

Multilingual Signage Typography in China Urban Information System

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1. Introduction

The word ‘graphic’ has stem from the Greek word ‘graphikos’, which means ‘writing’ (Downs, 2012). The sign graphic system embodies and conveys the sign program’s informational content which can help makes the sign information content more legible and readable, it no doubt that the graphic system is an important part of urban information system help to enhance the visual communication. The graphic system for a sign program in urban information system include typography, symbols, color, and other graphic elements, it gives structure, form, and style to the information that is communicated on signs, which need designers arranges these graphic devices into a unified system of layouts for the various signage programs (Matteo, 2010). In order to improve the construction of China urban information system, not only need to design a font which can provide a legible letterform but also need consider about how to use the typeface and other graphic devices for signage, and how they are arranged into layouts. When it comes to the harmonization of the Latin writing system and the Chinese writing system, the huge character set is a formidable challenge, even more daunting, however, is the widespread ignorance about the typesetting traditions of these two different writing systems, that’s an important reason causing the low legibility of signage in China urban information system, so it is time to re-examined the design method, only to build a reasonable proportion relationship between different graphic elements so that can improve the legibility of signs in China urban information system.

2. Proportions of Graphic Elements

2.1 Proportions of Latin Letters and Chinese Characters

The effective signage must have adequately sized graphics, so users have enough time to read a sign message (Arthur & Romedi, 1992). Thus, factors, such as the hierarchical rank of a sign message, sign view in angle or setback, all interact with viewing distance to determine the size of sign typography (Carter, Ben & Philip, 2011). As a starting point for sizing sign typography, an informal rule is that 1" of character height, as measured on a nonrounded capital character such as an ‘E’, ‘H’, or ‘I’ should be allowed for every 50’ of viewing distance. (Calori & Vanden-Eynden, 2015) Thus, according to this ratio, sign typography that’s to be viewed from 50’ should theoretically have a 1" cap-height and sign typography to be viewed from a distance of 500’ should theoretically have a 10" cap-height. However, the dynamics of reading, understanding, and acting on sign information are compounded and more critical in driving situations; consequently, more complex formulas are needed as starting points for determining vehicular signage cap heights. The *Manual for Uniform Traffic Control Devices (MUTCD)* provides guidance on cap heights for various kinds of vehicular signs shown a formula accommodates such dynamics as speed, setback, and other vital factors for vehicular signage.

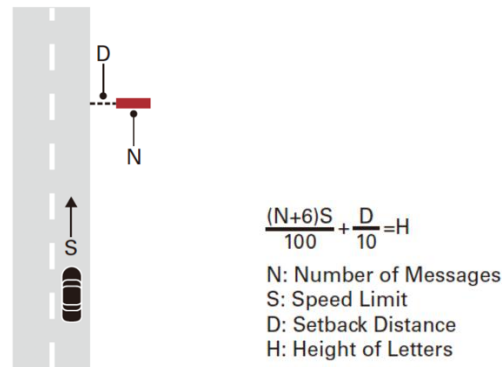


Figure 1. Formula provided by *MUTCD*, 2009 (from Calori & Vanden-Eynden, 2015 p.)

These formulas and reference guides are useful as starting points for determining cap heights in my research. The use of cap height is key to the graphic system for signage. In signage graphics, capital letter height is used as the measurement standard, instead of typographic point size, which is used for print and Web graphics. To measure cap heights, usually use nonrounded letters. To maintain optical balance in typeface design, rounded letters such as 'C', 'O', and 'S', are larger than the cap height to provide optical balance among different character shapes. Thus, to measure Cap height, usually use nonrounded letters, typically a capital 'I', because they're more easily measured.



Figure 2. Rounded letter and nonrounded letter

In Chinese writing system, there is no cap height, but each Chinese character they are optically equal in height and in width. When Chinese characters and Latin letters design within the same visual system, they are comparable to upper-case Latin letters, which are of optical equal height. Thus, the cap height measurement standard, also can be used for Chinese characters. When they are used on signs, the height of the Cap height of Latin letters should be optical equal with the height of Chinese characters, in this way can help to improve the optical balance of two different languages and then to keep the equal legibility of Latin letters and Chinese characters. So that the size of Chinese characters used on the signpost can be determined. But if the word includes with capital letters and lowercase, the structural differences between Chinese and Latin characters still make them appear different in size even when they are both set in the same point size. Influenced by the ascender and descender, Chinese characters appear larger, as they occupy the common grid more fully than Latin letters. Thus, in my research, when the word includes a capital letter and lowercase, the cap height of the word should achieve the optical equal height with Chinese characters, then after decided the proportion of the capital letter then can decide the proportion of lowercase letter of the English word.





