Special feature article

Creating comfortable space

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When I heard that the special topic of this issue was going to be "creation of comfortable space," the simple question of "what does amenity mean?" came to my mind. Needless to say, the word "amenity" has a broad meaning. Clear and detailed explanation of the concept of "amenity" is also given in this magazine's article, "Amenity in station space."

It is possible to consider the word "amenity" as a representation of acceptability that reflects human physiology and psychology, but it cannot be defined using only one word. For example, a level of amenity that a human being perceives differs from: external factors such as the surrounding environment or situation; and internal factors such as how this person has arrived at this environment or situation, or the physiology and psychology of that person at that time.

The "amenity" that we pursue is the one that people perceive in stations or trains. We have considered "amenity" as the most important element for improvement of station or train value. For example, according to the book called "Railway Renaissance" by East Japan Railway Company (published by Maruzen in March, 1991), the station concept that we attempt to achieve is "a station full of unique characteristics, culture, and amenity" (Figure 1). Embodiment of such concept started with improvement of restrooms in so-called cutting-edge stations or trains at the time. Such effort then shifted into the creation of station design that incorporates characteristics of the surrounding area, and then further shifted into "creation of user-friendly stations," such as promotion of barrier-free measures.

We are actively involved in development of technologies in order to realize such stations while maintaining a certain level of amenity. One of the examples of such technologies is the sound-and-vibration-proofing method (suspended seismic isolation method) (refer to the special paper in this issue) that allows the use of space below an elevated structure for a hotel. The technology that allows establishment of a hotel, which prioritizes silence and psychological comfort, under an elevated railway can present a new way of using railway assets and will significantly improve such asset quality.

Furthermore, we have been conducting amenity evaluations in the basic station environment and dealing with the amenity disturbing factors of stations. We have also obtained valuable study results in the following fields: analysis of the flow of people inside stations and minimization of congestion (e.g. research for JR Railway Technical

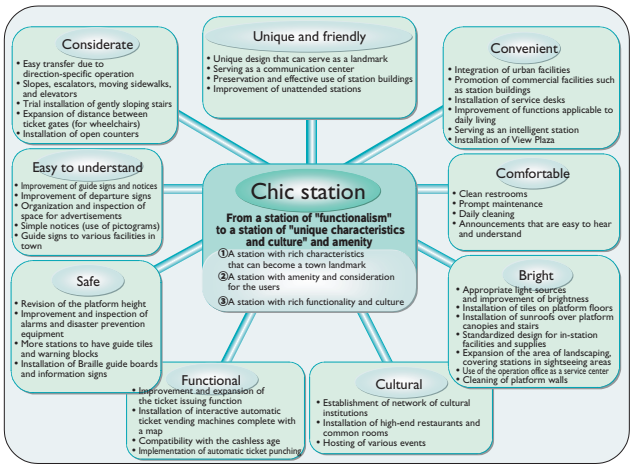

Fig.1: Station concept, proposed in 1989

Research Institute, by Mr. Toshiyuki Aoki); attempts to combine signs and advertisements in stations (e.g. Shinjuku, Shibuya, and Tokyo Stations); and research on the thermal, lighting, and auditory environments within stations or trains, research on their improvement, and implementation of improvement measures (e.g. research at Service Development Laboratory, Research and Development Center JR East Group).

As described above, we have been committed to various activities in order to realize amenity in stations and trains, and we have also provided the results of such activities. Here, we would like to categorize our studies on amenity and their results in accordance with their applications. There are two rough categories as follows:

(1) Study of disruption avoidance and order restoration based on the premise that congestion cannot be avoided, and implementation of the result
- Study of the flow of people inside stations, and harmonization of signs and advertisements.

(2) Research to achieve high-level amenity and implementation of the result
- Realization of comfortable restrooms and development of the suspended seismic isolation method

Let us call (1) above "amenity amidst congestion" and (2) above "amenity in silence." I believe the kind of amenity that we must pursue further is "amenity amidst congestion" because:

a. Even in the aging society with fewer children, JR stations and trains will be crowded, and such lively crowdedness is much welcomed.
b. It is possible to consider "congestion" and "amenity" as opposing concepts, and the volume of studies conducted thus far is not sufficient.

The expression "amenity amidst congestion" may be a little too strong. It may be better to rephrase it to study and implementation of "reduction of discomfort in congestion" or "safety in congestion." One of the implementation examples is the handling of cell phones inside trains, and such handling or measures implemented thus far can be categorized as implementation of model behavior in consideration of discomfort to others rather than implementation of study results. There are many other problems that are difficult to solve, such as the second-hand smoke issue and installation of platform doors. This is the reason why I think it is necessary to study "amenity amidst congestion" which can show the appropriate way to handle these problems.

