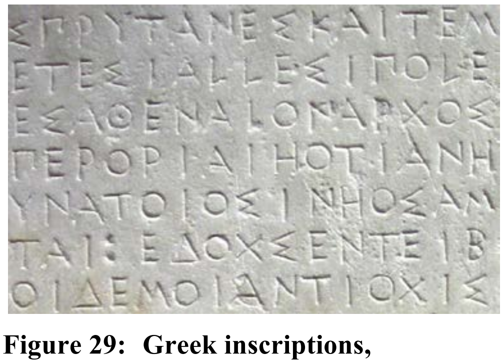


Figure 29: Greek inscriptions, carved marble, c. 403 BC.

The twenty-six letters Roman alphabet that we use today was formed from the Greek alphabet and spread through the Roman empire. *Majuscules* (大写字母 *Dàxiězìmŭ*) or *uppercase* letters derive directly from the forms carved in stone by the Romans, which serve as basis for many modern day typefaces, and now are used to describe the basic letterforms [4].

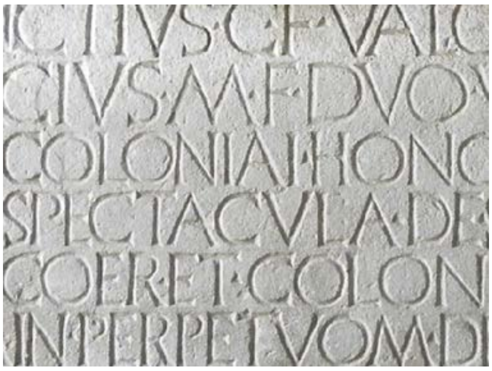


Figure 30: Roman inscriptions from Pompeii Stadium, Italy.

By the year 800, Charlemagne, or Charles the Great, regarded as the founder of the Holy Roman empire, began to standardize all ecclesiastical texts. Alcuin of York, Abbot of Saint Martin of Tours, and his workforce of monks endeavored to rewrite all religious texts. For this labor, they devised a print system including both majuscules and *minuscules* (小写字母 *Xiăoxiězìmŭ*), also called *lowercase* forms. These new letterforms were known as the *Caroline* (卡洛林 *Kăluòlín*) minuscules and they would later become the basis of modern typography [4].

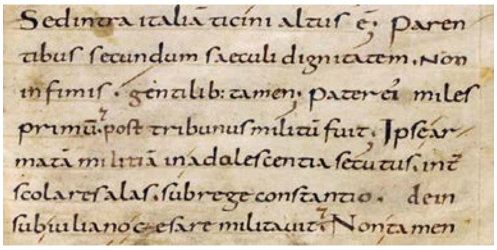


Figure 31: Carolin Minuscules.

After the inclusion of minuscules, the letterforms for Latin alphabet have been remaining basically the same since then. The modern Latin alphabet consists of fifty-two upper and lowercase letters with ten numerals and punctuation marks, plus a variety of other symbols and accents employed by various different languages. For instance, most European alphabets that are Latin based they are not the same, as some have more letters than others. English has twenty-six letters, while traditional Spanish has thirty [4].

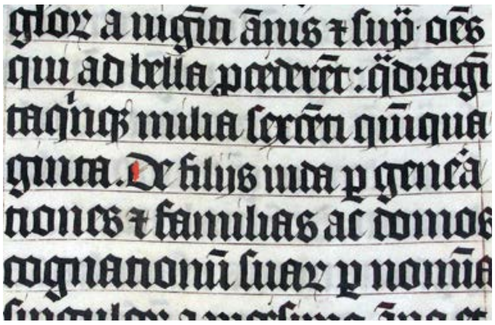


Figure 32: Blackletter calligraphy in Latin Bible, England, c 1407.

With the demise of the Charlemagne rule, regional variations on this new set with Caroline minuscules appeared. Around the year 1150, a style known as *Blackletter* (哥

特体 *Gētètǐ*) emerges in France from the ornate writing style prevalent during the Middle Ages. Blackletter style is also called *Gothic* (哥特手写体 *Gētè Shǒuxiětǐ*) and *Old English* (旧时英语手写体 *Jiùshí Yīngyǔ Shǒuxiětǐ*). Nowadays these typefaces appear heavy and difficult to read in large text blocks due to the complexity of the letters and the fact that they seem antiquated and unfamiliar to us. Blackletter typefaces are commonly used on certificates as well as to add decorative touches, such as initial caps [4].

Blackletter became popular in Northern Europe and remained in widespread use for over 400 years. Later, in the Italian Renaissance, scholars of the period rediscovered classic Roman and Greek works. They mistook the Caroline form as being much older, not initially realizing that these books had been rewritten between the years 796 to 804. They adapted the rotunda script (a broad open character), to create a hybrid humanistic script: the *scrittura humanistica*. Modern descendants of this form clearly has their roots in this calligraphic style [4].

Meanwhile in Germany, the printer Johannes Gutenberg (1400–1468) developed the first printing press and the use of movable type in the Western world, system able to print with both metal and wood type. Gutenberg is also been credited with the first printed book in 1455, a Latin bible produced in Mainz, Germany. The development of the printing press allowed the mass production of books that previously had to be written by hand. Movable type improved this development even further by allowing text characters to be reused, providing further time and cost savings. This technology remained the basis of the printing industry until hot metal printing [4] [5].

With the arrival of the Italian Renaissance in the late fifteenth and early sixteenth centuries, also comes a revival of the values developed in the classic cultures of the Greek and Roman Empire. These values are the main influence for the appearance of Roman types, designed by redrawn characters based on those used in earlier times. These styles with classical forms that people began to favor, first in Italy and then in the rest of Europe, are known as *Old Style* (旧时风格 *Jiùshí Fēnggé*) typeforms, and they superseded Blackletter styles quickly after their appearance. Old Styles are more condensed than the Carolingian forms that preceded them, but rounder and more expanded than Blackletter [4] [19]. The earliest of the Old Style Latin typefaces was *Bembo* (本博体 *Běnbótǐ*), created in 1495 by Francesco Griffo under the commission of the Cardinal Bembo, taking its name from this last one. Bembo fully describe classical and elegant features of the Roman inscriptions [12].

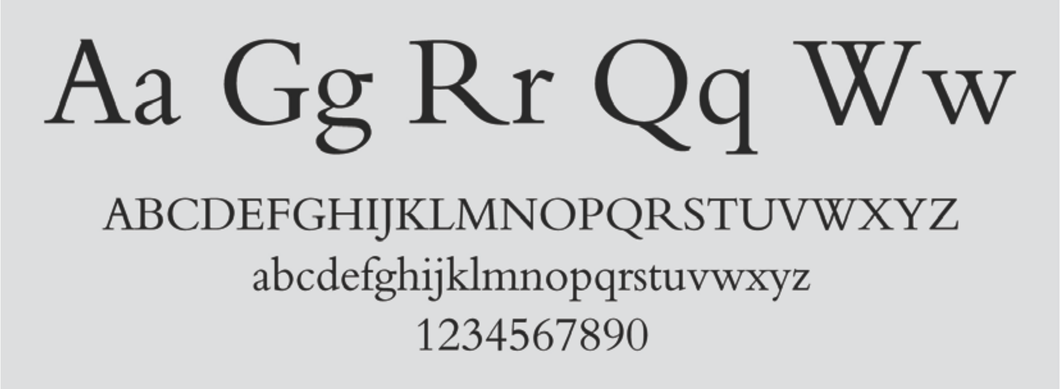

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 33: Bembo.

Another example of Old Style is *Garamond* (加啦蒙体 *Jiālaméngtǐ*), created in Paris by Claude Garamond in 1535. Garamond is considered as pure old-style face and also as the first with both Roman and Italic faces as components of a type cut [5] [12] .

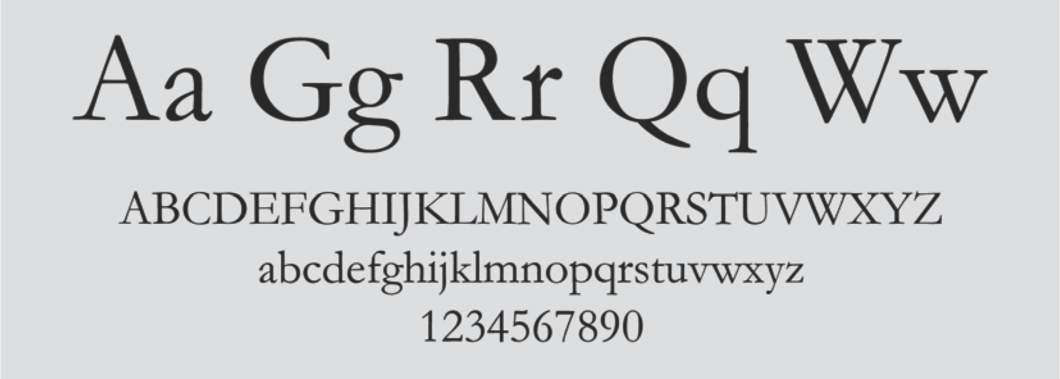
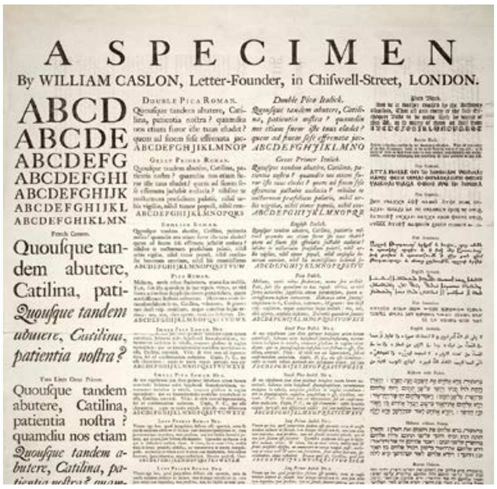

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 34: Garamond.


A SPECIMEN

By WILLIAM CASLON, Letter-Founder, in Chiſwell-Street, LONDON.

Figure 35: Fragment of Caslon's specimen, 1734.

Almost two centuries after the creation of Garamond, the British engraver William Caslon I published in 1734 his design *Caslon* (卡斯隆体 *Kǎsīlóngtǐ*), presenting a printed specimen with a total of 38 typefaces, considered as the first extensive typographic catalogue. The designs of Caslon are also categorized as Old Style, and they became popular soon, even out of England reaching the American colonies. Furthermore, Caslon was chosen by Benjamin Franklin for the first printing of the American Declaration of Independence, reason why this design is also considered as an early international typeface style [4] [12] [20] .

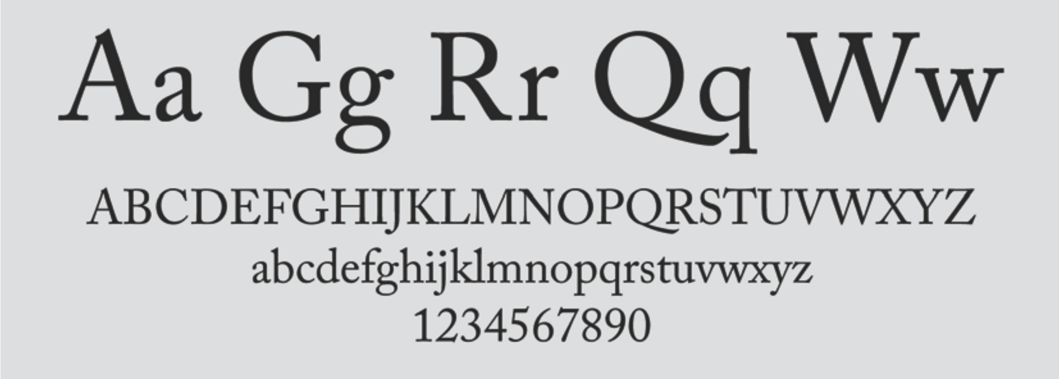

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 36: Caslon.

In the 1800s, the Industrial Revolution brought mechanization that allowed printing to speed up, photoengraving which replaced handmade printing plates and line-casting machines that revolutionized typesetting and allowed to increase the levels of detail and intricacy. Technological development also made font creation to take less time, allowing the development of a wider range of typefaces, and the process of extend font families much more easier. One development of the time was the introduction of *Boldface*, versions of a face with stroke weights heavier than those in the version used for setting text, used to demonstrate emphasis. Experimentation with serifs saw them become thinner and thinner. The fonts created within this evolution were called *Transitional* (过渡风格 *Guòdù Fēnggé*) fonts, and as the name implies, these transitional typefaces represented an intermediary phase in a design trend away from Old Style type aesthetics to a newer look. The font *Baskerville* (巴斯克维尔体 *Bāsīkèwéiěrtǐ*), created by John Baskerville around 1754, exhibits the classic traits of a Transitional face [4] [19] .

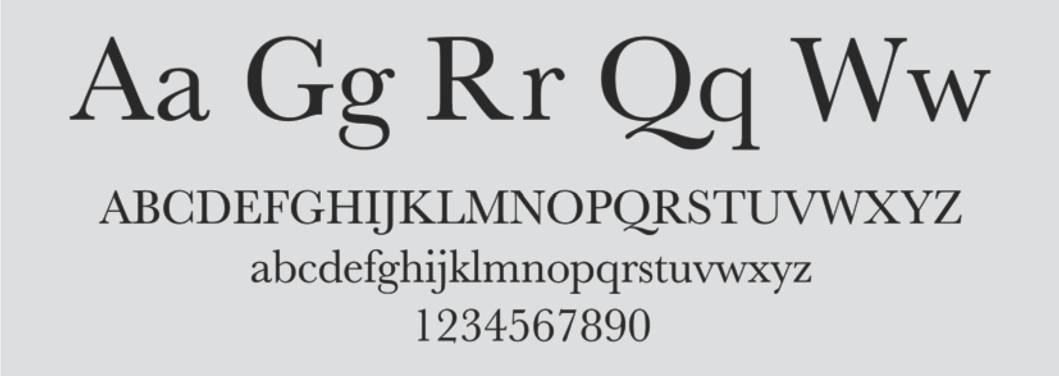

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 37: Baskerville.

The contrast between stroke weights in Transitional faces is much more marked than in Old Style, and this is especially evident in the uppercase letters. In addition, the stress of the curved letters is now vertical, giving the lowercase characters in particular a more upright and erect appearance[19].

Towards the middle of the Industrial Revolution, Transitional types began to adopt the characteristics that are seen in *Modern* (现代 *Xiàndài*) typefaces. Modern typefaces have an almost engraved look, and the thin strokes have been reduced to hairlines, as have the serifs. This extreme contrast gives modern typefaces an almost glittering quality. The serifs meet the strokes with right angle terminations, or in technical words, they are unbracketed. In comparison with most Old Style text faces, Modern types tend to appear somehow darker on the page, with an allover effect very upright, formal, and crisp[19].

One example of Modern style is *Didot* (迪多体 *Díduōtǐ*) created in 1784 by the French designer Firmin Didot, who was searching for a mathematically and geometrically perfect font[12]. According to the scholars, however, the most famous exponent of Modern style was the Italian printer Giambattista Bodoni, who created the *Bodoni* (波多尼体 *Bōduōnítǐ*) typeface around 1790. There is a great visual similarity between the styles of Didot and Bodoni, and despite they were born in the same period, it is believed they were created separately[12] [19].

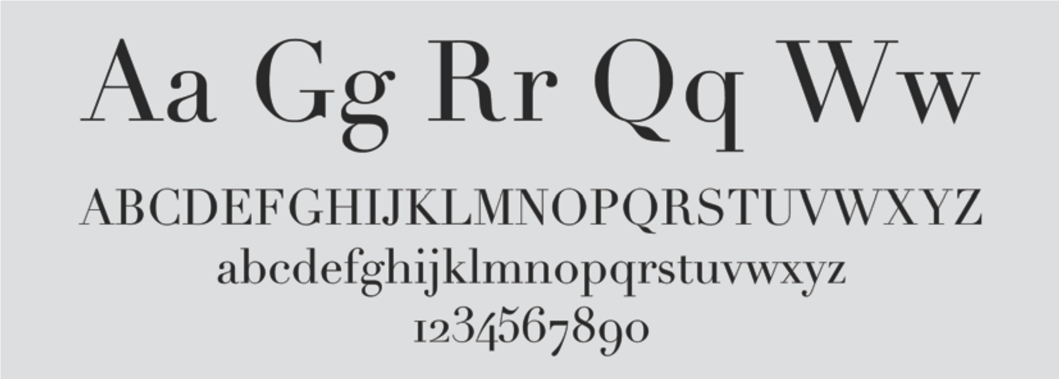


Figure 38: Didot.

In 1815, the British type-founder Vincent Figgins released *Antique*, a typeface designed from scratch without historical reference. The main new feature in Antique is larger, with square serifs that were considered to be bolder than those of their predecessors,

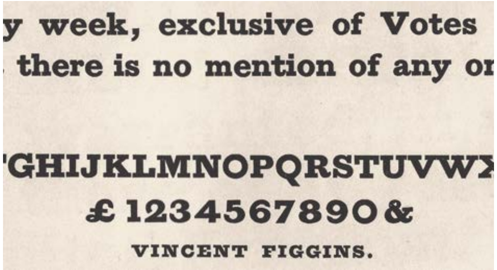


Figure 39: Antique.

which categorize this design as the first *Slab Serif* or *Egyptian* typeface. Antique typeface was an outrage to the public. Not everyone disliked the new form of type, though. Critic's comments would range from "the most brilliant typographical innovation of the nineteenth century", to being referred to as a "typographical monstrosity" [4] [21] .

Several artistic movements start to appear, as a counter response to the advances in printing developed during the Industrial Revolution, and these movements also influenced typography. The first of these was the "Arts & Crafts" movement in the late-nineteenth century United Kingdom, which involved a small group of artists and designers that were dismayed as the production of previously handmade items became coldly mechanized. Their movement encouraging traditional craftsmanship was a pushback against industrial technology. Ornate, decorative designs were used for the type, ornamental letters and illustrations. The work of William Morris and the Kelmscott Press is representative of this movement [22] .

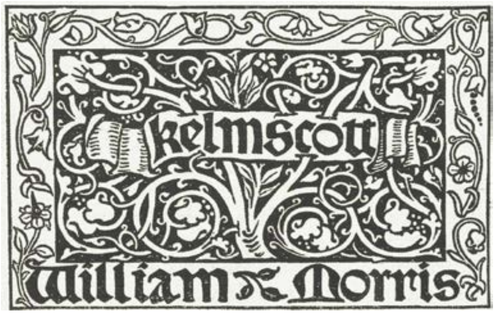


Figure 40: A revival of Medieval calligraphy in Kelmscott Press Mark.

During the same time period, 1890–1914, "Art Nouveau" was the answer of France to the Industrial Revolution. The goal was to create an international style based on decorative elements. Unlike the Arts & Crafts movement, Art Nouveau tried to integrate the decorative style into everything, from visual arts to applied arts and architecture. Lavish flowers, abstract lines and intricate borders were a few of the elements worked into the art. Consequently, the typefaces they used were also highly decorated, as artists strove to create new typefaces that contrasted with the utilitarian feel of metal type. These styles have an

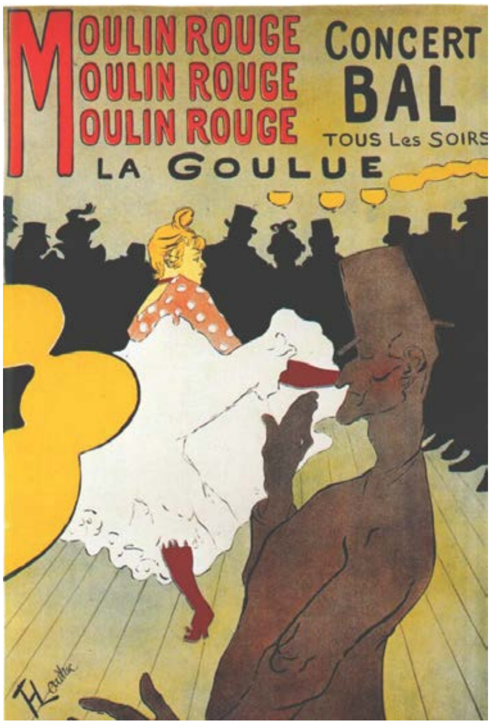


Figure 41: ***Moulin Rouge: La Goulue*****, poster by Toulouse-Lautrec, 1891.**

organic look that was often integrated with art inspired by nature. Lithography allowed the merging of art with industry to produce posters and color plates for books. The first person to mass-produce posters with lithography was the exponent of Art Nouveau in Paris, Jules Chéret (1836–1933). Other protagonists of this movement include Thomas Theodor Heine (1867–1948) and Henri de Toulouse-Lautrec (1864–1901) [4] [22].

At the onset of the twentieth century, typography was influenced by a new series of movements in the art and design world. Most of these movements were also a counter response, this time against the ornate and classical notions of art existed in the nineteenth century [5]. Functionality and progress became key concerns in the attempt to move beyond the external physical representation of reality through experimentation in a struggle to define what should be considered *modern* [4].

An example for the search of functionality expressed in this tendency is the appearance of the typeface *Akzidenz Grotesk* (格罗泰斯克体 *Géluótàisīkètǐ*), attributed to the German typographer Gunter Gerhard Lange, who created it in 1898. In Akzidenz Grotesk, the key feature is the elimination of serifs, in a very simple style. However, this was technically not the first typeface without them. William Caslon's great grandson, William Caslon IV, cut the first sans serif font in 1816, called *English Egyptian*. The absence of serifs was so unusual at that time, that other contemporary typographers of Caslon IV called it *grotesque*, a name that Akzidenz Grotesk inherits. The development of the grotesque features continued during the twentieth century, in a typographic style defined as *Grotesque* Sans Serif [4] [11] [20].

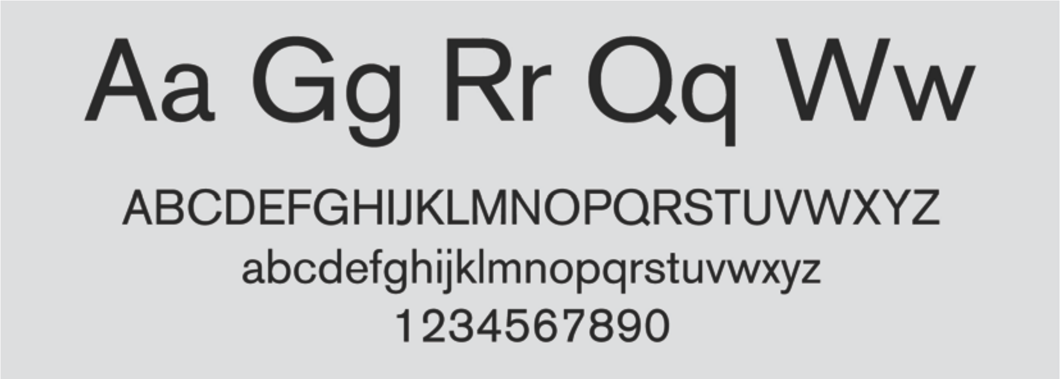


Figure 42: Akzidenz Grotesk.

Many of the most popular Sans Serif variant styles came from the pioneering work of the designers at the Bauhaus, a revolutionary art school in Germany from 1919 to 1933. The two mantras of Bauhaus were "Form follows function" and

"Less is more". These two principles were applied to all aspects of art, design, furniture, architecture and also typography. Its adherents were firm in their belief that the purpose of an item came first and its aesthetics were secondary. Bauhaus embraced modern technologies and production advances, striving to reduce everything down to its barest essential form. Type was unadorned and simple, with clean, clear, concise execution in the design layout [19] [22].

In 1924, Paul Renner designed *Futura* (本来体 *Běnláitǐ*), which is considered the major typeface development to come out of the constructivist orientation of the Bauhaus movement. Futura is considered as a *Geometric* Sans Serif typeface, due to the fact that Renner based the shapes of his typeface in simple geometric forms (the circle, the triangle and the square), represented with strokes of constant width and angled ends to obtain letters of high readability, in a modern type that was not just a revival of past styles. Futura became the most influential typeface of the Bauhaus era for its beautiful shapes and for combining mechanical and utilitarian functions in a modern style [4] [12] [19].

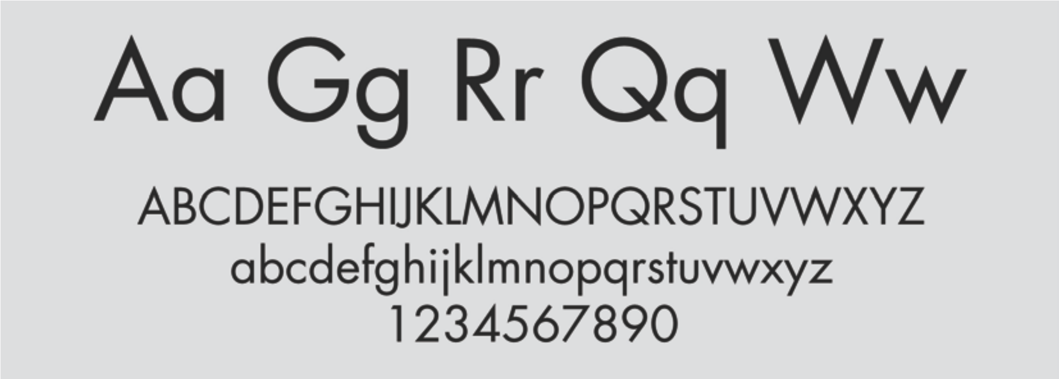
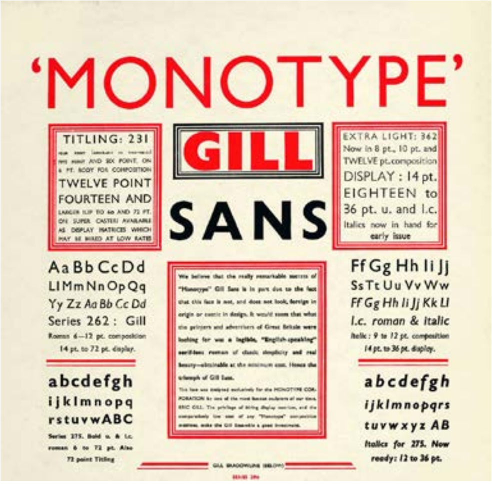


Figure 43: Futura.