Figure 3. Cap-height and the height of Chinese characters

2.2 Maintaining in-Line Rhythm

A passage translated from English into Chinese is usually shorter. In Keith Tam (2018) research, the Chinese translation of a selected English text was found to require only 61 percent of the area occupied by its English counterpart. This rather large difference in text lengths can create a difference in visual effect on the page, when two typeface used on signpost, the optimal spacing in Chinese character text is achieved by having a column width that is precisely the width of the point size of the text multiplied by the number of characters desired in a line. Thus, if the two scripts are intended to be given equal status, Chinese characters usually occupied one line while Latin letters maybe need more. In Chinese writing system, the line height is equal to the distance between right edges of bounding boxes, this is different from Latin writing system, in which line height is derived from the distance between base line. Thus, the line height for Latin letters will be too cramped for Chinese. In addition, since Latin letters have ascenders and descenders, but Chinese character with square appearance, and Chinese characters always looks bigger than Latin letters under the same size, consequently, Chinese paragraphs need much more leading, while Latin text can even be set with no leading when used on signs. In addition, visually, Chinese character is monospaced, verbally, Chinese character is 'mono-paced' it means one syllable is always represented by one Chinese character in the Chinese language, and it corresponds to the pace with which readers move their eyes. Thus, in order to maintain this rhythm, the inter character spacing should be kept consistent as much as possible. Basically, it is preferable to set long -form text compact, inserting no extra space between the characters, different from set compact in Latin, which additionally means no added leading between the lines. But if need to increase inter-character spacing, which is called 'loose setting', overall tracking configuration should be applied consistently to the whole text, and it should include considerations about line length setting in the first place.





Figure 4. Character spacing and line spacing

In the Chinese writing system, the characteristics of Chinese characters allow a horizontal reading direction, from left to right and also from right to left. But also the traditional direction for reading is vertical, beginning at the top right corner of the page and proceeding downwards in columns to the left. However, in the Latin writing system, the standard reading direction is from left to right. Latin letterforms do not have a vertical reading direction. Thus, Chinese characters can be read in any direction, but there are more limitations for Latin letters. When the design requires a vertical arrangement, Latin text must be rotated.

