
GESTALT AND DESIGN: WORK ON SIGNPOSTS OF THE METROPOLITAN EXPRESSWAY IN JAPAN AS AN EXAMPLE

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The Metropolitan Expressway (“Shutoko” in its Japanese abbreviation), is a network of expressways which radiates from the center of Tokyo to neighboring prefectures. Its total length is about 278 km and it has 1,140,000 users per day (Metropolitan Expressway Co. Ltd., 2007). It has one complete loop route called “Kosoku Toshin Kanjo Sen” or “C1”, and one incomplete loop route: “Kosoku Chuo Kanjo Sen” or “C2”. There are also eleven radiating routes and one connection route from Tokyo; most of these routes are connected with branch routes in neighboring prefectures or with NEXCO expressways maintained by East Nippon Expressway Company Limited.

Improvements to the design of signposts (Fig. 1) was requested by the drivers. Some proposals have been made which are academic and also rather intuitive. In August 2005, the company set up the Investigative Commission for Route Guidance. It consisted of academic experts, designers, representatives of motor-related companies, journalists, and corporate officers.

The fundamental principle was “route guidance from the user-viewpoint”. The commission asked the Visual Communication Laboratory¹ at Chiba University to produce a design proposal for the signposts. The mission was to redesign four types of signposts: (1) leading sign from an ordinary road to Metropolitan Expressway, (2) entrance indicator sign, (3) junction sign on the Metropolitan Expressway, and (4) exit sign. The commission specified a route as a model and asked for the layout of the elements on the signposts only.

Before designing

Almost all of the signposts for route guidance on the Metropolitan Expressway are “the sign of junction”, because there are so many meeting places of roads and branches. The designers soon realized that there were many issues to solve, and the mission grew beyond simply changing the layout.

Among the signposts which required redesigning, the junction sign and the exit sign are on the expressway. The designers started to redesign them. The present article focuses on this part out of the whole design work. These signposts consist of following four typical signs.

1. *Sign for the junction, where a radiate route connects to the C1.* The road branches off in two directions like a Y-shape, and both of separated roads are part of the C1. The designers picked up the advance notice at Tanimachi junction as an example of

¹ Now, Communication Design Laboratory.

this kind of signpost. The advanced notice contains a distance to the junction which makes the layout of the elements difficult.

2. *Sign for the junction, where a radiate route branches from C1.* The main lane in this junction is the C1; the radiate route gets out of the C1 and connects afterward to a NEXCO expressway. The designers selected Takebashi junction and decided to create signs for both the advance notice and for the junction itself.

3. *Sign for a Y-shaped junction, where some radiate routes and the C1 branch.* Although, to be exact only one radiate route branches from the C1 at this junction. After the junction, several radiate routes diverge from the radiate route that came out of the C1. Edobashi junction is an example of this type of junction; the sixth route branches off the C1 and, after Edobashi junction, the ninth route branches off the sixth route. The designers designed the advance notice, junction sign and also the exit sign for Edobashi which appears at the advance notice.

4. *Sign of exit.* Hakozaki junction has this type of sign, where the road does not branch off to the right and the left like other junctions but branches in the center and the surround.

Assumptions about users, designer's intentions, and a fundamental concept

In general, the designers need to take into account the requirements of the user, besides financial aspects and those of materials and the environment. As Darses and Wolff (2006) point out, designers do not always see the real user in person but speculate about the user. In the present case this led to them specifying three types of users: (1) Drivers who pass from Metropolitan Expressway onto NEXCO expressways, (2) drivers who cannot understand Japanese, and (3) drivers who use car navigation systems. These preset assumptions about the users led to the following intentions of the designers: (1) clear indication of NEXCO expressway, (2) enlargement of alphabetic expression, and (3) deletion of place names.