'MONOTYPE'

TITLING: 231

TWELVE POINT
FOURTEEN AND

GILL
SANS

EXTRA LIGHT: 362
Now in 8 pt., 10 pt. and
TWELVE pt. composition
DISPLAY : 14 pt.
EIGHTEEN to
36 pt. u. and l.c.
Italics now in hand for
early issue

Aa Bb Cc Dd
Ll Mm Nn Op Qq
Yy Zz *Aa Bb Cc Dd*
Series 262 : Gill
Roman 6—12 pt. composition
14 pt. to 72 pt. display.

abcdefgh
ijklmnopq
rstuvwABC

Ff Gg Hh Ii Jj
Ss Tt Uu Vv Ww
Ff Gg Hh Ii Jj Kk Ll
l.c. roman & italic
Italic: 9 to 12 pt. composition
14 pt. to 36 pt. display.

abcdefgh
ijklmnopqrs
tuvwxyz AB
Italics for 275. Now
ready: 12 to 36 pt.

Figure 44: Fragment of Gill Sans's specimen, 1935.

At some point between 1928 and 1930, *Gill Sans* (吉尔体 *Jiěrtǐ*) was released by Arthur Eric Rowton Gill. His multiple background as sculptor, designer and illustrator is consider as a main factor in the great understanding he dominated at the moment to create this type, by inserting modern shapes in the traditional proportion given by Roman typographies, a return to old type forms that classifies Gill Sans as a *Humanist* Sans Serif typeface [12] [20].

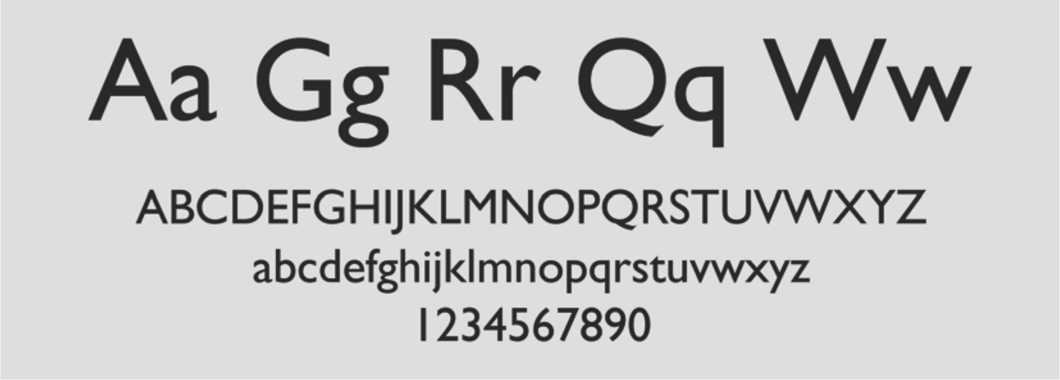

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 45: Gill Sans.

In 1931, the DIN institute, Deutsches Institut für Normung (German Institute for Standardization), published *DIN 1451*, a new variant for the Grotesque Sans Serif style. Despite the popularity of Geometric Sans Serif typefaces in the 1920s and 1930s, the DIN typefaces lacked elegance and did not took advantage from the design trends proposed by the Bauhaus. DIN contained several standard typefaces for mechanically engraved lettering, hand-lettering, lettering stencils and printing types. These were to be used in the areas of signage, traffic signs, wayfinding, lettering on technical drawings and technical documentation [23] .

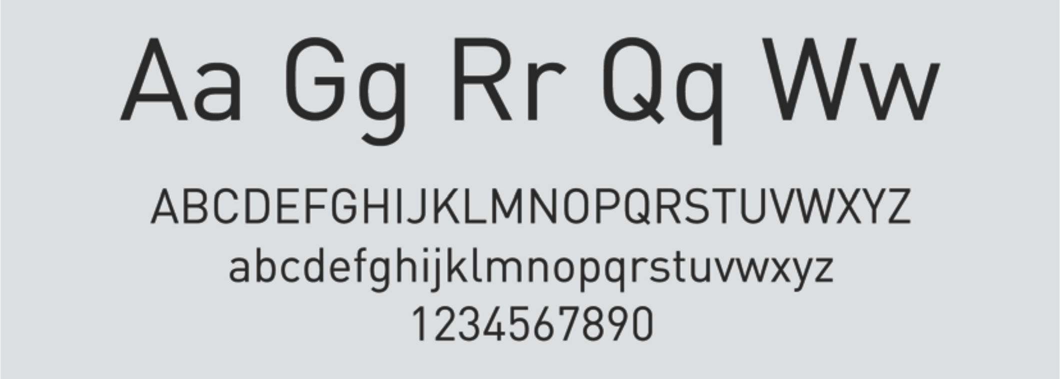

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 46: DIN.

Meanwhile, the development of Serifs fonts also followed its own course. *Times New Roman* (泰晤士新罗马体 *Tàiwùshì Xīn Luómǎtǐ*), was created in 1932 by the designer Stanley Morison under the commission of William Lints-Smith, the manager in London for the Times newspaper. The idea behind its conception was to find the best typeface for newspapers. Among the features that Times New Roman exhibits are high legibility, using short ascenders and descenders along with sharp-cut small serifs, giving the text beautiful visual qualities. All these features were consider for this type to be reproduced specifically in printed media, even with poor resources or in small letters. Times

New Roman is considered as the most popular Serif typography [4] [12] [20] .

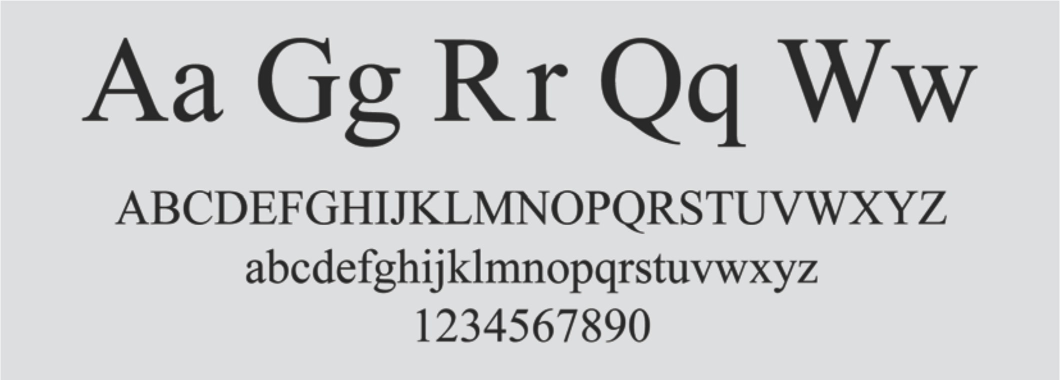

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 47: Times New Roman.

In 1950s, the demand for a wider choice of font styles and the emergence of photosetting both helped the development of typography. Multiple highlights in the history of Western typography took place in this decade. For instance, in Switzerland, an influent movement in graphic design style appeared under the name of *International Typographic Style*, also known as *Swiss Style*. International or Swiss Style emphasizes cleanliness, readability and objectivity, based on the revolutionary principles of the 1920s, such as those proposed by Bauhaus. Grids, mathematical principles, minimal decoration and sans serif typography became the norm as typography developed to represent universal usefulness more than personal expression [4] [24] .

Also during 1950s, the typographer Hermann Zapf led the Humanist movement, with the lines between Serif and Sans Serif typefaces blurred as organic lines were reintroduced into typography. The notable work of Hermann Zapf in font creation has several achievements. His *Palatino* (帕拉提诺体 *Pàlātínuòtǐ*) appeared in 1950 and named after Giambattista Palatino, a master of calligraphy from the days of Leonardo da Vinci [4] .

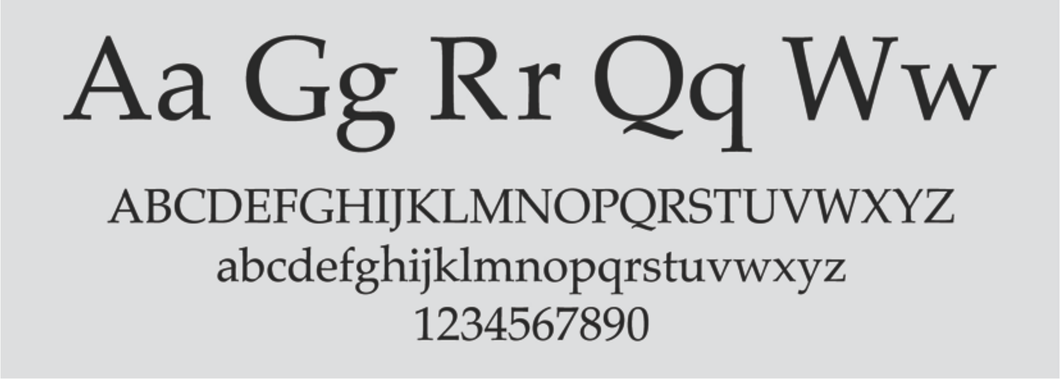

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 48: Palatino.

Palatino is a universally admired Zapf typeface. It is optimized for legibility, with open counters and carefully weighted strokes based on classical Italian Renaissance forms that were legible even on the inferior quality papers available following the Second World War. In 1958, Zapf releases *Optima* (奥普蒂玛体 *Àopǔdìmǎtǐ*), inspired by letters he sketched based on grave plates cut from c. 1530, which he witnessed while visiting the Santa Croce church in Florence. Optima is a humanist sans serif blended with Roman and calligraphic styles, making it a smooth read and a suitable font for general purposes. Letterforms are in the classical proportions of the golden ratio [4] .

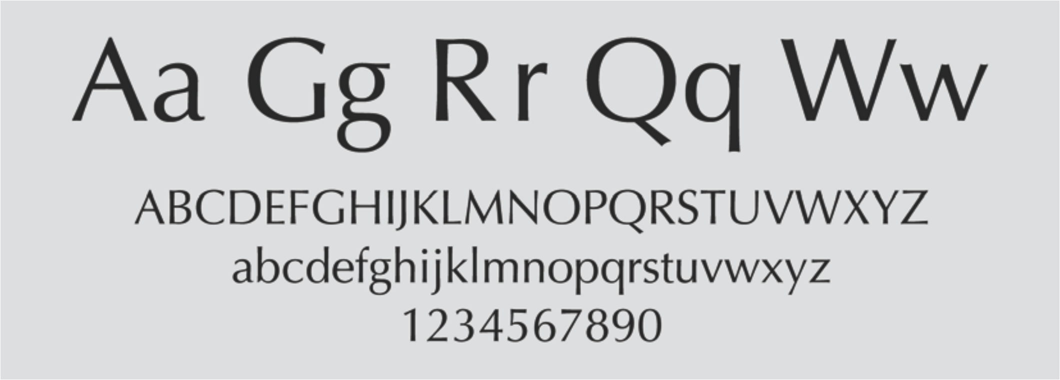

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 49: Optima.

In the same decade of 1950s, Howard Kettler created *Courier* (信使体 *Xìnshǐtǐ*) for the IBM typewriters, which later was redesigned by Adrien Frutiger for the IBM Selectric Typewriters. The letter structure of Courier is called *monospaced*, which means that all letterforms use the same horizontal and vertical space. Their strokes feature fixed width ending in rounded shapes. Its appearance remains the manual typewriter era. Nowadays, this typography is widely used inside digital media or where equal letterspace is required, showing consistent alignment [12] .

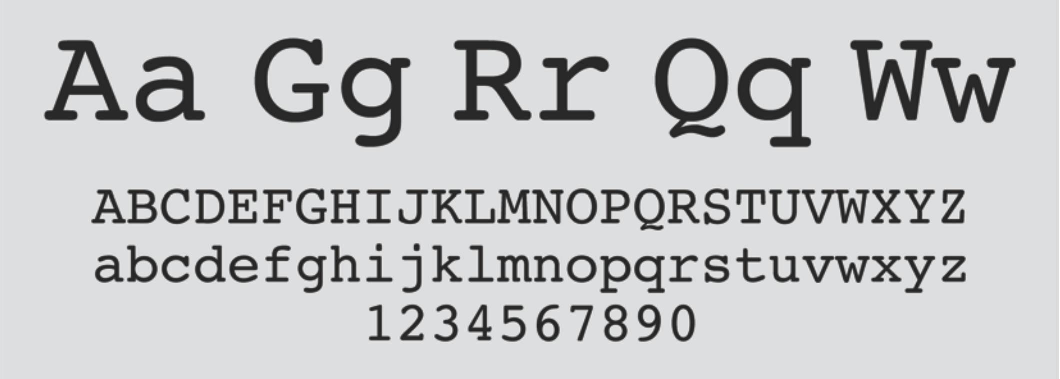

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 50: Courier.

Adrian Frutiger is recognized as one of the most famous typographers of the XX century. In 1957 he created his *Univers* (通用体 *Tōngyòngtǐ*) fontface. Classified as a *Neo-Grotesque* Sans Serif typeface, Frutiger based his model on the 1898 typeface Akzidenz-Grotesk. Univers was notable on its launch for its availability in a comprehensive but consistent range of weights and styles. It was one of the first typefaces to fulfill the idea that a typeface should form a *family* of similar designs, organized by weight and width proportions in a unified system, designated by the use of numbers rather than names. The variety of names to make the comparison of different weights from different families was difficult and confusing, and this point was one of the motivations for Adrian Frutiger to developed this grid system [4] [12] [25] .

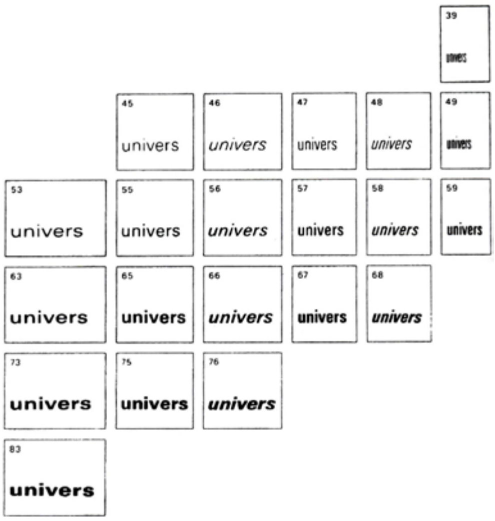

39 univers
45 univers
46 univers
47 univers
48 univers
49 univers
53 univers
55 univers
56 univers
57 univers
58 univers
59 univers
63 univers
65 univers
66 univers
67 univers
68 univers
73 univers
75 univers
76 univers
83 univers

Figure 51: Adrian Frutiger's grid system applied to Universe typeface.

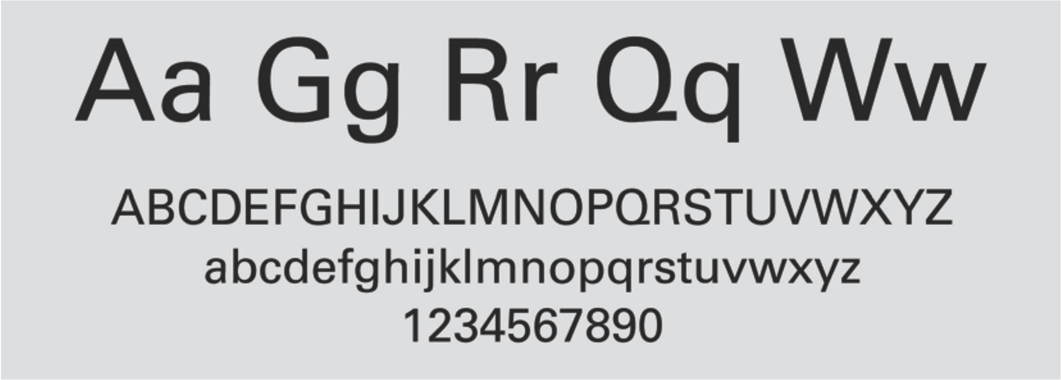

Aa Gg Rr Qq Ww
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

Figure 52: Univers.

In the same year, Max Miedinger under the commission of Edouard Hoffmann created *Helvetica* (赫尔维提卡体 *Hèěrwéitíkǎtǐ*), also classified as a Neo-Grotesque Sans Serif typeface. The work name for this font in 1957 was *New Haas Grotesque*, and it was just in 1960 when it is released under the name of Helvetica. Miedinger was an expert in Grotesque typefaces and his collaborative work with Hoffmann, assessing and correcting sketches was fundamental to obtain the design that was finally cutted by the Haas Type Foundry located in Basel, Switzerland. Due to its clear and concise letterforms, regular appearance and its flexibility at any size, Helvetica became soon an international influence into the design world. Helvetica is considered one of the most successful and well-known typefaces in the history of Western typography, widely used until nowadays [4] [12] [20] .

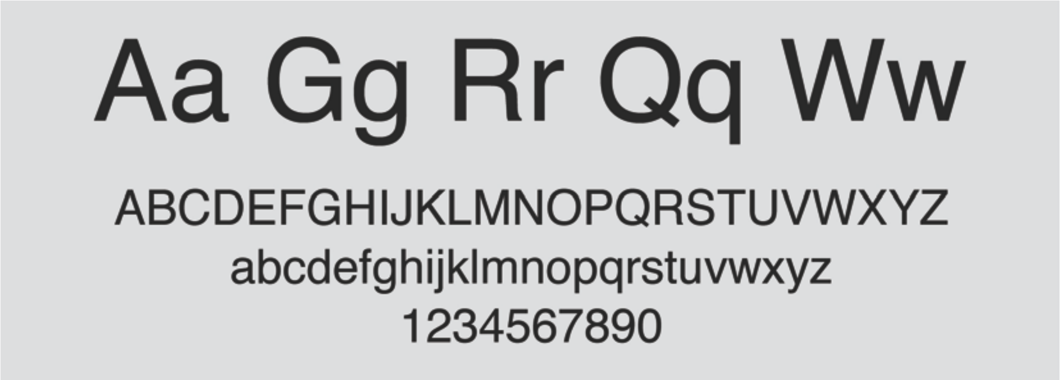


Figure 53: Helvetica.

The world of culture went massively popular in the 1960s as music, art, literature and furniture design became more accessible and reflected elements of everyday life. The artistic movement called *Pop Art* developed as a reaction against Abstract Art. It was often witty, purposely obvious and throwaway in its reflection of consumer culture such as advertising and comic books. Pop art's influence on typography resulted in the appearance of new fonts designs, particularly for *Display* types, designed or selected according to possible associations or references in place of any particular theory regarding legibility or aesthetics, while the International Style remained influential for body text [4] .

Typography in the 1970s continued where the 1960s left off, becoming more decorative, outrageous and extravagant until the middle of the decade. Photocomposition improved in the 1960s and facilitated the copying and production of fonts, allowing the whole process to be much faster than physically adjusting hot metal type, therefore, the proliferation of typefaces and historical revivals as fonts increased and became more international. The 1970s also saw computers progressively involved in this process through a mixture of photocomposition and the digital techniques that would emerge later, with several competing languages and formats. All these new technologies offered to the industry professionals more options and flexibility [4] .

The 1980s saw the introduction of personal computers, computer games, music videos and desktop publishing, as the invention of the laser printer meant that expensive photosensitive paper was no longer needed. As hairstyles and shoulder pads got bigger and bigger, physical cutting and pasting in graphic design was eliminated as computers took over, giving greater ability to experiment. The digital revolution meant that new fonts could be designed and trialed quickly and easily, without the great expense and commitment of hot metal type [4] .

As the 1990s began, graphic designers reacted to the International Style and sought to break away from the constraints of the grid patterns in favor of experimentation, playful use of type and a more handmade approach. Type use became more subtle and expressive, to be part of the message rather than just its conveyor [4] .

Since 2000, high-resolution digital printing has increased the options and challenges in graphic design. The growth of multimedia applications presents new demands on fonts, with the need to obtain legibility between computers, mobile phones and other devices. Graphic designers continue to experiment and enjoy the ability that modern technology allows to free-form type quickly and integrate it in their designs. Today we are living in a pluralistic phase, embracing the ability to move between different styles and points of view. Rather than being a single meta-narrative, pluralists suggest that there are many narratives and that fewer universal truths exist in a globalised world. Truths are instead more individualistic, personal and specific. This results in regionalism in graphic design, as something that is appropriate in one country will not necessarily translate well in another [4] .

3 Typographic Principles

3.1 Principles of Chinese Characters

3.1.1 Chinese Characters Structure

3.1.1.1 Squared Grid

The structure of Chinese characters is a square, internally divided by a grid, which is composed by one horizontal and one vertical line from the center of the square. This structure is referred in English as *Four-square Grid* (田字格 *Tián Zìgé*), and the auxiliary lines which draw the grid are named *Centerlines* (中心线 *Zhōngxīn Xiàn*). The type designer Peiyuan Xie (培元谢) created a set of secondary lines called *Secondary Centerlines* (第二中心线 *Dì Èr Zhōngxīn Xiàn*) to divide the main grid into eight smaller units. With this method, a second square is delimitated in the inner center part of the character, called the *Palace Area* (中官 *Zhōng Guān*). A larger palace area can improve the readability of Chinese type, by reducing the contrast between characters with different stroke number[12].

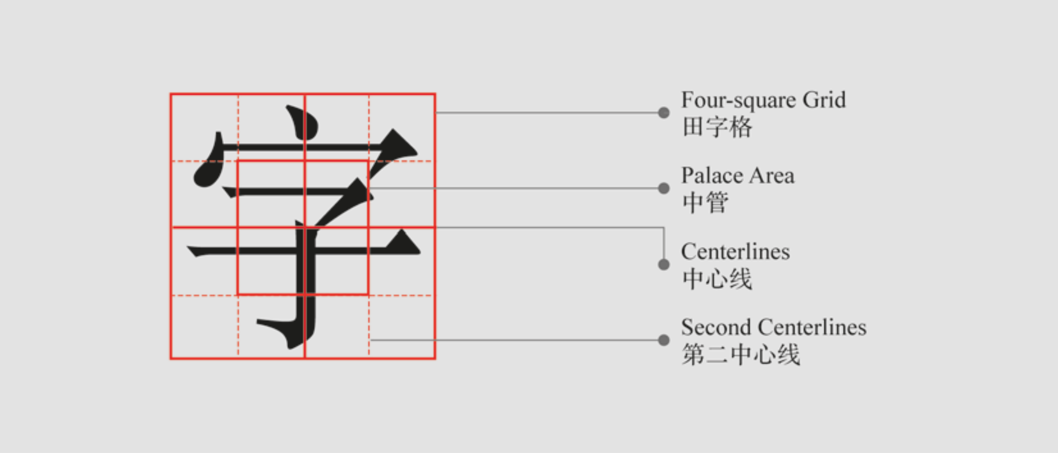


Figure 54: Structure of Chinese characters.

3.1.1.2 Strokes

Different from the alphabetic script that is spelled out in letters, Chinese characters are written in various strokes, which have their origins in calligraphic script [13]. Strokes can be understood as the building blocks of Chinese characters. A single stroke, with a few exceptions, does not represent meaning in the system [14]. Each stroke takes its position inside the four-square grid of the character, according some fixed rules [26]. A *basic stroke* is a single calligraphic mark moving in one direction across a writing surface and can be written alone [27]. There are eight basic strokes and all the others are compounding strokes combining them [26].