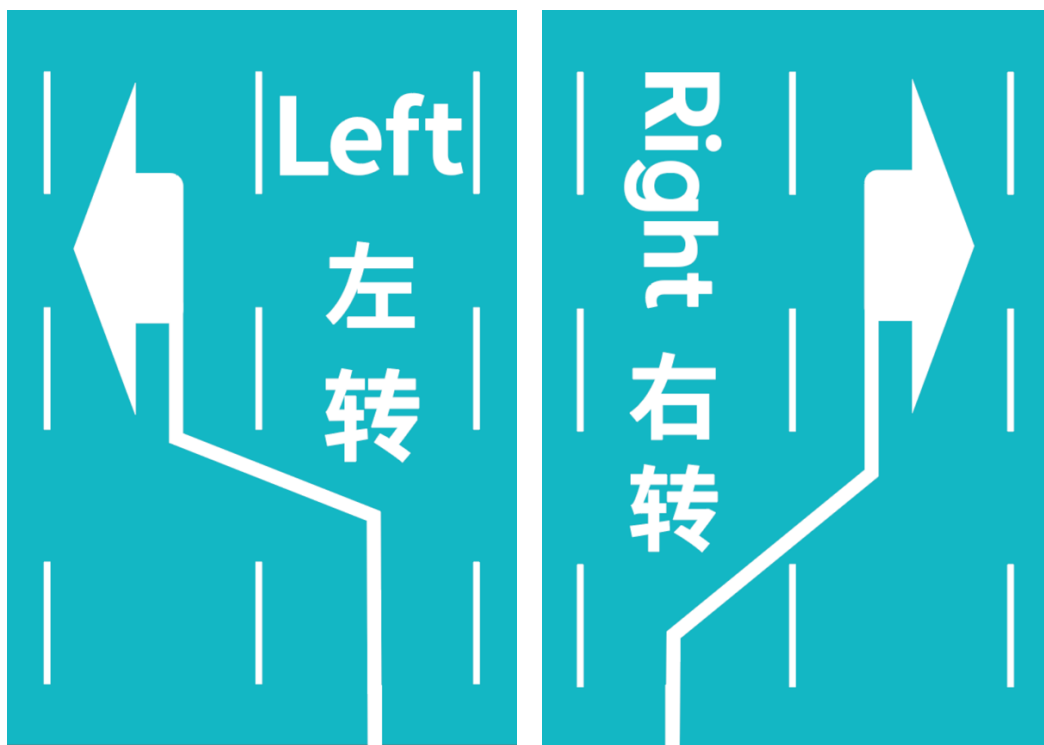


Figure 5. different alignment of Latin letters and Chinese characters

In my point of view, for the signage program, vertical setting is suitable for continuous, short reading, horizontal setting is often more suitable for complex content structures, and for parallel Latin and Chinese text, horizontal setting is often more convenient for both readers.

2.3 Proportion of Symbols

In signage, symbols can replace typography to communicate certain messages or augment typographic messages. For example, an airplane symbol can replace the word airport on a sign, or an arrow next to a destination name can indicate the route to that destination. Symbols can also be paired with typographic messages on signage to reinforce the typographic message, such as when the airplane symbol is paired with the word airport. This

typographic pairing can be useful in multilingual signage environments such as highway to reduce the need for multiple languages on the signs.

Given that design of a new symbol vocabulary is the exception rather than the rule, which is disobey the traditional understanding of transport symbol vocabulary. Thus, I focus here to use of existing symbol vocabularies. By far the most commonly used symbol vocabulary in the United States is the AIGA/DOT symbol system (Zender, 2006), which was developed by the American Institute of Graphic Arts (AIGA), in conjunction with the U.S. Department of Transportation (DOT) for U.S. transportation facilities, and developed this symbol vocabulary in the 1970s. The AIGA/DOT symbols, which have been adopted for signage use by various transportation authorities and facilities, are now in such widespread use they're generally well recognized by travelers throughout the United States (Koberg Jim Bagnall, 2003). Digital artwork for this transportation symbol vocabulary is available free of charge at the AIGA websites. The AIGA/DOT symbol vocabulary is particularly appropriate designing a sign program for a transportation facility. (Calori & Vanden-Eynden, 2015)

In China, the first standard *Road Traffic Signs and Markings* was compiled in 1986, making the standardization of signs used in China urban information system, which include the design of different kinds of traffic symbols (Pang, 2001), but it does not give a fully standardized design requirement, such as proportion relationship between symbols and characters, causing the designers have different understanding about how to use it, which makes each sign in different area have different versions, influence the legibility of signpost in China urban information system.

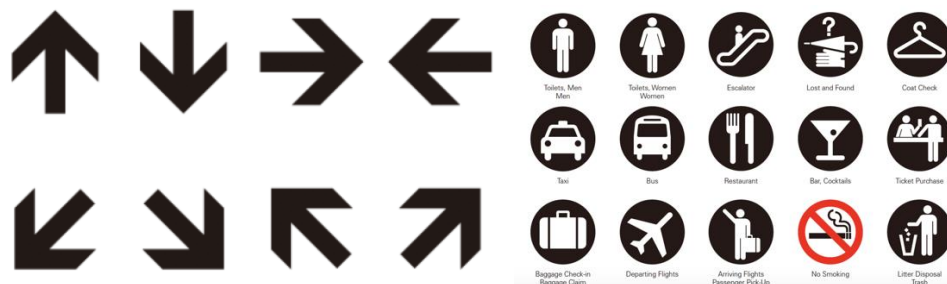


Figure 6. Selected symbols from the AIGA/DOT symbol vocabulary



Figure 7. Selected symbols from the China *Road Traffic Signs and Markings* symbol vocabulary