The first one was to show which expressway's route will connect to another expressway route. An example of the current sign is the green small vertically long rectangle in Fig. 1. This is an additional sign, meaning that the fifth route indicated in the main large sign will connect to Tohoku Expressway and Kan-etu Expressway. The drivers may misunderstand it, as if these two expressways would occur after the exit of Daikancho shown at the left and green sign. In other junctions, NEXCO expressways appear in the main signpost. The current signpost provides ambiguous information and has inconsistent rules.

The second intention was to achieve higher visibility of alphabetic expression. The current ratio of size between Japanese and alphabet is 2 to 1. The enlargement of alphabet was also requested by the commission, for the sake of non-Japanese reading drivers. At the beginning of design process, the designers recognized this issue, but as described later, they were gradually finding other design concepts to improve the comprehensibility of signposts.

The third intention assumed that the car navigation system could provide detailed

information for route guidance. Thus, the signpost can be stripped-down. One of current signposts shown in Fig. 1 contains four place names, Omiya, Kitaikubukuro, Ginza, and Hakozaki, but the principle of their appearance is unclear. Omiya, rather than being an exit, is a city around the end of the S5 route. If you follow the Hakozaki exit sign you will suddenly find never-seen exit names, Hamacho and Kiyosumibashi; the former is “Exit 604”, but the latter has no number.

This third intention led to an essential design concept: To distinguish the C1 as the key structure of Metropolitan Expressway. If drivers see the number of the radiating route, NEXCO expressway’s name or the exit name as their destination, they should leave from the C1, otherwise they can remain in the C1. If the connected routes and the exits appear in signposts in the C1, there is no need to show any place names, theoretically. The drivers should confirm the name of NEXCO expressway, the route number, or the exit name, in advance. The drivers can then remain on the C1, until they see the name related to their destination; if they miss the exit, they will return there because the C1 is a loop route! It would be unrealistic, however, to delete all of place names from signposts on the C1, some redundant information would be useful for the drivers who have seen many place names.

The designers did not decide on the mark for C1 until the very last minute. The most important point was clear representation of the loop, to be immediately comprehended, without any explanatory words (as shown to be effective, see Garvey & Kuhn, 2004). The designers decided to encircle letters of “C1” with a curving arrow, although it took some time to fix its detail. Figure 2 shows a preliminary solution for the advance notice of Tanimachi junction. At this junction it was difficult to match the orientation of the arrows with the real road structure. If you draw a circle, the sharp end of this circle arrow faces that of the direction arrow in the center of signboard. The C1 mark in Fig. 2 avoids this conflict as possible, whereas the circle-ness and the congruence of starting points of two arrows are lost.

Finally, the designers attached importance to representing the loop of C1. In the final C1 mark shown in Figs. 3 and 4, a curved arrow is made of two circles with different radius and the open is very small. The “C” is smaller than the “1” whose serif in the bottom and the beginning of stroke are a little bit cut, so that these two letters have enough space between them. The designers adopted this compound circle, partially because they had to make the mark for C2. These two marks should have similar appearance, but the latter mark contained wider components. The compound circle and the difference of letter size are solutions to get a common rule that the designers regarded as more important. The elaboration of the C1 mark was one of triggers to make the designers conscious of the importance to provide information consistently.



Figure 1. An example of current signposts in the Metropolitan Expressway.



Figure 2. A preliminary design of advance notice of Tanimachi junction.



Figure 3. The final design proposal of advance notice of Takebashi junction.



Figure 4. The final design proposal of advance notice of Edobashi junction..

Intermediate design steps

The three above-mentioned design intentions and a fundamental principle could not fix the details of the design and solve problems that emerged during the design process.

The size of signboard was a typical problem. Although there was a limit to the size because of physical loading of signboard (Japan Contractors Association of Traffic Signs and Lane Markings, 2004; Metropolitan Expressway Public Corporation, 1991a, b), the commission did initially not provide exact measures of enlargement. The size of a current signpost, “No. 108/2-C”², is 2300 x 7200 mm. The first tentative size was 2600 x 7200 mm, where the designers put all elements with affordable space among them. They knew that a smaller signboard would be more realistic, so that they tried out different sizes, showing that enlargement of the alphabet and route marks was not possible for the current size. Finally, they convinced the commission and got the size increased to 2500 x 7200 mm.