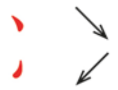
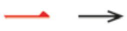
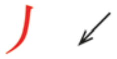
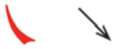
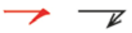
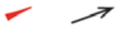
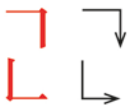
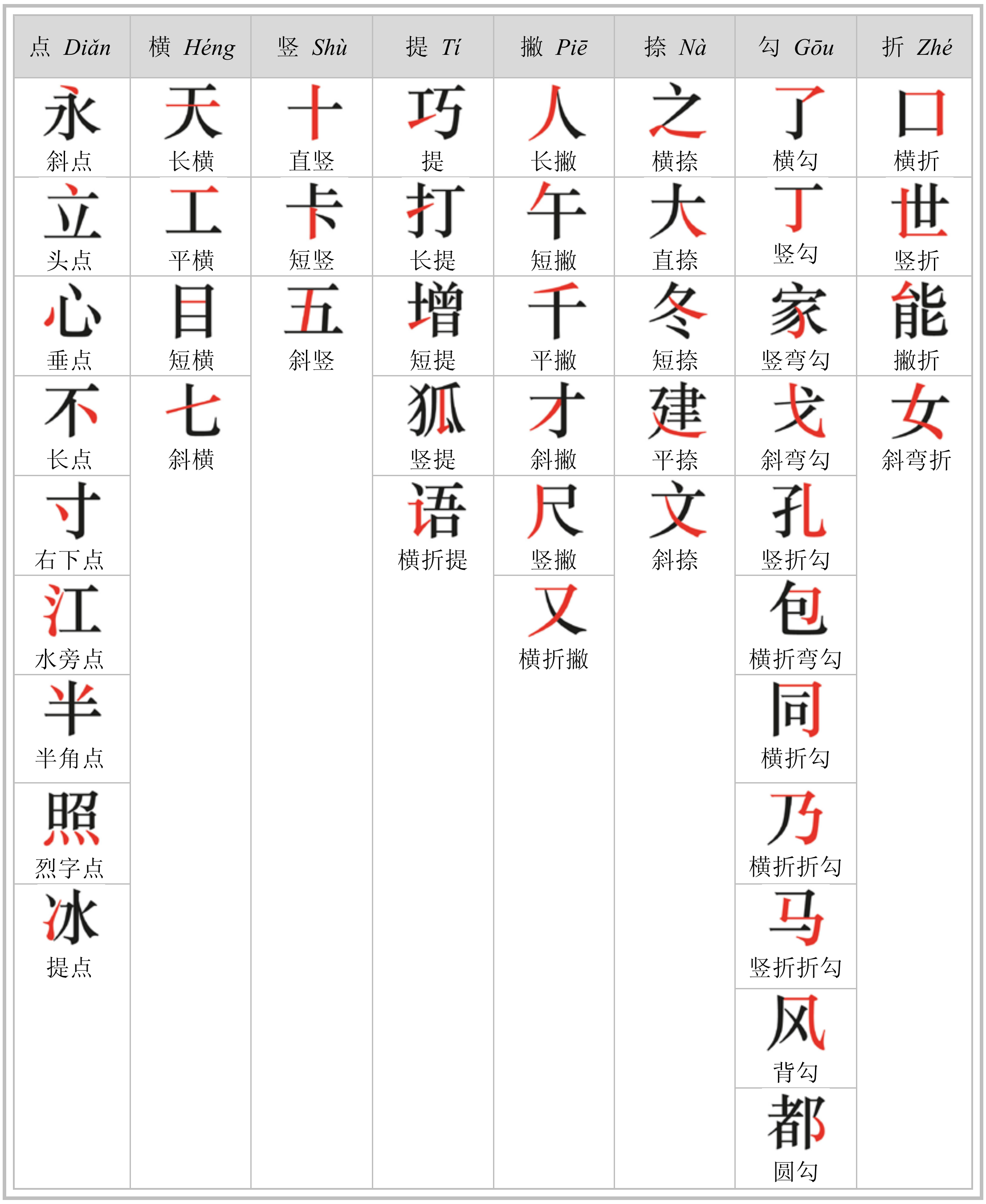
Chinese	English	Usage	
点 Diǎn	Dot	The dot is a tiny dash. It can be written from top to bottom-right or from top to bottom-left.	
横 Héng	Horizontal	The horizontal stroke is written from left rightward and it cannot be written otherwise.	
竖 Shù	Vertical	The vertical stroke is written from top downward and it cannot be written otherwise.	
提 Tí	Rise	The upward stroke to the right is written from bottom-left to top-right.	
撇 Piē	Throw away	The down stroke to the left is written from top-right to bottom-left and it cannot be written otherwise.	
捺 Nà	Press Down	The down stroke to the right is written from top-left to bottom-right and it cannot be written otherwise.	
勾 Gōu	Hook	The hook is written by a quick lifting of the pen or brush. It is appended to other strokes, suddenly going down or going left only.	
折 Zhé	Break	The strokes with turns, usually in 90°. The horizontal stroke with a downward turn and the vertical stroke with a horizontal turn to the right.	

Table 1: Strokes of Chinese Characters

勾 Gōu and 折 Zhé are also considered *combining strokes* because they never occur alone and they must be paired with at least one other stroke instead, forming a *compound stroke*. A compound stroke, also called *complex stroke*, is produced when two or more basic strokes are combined in a single stroke written without lifting the writing instrument from the writing surface [27].



点 *Diǎn*	横 *Héng*	竖 *Shù*	提 *Tí*	撇 *Piē*	捺 *Nà*	勾 *Gōu*	折 *Zhé*
永 斜点	天 长横	十 直竖	巧 提	人 长撇	之 横捺	了 横勾	口 横折
立 头点	工 平横	卡 短竖	打 长提	午 短撇	大 直捺	丁 竖勾	世 竖折
心 垂点	目 短横	五 斜竖	增 短提	千 平撇	冬 短捺	家 竖弯勾	能 撇折
不 长点	七 斜横		狐 竖提	才 斜撇	建 平捺	戈 斜弯勾	女 斜弯折
寸 右下点			语 横折提	尺 竖撇	文 斜捺	孔 竖折勾	
江 水旁点				又 横折撇		包 横折弯勾	
半 半角点						同 横折勾	
照 烈字点						乃 横折折勾	
冰 提点						马 竖折折勾	
						风 背勾	
						都 圆勾	

Table 2: Basic strokes and compound strokes variants in Chinese characters.

3.1.1.3 Stroke Order

Most characters have more than two strokes. To place each stroke inside the squared based grid that defines a Chinese character there are certain rules that determine a fixed order to follow, to ensure speed, accuracy and legibility in composition:

[1] First horizontal 横 (*Héng*), then vertical 竖 (*Shù*): The horizontal stroke

and strokes containing a horizontal should be written before the vertical or the down strokes either to the right or left.

[2] First the down stroke to the left 撇 (Piē)，then the down stroke to the right 捺 (*Nà*): When the down stroke to the right crosses or touch that to the left, the former is written before the latter.

[3] From top to bottom: The strokes at the top should be written before those at the bottom.

[4] From left to right: The strokes on the left should be written before those on the right.

[5] From outside to inside: The containing components are written before the contained ones.

[6] First enclosures strokes, then the contents: Outside enclosing components are written before inside components, and then bottom strokes in the enclosure are placed last if present.

[7] First middle strokes, then strokes on both sides: In vertically symmetrical characters, the center components are written before components on the left or right. Components on the left are written before components on the right. If the middle stroke crosses other stroke or there is no stroke under it, the vertical stroke should be written last.

[8] First horizontal 横 (*Héng*), then the down stroke to the left 撇 (*Piē*): The horizontal stroke should be written before the down stroke to the left [13] [26] [28] .

In Modern Chinese, there is an average of eleven strokes per character, therefore in order to differentiate between characters, the configurations of these strokes are necessarily complex [9] . In addition to the comprehension of the strokes, their combinations and the sequential order for their placement, there are also a few relevant points in the structural construction of Chinese characters:

[1] Strokes Shape: The shape of a stroke inside a character must be distinctively clear to not lead to misunderstanding. A character is composed of fixed strokes that cannot be altered freely, e.g., the first stroke of ‘天’ (*Tiān*) is an horizontal stroke and if it substituted by the down stroke to the left, the character will turn into ‘夭’ (*Yāo*).

[2] Strokes Length: The length of a stroke and interval between strokes are also important, e.g., if in ‘人’ (*Rén*) the down stroke to the left is shortened, it will turn into ‘入’ (*Rù*). If these two strokes are apart, it becomes ‘八’ (*Bā*).

[3] Intersection Points of Strokes: It is also important to make clear whether a stroke crosses or touches another, e.g., if the down stroke to the left in ‘天’ (*Tiān*) crosses the first horizontal stroke, the character becomes ‘夫’ (*Fū*).

[4] Number of Strokes: The number of the strokes is fixed and neither addition nor omission is allowed, e.g., if one horizontal stroke is added to ‘大’ (*Dà*), the resulting character is ‘天’ (*Tiān*) or ‘夫’ (*Fū*), and if one horizontal stroke is omitted, the result is ‘人’ (*Rén*)[26].

3.1.1.4 Radicals

The smallest meaningful unit in a character is known as *radical* (部首 *Bùshǒu*), which are identifiable composing parts with representative meaning internal to the written system of Chinese characters. They are also referred as *component*. A radical may consist of one or more strokes, and a character may consist of one or more radicals. Some Chinese characters are formed by radical repetition; however, different radicals compose the majority of them. Some radicals can be characters themselves, while other radicals have meaning but do not appear themselves as characters[12] [14].

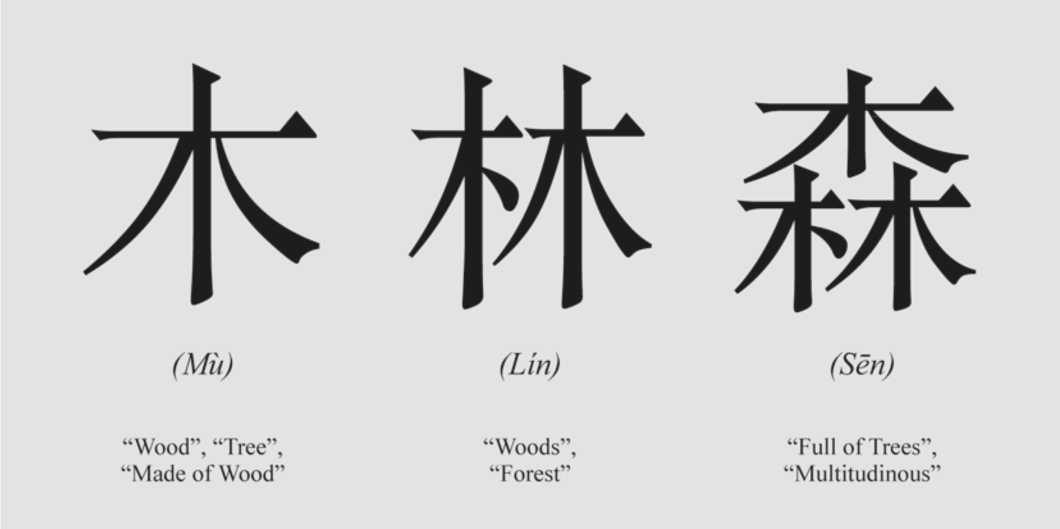

木
林
森
(Mù)
(Lín)
(Sēn)
“Wood”, “Tree”, “Made of Wood”
“Woods”, “Forest”
“Full of Trees”, “Multitudinous”

Figure 55: Example of Chinese characters formed by Radical repetition.

The exact number of radicals in the Chinese language is matter of debate. In the year 100 AD, Shuowen Jiezi (说文解字 *Shuōwén Jiězì*) listed 540 radicals. In the Kangxi Dictionary (康熙词典 *Kāngxī Cídiǎn*) published in 1716 under the Qing dynasty, there were 214 symbols categorized as radicals. Since then, some dictionaries have included more, and others include fewer symbols[14].

一	凵	士	己	支	比	瓜	示	聿	衣	辰	革	鬲	鼻
丨	刀	夂	巾	攴	毛	瓦	禸	肉	襾	辵	韋	鬼	齊
丶	力	夊	干	文	氏	甘	禾	臣	見	邑	韭	魚	齒
丿	勹	夕	幺	斗	气	生	穴	自	角	酉	音	鳥	龍
乙	匕	大	广	斤	水	用	立	至	言	釆	頁	鹵	龜
亅	匚	女	廴	方	火	田	竹	臼	谷	里	風	鹿	龠
二	匸	子	廾	无	爪	疋	米	舌	豆	金	飛	麥	
亠	十	宀	弋	日	父	疒	糸	舛	豕	長	食	麻	
人	卜	寸	弓	曰	爻	癶	缶	舟	豸	門	首	黃	
儿	卩	小	彐	月	爿	白	网	艮	貝	阜	香	黍	
入	厂	尢	彡	木	片	皮	羊	色	赤	隶	馬	黑	
八	厶	尸	彳	欠	牙	皿	羽	艸	走	隹	骨	黹	
冂	又	屮	心	止	牛	目	老	虍	足	雨	高	黽	
冖	口	山	戈	歹	犬	矛	而	虫	身	靑	髟	鼎	
冫	囗	巛	戶	殳	玄	矢	耒	血	車	非	鬥	鼓	
几	土	工	手	毋	玉	石	耳	行	辛	面	鬯	鼠	

Table 3: List of Kanxi Radicals.

3.1.1.5 Spatial Structure

With the adoption of movable type printing technologies, the placement of radicals into the four-square grid was standardized in order to increase the efficiency of the typecasting, which also grants visual consistency across one style.

The compositions for radical arrangements inside Chinese characters in a way *reset* the regularity of the basic four-square grid, allowing multiple variations for the *spatial structure* (空间结构 *Kōngjiān Jiégòu*) [12] [13] .

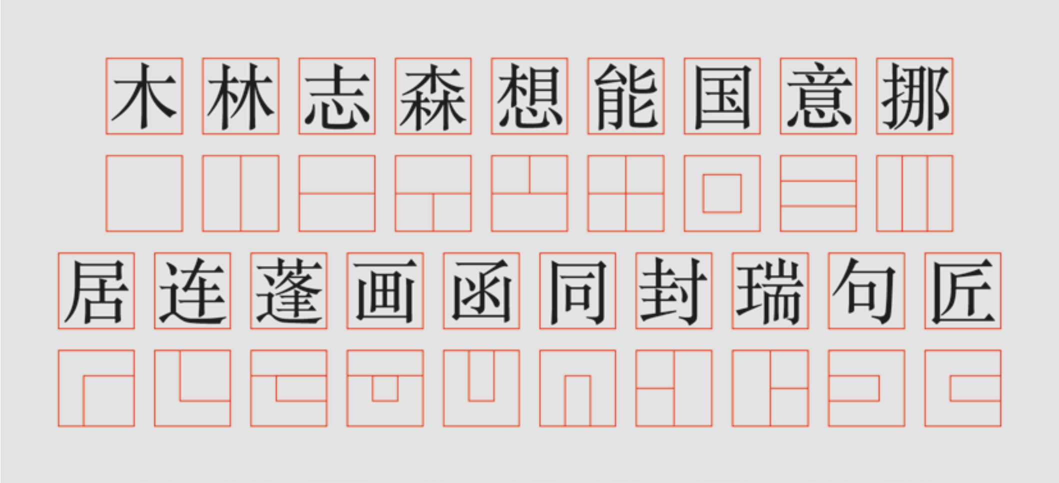


Figure 56: Chinese characters in different variations of spatial structure.

In general, every character has its own vertical and horizontal dimensions inside the spatial structure, which range between the characters '十' (*Shí*) and '口' (*Kǒu*), the latter not to be confused with '囗' (*Wéi*), which is the same shape but bigger. This rule is only broken by few exceptions, such as the character '一' (*Yī*) and some punctuation marks [29] .

3.1.1.6 Weight Center Point and Center Line

Due to the multiple variations of the spatial use according different radicals arrangements, the visual center of gravity is not always located in the exact center of the grid, despite its regularity. This point of visual gravity is known as the *Weight Center Point* (重心点 *Zhòngxīn Diǎn*) of Chinese characters. For most of Chinese characters, the upper half is tight exposing a loose bottom, and the left half is tight exposing a loose right, and these combined parts must be visually balanced both vertically and horizontally. Therefore, the weight center point is generally slightly higher than the mathematic exact center of the four-square grid [12] [13] .

All Chinese characters in one style are aligned to the weigh center point, in a line called *Chinese Center Line* (汉字中心线 *Hànzì Zhōngxīn Xiàn*), which will depend on the typography in use. A hint to recognize the weight center point of Chinese characters is to observe the structure of the character '十' (*Shí*), where the vertical alignment of the horizontal stroke will indicate its position [12] [29] .

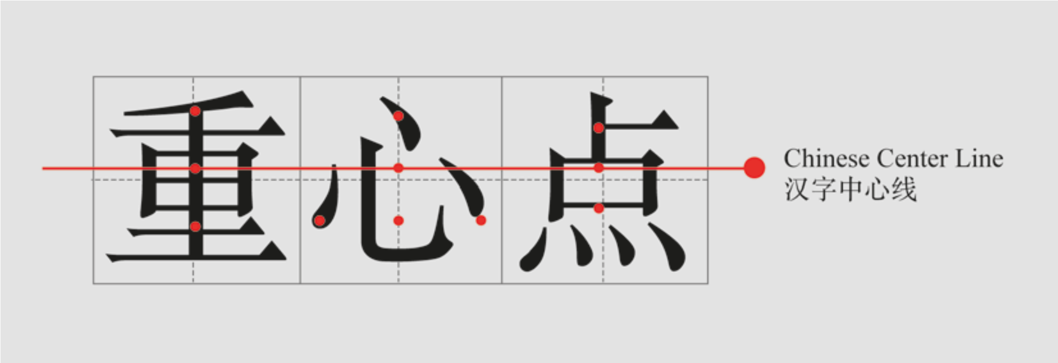


Figure 57: Chinese Centre Line defined by several Weight Center Points.

3.1.1.7 Type Size

Type size for Chinese characters follows the traditional unit of point for measurement. A *point* is a basic typographical measurement is an absolute measurement equivalent to 1/72 of an inch or 0.35 millimeters. A range between 9 to 12 points is generally used for type size in books and long texts, and 9 points is the preferable size used in newspapers. In applications where smaller size is required, such us the text for the information under images, presentation cards or stationary information, the type size for Chinese language can be set as small as 6 points, without jeopardizing the readability and legibility of certain individual characters with a tight and compact composition of strokes, therefore, the specific set of characters used for a given content must be considered with attention [4] [30].

Type Size	Number of Strokes											
	1	2	3	4	5	6	7	8	9	10	15	20
24pt	一	十	土	王	玉	全	李	青	美	旅	飘	壤
18pt	一	十	土	王	玉	全	李	青	美	旅	飘	壤
16pt	一	十	土	王	玉	全	李	青	美	旅	飘	壤
14pt	一	十	土	王	玉	全	李	青	美	旅	飘	壤
12pt	一	十	土	王	玉	全	李	青	美	旅	飘	壤
10pt	一	十	土	王	玉	全	李	青	美	旅	飘	壤
8pt	一	十	土	王	玉	全	李	青	美	旅	飘	壤

Table 4: Optical relation between Type Size and Number of Stokes.

3.1.2 Typographic Variants

3.1.2.1 Weight Variations: From Light to Bold

Adopting standard conventions of Western typography, the weight of a Chinese typeface is generally rated on a scale ranging from *light* (细 *Xì*) to *bold* (粗 *Cū*), depending on the thickness of its strokes. In general, a Chinese type will contain regular or medium thickness, although some families had evolved to contain wider ranges of weight, up to nine degrees of thickness [12] .

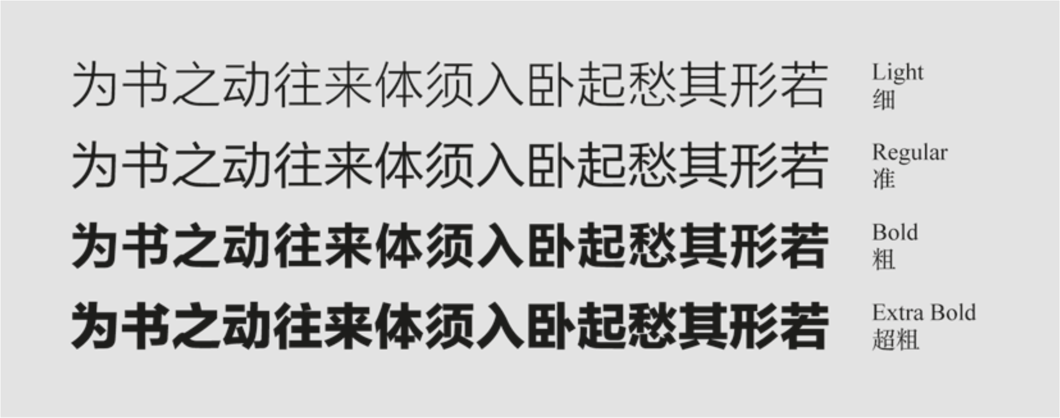

为书之动往来体须入卧起愁其形若
Light
细
为书之动往来体须入卧起愁其形若
Regular
准
为书之动往来体须入卧起愁其形若
Bold
粗
为书之动往来体须入卧起愁其形若
Extra Bold
超粗

Figure 58: Example of weight variations on Chinese typography.

3.1.2.2 Width Variations: From Condensed to Extended

As in the same situation for variations of weight, the variations of width were adopted in Chinese typefaces from the development and application of Western typefaces. Variations of width refers to *condensed* (窄 *Zhǎi*) types, which are narrower than the regular square Chinese character, while *extended* (扁 *Biǎn*) types are Chinese characters with wider horizontal proportion than the regular squared one. Notice that in typefaces for Traditional Chinese there are no width variations [12] .

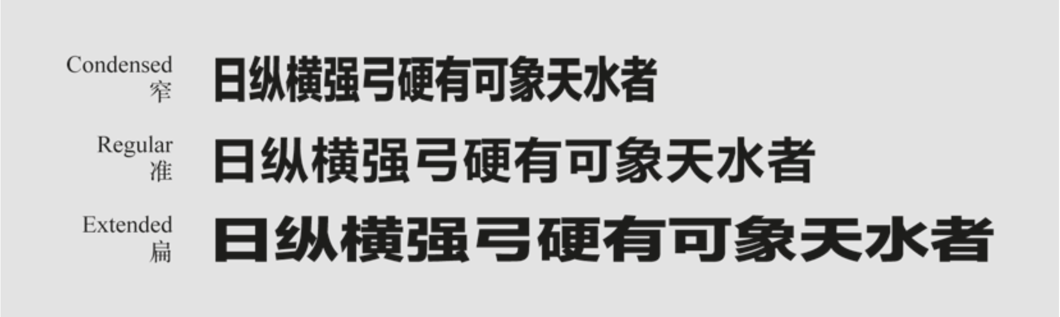

Condensed
窄
日纵横强弓硬有可象天水者
Regular
准
日纵横强弓硬有可象天水者
Extended
扁
日纵横强弓硬有可象天水者

Figure 59: Example of width variations on Chinese typography.

3.1.3 Paragraph Structure

3.1.3.1 Reading Direction

In Chinese, the traditional direction for reading is vertically, beginning at the top right corner of the page and proceeding downwards in columns to the left. Chinese calligraphers used brushes as writing instrument; therefore, it is easier to write down the page. In addition, the characteristics of Chinese characters also allow horizontal reading direction, from left to right and also from right to left. Nowadays the application for the latter is very rare and only appears where historical and traditional sense is required [12] [14] .

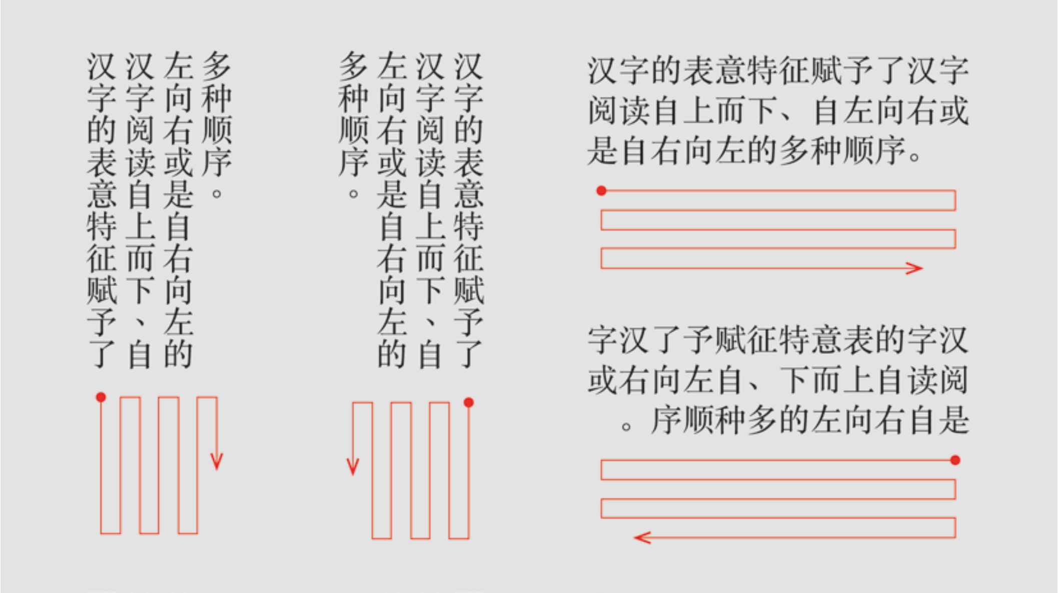

汉字的表意特征赋予了汉字阅读自上而下、自左向右或是自右向左的多种顺序。
汉字的表意特征赋予了汉字阅读自上而下、自左向右或是自右向左的多种顺序。
汉字的表意特征赋予了汉字
阅读自上而下、自左向右或
是自右向左的多种顺序。
字汉了予赋征特意表的字汉
或右向左自、下而上自读阅
。序顺种多的左向右自是

Figure 60: Reading Direction for Chinese characters.

3.1.3.2 Alignment

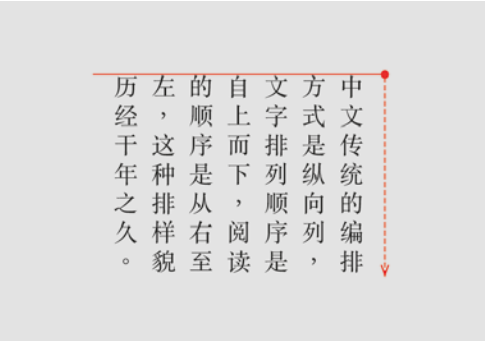

中文传统的编排方式是纵向列，文字排列顺序是自上而下，阅读的顺序是从右至左，这种排样貌历经千年之久。

Figure 61: Top alignment for Chinese characters in vertical arrangement.

