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日本の美術館における空間探索行動に関する研究

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SPATIO-BEHAVIORAL EXPLORATIONS DURING ART-MUSEUM VISITS IN JAPAN

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Following a review of previous research on what has been termed “*Japanese social behavior*,” this article aims to explore which views are closer to reality through case studies that examine the interplay between visitors’ micro-behavioral patterns and their spatial characteristics in a specific and dense social environment, namely the art museum in Japan.

Many observers of Japan agree that Japanese social behavior is guided by situational considerations. However, the more important questions of “*in what situations or environments does Japanese social behavior occur?*” or “*to what extent the behavior of individuals in Japan is guided by situational or spatial considerations*” have not been given the attention that they deserve. The article argues that this lack of attention poses methodological problems and that there is a lack of a more detailed understanding of the spatial characteristics of individual behavior and its relationship to social and behavioral aspects. The article bases its arguments on the results of a threefold analysis of the behavioral patterns of individuals when visiting and experiencing art museums. Art museums are among the most frequently visited public institutions for leisure activities and are the most common type of museum in Japan. The exhibition space has the original purpose of appreciating artworks, but it is also a place where visitors’ actions influence various physical experiences and sensations, such as access behavior to the space, the way it is used, and co-presence in the space.

The analyses are conducted in the following three points. First, the art galleries of ten museums in Japan are described quantitatively as the spatial structure of environments, as they could potentially influence visitors’ micro-behavioral patterns. For this purpose, the model

Keyword _____ *Human-environment interrelations, social behavior and communication, spatial factors, co-presence in public space, art museum environments in Japan*

キーワード _____ 人間と環境の相互関係、社会的行動とコミュニケーション、空間的要因、日本人の行動、公共空間上の共存、美術館の環境

of “*Space Syntax*” is adopted and a model of “visibility field” based on “*Isovist*” theory is developed. Secondly, the observed patterns of individual visitor experiences and behaviors are linked to these models. Finally, in the third part, a series of comparisons are made in order to find out the possible interrelations between the observed behavioral patterns and their spatial variables. The article emphasizes the themes of space, movement, co-presence, and multiplicity in its attempt to construct an alternative view of the basic principles of individuals’ behavior and communication in Japan from a more experiential and contextual perspective.

本稿は、「日本人の社会的行動」に関する先行研究をふまえた上で、日本の美術館という特定の社会的コンテキストにおける来館者の行動の空間的側面を探求することで、実証的なエビデンスを示すことを目的としている。

多くのオブザーバーは、日本の社会的行動は状況への配慮によって導かれることに同意しているが、「日本人の行動はどのような状況や環境で起こるのか」、または「日本人の行動は状況的・空間的配慮によってどのように導かれるのか」という、より重要な問いに十分な注意が払われてこなかった。このような関心の低さには方法論上の問題があり、日本の個人の空間的性質と、その社会的・行動的側面との関係をより正確に理解することが必要であると論じている。また、美術館を訪れる際の個人の行動パターンを3段階で分析した結果に基づいて論じている。美術館は、自由時間に最も多く訪れる公共空間の一つであり、日本で最も一般的なミュージアムの一種である。展示空間は、芸術作品の鑑賞を本来の目的とするが、訪問者の行為がその空間へのアクセス行動、空間の使用方法や居方といった、様々な身体経験と感性に影響を与える場所でもある。

分析は、次の3つについて行う。まず、日本の10の美術館の展示空間をサンプルに「スペースシンタクス」理論と「アイソピスト」理論を採用して、空間コンテキストとしてモデル化する。それによって、展示空間そのものがどのようなポテンシャルを持っているかを説明する。次に、各展示空間において訪問者の観察・行動パターンを、これらのモデルと一緒にマッピングする。最後には、一連の比較分析が行われ、観察された行動パターンとそれらの空間変数の間の可能な相互関係を見つける。この論文は、より体験的で文脈的な観点から、人々の社会的行動とコミュニケーションの基本原則に関する代替的な見方を構築する試みにおいて、空間、動き、共存、多様性のテーマを強調する。

1 | INTRODUCTION

In descriptions of postwar Japan, considerable attention has been paid to macro-theories that start at a level higher than that of the individual, namely “Japanese social behavior,” which explains how the individual *should* or *could behave* in a social environment. In this regard, there seem to be two major but opposing trends that have particularly shaped the external image of Japanese society. One of them may be defined as the *group orientation* or *groupism*, the other as the *shame culture*.