Thus, when Latin letters and Chinese characters coexist on signs, which need a reasonable proportion relationship to arrange the characters and symbols, so that can more clearly convey the informational on sign, so help reader more easily act upon the information. Arrows are quite simple symbols, typically comprising a pointed head and a shaft, which are relatively clear-cut shapes. In this study, I try to size either the width or height of the arrow also to the cap height of the typography. But, I found that when arrows are sized to typographic cap height, arrows looks too small to be legible, as same as for some symbols, particularly for some symbols if they are enclosed by a square or circular surround. Thus, arrows and symbols need little bit large than cap height, so that can keep the arrow and symbol as legible as the letterform. Furthermore, considering that most languages are read from left to right, thus, so it fixes the arrows at the beginning of each sign message. And when arrows and symbols are positioned in line with the Chinese character or Latin letter, I make them align the horizontal centerlines of the symbols and arrows with the horizontal centerline of the cap height, so that to enhance visual consistency and can make the information on signs more legible and readable. But in some case,

influence the length of Latin words and limitation of the sign areas, the arrows and symbols need positioned above or below the Latin letter or Chinese character, according to this situation, I set the arrows and symbols align with the left side of Latin letters and Characters. But in some case, to place arrows on the same side of the message typography in which the arrow is pointing — for example, placing right pointing arrows to the right side of the message typography, so the symbols and arrows cannot always set the left side of the typography, but it should be keep the optical balance with the Latin letters and Chinese characters. Thus, no matter symbols positioned above, positioned in line or stacked with typography, in my research, I believe the proportion of symbols should be keep optical equal size with cap height of Latin letters. Once established proportional relationships among graphic elements should be maintained at various sizes so in this way to achieve the visual harmony with Latin letters and Chinese characters.



Figure 8. The proportion of symbols

3. Color

Color is an important part in sign program's graphic system. For example, color can help to augment the meaning of sign messages. And color can help to distinguish messages from one another. It plays a role in whether signs stand out from or harmonize with the sign environment. For those projects where navigation decisions must be quickly and easily made, such as transportation facilities, a goal may be to make the signs stand out from their surrounding environment so that they can be easily distinguished, read, and acted upon (Itten, 1970). But designer doesn't always have free rein when it comes to selecting a color vocabulary for a sign program. In China, the color of signage programs mandated by ministry of Transport, which is also standard in *Road Traffic Signs and Markings*. The use of color to communicate meaning in sign graphics leads to the topic of color-coding. Color-coding means a given message with a given color to reinforce the message and to distinguish it from other messages (Itten, 1970). For color-coding to be effective in signage, a message and color must be linked, because color by itself is generally too ambiguous to communicate a specific message clearly (Calori, 2007). In China urban information system, the driving population has been trained over time to stop on red and go on green. Thus, green is used for exit sign graphics because of its association with the concept of go for example "exit" and red its association with danger, warning, and emergency, for example 'over speed'.

For most transit systems worldwide use some form of color-coding — in association with numbers, letters, or names — on maps and signage to help users distinguish one route from another (Calori, 2007). But for excessive or inappropriate use of color-coding can actually impair rather than enhance the communication effectiveness of a sign program (Koberg & Jim, 2003). Color-coding is not a panacea for unclear message nomenclature and should never be relied on to substitute for a poorly formulated sign information content system. Even for few parts of people, if they have impaired color perception then they cannot distinguish between certain colors, the more visually complex the vocabulary becomes, making it more difficult for people to distinguish among the various colors and to learn the meaning associated with each color. Thus, in my research, I prefer to use minimum kinds of color but improve the contrast ratio so that provide maximum contrast with the sign messages. In this way to help improve the function of the signpost in China urban information system reduce the color disturbance then improve the legibility of China urban information system.