Alignment (对齐 *Duìqí*) refers to the position of type within a text block, in both the vertical and horizontal planes [4] . According with the traditional reading direction in vertical arrangements, Chinese characters are aligned in a flushed top and ragged bottom. For horizontal layouts, the most natural alignment for Chinese is justified due to the squared nature of its characters, a layout that reflects a marked sense of strictness. In the case of small amounts of texts in Chinese language, left, right and centered alignments are also commonly used [7] [12] .

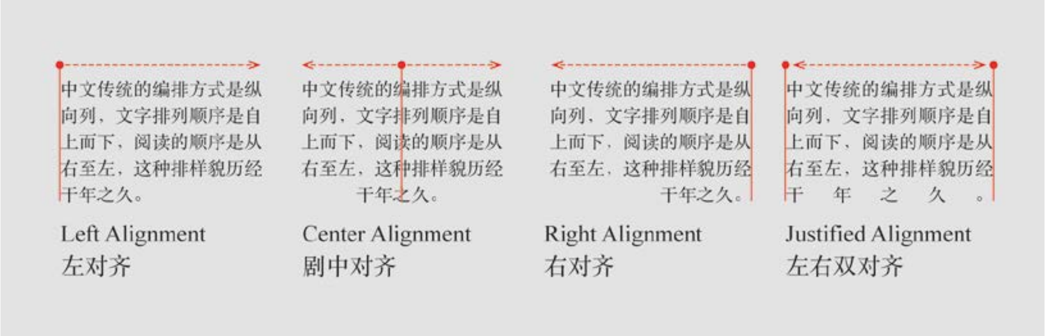

Left Alignment
左对齐
Center Alignment
剧中对齐
Right Alignment
右对齐
Justified Alignment
左右双对齐

Figure 62: Alignment values for Chinese characters in horizontal arrangements.

3.1.3.3 Line Width

Line width (行宽 *Hángkuān*) is the width of the line formed by characters arrangement. For body text in literature books, a line containing between 20 to 35 characters of width is considered as appropriate. More than this quantity will make the vision of the reader quickly tired. For applications such as newspapers and periodicals, where many columns are used, the number assigned to line width can be adapted to the requirements of the layout with more freedom [30] .

3.1.3.4 Line Spacing

Line spacing (行距 *Hángjù*) is defined as the vertical space between lines of text. In general, for Chinese characters this measure takes a value in between the half the width of a character to the entire width of a character [30] .

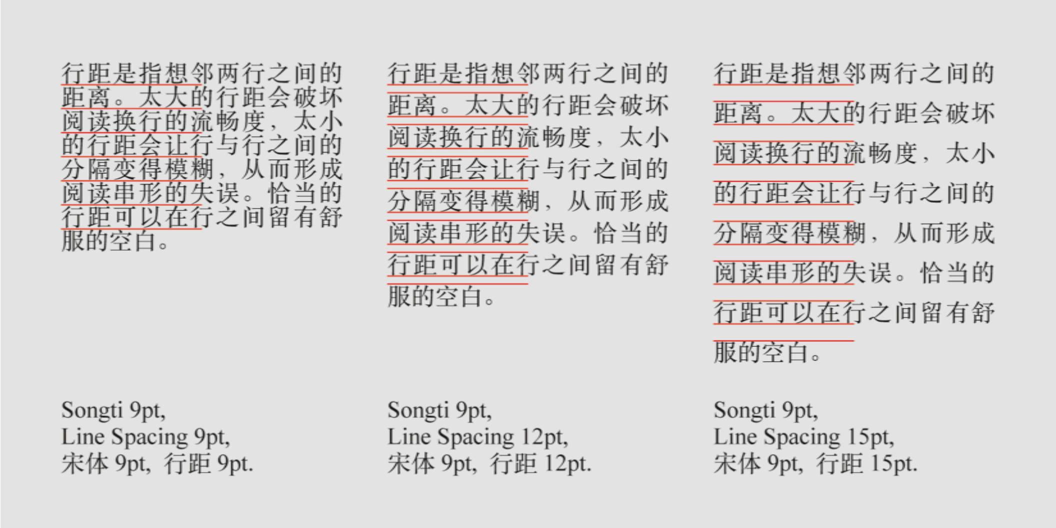

Songti 9pt,
Line Spacing 9pt,
宋体 9pt，行距 9pt.
Songti 9pt,
Line Spacing 12pt,
宋体 9pt，行距 12pt.
Songti 9pt,
Line Spacing 15pt,
宋体 9pt，行距 15pt.

Figure 63: Line Spacing in Chinese paragraphs.

In digital edition, this measure is counted from the top line of a row of characters to the top line of the following row, taking a value from 150% to 175% of the character type size, without over passing the 200%. There is, however, a greater freedom to set the value of line spacing applicable to short texts, such as titles and headlines [30] .

3.2 Principles of Latin Typography

In this section, the principles of Latin typography are described following the same logic used to introduce the principles of Chinese characters: in the first place, the graphemes *letterforms*; secondly, groups of letterforms until they express meaning as a *word*.

3.2.1 Letterform Structure

The following subsection explains the most relevant parts within the anatomy of *letterforms*, understood as any letter, numeral, punctuation mark, and other sign included in a font for Latin alphabet. Although letterforms are also known as *characters*, that nomenclature in this research is reserved to refer specifically to Chinese characters.

Letterforms have an array of attributes and forms that are described through a variety of different terms, in much the same way as the different names for every part of the human body [4] . The terms used to describe the shapes of letters are an amalgamation of terms born over many centuries, in many countries, and from the disciplines of both typography and calligraphy [19] .

3.2.1.1 Em Square and Type Body

The *em square* is the grid upon which all the letterforms in a font are created. The majority of letterforms are placed inside the grid drawn by the em square, nonetheless, some letterforms extend outside of it in very rare cases. The em square takes its name from one of the fundamental relative units for measurement in Latin typography: the *em*. The em is the basis for a range of relative units of measurement whose values are contextual, being the em square one of them. Relative units have no fixed value in terms of absolute units such as inches, or millimeters; these units of measure grow or shrink in size proportionately as the objects they measure does. In practice, an em will take the same value as the *type body* currently being set: if type is setted at 11-points, an em equals 11 points. The dimensions of the em square typically are those of the full body height of a font plus some extra spacing to prevent lines of text from colliding when typeset without extra leading. Despite the sound of its name, an em is not the width of an ‘M’; in fact, an ‘M’ is rarely a full em wide [19] .

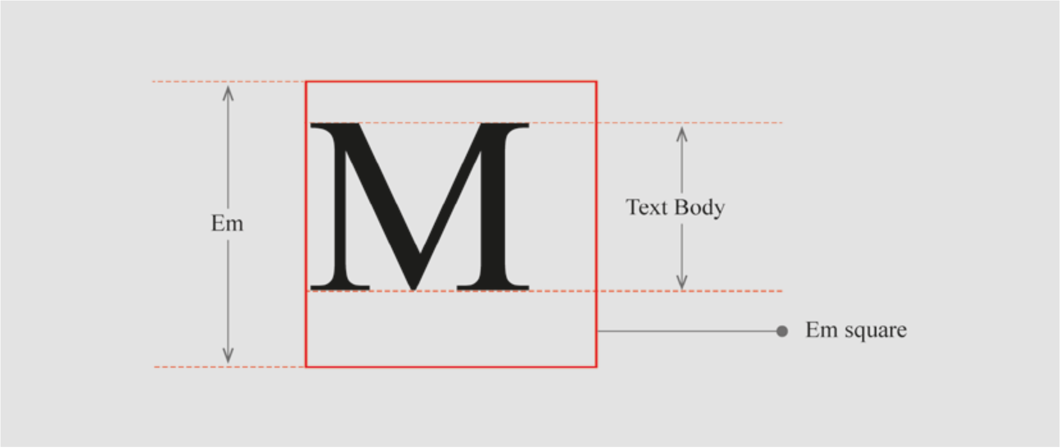


Figure 64: Alignment values for Chinese characters in horizontal arrangements.

3.2.1.2 Baseline

The *baseline* (基线 *Jīxiàn*) is the imaginary line that all type letterforms sit upon, with the exception of the ‘o’ and other rounded letterforms that fall slightly below it [4] [30] . The position of the baseline within the em square can vary from font to font, depending on the design of the letterforms. On average, though, the baseline is located about one-third of the way up from the bottom of the em square. Without a consistent position for the baseline, typeset letters would appear to pop up and down on a line [19] .

3.2.1.3 X-Height and Meanline

The *x-height* (x高度 *x-Gāodù*) of a typeface is defined as the distance from the baseline to the top of the lowercase ‘x’, and as such it is a relative measurement that varies from typeface to typeface [4] [31] . A line drawn at this height, parallel to the baseline, is called the *meanline* (身线 *Shēnxiàn*) of the face. The contemporary trend is toward larger x-heights. It is believed that typefaces with larger x-heights are easier to read, and on computer screens this is unarguably the case, as adding a pixel (or more) to the height of lowercase letters makes them much more legible [12] [19] . The x-height is also used as key reference point in the layout of a design [4] .

3.2.1.4 Ascenders, Descenders and Related Lines

An *ascender* (上缘 *Shàngyuán*) is the part of a letter that extends above the mean line, while a *descender* (下缘 *Xiàyuán*) is the part of a letter that falls below the baseline[4] [12]. The imaginary line to which the ascenders of a typeface reach is known as *ascender line* (上缘线 *Shàngyuánxiàn*), while the one which the descenders reach is called *descender line* (下缘线 *Xiàyuánxiàn*). Below the ascender line is located the *cap height line* (大写字母高线 *Dàxiězìmŭgāoxiàn*), which specifies the height of the capital letters. The cap height line of some typefaces overlaps with the ascender line[12] [19].

The heights and depths of ascenders and descenders vary widely from typeface to typeface, with ascenders sometimes being quite a bit taller than capital letters of the same face in the same point size[19]. Unlike x-height, which can vary dramatically, descenders and ascenders are normally constrained by the dimensions of the em square in which they are designed. In the days of metal type, it was not uncommon for a typeface to come in two varieties (short ascenders/descenders and long ascenders/descenders) but nearly none of those have been translated into electronic format[19].

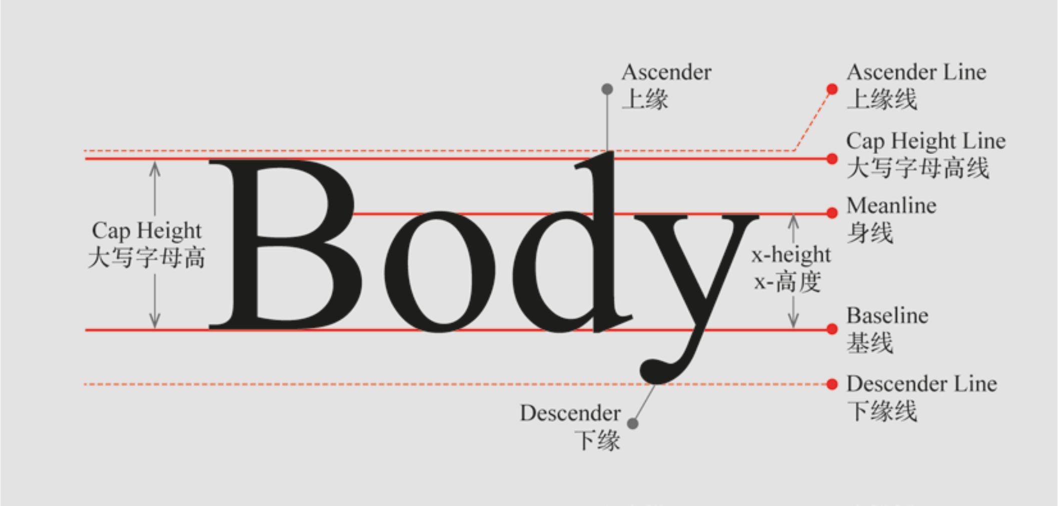


Figure 65: X-height, ascender, descender and related lines in Letterform anatomy.

3.2.1.5 Serifs

In a basic definition, a *serif* (衬线 *Chènxiàn*) is a small stroke at the end of a main vertical or horizontal stroke [4] [31]. However, the relevance of serifs overpasses mere decorative functions: they are important visual aids that help the eye to differentiate one character from another, and to help the brain distinguish individual characters from among the forest of tiny strokes that make up passages of typeset text. Serifs also provide a slight horizontal texture to type, creating a sort of graphic current to draw the eye along the line. The letterforms of seriffed text are thus somewhat more legible, or easier to recognize. The added legibility, in turn, makes text easier and faster to read, that is to say, more readable [19].

There are many kinds of serifs, varying widely in shape, size, and bulk. They have evolved over the ages, and styles of type are often named in relation to the epoch in which they were created [19].

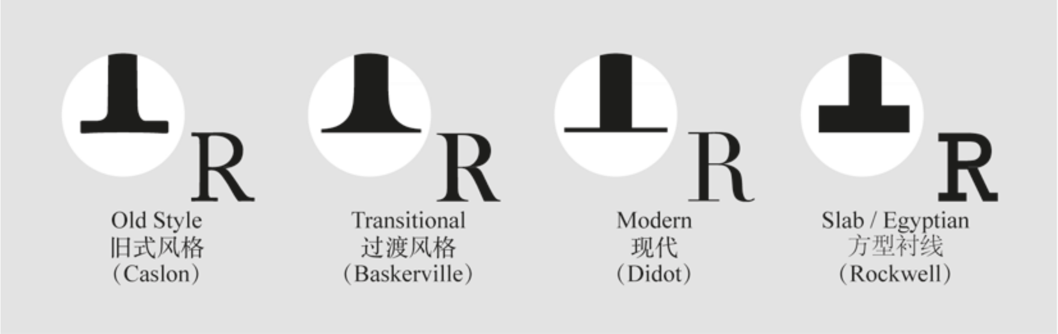

R
Old Style
旧式风格
(Caslon)
R
Transitional
过渡风格
(Baskerville)
R
Modern
现代
(Didot)
R
Slab / Egyptian
方型衬线
(Rockwell)

Figure 66: Examples of different styles of Serifs.

3.2.1.6 Ligatures

A *ligature* (连字 *Liánzi*) is the joining of separated letterforms to form a single unit [4] [31]. These fused letterforms are designed to alleviate certain awkward letter-shape interactions and sometimes used for historical or linguistic reasons. All text fonts include the common ‘fl’ and ‘fi’ ligatures, but some fonts contain many more. These can be made to appear in the text by turning on this layout feature. In most cases, this will be a global selection, affecting the entire document [19].

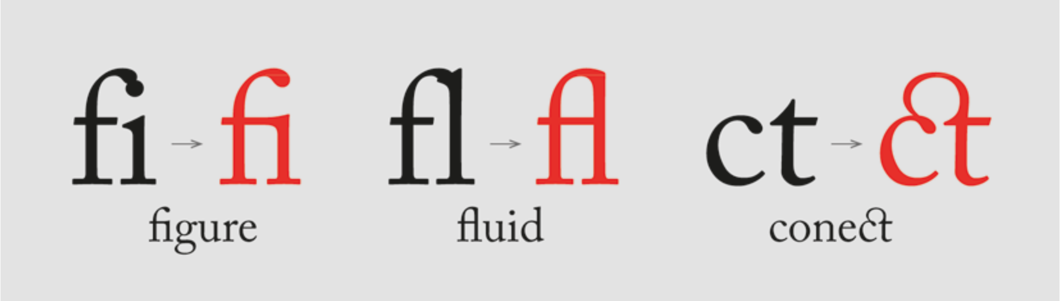
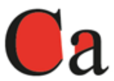
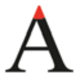
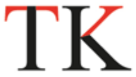
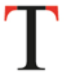
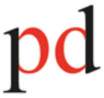
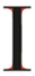
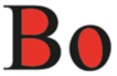
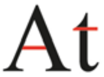
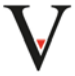
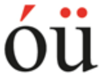
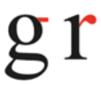
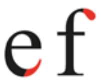

fi → ﬁ
figure
fl → ﬂ
fluid
ct → ct
conect

Figure 67: Examples of Ligatures.

3.2.1.7 Other Parts of Letterforms Structure

There are names for all the parts of letters, and even when some are specific to a particular letter, most of them are generic and apply to a number of letterforms [19]. Most relevant named parts in letterform anatomy are listed in the following table.

English Name	Chinese Name	Description	
Aperture	字腔 Zìqiāng	The aperture is the partially enclosed, somewhat rounded negative space in some letterforms such as ‘C’, ‘S’, the lower part of ‘e’, or the upper part of a double-storey ‘a’.	
Apex	尖端 Jiānduān	The point formed at the top of a letterform such as ‘A’, where the left and right strokes meet.	
Arm	字壁 Zìbì	A horizontal stroke that is open at one or both ends, as seen on the ‘T’, and ‘F’ as well as the upstroke on the ‘K’ and ‘Y’. Also called *bar*.	
Beak	喙 Huì	A triangular, serif-like protrusion at the end of a stroke in certain serif type designs.	
Bowl	字碗 Zìwǎn	The part of a letterform that encloses a space in circular letterforms such as ‘p’ and ‘d’. The bowl may be closed or open.	
Bracket	括弧 Kuòhú	The transitional shape, connecting the stem and the serif of some fonts. Not all serifs are bracketed serifs.	
Counter	字谷 Zìgǔ	The space inside a *bowl* as found on ‘e’, ‘a’ and other letters.	
Crossbar	十字线 Shízìxiàn	The horizontal stroke on the letterforms ‘A’, ‘H’, ‘T’, ‘e’, ‘f ’, and ‘t’ that intersects the central stem. Also called a *cross stroke*.	
Crotch	交汇点 Jiāohuìdiǎn	The inner point at which two angled strokes meet.	
Diacritics	附加符号 Fùjiāfúhào	An ancilliary mark or sign added to a letter. Accents are one type of diacritics. In the Latin alphabet, their function is to change the sound value of the letters to which they are added.	
Ear	字耳 Zìěr	A small stroke extending from the right side of the bowl of a ‘g’ or protruding from the stem of letters such as ‘r’ and ‘f ’.	
Finial	珠 Zhū	An ornamental terminal stroke at the top of letterforms without serif, such as in ‘a’, ‘e’ and ‘f’.	

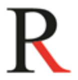
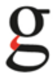
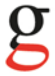
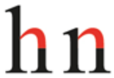
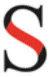
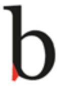
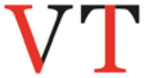
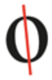
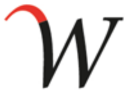
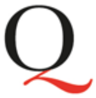
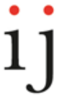
Leg	字腿 Zìtuǐ	The descending stroke on a ‘K’ and ‘R’. Sometimes also used for the *tail* of the ‘Q’.	
Link	连接线 Liánjiē Xiàn	A stroke that joins two other letter parts such as the bowls of a double-storey ‘g’. Is also called *neck*.	
Loop	字环 Zìhuán	In a double-storey ‘g’, the *loop* is the enclosed or partially enclosed counter below the baseline that is connected to the bowl by a link. Used also to name the enclosed or partially enclosed extenders on cursive ‘p’, ‘b’, ‘l’, and similar letters. Is also called *lobe*.	
Shoulder	字肩 Zìjiān	The curved stroke leading into the leg of an ‘h’ or ‘n’ for example. Is also called *arc*.	
Spine	字脊 Zìjí	A left-to-right curving stroke in the ‘S’ and ‘s’.	
Spur	棱线 Léngxiàn	The small protruding part off a main stroke, often where a curve meets a straight stem.	
Stem	主干 Zhǔgàn	The main vertical or diagonal stroke of a letter.	
Stress	应力 Yìnglì	The orientation, or slant of a curved letterform.	
Swash	花饰 Huāshì	An elegant extension on a letter form, either a modification of an existing part or an added-on part.	
Tail	字尾 Zìwěi	The descending, often decorative stroke on the letter ‘Q’.	
Tittle	点 Diǎn	The dot on the ‘i’ and ‘j’.	

Table 5: Description of different parts in Letterforms structure.

3.2.1.8 Type Size

The *type size* of a Latin typeface refers to the size of the body, the imaginary area that encompasses each character in a font. Type size influences directly other text attributes intervening with the legibility and the readability of a chosen typeface. Type size is also known as *point size*, because is the size of type is measured exclusively in points. The traditional definition of point size goes back to the days of handset type, when each letter was cast on its own block and the point size of the type was defined by the height of the blocks, from just above the apex of the tallest character to just below the limit of the lowest-reaching one. When fonts went digital, the point size of the type became the height of the bounding box that surrounded each letter [19] .

As type size varies, other visual aspects of the type will also vary, for instance, when type size increases, the physical space between letters also increases [4] .

36pt	Type Size affects white
24pt	Type Size affects white space
18pt	Type Size affects white space
14pt	Type Size affects white space
11pt	Type Size affects white space

Table 6: Optical relation between Type Size and white space.

3.2.2 Word Structure

In linguistics, a *word* is the smallest element with semantic or pragmatic content [9] . When most people look at a corpse of text, they do not see typefaces and they do not see type, they see words [19] . When designing text, the achievement of the properties of legibility and readability can achieved by controlling certain typographical attributes of words, explained as follows.

3.2.2.1 Letter Spacing, Kerning and Tracking

Letter spacing (字符间距 *Zìfújiānjù*) is the distance between each letter. The setting of letter spacing is relative to the type style and size, therefore is very hard to standardize. However, there are some considerations to take in account when managing letter spacing:

[1] In general, when type is in big size, the letter spacing will appear extended, and contrariwise, when the type is in small size, the letter spacing will appear narrowed. In both cases, letter spacing must be adjusted accordingly to achieve equal optical space, where the letters are separated by even and proportioned white areas.

[2] Ordinarily, sans serif typefaces need larger letter spacing than serifs to keep the inner and outer spaces of the type with more contrast.

[3] When set in small sizes, italics letterforms also need larger spacing for a better readability [12] .

Two of the smallest adjustments can be applied for setting the letterforms closer together or farther apart: [1] Kerning and [2] Tracking. Both are calibrated in the same units (usually thousandths of an em) but their objectives are quite different.

[1] *Kerning* is a targeted setting: it adjusts the spaces between specific letter pairs to adjust anomalies in spacing created by the shapes of the two letters, which can make the characters look too far apart or too close together. The letters in ‘To’, for example, are usually kerned closer together, because the empty space under the crossbar of the ‘T’ creates a gap between it and the ‘o’ next to it. Likewise, tight spacing can make familiar letter patterns seem ambiguous, for instance, an ‘rn’ that melts together to look like an ‘m’ or a ‘cl’ that looks like a ‘d’.

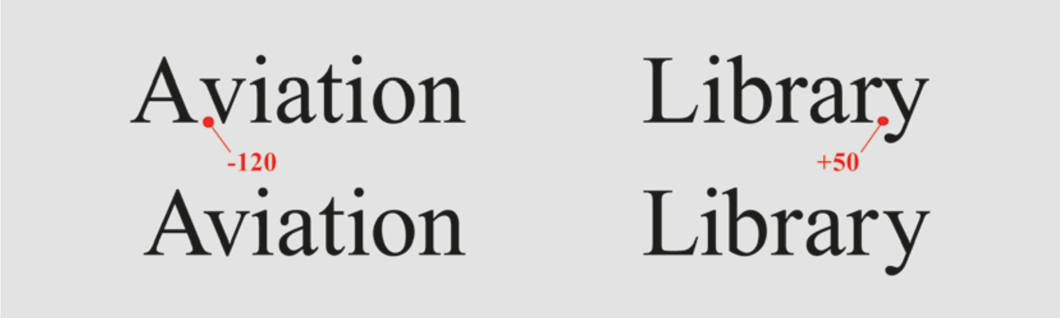


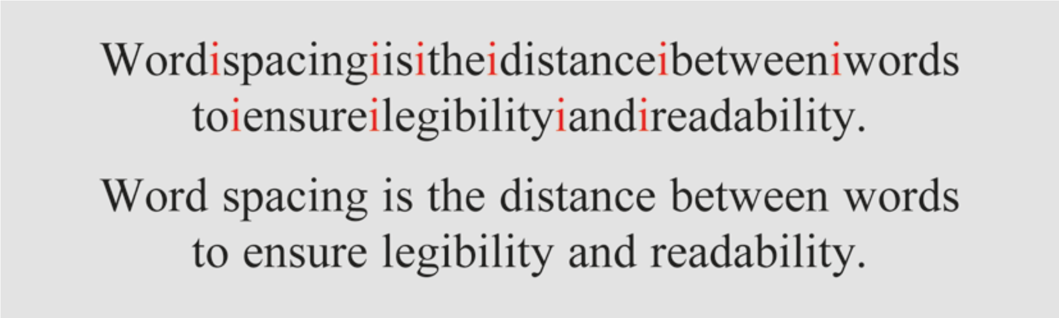
Figure 68: Examples of Kerning.

[1] *Tracking* is a generalized setting: it uniformly affects the spacing between all the letterforms in a range of text. Tracking is normally adjusted to compensate for spacing problems caused by changes in point size (especially in very small and very large type). It is also used to adjust badly spaced passages of text [19] .