The position of the notice of distance to the junction was also hotly debated. In the current signpost, the number is below the central arrow. However, an ongoing design had it in the opposite position. The final version is the same as the current style. The reason why the designers decided to put the number below the arrow may be to maintain consistent provision of information. If, for example in Fig. 3, the number was given above the arrow, its reference would be ambiguous. The number in the upper position is effective only in the Y-shaped branch. Here, again, the general and consistent rule of information provision was a crucial factor in the design and become an essential design concept.

Final design proposal and revealed design concepts

The final design proposals for the advance notice sign at Takebashi junction is shown in Fig. 3 and that of advance notice at Edobashi junction in Fig. 4. They contain almost all of design points of which three are elaborated here.

1) Priority of information. During the making of the C1 mark, the designers realized that not all details are of equal importance. The branch indicated in Fig. 3 has the main lane. If they want to leave the main lane, they have to notice the sign for the branch and change lane. Thus, the designers distinguished primary information “for action” from secondary information “for stay”. Information “for action” is intended to urge actions and was provided in larger size than information for stay, which supplies further indication to drivers. Thus, the number of the fifth route is bigger than C1.

When the designers faced the signpost of Edobashi junction, they noticed that several steps would be needed to represent the priority of information. There are three options for travel; one is to exit from the Edobashi, the other toward the sixth route, and the third to continue on the C1. The sixth route will connect with a NEXCO route, “Joban do”. Moreover, if you want to go on the ninth route, you have to select the sixth route, because the ninth route never appears in the C1 after this junction. The

² Its horizontal sizes are 6500, 7200, or 7500 mm, according to the length of place names.

ninth route will connect with a NEXCO route, “Tokan do”³. Thus, the information for action at Edobashi junction is the exit name in Japanese, route numbers after the junction, “6” and “C1”.

The designers finally proposed four letter sizes according to priority of information. There is a consistent rule that bigger letters require driver’s action. The size of elements obviously influences the total size of signboard.

2) *Use of marks and pictogram.* To delete letters and to increase the comprehensibility for non-Japanese reading drivers, the designers decided to positively adopt the mark. The connected NEXCO expressways are represented by both of the pictogram and the name. To keep the uniformity, its height was equal to the total height of the Japanese characters .

3) *Outstanding exit mark.* The designer considered that the exit sign should be distinguished, not only for non-Japanese reading drivers but also for Japanese drivers. After the examination of several ideas, the designers decided to distinguish by color. A yellow part in dark green background and white elements stands out and hence was chosen.

Discussion

Psychology and design advance towards each other. “User-centered design” or “universal design” is now a frequently-heard expression, which focuses attention on users. Design professionals require comprehensive knowledge about human factors. Psychologists are interested in and move into the design world. Designers need not only ergonomists but also psychologists to back up their knowledge (Akita, 1991; Darses & Wolff, 2006; Zeisel, 1981/1995). It still remains a frequent problem to apply basic research of limited factors to specific, often rather complex design applications. Psychologists and designers work in similar places, but their interests are not always consistent with each other (Kiritani, 2007). Description of the design practice is useful for psychologists to understand what the design is and what the mission of the designers is. Zeisel (1981/1995) recommended the researchers who wanted to share their knowledge with the designers should know how the designers made a decision during the design. Experimental psychology of attention and visual search will be able to examine the design of signposts. For example, the visibility of fonts⁴ was experimentally measured (Kiritani et al., 2007).

The similarity between experimental phenomenology and design work deserves special emphasis. Following the definition of phenomenological attitude concerning perceptual experience (e.g., Koffka, 1935; Metzger, 2006), I stress the usefulness of observation and description free from any other theoretical standpoint. Kanizsa (1984), Michotte (see Thinès, 1991), and Vicario (1993) describe the experimental

³ “Tokan do” is an abbreviation of “Higashi-Kanto jidousha do”. This official name is very long and its abbreviation has considerable currency, so that the commission agreed with its use.