4. Spacing of Graphic Elements

For a face of the signpost, spacing around and between graphic elements also affects sign layout proportions and sizes (Oikawa, 2010). Thus, margins are essential for the legibility, clarity, and organized appearance of the sign graphic system. Each sign has a top, bottom, left, and right margin. For the layout of the signpost, there's no rule for determining how large or small margins should be (Calori, 2007). However, a good layout on a signpost, margins should not be so small that the graphics appear too close to the sign perimeter, nor so large that the graphics appear dwarfed by the margins. A good starting place is to look at margins that equal the cap height of the primary message in the layout. In Calori and Vanden-Eynden's research (2015), they set the stipulate for the margins and typography, 1" margins for typography with a 1" cap-height. According to this proportion, the relationship can then be enlarged or reduced by multiples of the cap height, such as by 1.2 times cap-height for a larger margin or by 0.8 times cap-height for smaller margins. Since the optical influence, bottom margins should always be slightly larger than top margins to make them appear equal, so that can keep the visual balance for horizontally centered layouts.

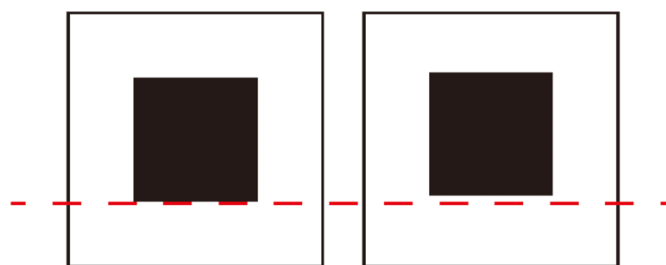


Figure 9. To achieve visual balance comparison

Horizontal spacing is also necessary between side-by-side graphic elements, such as gutters (The term gutter, which comes from print graphic design, refers to the space between columns of text on a page) between arrows, symbols, and typography (Smitshuijzen, 2007). In signage graphics, gutter can refer to the space between columns of arrows and typography, or the space between columns of arrows and symbols. A good starting point is to use half the cap height as the unit for gutter spacing, and then adjust it by a greater or lesser multiple. The

same is the case for horizontal spacing of symbols or arrows that are placed at the end of lines of typography (Trulove, 2000). The key to effective horizontal spacing of graphic elements is to space them closely enough so that they appear to belong together and to conserve sign space, but not so tight that the elements appear too crowded. In addition, layout format proportions pertain to the perimeters of the various sign types or faces within a program. The proportions of layout formats ultimately translate into the proportions of sign faces or panels (Arthur, 1992). Thus, layout format proportions need to account for the maximum quantity of information that is programmed for any given sign type. Kinner (1958) developed a system based on legibility and the geometries of the letters, and included specifications regarding the positioning of every letter in reference to other letters. It was the length of the place names that ultimately determined the size of the sign. For the signs used in China urban information system, I believe this layout method can help to improve the legibility of Latin letters and Chinese characters, since the limitation of area of signs, making the Latin letters too crowd so that influence the legibility of Latin letters, thus, according to Kinner's method, in my research I designed the signpost for China urban information system, using the cap height to decided margins of sign, then can decided the perimeters of the signpost.



Figure 10. Original work

5. Conclusion

To sum up, the urban information system wouldn't be complete without a study of the basic ways in which graphics elements can be applied to signs, graphic elements application processes greatly affect the legibility of a sign project's graphic system. Thus, typography, symbols and arrows, color, and other graphic elements all are the building blocks of an urban information system.

To improve the visual harmonization between the Latin writing system and the Chinese writing system, one important aspect is to design a font in which Latin letters and Chinese characters, to give an optically balance appearance when they are used to types multilingual text, on other hand, keep an optical balance between different graphic elements also can help to improve the legibility of signs, in addition, the layout also can affect the size and proportion of signs, using an stable size of sign to decide the position of Latin letters and Chinese characters and other symbols is unreasonable, that's also an important reason causing the low legibility of signs in China urban information system, thus, cap height can be as an important reference to measure the size of Chinese characters, as well as the spacing between different elements, in addition, to respect the traditional of different typography is important to the design of multilingual signpost, just as a popular saying goes: there is no bad type, only bad typography. I believe it need to inherent principles of these two different scripts that can stand the sway of multilingual typeface design trend so that can provide a reliable graphic typography solution for the design of sign program suitable for both Latin letters and Chinese characters. Only to provide a reasonable proportional area for Latin letters, Chinese characters as well as other graphic elements, so that can improve the construction of China urban information system to build a better environment for people social life.

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