3.2.2.2 Word Spacing

Word spacing (词间距 *Cíjiānjù*) is the distance between each word to make a text clear and readable. It is also known as *space bands*. Too large or too little word spacing will affect the rhythm of a sentence or make the words unreadable. Because the widths of letterforms vary from typeface to typeface, the widths of the word spaces have to be adjusted accordingly to the typeface in use. In general terms, it should be balanced according the circumstances in order to improve the visual experience of the reader: as much as necessary, yet as little as possible. A functional solution is to set a lowercase ‘i’ between each word, since its width is approximately equal to a proportioned word spacing [19] .

For the objectives of this research, it is very important to notice that word spacing is an attribute not existing in Chinese typography [12] .



Wordispacingiisitheidistanceibetweeniwords
toiensureilegibilityiandireadability.

Word spacing is the distance between words
to ensure legibility and readability.

Figure 69: Example of Word Spacing.

3.2.3 Typographic Variants

3.2.3.1 Uppercase and Lowercase Letterforms

Uppercase (大写字母 *Dàxiězìmŭ*) are majuscules letterforms, also known as *capitals*, while *lowercase* (小写字母 *Xiăoxiězìmŭ*) are minuscules letters. Both of these letterforms sets have distinct applications and it is important to note that not all fonts are available in both forms [4] [12] .

Although it could be argued that the majuscule format generally appears to be more formal or authoritative than minuscules, such connotations are linked to many other factors such as the typeface itself and the colors used in the design. It would therefore be overly simplistic to suggest a universal difference or preference between majuscules and minuscules. They both work equally well when used in the right context, and with care and consideration. Both offer a cohesive, unified design as the letter heights remain relatively constant [4] .

3.2.3.2 Roman Letterforms

Although the classical inscriptions on Trajan’s column in Rome have been the inspiration for hundreds of type designs over the ages, *roman* (罗马体 *Luómǎtǐ*) types are so called because in the early days of movable type (the late fifteenth century), those typefaces were innovated in Rome. Their forms quickly evolved into the letterforms we use for text today. Roman typefaces have an upright structure, or stance, with the main strokes of letters such as ‘T’ and ‘I’ being perpendicular to the baseline[19] [33]. Roman is nowadays used to name the basic cut of a typeface, which sometimes is also referred as *book*, *standard* and *regular*, although *book* can also be a slightly lighter version of the Roman face[4] .

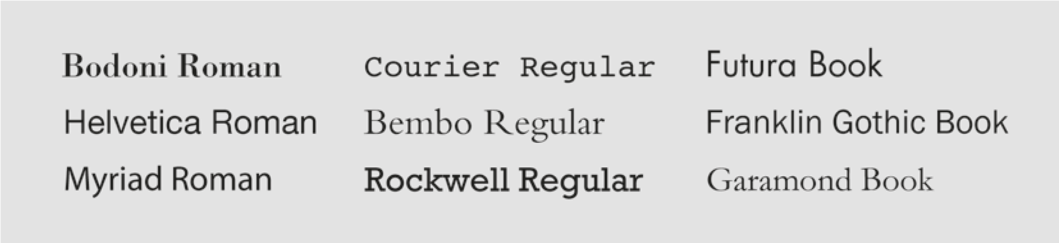


Figure 70: Examples of Roman typefaces.

3.2.3.3 Italic and Oblique Letterforms

Italic (意大利体 *Yìdàlìtǐ*) is a drawn typeface based around an angled axis, which are normally designed for serif typefaces [4] [33]. Italic letterforms were created as a way to cram more type onto a page and reduce printing costs. Italics derivate from a popular hand-lettering form called *cursiva humanistica*, which had the merit both of being familiar to readers of the time and of setting more compactly on the line than prevailing roman types. Briefly called *aldinos*, these faces were soon known by the more generic term *italics*. The use of italics as text types waned, but their role as accompaniment and stylistic counterpoint to roman types remained. Eventually it became the norm for roman types to have italic complements designed specifically for them[19].

Not all typefaces have a true cursive complement. Many instead have a slanted variation of the roman face. These are often referred to as *obliques* (仿斜体 *Fǎngxiétǐ*). Obliques have generally been designed inclinated from scratch in order to preserve the correct proportions of the letterforms. Creating obliques by inclinating roman letterforms with a computer program is not recommendable, as it inevitably distorts the shapes of the letters in a subtle, yet unpleasant, way. It is strongly advised to use a designed oblique if it is available[19] [33].

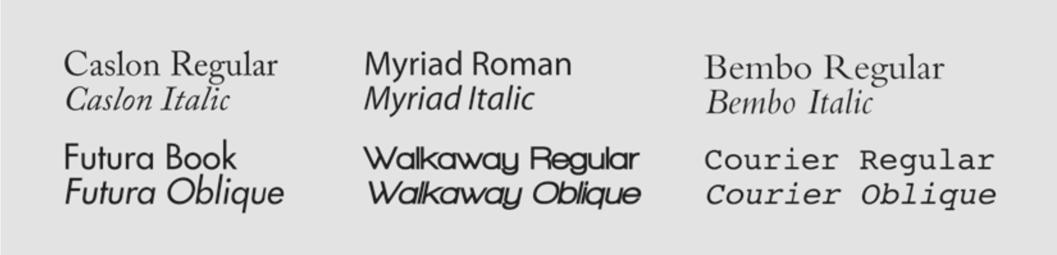

Caslon Regular
Caslon Italic
Futura Book
Futura Oblique
Myriad Roman
Myriad Italic
Walkaway Regular
Walkaway Oblique
Bembo Regular
Bembo Italic
Courier Regular
Courier Oblique

Figure 71: Examples of Italic and Oblique typefaces.

3.2.3.4 Weight Variations: From Light to Bold

Another distinction among letterforms is their weight, referring to the thickness of the principal strokes of the letters. The weights of Latin typefaces are apt to be described in many terms, and these are far from standardized. Some names have their roots in tradition, and others reflect attempts to give distinctive and descriptive names to new weights of an existing typeface [12] [19] .

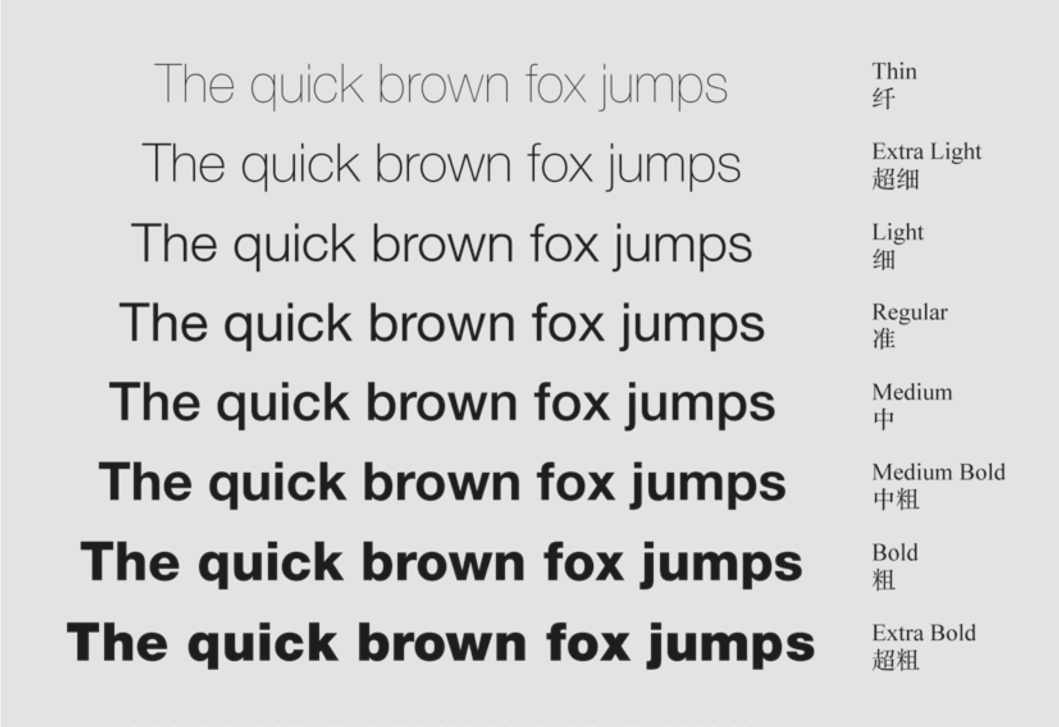

The quick brown fox jumps
Thin
纤
The quick brown fox jumps
Extra Light
超细
The quick brown fox jumps
Light
细
The quick brown fox jumps
Regular
准
The quick brown fox jumps
Medium
中
The quick brown fox jumps
Medium Bold
中粗
The quick brown fox jumps
Bold
粗
The quick brown fox jumps
Extra Bold
超粗

Figure 72: Examples of weight variations on Latin Typography.

3.2.3.5 Width Variations: From Condensed to Extended

Many type families include variations in the width of their letterforms, in order to provide additional typesetting flexibility. *Condensed* (窄 *Zhǎi*) types are narrower letterforms than the roman type, created to be used in tight space situations. *Extended* (扁 *Biǎn*) types are wider versions of the roman letterforms and are often used for headlines to dramatically fill a space [4] [12] .

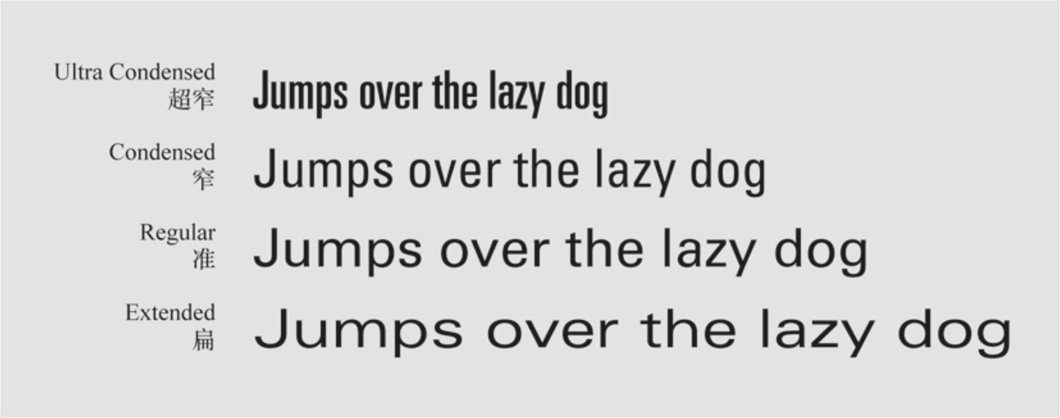

Ultra Condensed
超窄
Jumps over the lazy dog
Condensed
窄
Jumps over the lazy dog
Regular
准
Jumps over the lazy dog
Extended
扁
Jumps over the lazy dog

Figure 73: Examples of width variations on Latin Typography.

3.2.4 Paragraph Structure

3.2.4.1 Reading Direction

For Latin alphabet based languages, such as English, the standard reading direction is from left to right, defined from the natural motion of writing with a pen for right-handed people. Latin letterforms do not posses vertical reading direction as Chinese, and when Latin text needs vertical arrangement, it must be rotated 90 degrees. Very short Latin words, however, can be arranged in a full vertical arrangement in stacked letters, being readable only from top to bottom [4] [7] [12].

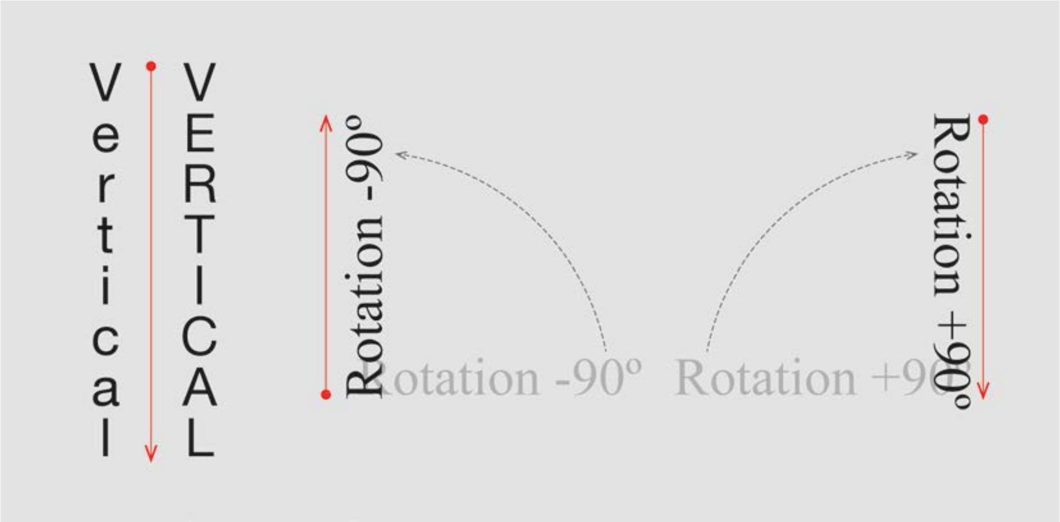

Vertical
VERTICAL
Rotation -90°
Rotation -90°
Rotation +90°
Rotation +90°

Figure 74: Vertical Reading Direction for Latin words.

3.2.4.2 Alignment

For Latin paragraphs there are four different values to assign for position of type within a text block:

[1] Left Alignment: flush left, ragged right. This alignment follows the principle of handwriting, with text tight and aligned to the left margin and ending ragged on the right. Left alignment is considered the most readable one.

[2] Right Alignment: flush right, ragged left. Right alignment rags text on the left and aligns it on the right. Right-aligned text is less common as it can be quite difficult to read for readers of Western languages.

[3] Centered Alignment. In centered alignment, each line horizontally is positioned in the centre of the page to form a symmetrical shape from it, with line beginnings and endings ragged. It has readability issues similar to right-aligned text.

[4] Justified Alignment. Justified text lines up on both the left and right sides. In order to align both the left and right edges of the text, extra space is added between words to tweak each line of type, forcibly filling the line [4] [22].

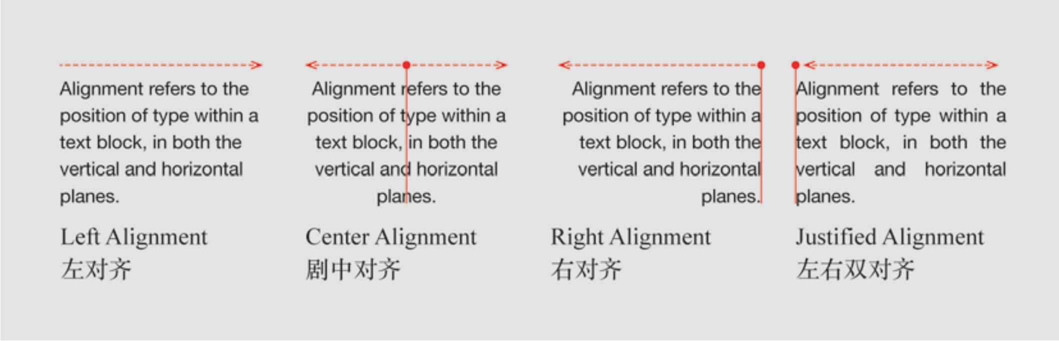
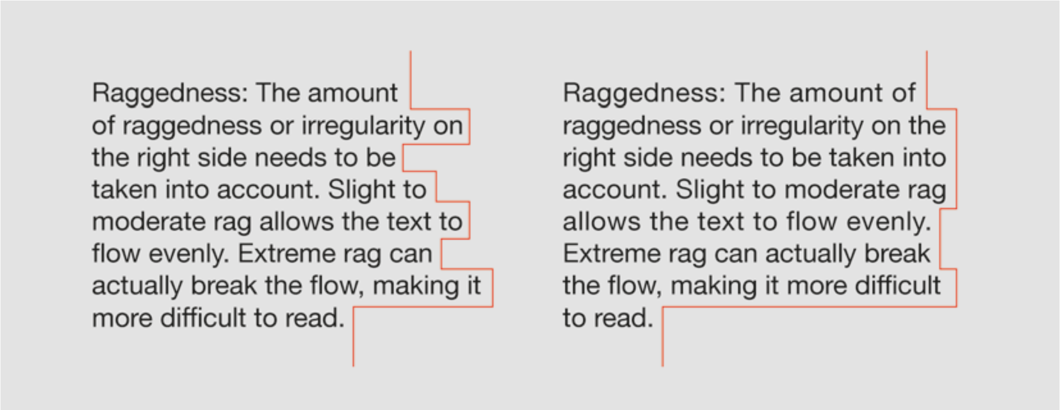

Alignment refers to the position of type within a text block, in both the vertical and horizontal planes.
Left Alignment
左对齐
Alignment refers to the position of type within a text block, in both the vertical and horizontal planes.
Center Alignment
剧中对齐
Alignment refers to the position of type within a text block, in both the vertical and horizontal planes.
Right Alignment
右对齐
Alignment refers to the position of type within a text block, in both the vertical and horizontal planes.
Justified Alignment
左右双对齐

Figure 75: Alignment values for Latin texts in horizontal arrangements.

Left alignment is considered as the best choice for Latin based-languages, especially when there are large amounts of text on a page. However, two factors are important to consider: [1] raggedness and [2] breaks.

[1] *Raggedness*: The amount of raggedness or irregularity on the right side needs to be taken into account. Slight to moderate rag allows the text to flow evenly. Extreme rag can actually break the flow, making it more difficult to read.

[4] *Breaks*: Written sentences should be read as if one speaks them. Awkward breaks between related words in the sentences also affect readability. This is especially true in headlines. If there are line breaks in wrong places, the sentence may not transmit the semantic meaning as it was originally intended or it may be more difficult to understand [22].



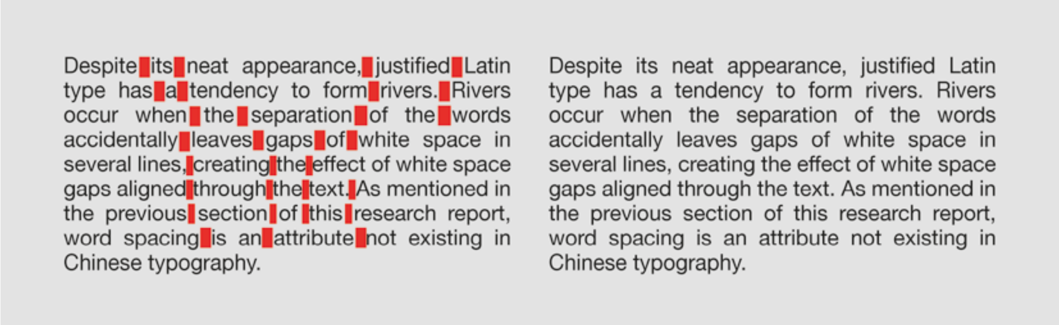
Raggedness: The amount
of raggedness or irregularity on
the right side needs to be
taken into account. Slight to
moderate rag allows the text to
flow evenly. Extreme rag can
actually break the flow, making it
more difficult to read.

Raggedness: The amount of
raggedness or irregularity on the
right side needs to be taken into
account. Slight to moderate rag
allows the text to flow evenly.
Extreme rag can actually break
the flow, making it more difficult
to read.

Figure 76: Extreme and slight degree of Raggeness in Left alignment.

When Latin text is justified, several undesired behaviors can occur, such as [1] *rivers*, [2] *excess of hyphenation*, and the appearance of [3] *widows*, *orphans* and *hypos*, all of them regarded as unprofessional mistakes and must be avoided, explain as it follows.

[1] *Rivers* (文字河 *Wénzìhé*): Despite its neat appearance, justified Latin type has a tendency to form *rivers* [22]. Rivers occur when the separation of the words accidentally leaves gaps of white space in several lines, creating the effect of white space gaps aligned through the text [4]. As mentioned in the previous section of this research report, word spacing is an attribute not existing in Chinese typography; therefore, Chinese paragraphs do not allow the appearance of rivers. In Latin paragraphs generates vertical disturbance for the horizontal flowing of the eye while reading [12]. There is no software smart enough to detect them yet, much less do anything about them, however, they can be easier to spot by turning the text upside-down or by squinting to unfocus the eyes. To fix rivers, the content of the text can also be edited to adjust its flow. Without rewriting, the first solution is to add or remove a small amount of tracking from the individual lines, sentences or paragraphs. A second solution is with the correct use of *hyphenation*[4] [19] [22].

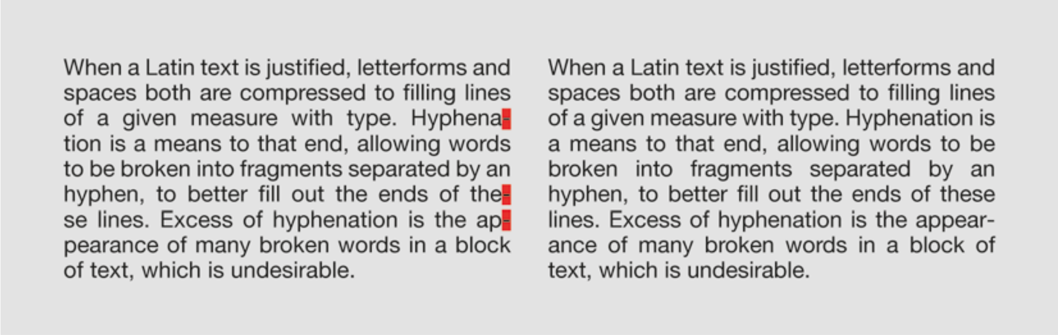


Despite its neat appearance, justified Latin
type has a tendency to form rivers. Rivers
occur when the separation of the words
accidentally leaves gaps of white space in
several lines, creating the effect of white space
gaps aligned through the text. As mentioned in
the previous section of this research report,
word spacing is an attribute not existing in
Chinese typography.

Despite its neat appearance, justified Latin
type has a tendency to form rivers. Rivers
occur when the separation of the words
accidentally leaves gaps of white space in
several lines, creating the effect of white space
gaps aligned through the text. As mentioned in
the previous section of this research report,
word spacing is an attribute not existing in
Chinese typography.

Figure 77: Alignment values for Latin texts in horizontal arrangements.

[2] *Excess of Hyphenation*: When a Latin text is justified, letterforms and spaces both are compressed to filling lines of a given measure with type. *Hyphenation* is a means to that end, allowing words to be broken into fragments separated by an *hyphen*, to better fill out the ends of these lines [19] . Excess of hyphenation is the appearance of many broken words in a block of text, which is undesirable. However, in most of the modern software for text design and edition, the sets for Hyphenation and Justification can control the number of hyphens that can appear in a text block, as well as the number of consecutive lines that are allowed to have broken words, considering that more than two consecutively lacks of aesthetics. The point at which words break (usually on a syllable) can also be controlled, for example, 'trans-formation' [4] .

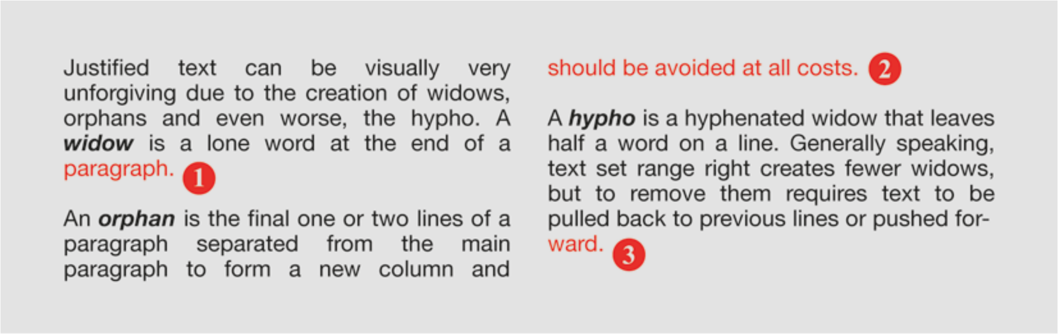


When a Latin text is justified, letterforms and
spaces both are compressed to filling lines
of a given measure with type. Hyphena-
tion is a means to that end, allowing words
to be broken into fragments separated by an
hyphen, to better fill out the ends of the-
se lines. Excess of hyphenation is the ap-
pearance of many broken words in a block
of text, which is undesirable.

When a Latin text is justified, letterforms and
spaces both are compressed to filling lines
of a given measure with type. Hyphenation is
a means to that end, allowing words to be
broken into fragments separated by an
hyphen, to better fill out the ends of these
lines. Excess of hyphenation is the appear-
ance of many broken words in a block of
text, which is undesirable.

Figure 78: Example of excess of hyphenation.

[3] *Widows*, *Orphans* and *Hypos*: Justified text can be visually very unforgiving due to the creation of widows, orphans and even worse, the hypho. A *widow* is a lone word at the end of a paragraph. An *orphan* is the final one or two lines of a paragraph separated from the main paragraph to form a new column, and should be avoided at all costs. A *hypho* is a hyphenated widow that leaves half a word on a line [4] .



Justified text can be visually very unforgiving due to the creation of widows, orphans and even worse, the hypho. A ***widow*** is a lone word at the end of a paragraph. ①

An ***orphan*** is the final one or two lines of a paragraph separated from the main paragraph to form a new column and should be avoided at all costs. ②

A ***hypho*** is a hyphenated widow that leaves half a word on a line. Generally speaking, text set range right creates fewer widows, but to remove them requires text to be pulled back to previous lines or pushed forward. ③

Figure 79: Example of a *widow* (1), an *orphan* (2) and a *hypho* (3).

Generally speaking, text set range right creates fewer widows, but to remove them requires text to be pulled back to previous lines or pushed forward to fill the line out. The same principle applies to removing orphans, but often far more text is needed to alleviate the problem[4].