When I thought about the topic of this article, I remembered a book that I read almost 30 years ago, and so I read it again. It was "The Hidden Dimension" written by Edward Hall, translated into Japanese by Toshitaka Hidaka and Nobuyuki Sato (published by Misuzu Shobo in October, 1970).

From the perspective of "use of space," which is deeply associated with issues regarding existence of human kind, communication, architecture, and city planning, the author attempts to capture the hidden structure of humanity and its culture in order to suggest resolutions to various issues. With regard to "amenity amidst congestion," I would like to list the points of research along with the topics used in this book.

(i)Distance adjustment, and the degree of congestion and social behavior of animals

In the world of animals, they show so-called "territorial behavior" which is the basic behavior by which they secure their own safety. This behavior allows animals to keep a certain distance between each other without making any specific rules or similar things. Through this behavior, animals adjust population density, and the abovementioned book describes how "animals secure prosperity of their species by adjusting population density." Although humans do not define their territories as clearly as animals, individuals still keep their personal space in order to maintain a sound emotional as well as psychological status. Humans change this personal space when interacting with others, depending on the situation or the interacting partners. In the book, this is described as the "spacing" mechanism in the world of animals, and the book also states that the maintained space protects animals from other animals' aggressive instinct. In the world of survival of the fittest, weak animals escape from attacks by other animals, and strong animals secure their own hunt areas. This then leads to establishment of an ecological pyramid. The balance of this pyramid is always maintained through avoidance of overpopulation or depopulation. When population density becomes higher, individuals influence each other to cause heightened psychological and emotional stress, finally resulting in adverse psychological effects. The book states that territorial behavior and the spacing mechanism play an important role in avoiding such adverse effects, and it explains the influence on not only emotions or feeling but also on bodily functions through the "biochemistry of population adjustment."

This book uses the example of the animal world to explain the mechanism of space, and what we should learn from it is that, in order to protect ourselves, there must be sufficient space for protecting ourselves from attacks by others. In other words, when out of necessity many people exist in a limited amount of space, it is necessary to reduce the aggressiveness of individual people. There may be physical aggressiveness or psychological aggressiveness, but regardless, this book suggests that some kind of spatial mechanism is necessary to deal with such aggressiveness.

(ii)Space perception: visual space, auditory space, olfactory space, thermal space, and tactile space

When perceiving space, many individuals perceive atmosphere, impression, and scale of the space not only with their visual sense but also with the rest of the five senses. Taking "sound," or auditory perception, as an example, individuals feel the size of space by resonance or understand how the space is used depending on how noisy it is in that space. In the book, reconstruction of a British cathedral was introduced as an example. The successful reconstruction included employment of new and innovative visual design and maintenance of the original atmosphere. One of the factors of such success was sound. The designer states that "the cathedral has to not only look like a cathedral but also sound like a cathedral." Materials to be used to provide the cathedral its acoustical

Fig.2 : Inside of the former Imperial Hotel, photographed at Museum Meijimura in November, 1998
(using a diagonal fish-eye lens)

properties were thoroughly and cautiously selected, and it largely contributed to the successful reconstruction. This at the same time suggests that space perception does not only rely on visual senses. I believe that acoustic effects in movies, plays, and commercials, together with visual effects, create a certain atmosphere and space.

For the olfactory sense, too, many individuals have experience wherein it influences perception of a place or space. When you walk down the street and smell something in the air, you may sometimes remember certain events from the past. If that smell is something you experienced in a certain space, area, or foreign country, then that smell would remind you of that place. It is general knowledge that the olfactory sense has the strongest association with memory compared with the other senses, and the above episode is a good example of it.

When a large number of people exist in a closed space, people feel suffocated, causing them to feel that they are confined in a very small place. In that sense, it is possible to say that temperature and air can also serve as factors that help perception of space. When the space between people is reduced, they start to feel the body temperature of others. If this occurs in a limited, closed space, the body temperature cannot escape and people there will associate the heated air with congestion. In order to avoid such situations, it is necessary to create a bigger space. In the book, there is an example where a person becomes used to a well-air-conditioned airport terminal and then goes outside the airport where the strong summer sunshine directly falls onto the person. Although the crowdedness of inside the airport and outside the airport are about the same, this person feels that it is more crowded outside the airport because it is hotter out, associating the heated air with crowdedness. Here, heat influences perception of the status of a certain space.