⁴ The process of selection of fonts and their size was skipped, because of space limitation. The fonts used in the proposal were Shin-GoM for Japanese and Vialog Medium for alphabet and number. The size ratio between Japanese and alphabet fonts was 100 to 65.

phenomenology as manipulation of stimulus variables to find the combination among them which generates or destroys the phenomenon. This manipulation is similar to the practical process of designing. All of design factors are in any way co-variable and they influence each other so that designers have to re-examine their decisions again

and again. This is a spiral-up method of designing⁵. The final design product does not reveal where the starting point was. The designers should manipulate several factors at the same time and puzzle out a design task, but not in a blind operation of stimuli. They are not aware of the experimental phenomenology, but rather rely on an intuitive phenomenology which could gain a lot from a more systematic perceptual science.

Experimental phenomenology could allow for a more effective realization of relevant parameters of design at the beginning of the work. The designers noticed the specificity of the C1 and decided to design its mark. This process told them the priority, a distinction of “figure” and “ground” parts in the language of experimental phenomenology, of information provision and suggested the changing of letter sizes. This change of elements was not discussed at the beginning of the work.

There may be a further analogy between design and Gestalt formation. The final design product appears as an organized whole. Although the design concept does not arise spontaneously appear, it serves as a framework that becomes clear during the design process, like the above-mentioned priority of information provision. It is often said that the designers think with their hands; sketches or trial models that they make stimulate and check their new idea. They have to observe what they made, free from any prejudices, and they should then speculate about what to do next.

The concept of design does not control the design work at the beginning. The design process is a loop one, and the final work does not highlight this.

In conclusion, experimentation is necessary for the design process, whereas experimental phenomenology essentially implies it. It may be difficult to experimentally verify the design work, because there are other crucial constraints such as time and money. Moreover, the present case had an external force that distorted its outcome; 40 of 56 survey participants preferred the yellow color for the exit sign which was a new design proposal, but it will not be approved by the Ministry.

Vicario (2002) insists that the experimental phenomenology is not peculiar to psychology, because it is practiced in every science. Thus, the phenomenological aspect should be considered as an important and integral part of design as a science.

⁵ The design process has a spiral feature, because the designers return to the same problem which they have already examined. This looped aspect of designing is empirically studied by the Design Management Laboratory at Chiba University and there is evidence of four main steps in the loop (Ashizawa, 2008; Moriyuki, 2008).

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Summary

The process of designing is outlined with a proposal for modifying signposts in the Metropolitan Expressway in Japan as an example. It was not a labor of simple layout of elements. After assuming user's needs, designers clarified their intention and decided designs. The design concepts and their products complete interactively within a circular process. Understanding of this process would be useful for psychologists who want to advice designers. The designing process is linked to experimental phenomenology, although it does not necessarily include experiments. The designers have to observe what they do free from any prejudices and spiral up the designing process.

Keywords: Design process, signpost, Experimental Phenomenology, applied Gestalt theory.

Zusammenfassung

Der Prozess der praktischen Umsetzung von Gestaltung wird am Beispiel des Neuentwurfs von Verkehrsschildern eines japanischen Autobahnsystems dargestellt. Es ging dabei nicht nur um die Anordnung einzelner Formelemente. Aufgrund der vorausgesetzten Bedürfnisse der Verkehrsteilnehmer und Vorgaben der Autobahnbetreiber wurde die Zielrichtung der Gestaltungsmaßnahme bestimmt. In fortlaufender Abstimmung dazu erfolgte die Produktumsetzung. Das Verständnis dieses Abstimmungsprozesses ist für die Psychologie bei der Beratung von Gebrauchsgraphikern nützlich. Der Gestaltungsprozesses steht der experimentellen Phänomenologie nahe, ist aber nicht notwendig experimentell. Die Gestalter sollten ihr Tun vorurteilsfrei beobachten und so die Spirale des Gestaltungsprozesses in Gang setzen.

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