3.2.4.3 Line Width

In the case of Latin typography, line width is the width of the line formed by an arrangement of words. Line width is influenced by the type size, and also by letter spacing and word spacing[12]. In general, left-aligned and justified text read best when the line width is between sixty to seventy characters. For short lines, maintaining a minimum of twenty characters per line is recommendable; for values fewer than twenty, the eyes needs to work harder to read. Note that short line width in justified text can create the undesired effect of extreme rivers and word spacing.

3.2.4.4 Line Spacing

The vertical space between lines of text written in Latin-based languages is measured from baseline to baseline. Line spacing it is also known as *leading*, a term that derivates from hot-metal printing, which makes reference to increase the vertical space between lines of metal type by literally inserting lead strips. Line spacing is directly influenced by the type style and size, which is very variable. Nonetheless, in order to achieve readability, line spacing should be at least the same size than the size of the letter. The function of line spacing is to introduce space into a text block and allows the characters to have enough space for the information to be easy to read. Too large line spacing will break the flow of the reading from line to line, while too little line spacing will make the lines of text crash into one another [4] [12] [32] .

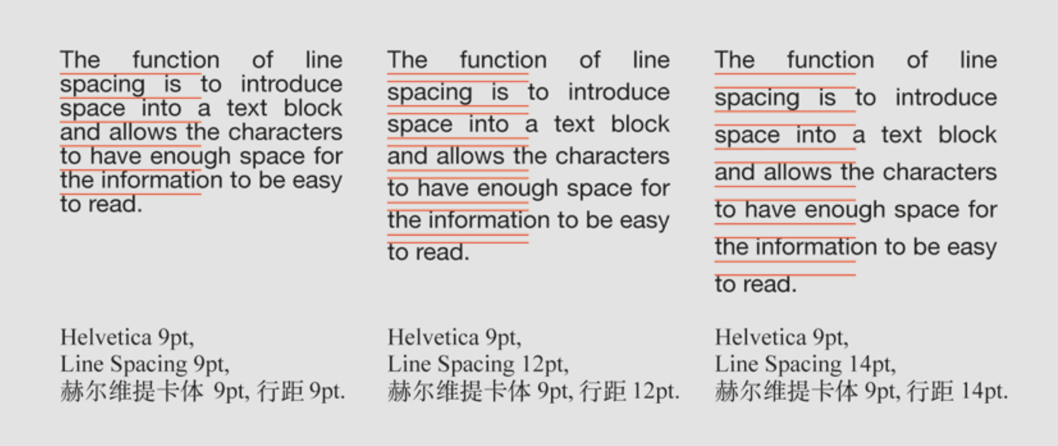

The function of line spacing is to introduce space into a text block and allows the characters to have enough space for the information to be easy to read.
Helvetica 9pt,
Line Spacing 9pt,
赫尔维提卡体 9pt, 行距 9pt.
The function of line spacing is to introduce space into a text block and allows the characters to have enough space for the information to be easy to read.
Helvetica 9pt,
Line Spacing 12pt,
赫尔维提卡体 9pt, 行距 12pt.
The function of line spacing is to introduce space into a text block and allows the characters to have enough space for the information to be easy to read.
Helvetica 9pt,
Line Spacing 14pt,
赫尔维提卡体 9pt, 行距 14pt.

Figure 80: Line spacing in Latin paragraphs.

Some Latin typefaces have taller ascenders than is typical, with the result that with tight space between one line and the next one, the ascenders of one line may touch the descenders above. When using a face with clearly tall ascenders, the line spacing must be adjusted accordingly [19] .

4 Designing Text in Multilingual Contexts

After describing the intrinsic principles for Chinese and Latin writing systems in Chapter 3, this section is dedicated to present general references for the use of Chinese and Latin typography in multilingual contexts.

As explained in the Introduction of this research, from the linguistic perspective there are two situations defined as multilingualism in writing forms. The former is named *Parallelism*, which consist in two texts written in different languages expressing the same semantic content, usually providing visual cues to indicate equivalence, such as symmetrical placement around a horizontal or vertical axis. The later is called *Complementarity*, which refers to a textual composition formed by smaller units with different languages or languages mixtures.

The problem identified during the development of the previous chapter is that even when the two systems share certain typographic attributes, sometimes the value assigned to these shared attributes cannot be matched; for instance, the value for the length of two parallel paragraphs will present a notable difference. Or even worst, in some cases the typographical attribute does not exist at all in the counterpart, such as word spacing, an attribute proper to Latin texts, which normally causes several issues in a visual composition, issues that will not appear in a text written in Chinese.

The main purpose of this general references is to serve as a guideline for an adequate combination of similar typographic attributes, increasing the ability of these texts to transmit better visual cues to indicate their equivalence or to complement each other, enhancing their unity in any of the two models for multilingual written design.

4.1 Reading Direction

Considering the differences in reading direction for Chinese and Latin arrangements of texts, horizontal layout results the most logical choice for multilingual text design. Several factors are considered to reach this conclusion:

[1] Human vision has a natural horizontal direction given by the positions of the eyes, thus, the visual scope is broader than vertical.

[2] Horizontal layout can improve the reading efficiency and reduce eye fatigue.

[3] Despite the traditional vertical arrangement of Chinese characters is

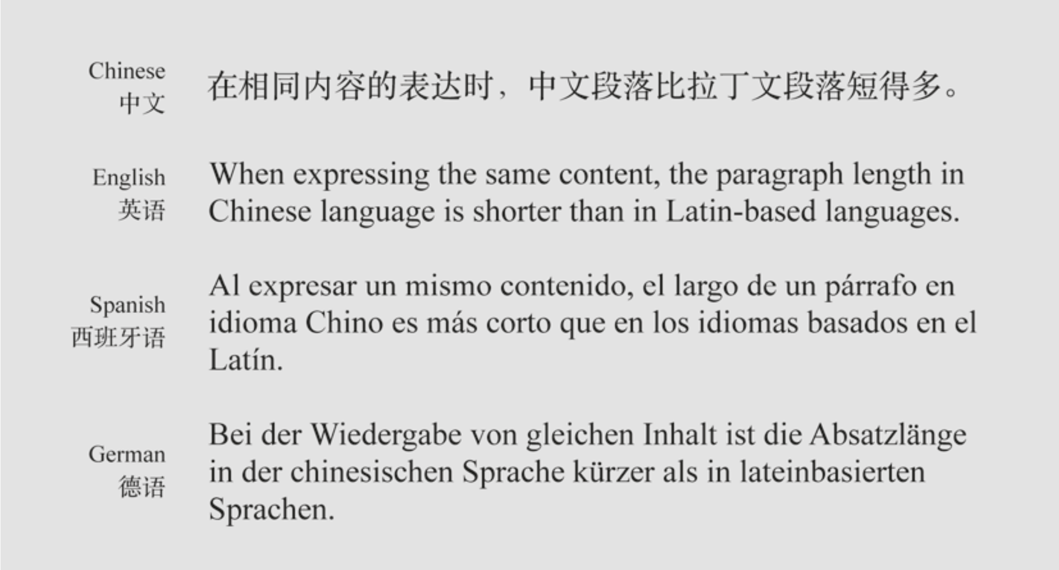
considered superior in aesthetics, this layout has been replaced over time for the one in horizontal arrangement, left to right direction, and must be avoided for long texts [12].

4.2 Type Size

One of the first priorities of text design is the assignment for the value of type size. The setting of size will depend of course on the specific requirements of the design project, however, in general terms the first consideration should be the performance of the Chinese type, and then determine the size for Latin-based languages type. In one hand, due to the great variation in the stroke number for different Chinese characters, the setting for their type size should consider readability for all of them, including those with a very tight and compact composition of strokes, as mentioned before in this research. On the other hand, Chinese type should be smaller by one or two points in order to reach visual balance with the size of the Latin type, otherwise, Chinese type will appear in a different degree of gray compared with a Latin type [12].

4.3 Paragraph Length

When expressing the same semantic meaning, the length of a paragraph written in different Latin-based languages, such as English, Spanish and German will be similar but not exactly the same. This variation in the value of paragraph length is more dramatic when comparing any Latin-based language with Chinese language [12].



Chinese 中文	在相同内容的表达时，中文段落比拉丁文段落短得多。
English 英语	When expressing the same content, the paragraph length in Chinese language is shorter than in Latin-based languages.
Spanish 西班牙语	Al expresar un mismo contenido, el largo de un párrafo en idioma Chino es más corto que en los idiomas basados en el Latín.
German 德语	Bei der Wiedergabe von gleichen Inhalt ist die Absatzlänge in der chinesischen Sprache kürzer als in lateinbasierten Sprachen.

Figure 81: Different paragraph lengths between Chinese and Latin-based languages.

The Chinese paragraph is much shorter than the one expressed in English, for instance, in a proportion around 1:2. If equivalent paragraphs are set to the same line width arranged one next to the other, a large blank field will appear under the Chinese one, jeopardizing the balance of the composition [12] .

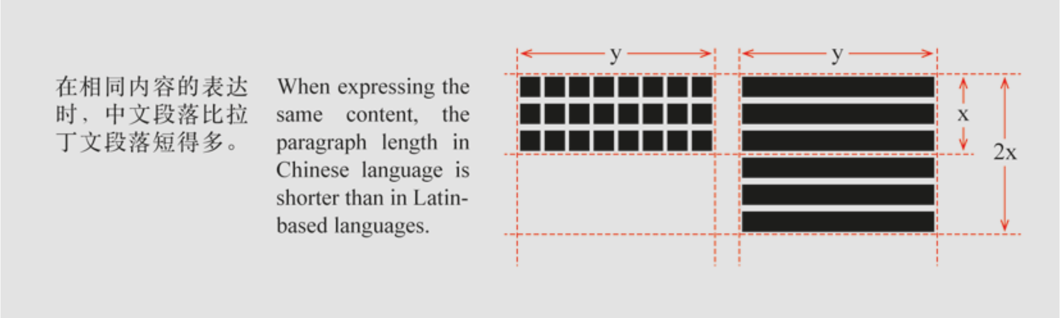

在相同内容的表达时，中文段落比拉丁文段落短得多。
When expressing the same content, the paragraph length in Chinese language is shorter than in Latin-based languages.
y
y
x
2x

Figure 82: Comparison of paragraph lengths between Chinese and English.

4.4 Paragraph Combination

To keep the visual sense of equivalence under the unavoidable difference in paragraphs length previously described, one solution is to create a vertical arrangement composing one column, with one paragraph above the other.

To solve this difference in horizontal arrangements, the designer Henry Steiner (1995) created a 1:2 proportion for parallel paragraphs in which the Chinese language uses one column and English language uses the space of two columns [12] .

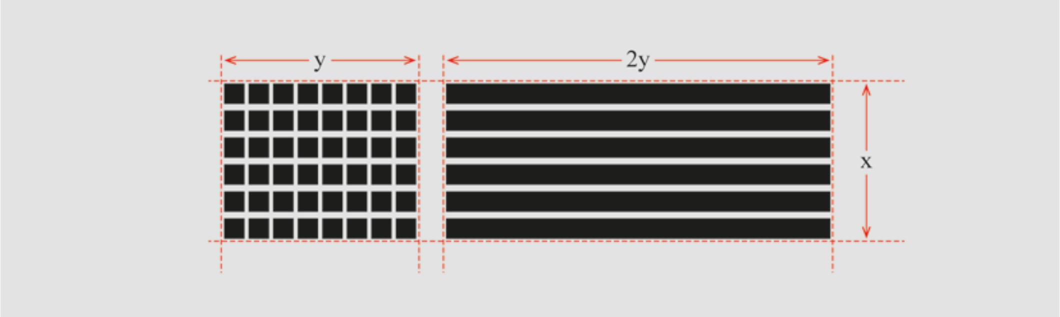


Figure 83: Stainer's proportion 1:2 for parallel paragraphs.

Based on the 1:2 proportion of Steiner, the designer Xiaofeng Wang (2012) developed a 1:1:1 three-column proportion, in which Chinese language occupies one column and the English language uses the other two, separately. In this proportion, English and Chinese paragraphs can share equal width, in three columns of approximately the same length [12] .

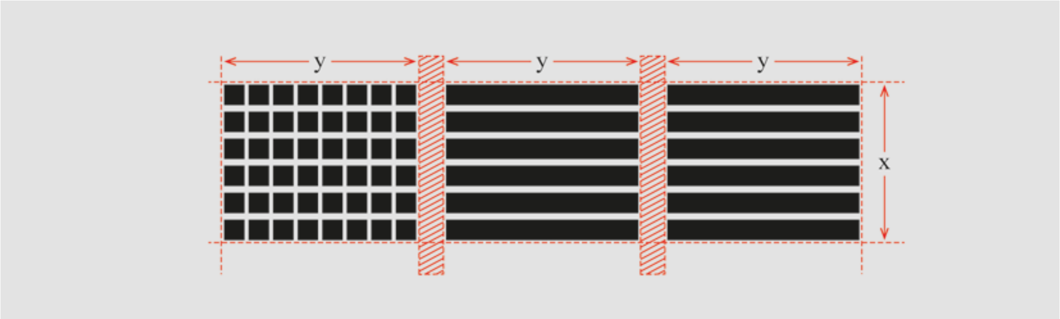


Figure 84: Wang’s proportion 1:1:1 for parallel paragraphs.

The structures proposed by Steiner and Wang are flexible enough to allow several variations for their composition inside a design layout.

4.5 Paragraph Alignment

When designing multilingual texts, a logical decision is to set both texts to justified alignment, because the Latin paragraph formed by this distribution of lines is the most similar to the rectangular, natural grids of rows in Chinese paragraph, enhancing the sense of a unified composition [12] .

However, some considerations must to be taking into account when justified alignment is set for combined paragraphs.

Firstly, as mentioned in the previous section of this research report, word spacing is an attribute not existing in Chinese typography; therefore, Chinese paragraphs do not allow the appearance of rivers, as they do accidentally occur in paragraphs written in Latin-based languages. Rivers, then, must check and avoided in Latin-based languages [12] .

Secondly, in Chinese language two or three characters compose the semantic equivalent of a word. When the number of characters at the end of a paragraph is little, it may also have the appearance of widows in Latin typography, and this also must be avoided [12] .

4.6 Line Width

In general terms, the setting of the line width will determine the *column width* (栏宽 *Lánkuān*) of the paragraph within a layout, affecting directly the legibility of the text. According to the needs of the design layout, the line width of a paragraph should find a balance between narrow and wide: too narrow line width will increase the frequency of visual scanning from line to line and tire the eyes of the reader. Likewise, too wide paragraph will exceed the visual sight of the reader, therefore, it will slow down the reading speed [12] .

4.7 Line Spacing

In general, recommended values for line spacing in each writing system should be the first consideration to arrange multilingual texts in a composition, in order to ensure readability and legibility of the contents.

Nonetheless, one of the main differences between Chinese and Latin typography is that Chinese characters measure their line spacing according to their visual center line, while Latin letterforms and words measure their line space from baseline to baseline. Consequently, the alignment of line spacing in multilingual contexts must consider this fundamental difference.

The suggestion given by Xiaofeng Wang (2012) is to consider some general aspects, despite the characteristics of the specific typeface for each language in a match, paying attention to:

[1] The baseline of the Latin letterforms should be a bit higher than the bottom edge of Chinese characters.

[2] The ascender line of Latin letterforms should be lower than the top edge of Chinese characters.

[3] The portion of Latin letterforms above their baseline should take a value between the 70% to the 80% of the total height of Chinese characters.

[4] Parallel rows aligned is highly desirable for a comfortable reading, and if is not possible for each row of a body of text, at least should be considered for the first row of each paragraph[12].

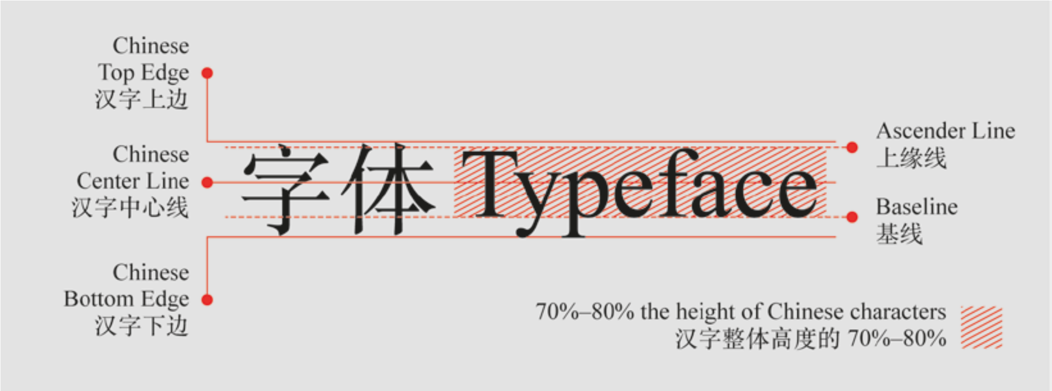


Figure 85: Wang’s model for Line alignment.

A second suggestion given by Roman Wilhelm (2009) is to pay attention to the horizontal lines delimited by the spatial structure in the characters ‘十’ (*Shí*) and ‘口’ (*Kǒu*) to determine a height range, and then, match the height of Latin letterforms according to that range[29].

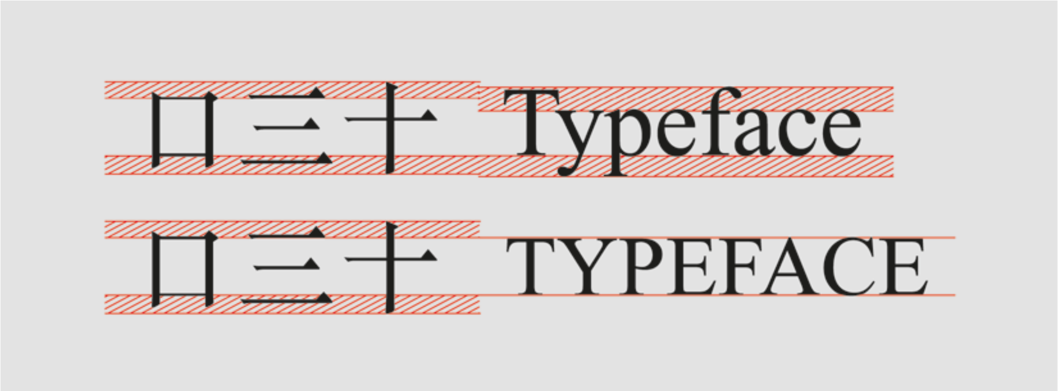


Figure 86: Wilhelm’s model for Line alignment.

4.8 Type Detailing

Besides the general approaches for text designing in multilingual contexts involving Chinese and Latin-based languages, there are some details to consider, referring to specific graphemes extensively used in both systems. Such is the case for representation of *numerals* and *punctuation marks*, presenting relevant differences between their representation as well as in their function and application.

4.8.1 Numerals

Chinese and Western languages also present important differences in the representation for numerals. In multilingual contexts, designers must pay attention on how to equate numerals according the specific requirements of one given project.

In Latin typography, digits are represented with *Roman Numerals* and *Arabic Numerals*. Roman numerals use Latin letterforms to be expressed. Arabic numerals in turn, have two variants for their representation. The former variant is called *Lining Numerals* or *Uppercase Numerals*, in which each digit presents the same width and height, all of them aligned to the baseline, allowing a better vertical alignment. The latter variant for Arabic numerals is called *Old Style Numerals* or *Lowercase Numerals* and they do not align to the baseline, which means they can be difficult to read. Old Style numerals have descenders and only the ‘6’ and ‘8’ have the same proportions as their lining counterparts. Old Style numerals are used in long sequences of digits to improve readability, such as in phone numbers. These two styles reflect the different ways that numerals are used in text, such as in text blocks or tabular form. Notice that Arabic numerals are widely used in both Chinese and Latin typography [4] [12] .

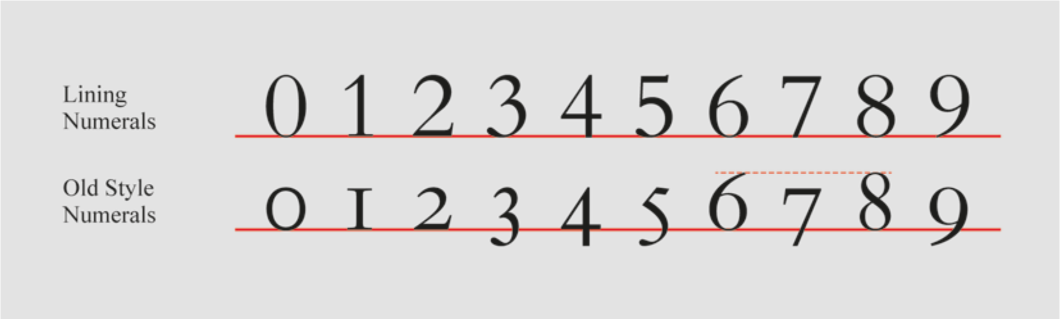


Figure 87: Variations for Arabic numerals.

In Chinese, there are specific characters to represent numbers, in two variants called *Standard Numerals* (小写) and *Capital Numerals* (大写). The former variant is used in ordinary applications of everyday life, while the latter was used traditionally for notes on economy, designed to prevent accounting books to be juggled[12].

The following table compiles visual examples for the different variations on numeral representations.

Arabic Numerals	Roman Numerals	Standard Chinese Numerals	Capital Chinese Numerals
0		〇	零
1	I	一	壹
2	II	二	贰
3	II	三	叁
4	IV	四	肆
5	V	五	伍
6	VI	六	陆
7	VII	七	柒
8	VII	八	捌
9	IX	九	玖
10	X	十	拾
20	XX	二十 / 廿	贰拾
30	XXX	三十 / 卅	叁拾

40	XL	四十 / 卌	肆拾
50	L	五十	伍拾
60	LX	六十	陆拾
70	LXX	七十	柒拾
80	LXXX	八十	捌拾
90	XC	九十	玖拾
100	C	百	佰
500	D	五百	伍佰
1.000	M	千	仟

Table 7: Different representations for Numerals.

4.8.2 Punctuation Marks

In Chinese and Latin, some functions and usage of punctuation marks are represented in different forms. Designers are encouraged to pay attention to these differences and consult regional typography habits and standards [12] .

In traditional Chinese writing there were no punctuation marks, such as commas, quotation marks, exclamation marks and colons. As a consequence of adopting horizontal arrangements, some conventions from Western were adapted, although not in the same exact way punctuation marks function for Western languages [14] . Notice that nowadays each punctuation mark for Chinese will usually occupy the same squared space as any other character in a typeface. In Western typography, punctuation marks are an essential element: they creates pauses, inflections and separations; they asks questions and screams different tones of emphasis [22] .

Punctuation marks of common use were extracted from different sources of this research, to be compared and included in this section. All the differences encountered in both linguistics and design references were included in the following table.

Mark	Usage / Notes	In Chinese Language	In Western Language
Period 句号()	Indicate full stop.	完。 A tiny circle.	End. A dot.

Comma 逗号()	Indicate pause.	比如，这里	For instance, here
Enumeration Comma 顿好()	Indicate slight pause to separate items on a list.	中文、英语、德语	Do not exist
Colon 冒号		：	:
Semicolon 分号		；	;
Suspension Points 省略号		· · ·	…
Ellipsis 删节号	In Chinese, an ellipsis occupies the same space as two characters in the center of the line.	……	Do not exist
Em Dash 破折号	In Chinese, an em dash occupies the space of two characters in the center of the line, and there should be no breaking in the line.	——	—
En Dash 一字线	Used to connect two words to signify a range. In Chinese an en dash occupy the space of one character.	—	–
Hyphen 连字号		-	-
Bullet 标点符号	Indicate separation of words in a foreign name	列奥纳多·达·芬奇	Do not apply
Quotation Marks 引号		「...『...』...」	“… ‘…’ …”
Title Marks 书名号	Indicate the title of a work, book or film.	《书题》 Double Angle Brackets	“Title of a Book” Quotation marks
Parenthesis 括号		中文（括弧）字傅	Latin (parenthesis) mark
Brackets 方括号		［方括号］	[Squared Brackets]
方头括号	In Chinese, indicate quotation or a term nomenclature.	【括号】	Do not exist

Table 8: Differences in punctuation marks between Chinese and Western languages.

5 Typefaces for Multilingual Design

Today we have a range of typographic resources never seen before, situation that can be quite exciting, but also very confusing and leading often to underestimate rational criteria for the use of these resources to improve the communicative functions of text design, favoring personal aesthetic preferences instead. This perspective can be described more precisely by using the words of Munari (1966) on his notes about the function of the designer and the objectives of design itself: “Today we do not think in terms of beauty but of formal coherence […] If the form of an object turns out to be ‘beautiful’ it will be thanks to the logic of its construction and to the precision of the solution found for its various components” [37] . In multilingual design, when typography needs to be equated between Chinese and Latin resources in order to achieve formal coherence, an important question arises: Which logic should be used to select those typefaces?

By observing the current production of typography in digital formats, one can quickly realize that the number of Latin typography outnumbers by far the amount of styles available for Chinese language. In an interview of Delphine Hirasuna with Anita Luu and Sing Lin, two American designers, this phenomenon is explained by recognizing that the Latin alphabet only has around 30 main letterforms, while Chinese language has over 8,000 individual characters, of which about 3,500 are most commonly used. Consequently, the work for a Chinese typographer is to craft at least 3,500 Chinese characters and their traditional or simplified equivalent, instead range of letterforms required for a Latin set of letterforms, which considerable less [38] .