As for tactile and muscle senses, although you do not touch it directly, you may be able to guess the feeling of touching something or something similar based on information obtained visually, such as texture or shades, as long as the feeling of touching a certain thing has been retained in your memory. In the book, an example that effectively uses such effect is introduced. It is the hall of the former Imperial Hotel (Figure 2) designed by Frank Lloyd Wright. The book illustrates the richness of space modeling realized by the use of bricks.

Thus, space is not perceived only by visual sense but also by interactions of the visual sense with the other senses. The comfortable space that we pursue should be established based on comprehensive perception studies instead of superficially creating it.

(iii)Visual space

The book states that visual sense is the most recently developed and the most complicated sense of all senses, but it is also true that the visual sense is influenced by various factors. For example, a person who underwent cataract surgery first sees everything in blue but after a while perceives the world in normal colors. This suggests that, before the surgery, this person's vision was corrected with a biological blue filter so that colors could be perceived as if not affected by the cataract, since disease makes colors be perceived in brown at the retina. This means that images actually projected on the retina differ from images that are perceived. This example can be understood as an example of "habituation," but it should be noted that even though habituation allows images to be perceived correctly, visions affected by cataracts overall are still brown in color, and therefore, patients have difficulty distinguishing yellow from white. This makes it difficult for the patients to read signs with white backgrounds and yellow frames, such as information on extra trains shown on the time table, and this problem cannot be solved with "habituation." As described above, there are things that cannot be dealt with by habituation, but it is also still true that images that are seen differ from images that are perceived. In the book, they are differentiated as the "visual field" and "the world according to the visual sense" to explain that information coming in from the visual field is corrected by data from other senses so that the world according to the visual sense is stabilized. One of the examples of this stabilization is that individual motions are perceived with exaggeration in the periphery of the visual field but are still perceived as a series of smooth motions due to the structure of eye.

These studies seem to provide tips for how to differentiate guide signs, conveying necessary information, and advertisements in the world according to the visual sense of individuals in stations.

As an example of the use of the abovementioned mechanism, the

Fig.3:"Shinjuku Station" by Shohachi Kimura, stored at Fuku Fuku Museum

book introduces pictures drawn by Rembrandt. His pictures can be perceived three-dimensionally if seen from a certain distance, and this is described as a successful example of effective use of the visual field and the world according to visual sense.

The book then introduces an organization model of space, the concept of distance in the human world, human behavior or awareness associated with the concept of distance, and differences in space perception among various races and cultures. I would like to recommend that those who are interested in these topics read this book.

Until a few days ago there was the "Railways in Art" exhibition at the Tokyo Station Gallery. It was a very interesting exhibition. Pictures drawn at various periods of time and in various countries were displayed, showing scenery with railways, passengers, and people visiting stations. There were also posters that symbolized social roles of individual railways. There were pictures of scenery including railways drawn by impressionists. Not only Monet but also Renoir drew railways. According to the book by Hall, impressionists "realized the importance of ambient light reflected on objects and thus tried to capture it in their drawing as it was being reflected and filling the surrounding air." I remembered this phrase while I was visiting the exhibition.

The picture that caught my attention the most was "Shinjuku Station" by Shohachi Kimura (Figure 3). The catalog says "the energy of people who come and go from the station is captured in Shinjuku, the new commercial area where all the activities in Tokyo are concentrated at the beginning of the Showa period. The top half of the picture focuses on the wooden ceiling and windows of the station entrance, and the moving crowd in the bottom half of the picture is mostly in black shades. In those shades, however, the colors of the platform guide signs and advertisements, and the red and green clothes of women drawn on the left add liveliness to the picture" (refer to page 168 of the "Railways in Art" exhibition catalog). Clearly, it was not Shinjuku Station that was in his "visual field," but it was Shinjuku Station "according to his visual sense." The first impression that I got from the picture was exactly what the catalog said, but also I believe this picture contains some of the issues that have been described in this paper. Separation of guide signs from advertisements, control of the flow of people in times of congestion, placement of speakers for reminder announcements, and design of high windows that efficiently receive sunlight from the outside are the examples.

Within the picture, the expressionless and similar faces of the individuals caught my attention the most. This is probably the expression of what the catalog described as "the moving crowd as if they are pushed and crushed," but to me, it looked like customers' silent cry for "amenity amidst congestion" that they wished for but never obtained. If someone like Shohachi Kimura in contemporary times draws a picture of Shinjuku Station, I hope that the picture will show lots of energy of the crowd and many smiles expressing the fun of visiting the station. For realization of such stations and trains according to the world of customers' visual sense, we will further conduct studies unique to a railway company and implement the study results.