In contemporary digital formats for typefaces, a Chinese font also includes two Latin letterforms, one with letter space as in Western typefaces and one monospaced [29] . In general, these Latin complementary styles often do not create a formal coherence with the Chinese counterpart, neither fulfills the visual exigencies for Western readers, accustomed to sophisticated variations of typography design.

Aware of these complex situations, few recent research in typography allow the emergence of typefaces integrating Chinese characters and Latin letterforms in one design of unified style. One example is *Collator*, designed by Vince Lo, a bilingual typeface in specifically created to achieve greater harmony between Chinese and Latin type forms, taking into account the continuous problems due to the different traditions of the two languages [39] .

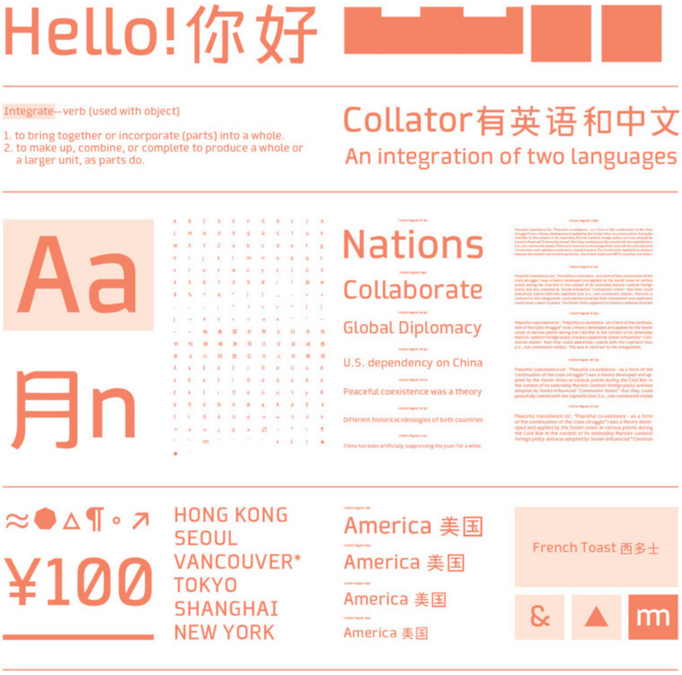

Hello!你好
Integrate—verb (used with object)
1. to bring together or incorporate (parts) into a whole.
2. to make up, combine, or complete to produce a whole or a larger unit, as parts do.
Collator有英语和中文
An integration of two languages
Aa
月n
Nations
Collaborate
Global Diplomacy
U.S. dependency on China
Peaceful coexistence was a theory
Different historical ideologies of both countries
China has been artificially suppressing the yuan for a while
¥100
HONG KONG
SEOUL
VANCOUVER*
TOKYO
SHANGHAI
NEW YORK
America 美国
America 美国
America 美国
America 美国
French Toast 西多士
&
m

Figure 88: Collator, designed by Vince Lo.

Another example is the *Xin Gothic* typeface, designed by Sammy Or, Julius Hui, Benny Law and Cherry Chao, released end of 2011 after a process that took over four years. The structure and proportions of Chinese characters in Xin Gothic are based on the Kai calligraphic script from the Han Dynasty. The result is a consistent form designed specifically for multilingual typesetting of Chinese and languages that use the Latin character set [40].

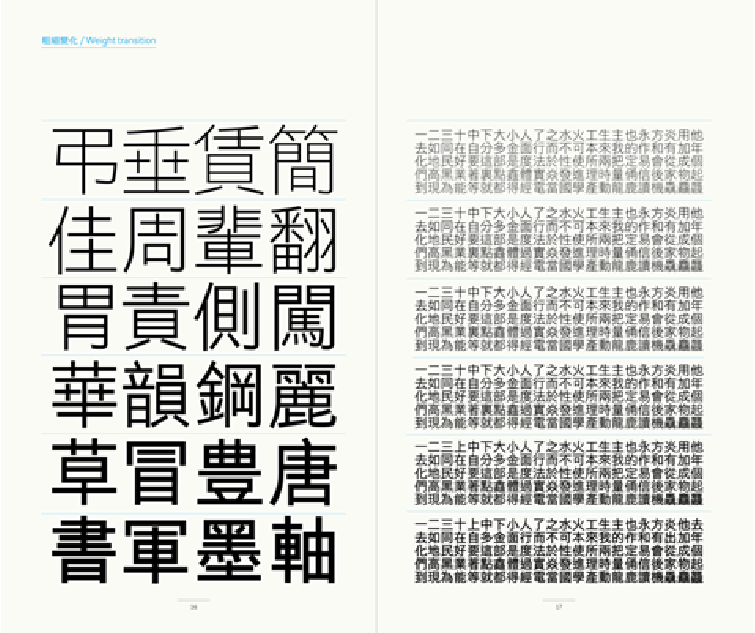

粗細變化 / Weight transition
弔垂賃簡
佳周輩翻
胃責側闖
華韻鋼麗
草冒豊唐
書軍墨軸

Figure 89: Xin Gothic, designed by Sammy Or et als.

Despite the appearance of these valuable innovative typefaces, they represent just the beginning for a new tendency in typography oriented specifically to multilingual design. By now, the majority of designers still remain forced to search into the resources for Latin typography for a complement style to pair it with the Chinese style, and vice-versa. Again, the same question emerges: how do we pair them?

A compilation of different conceptual approaches in this topic given by different designers, both Chinese and Westerners is presented, in order to understand the fundaments they used to equate typographic styles to achieve formal coherence between different writing systems.

5.1 Conceptual Approaches

The Austrian graphic designer Henry Steiner is recognized as one of the pioneers in the field of multilingual design involving Chinese and Latin typography. Establishing his design consultancy firm in 1964 in the city of Hong Kong, Steiner has been since then developing approaches on how the graphic designers can overcome geographical, cultural, and political boundaries in the service of communication. The ideas of Steiner in the field of multilingual design had become a great influence for the next generation of Chinese designers [41] . As for the specific topic of typography combination, in words of Steiner, the goal in is “to achieve a harmonious juxtaposition; more of an interaction than a synthesis. The individual character of the elements should be retained, each maintaining its own identity while also commenting on and enriching the other, like the balance of Yin and Yang” [42] .

The approach of the information designer, typographer and teacher Keith Tam are based in extensive case studies in the bilingual context existing in the city of Hong Kong. For the topic of equivalent typography, Tam matches main styles from both systems, in a general perspective where Songti or Mingti for Chinese is equated with Serif for Latin, and Heiti for Chinese is equated with Sans Serif for Latin [7] .

The approach of the designer Xiaofeng Wang in typography combination result more concrete and practical when compared with the notions given by Steiner and Tam. For Wang, the principle of building a functional combination for homogeneous type is to find a match able to create a balanced gradient, referring to the gray scale in body texts. From this perspective, a unified gray scale will reduce the visual differences in detailed elements intrinsic to each writing system. As for the case of short paragraphs and big type size, Wang points out that the differences between each system will be more notorious. To reach visual consistency, Wang suggests focusing the criteria in visual attributes able to be matched, for instance, by comparing strokes characteristics such as thickness, edges and terminations [12].

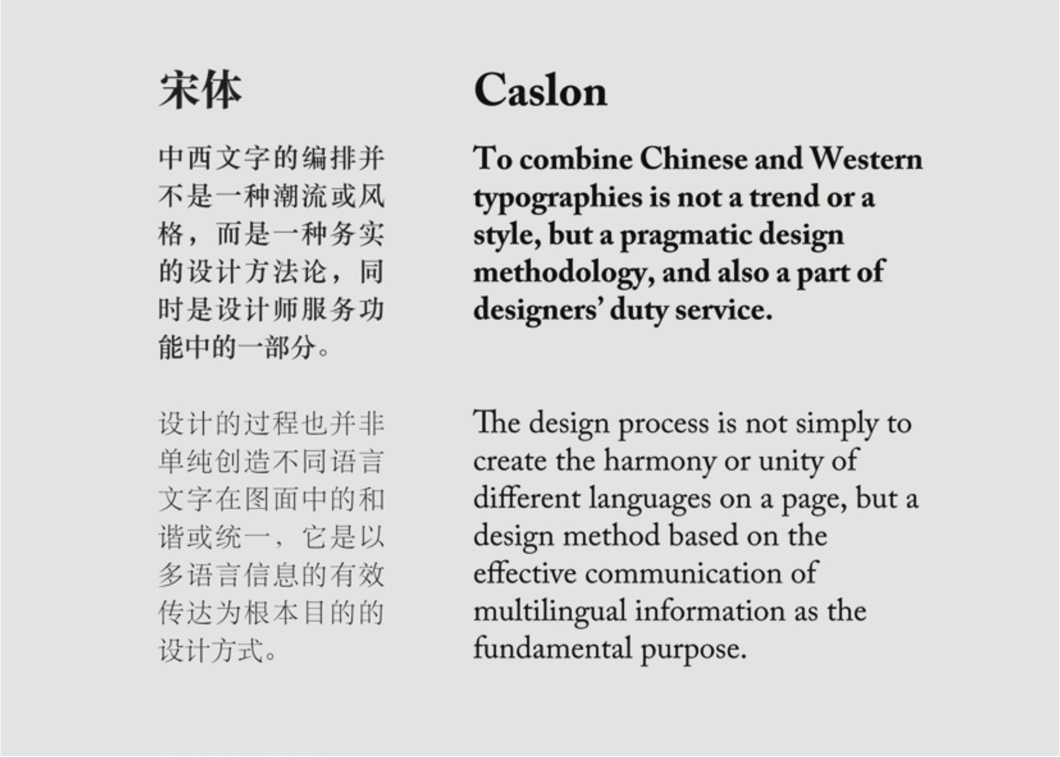
A very similar approach is given by Yifang Cao in her thesis project Visual Translation, where Chinese and Latin typography are combined for the development of multilingual Brand Identity Design. Her proposal consist in to match the style for just the few words used in a determined brand name, by the deconstructing the anatomy of letterforms and recomposing the specific characters for the Chinese brand name with the deconstructed parts. As an introduction to her method, Cao suggests a close inspection on stroke properties will reveal similarities between two typefaces, making them suitable for pairing [43].

The last approach included in this research is given by Roman Wilhelm, a German visual communicator who focused his work on cross-cultural mediation, bilingual typography and typeface design. His approach to pair typefaces consider three parameters: common type characteristics to create harmony, assimilation in the historic ground for the use of certain styles, and finally, similarities in the purpose for the use of different typefaces [29].

5.2 Examples of Matching Typefaces

This section presents concrete functional pairs of matching typography in visual examples, according the different conceptual approaches given by Steiner, Tam, Wang, Cao and Wilhelm. These examples are sorted under the general classification given by Tam, then alphabetically by the name of the Latin typeface.

5.2.1 Combinations for Songti & Serif



宋体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

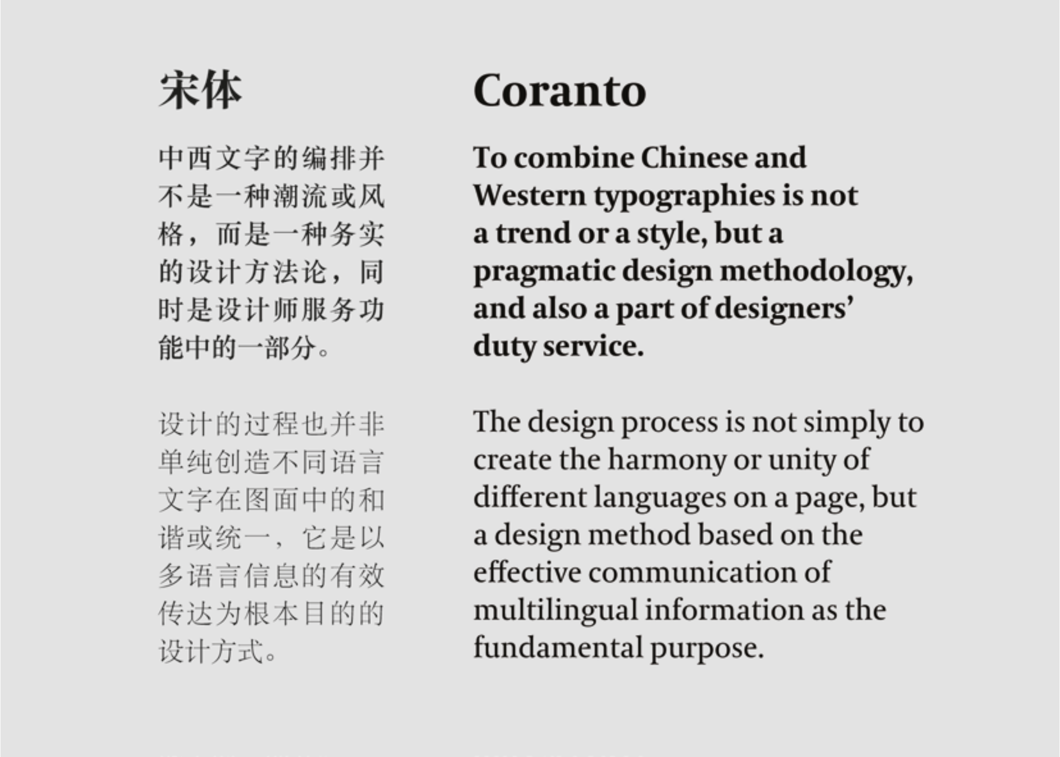
设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Caslon

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 90: Songti & Caslon (Xiaofeng Wang).



宋体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

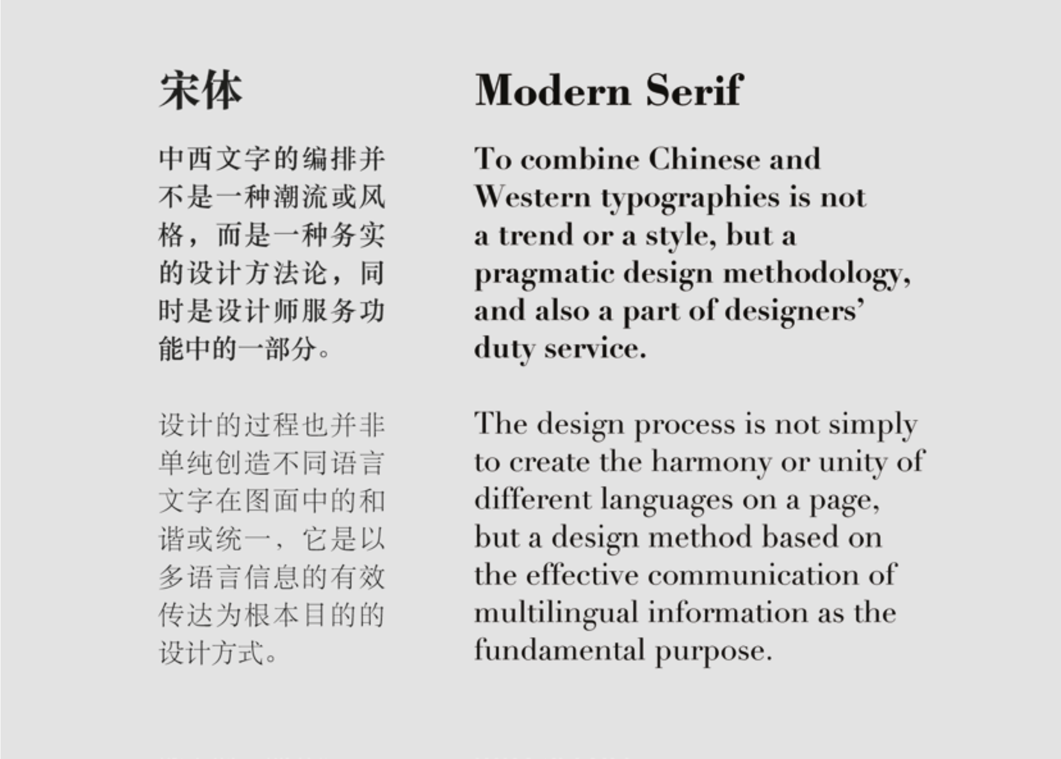
设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Coranto

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 91: Songti & Coranto (Keith Tam).



宋体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

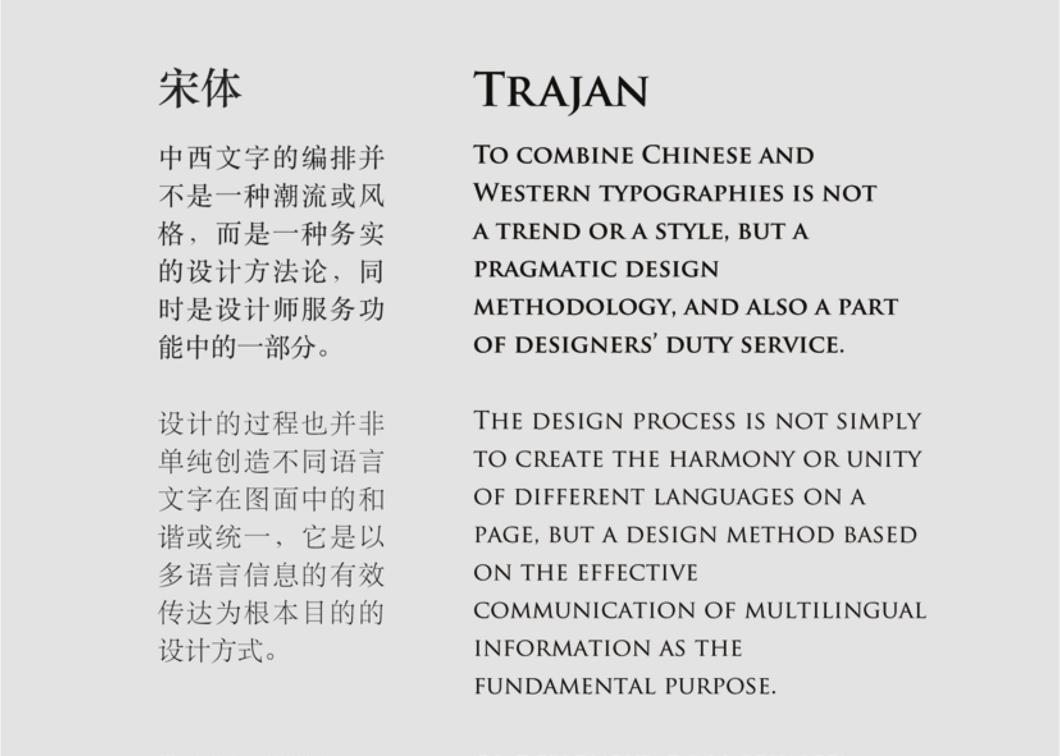
设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Modern Serif

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 92: Songti & Modern Serif (Henry Steiner).



宋体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

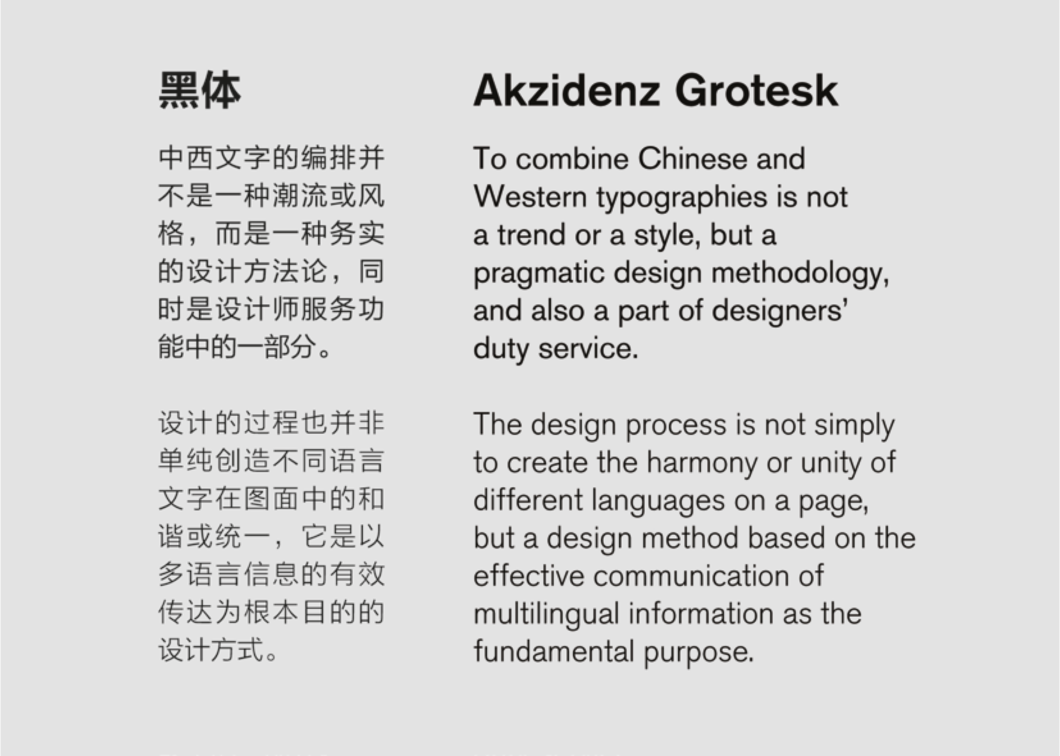
TRAJAN

TO COMBINE CHINESE AND WESTERN TYPOGRAPHIES IS NOT A TREND OR A STYLE, BUT A PRAGMATIC DESIGN METHODOLOGY, AND ALSO A PART OF DESIGNERS' DUTY SERVICE.

THE DESIGN PROCESS IS NOT SIMPLY TO CREATE THE HARMONY OR UNITY OF DIFFERENT LANGUAGES ON A PAGE, BUT A DESIGN METHOD BASED ON THE EFFECTIVE COMMUNICATION OF MULTILINGUAL INFORMATION AS THE FUNDAMENTAL PURPOSE.

Figure 93: Songti & Trajan (Xiaofeng Wang).

5.2.2 Combinations for Heiti & Sans Serif



黑体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

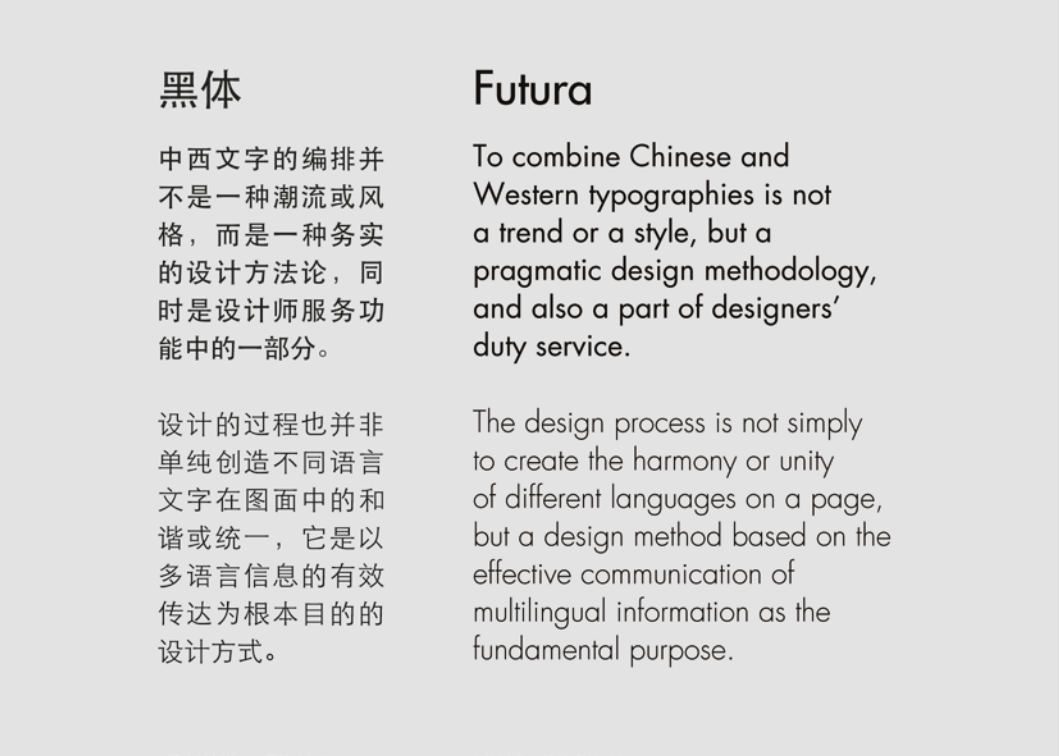
设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Akzidenz Grotesk

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 94: Heiti & Akzidenz Grotesk (Roman Wilhelm).



黑体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

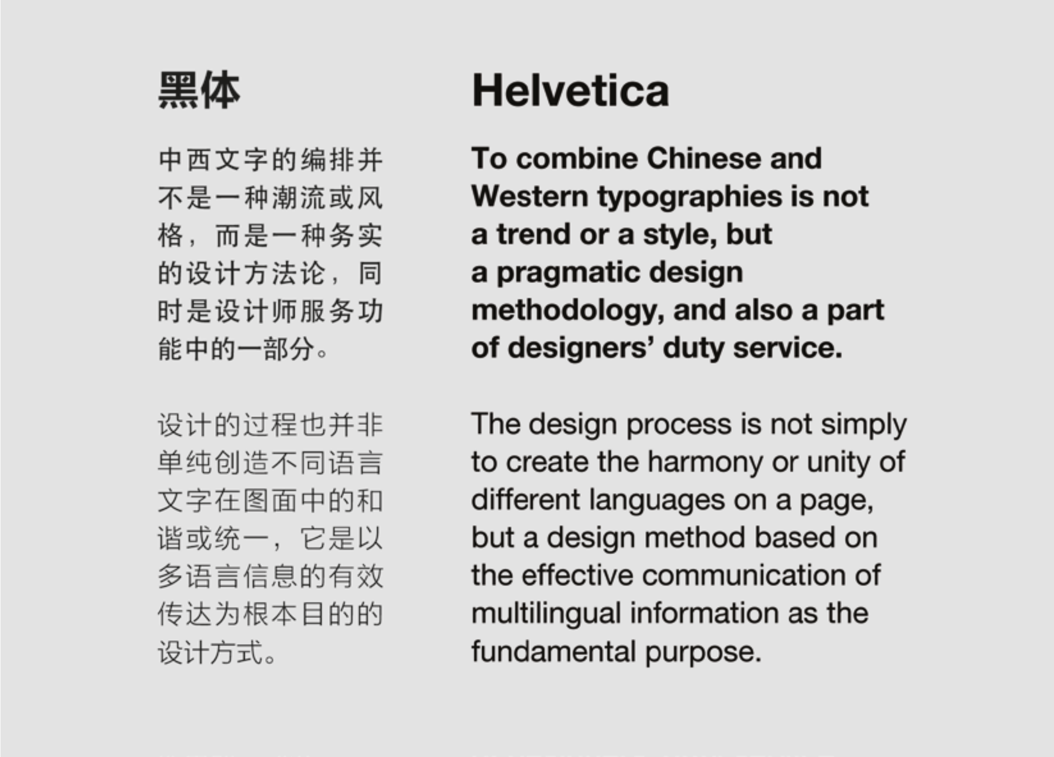
设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Futura

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 95: Heiti & Futura (Henry Steiner).



黑体

Helvetica

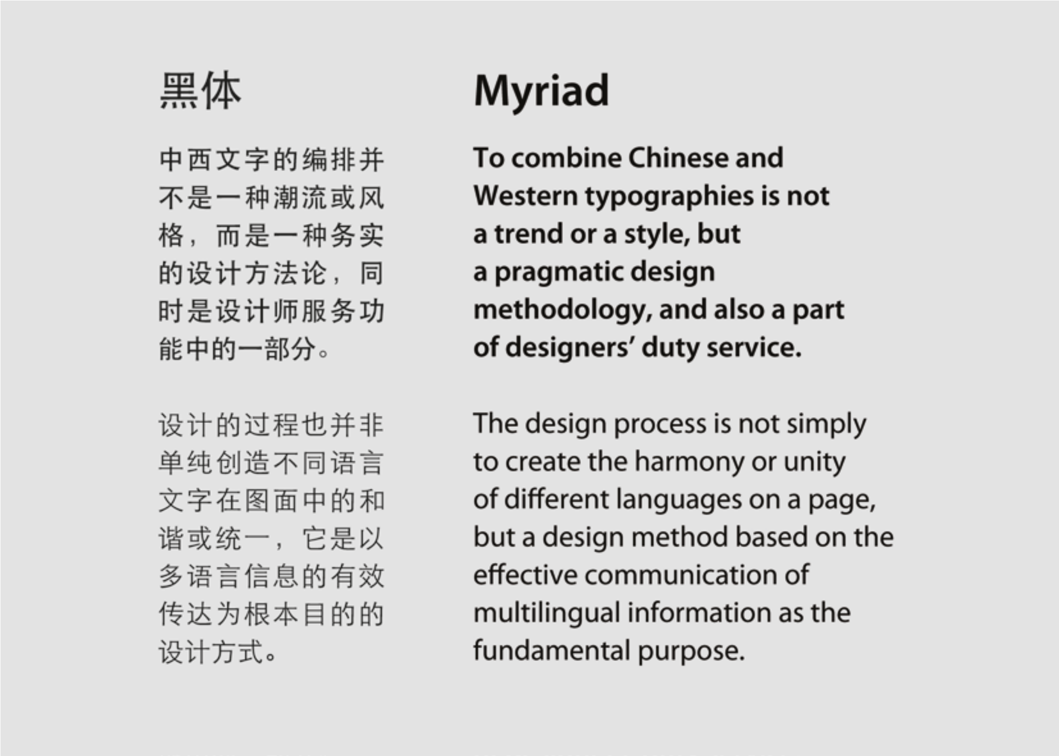
中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 96: Heiti & Helvetica (Xiaofeng Wang).



黑体

Myriad

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

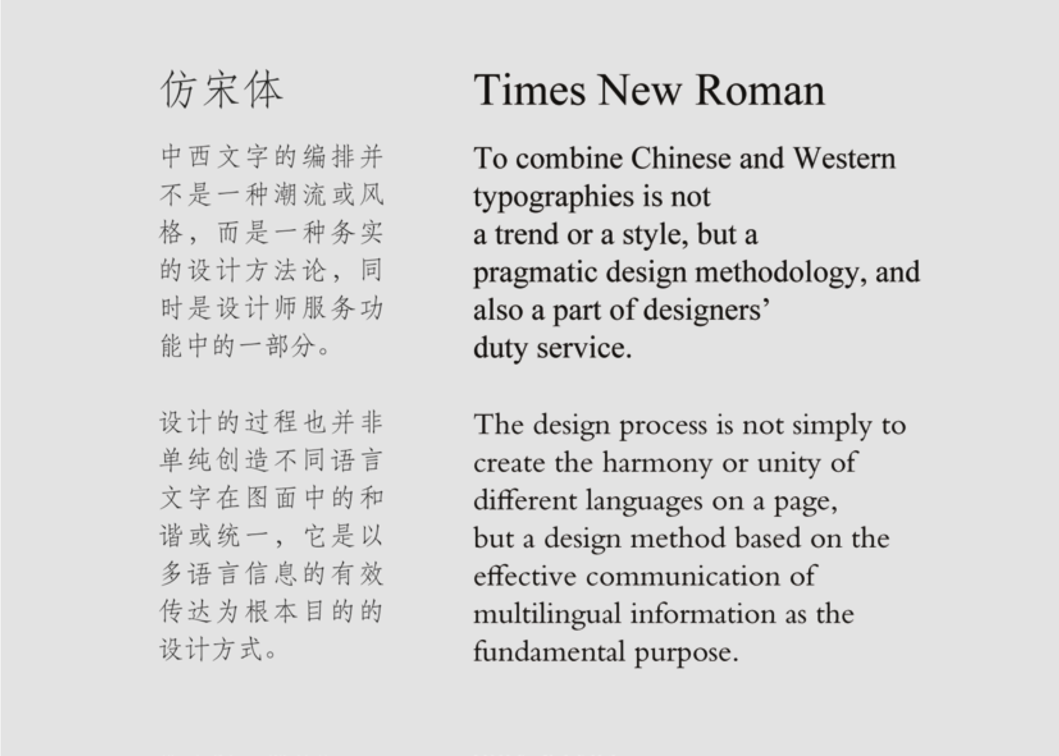
To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 97: Heiti & Myriad (Official Comitee Beijing Olimpics 2008).

5.2.3 Other Combinations



仿宋体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

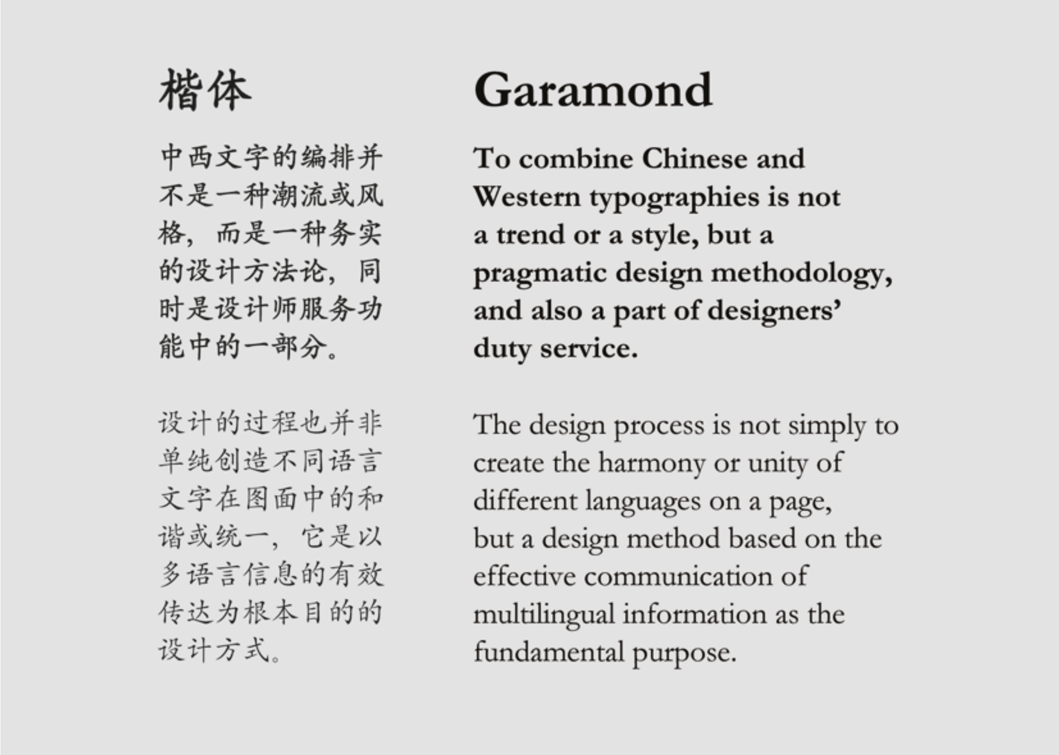
设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Times New Roman

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 98: Fangsongti & Times New Roman (Xiaofeng Wang).



楷体

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

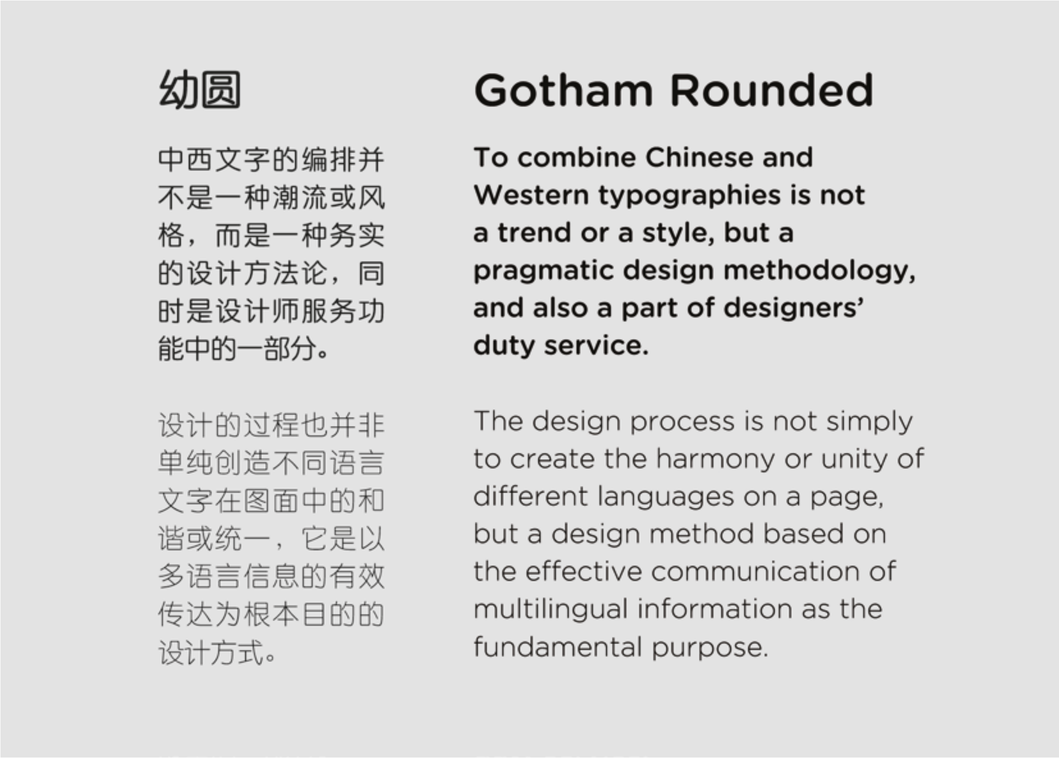
设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Garamond

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 99: Kaiti & Garamond (Henry Steiner).



幼圆

中西文字的编排并不是一种潮流或风格，而是一种务实的设计方法论，同时是设计师服务功能中的一部分。

设计的过程也并非单纯创造不同语言文字在图面中的和谐或统一，它是以多语言信息的有效传达为根本目的的设计方式。

Gotham Rounded

To combine Chinese and Western typographies is not a trend or a style, but a pragmatic design methodology, and also a part of designers' duty service.

The design process is not simply to create the harmony or unity of different languages on a page, but a design method based on the effective communication of multilingual information as the fundamental purpose.

Figure 100: Youyuanti & Gotham Rounded (Yifang Cao).

6 Conclusion

The research made for Chapter 2, *History Overview*, was fundamental to identify the apparition and evolution of typographic styles across the Chinese and Latin writing systems. Being aware of the historical aspects for the visual representation of each language system allow the use of typography to refer to: specific historical periods, specific technologies, specific uses and specific functions. This understanding results extremely necessary for the exercise of pairing typographic styles for each language in multilingual design, which is the third of the three objectives for this investigation.

The investigation for Chapter 3, *Typographic Principles,* focused into describe the internal structure of the graphemes for each system. This step was essential to understand Chinese and Latin writing systems separately, but even more relevant to recognize structural differences between them, reaching in this way the completition of the two remaining objectives for this research.

The conclusion after the research for Chapter 4, *Designing Text in Multilingual Contexts*, is that the mayor differences between Chinese and Latin Typography can be observed —in general terms— in the typographic attributes of: *Reading Direction* and *Paragraph Alignment*, where not all the settings for Chinese are applicable to Latin based languages; *Paragraph Length*, which affects the *Paragraph Combination* inside Multilingual Design for its two models (*Parallelism* and *Complementarity*).

An important point to mention is that this research identified other scholars form Design, such as Wang, Steiner, Tam and Wilhelm, who also recognize these differences and already proposed visual solutions to equate them, by balancing the management of typographic attributes such as: *Type Size*, *Line Width* and *Line Spacing.*

Type Detailing, explained at the end of Chapter 4 revealed the importance of pay attention to details in Multilingual Design, where some individual graphemes, such as numerals, and punctuation marks differ from one system to the other and they need to be also equated.

After the research made for Chapter 5: *Typefaces for Multilingual Design*, two relevant conclusions are worth to mention. The formal is to recognize that nowadays there are more styles for Latin based languages than they exist for Chinese Language, which means that finding matching typefaces for one given design project should logically starts by choosing the most suitable Chinese typography, where the options for the type style are less, and secondly choose the adequate Latin typography for the counterpart, where there is more variety of styles. The later conclusion is to identify the extended existing criteria to pair typographic styles is from the formal perspective, comparing the graphic qualities of the strokes for each style, where in the practice Songti for Chinese has been paired with Serif styles for Latin, and Heiti for Chinese has been paired with Sans-Serif styles for Latin.

Typography styles integrating Chinese Characters and Latin Alphabeth, combining their differences and similitudes in harmonious balance are still in development. This represents an open market with undiscovered possibilities for both Chinese and Western typographers. In the meantime, the foundings of the present research can be used as a general guideline to manage typography in Multilingual Design including Chinese and Latin-based languages.

References

[1] HOUSE, Juliane, and Jochen REHBEIN. "What is 'Multilingual Communication'?" In *Multilingual Communication*, edited by Juliane House and Jochen Rehbein. Benjamins, 2004.

[2] TUCKER, Richard G. "*A Global Perspective on Bilingualism and Bilingual Education.*" CAL Online Resources: Digests. August 1999.

[3] SEBBA, Mark. "*Researching and Theorising Multilingual Texts.*" In *Language Mixing and Code-Switching in Writing: Approaches to Mixed-Language Written Discourse*, edited by Mark Sebba, Shahrzad Mahootian and Carla Jonsson. New York: Routledge, 2012.

[4] AMBROSE, Gavin; Paul HARRIS. *The Fundamentals od Typography.* AVA, 2006.

[5] EVANS, Poppy; THOMAS, Mark. *Exploring the Elements of Design.* 3rd Edition. Delmar Cenage Learning, 2013.

[6] WEBBER, Wibke. "*Text Design: Design Principles for Texts.*" In *The Design of Material, Organism, and Minds*. Springer, 2010.

[7] TAM, Keith. "*A Descriptive Framework for Chinese-English Bilingual Typography*." *Typographische Monatsblätter*, 2012.

[8] 勇肖。《序一》，在《中西文字并排设计》大连理工大学出版社，2013.

YONG, Xiao. "Preface 1." In *Chinese & Latin Typography*, by Xiaofeng Wang. Dalian University od Technology Press, 2013.

[9] CHEN, Ping. *Modern Chinese: History and Sociolinguistics.* Cambridge University Press, 1999.

[10] GU, Sharron. *A Cultural History of the Chinese Language*. McFarland, 2012.

[11] NORMAN, Jerry. *Chinese.* Edited by Cambridge University Press. 1988.

[12] 王小枫。《中西文字并排设计》。大连理工大学出版社，2013.

WANG, Xiaofeng. *Chinese & Latin Typography.* Dalian University of Technology Press, 2013.

[13] 廖洁连。《中国字体设计人:一字一生》。华中科技大学版社，2012.

LIAO, Jielian. *Chinese Typographers: One Character, One Life.* Huazhong University of Science and Technology Publishing House, 2009.

[14] GAO, Mobo C.F. *Mandarin Chinese: an Introduction.* Oxford University Press , 2000.

[15] HONG KONG MUSEUM OF ART. *The Pride of China: Masterpieces of Chinese Painting and Calligraphy of the Jin, Tang, Song and Yuan Dynasties from the Palace Museum*. Hong Kong Museum of Art, 2007.

[16] 曹方。《文字艺术设计》。北京 : 高等教育出版社，2009.

CAO, Fang. *Typography Art Design.* Beijing: Higher Education Press, 2009.

[17] REED, Christopher A. *Gutemberg in Shanghai: Chinese Print Capitalism, 1876-1937*. UCV Press, 2004.

[18] CAFA ART MUSEUM. "*Radical Patterns—The Birth of Chinese Typography*." 《传统的激进——中国现文字设计的诞生》Exhibition. Beijing. (Visited 04 03, 2015).

[19] FELICI, James. *The Complete Manual of Typography: A Guide to Setting Perfect Type*. 2nd Edition. Peachpit, 2012.

[20] DE JONG, Cees W., ed. *Type: A Visual History of Typefaces and Graphic Style. Vol. I, 1628—1900*. II vols. TASCHEN, 2013.

[21] Wikipedia, The Free Encyclopedia. *Vincent Figgins.*
https://en.wikipedia.org/wiki/Vincent_Figgins
(Accessed 04 13, 2015).

[22] BOSLER, Denise. *Mastering Type: The Essential Guide to Typography for Print and Web Design*. 1st Edition. iBook. HOW Books, 2012.

[23] Wikipedia, The Free Encyclopedia. *DIN 1451.*
http://en.wikipedia.org/wiki/DIN_1451
(Accessed 04 11, 2015).

[24] Wikipedia, The Free Encyclopedia. *International Typographic Style.*
http://en.wikipedia.org/wiki/International_Typographic_Style
(Accessed 04 11, 2015).

[25] Wikipedia, The Free Encyclopedia. *Univers.*
https://en.wikipedia.org/wiki/Univers
(Accessed 04 12, 2015).

[26] 刘岚云；鲁建骥。《初级汉语课本,汉字读写练习》。北京语言大学出版社，2009.

LIU, Lanyun, and Jianji LU. *Chinese For Beginners, Chinese Character Workbook.* Beijing Language and Culture University Press, 2003.

[27] Wikipedia, The Free Encyclopedia. *Strokes (CJKV Character).*
http://en.wikipedia.org/wiki/Stroke_(CJKV_character)
(Accessed 09 12, 2014).

[28] Wikipedia, The Free Encyclopedia. *Stroke Order.*

http://en.wikipedia.org/wiki/Stroke_order
(Accessed 09 12, 2014).

[29] WILHELM, Roman. "http://www.multilingual-typography.com." *Multilingual Typography.* http://www.multilingual-typography.com/files/microtypography.pdf (Accessed 03 2015, 2015).

[30] 党晟。《字体符号版面设计》。西安 :陕西人民美术出版社，2000.
DANG, Sheng. *Typography.* Shaanxi People's Fine Arts Publishing House Xi'an, 2000.

[31] 厉致谦。《西文字体的故事》。同济大学出版社，2013.
Colourphilosophy. *Typography.* Tongji University Press, 2013.

[32] FontShop International. *The Typographer's Glossary: Common Type Terminology.* https://www.fontshop.com/glossary
(Accessed 10 12, 2013).

[33] 石增泉。《字体设计》。人民美术出版社，2013.
SHI, Zengquan. *Typography Design.* People's Fine Arts Publishing House, 2013.

[34] Wikipedia, The Free Encyclopedia. *数字 (Digits).*
https://zh.wikipedia.org/wiki/數字
(Accessed 10 17, 2014).

[35] Wikipedia, The Free Encyclopedia. *标点符号 (Punctuation Marks).*
https://zh.wikipedia.org/wiki/标点符号
(Accessed 10 18, 2014).

[36] Wikipedia, The Free Encyclopedia. *Punctuation.*
https://en.wikipedia.org/wiki/Punctuation
(Accessed 10 18, 2014).

[37] MUNARI, Bruno. *Design as Art.* Penguin Group, 1966.

[38] HIRASUNA, Delphine. *Typography in China. Interview with Anita Luu and Sing Liu.* http://www.atissuejournal.com/2009/05/28/typography-in-china/ (Accessed 03 21, 2015).

[39] LO, Vince. *Collator.* http://collator.tumblr.com/
(Accessed 03 28, 2015).

[40] Creative Roots. *Bilingual Typeface Xin Gothic.*
http://creativeroots.org/2012/02/bilingual-typeface-xin-gothic/
(Accessed 03 28, 2015).

[41] Wikipedia, The Free Encyclopedia. *Henry Steiner.*
https://en.wikipedia.org/wiki/Henry_Steiner

(Accessed 03 23, 2015).

[42] STEINER, Henry. *Cross-Cultural Design: Communicating in the Global Marketplace*. London: Thames and Hudson Ltd, 1995.

[43] CAO, Yifeng. "*Visual Translation: A New Way to Design a Chinese Typeface based on an Existing Latin Typeface*." Thesis, Agricultural and Mechanical College, Louisiana State University, 2012.

作者简历及在学研究成果

一、 作者入学前简历

起止年月	学习或工作单位	备注
1997年03月至2000年12月	Pontificia Universidad Católica de Chile, Bachelor in Fine Arts (美术学).	
2001年01月至2004年06月	Ogilvy & Matter, Graphic Designer (平面设计者).	
2004年07月至2005年05月	Anticipa S.A. Technology Services, Graphic Designer (平面设计者).	
2005年06月至2010年07月	Workspace Studio, Graphic Designer (平面设计者).	
2010年08月至2012年07月	北京科技大学, Chinese Language	

独创性说明

本人郑重声明：所呈交的论文是我个人在导师指导下进行的研究工作及取得研究成果。尽我所知，除了文中特别加以标注和致谢的地方外，论文中不包含其他人已经发表或撰写的研究成果，也不包含为获得北京科技大学或其他教育机构的学位或证书所使用过的材料。与我一同工作的同志对本研究所做的任何贡献均已在论文中做了明确的说明并表示了谢意。

签名：＿＿＿＿＿＿ 日期：＿＿＿＿＿＿

关于论文使用授权的说明

本人完全了解北京科技大学有关保留、使用学位论文的规定，即：学校有权保留送交论文的复印件，允许论文被查阅和借阅；学校可以公布论文的全部或部分内容，可以采用影印、缩印或其他复制手段保存论文。

（保密的论文在解密后应遵循此规定）

签名：＿＿＿＿＿＿ 导师签名：＿＿＿＿＿＿ 日期：＿＿＿＿＿＿

学位论文数据集

关键词*	**密级***	**中图分类号***	**UDC**	**论文资助**
Chinese Typography, Latin Typography, Multilingual Design				
学位授予单位名称*		**学位授予单位代码***	**学位类别***	**学位级别***
北京科技大学		10008	Artistic Design	Master
论文题名*		**并列题名**		**论文语种***
Research in Chinese and Latin Typography for Multilingual Design				
作者姓名*	Lai Fan Guim Cid		**学号***	S20121882
培养单位名称*		**培养单位代码***	**培养单位地址**	**邮编**
北京科技大学		10008	北京市海淀区学院路30号	100083
学科专业*		**研究方向***	**学制***	**学位授予年***
Artistic Design		Artistic Design	3 years	2015
论文提交日期*	Prof. Qin, Jingyan			
导师姓名*			**职称***	
评阅人	**答辩委员会主席***		**答辩委员会成员**	
电子版论文提交格式 文本( ) 图像( ) 视频 ( ) 音频 ( ) 多媒体 ( ) 其他 ( ) **推荐格式：**application/msword；application/pdf				
电子版论文出版（发布）者		**电子版论文出版（发布）地**		**权限声明**
论文总页数*	95 pages			
共33项，其中带*为必填数据，为22项。				