The word *groupism* usually connotes a situation where the individual dedicates himself or herself to the group even at the risk of giving up one’s own interest. Here, each person as a member of the group does not insist on his or her own view or position, but is required to follow the group standard wholeheartedly. Uniformity of actions and conventionalities within the group are often marked. In this respect *groupism* can be taken for a kind of totalitarianism.

Indeed, much has been said about the Japanese *groupism*, their predominant value of group over individual when contrasted to the Western view of individual over group. The Japanese have such strong group orientation that Shuichi Kato, Japan’s leading social critic, once commented: “*In Japan, individuals do not exist. The group absorbs them. The basic cultural pattern of groupism originated in the enclosed village communities of this ancient, crowded island. The group is insular and closed to the outside. There are sharply different attitudes towards insiders and outsiders, and little openness between them.*” (Kato, 1987)

Regarding people in Japan as predominantly *groupist* leads us to the conclusion that Japanese culture is largely unified and homogeneous. This view about Japan has been influential so far; owing to the preoccupation that *groupism* is the driving force in the unification of society. No doubt, Japan must appear as solid as a monolith to some people. However, some other observers have also drawn diametrically opposite views of Japan.

Among them, the view of noted anthropologist Ruth Benedict has remained especially influential in Japanese studies to this day. In her seminal book, Benedict refers to a series of often-contradictory behaviors exhibited by the Japanese and points out that they coexist without posing any problems (Benedict, 1946, p.2). Here, she finds in these inconsistent behavioral tendencies the key component on which to construct the very framework of what is called the *Japanese system*.

But, how or why does such contradictory behavior occur among the individuals in Japan? Benedict proposes what she calls the *shame culture*, in contrast with the *guilt culture*, as a conceptual tool to unravel this question. The guilt in the *guilt culture* is rooted in one's religious ethics as an internalized conviction of sin, wherein the actor principally understands the cultural and behavioral norm to be followed consistently. On the other hand, the *shame culture* tends to rely on externally sanctioned norms of behavior, whereby the actor attempts to avoid a bad rumor about him or herself, or worries about his/her reputation within a social context. In this case, it is expected that the actor will behave precisely in accordance with what a particular situation calls for. As a result, he or she may be forced to exhibit a rather inconsistent series of behaviors. Nevertheless, according to Benedict, there seems to be nothing unusual about this case.

A number of interesting questions arise from this discussion. When these opposing views are presented to an audience outside the Japanese context, are we supposed: a) to stereotype Japanese people as *groupist* signifying an integrated pattern; or b) to grasp Japan as that represented by Benedict's *shame culture*, where cultural pattern is formed of co-existing contradictions? Which view of the two depicts the most accurate image of Japanese society? Additionally, these may even turn out to be more abstruse, if one attempted to figure out the context or surrounding setting, not to mention the resultant behavior. In fact, we believe that there are some methodological problems inherent in both views, which require further investigation. Take the *groupism* view of Japan. The observation that the Japanese do not make their intention as clear as Westerners may have prompted some to judge the Japanese to be lacking in independence. *Groupism* here is defined as the trait where the members of a group tend to exhibit the privation of autonomy. The *shame culture* theory also explains the situation where the "guilt culture" based on individual moral integrity is absent and therefore appears deficient in the Western view.

As long as the *groupism* and *shame culture* theories focus their point of analyses upon the absence of individual autonomy, then they should remain as the views simply to point out rather negative images of Japanese society. Thus, what we need to attempt here is to clarify both our images and theories about Japanese behavior in a more positive or objective fashion. We must, therefore, shift the base point of our research, from that which focused thus far on the dichotomies of individual and society in Western origin, to that which could be derived from the interactive and communicational processes involved in specific public instances in Japan.

On the other hand, although it has not been clearly specified, many observers, from Ruth Benedict (1946) to Chie Nakane (1973) and Karel van Wolferen (1989), have agreed that the Japanese are guided by situational considerations. However, the more important questions of "*in which situations or environments*

does the behavior occur?” or *“to what extent individuals behavior in Japan guided by situational or spatial considerations?”* have not been given the attention they deserve. So much so that, in his analysis of Japanese thinking and behavior, Shohei Koike concluded, among other things, that Japanese behave differently depending on what settings they are in. Koike strongly points out that, as the setting changes, foreign visitors are often surprised to see that the same Japanese person acts differently towards them --formally or casually, friendly or indifferently, practically or emotionally, and so on (Koike, 2009). In other earlier works, both Nakane (1973) and Kuwayama (1992) also stress the critical influences of group formation, interpersonal relations and observation of others on individual behavior in Japanese social environments.

It is because of these points as raised by Koike, Kuwayama and Nakane that lead us to the research interest of this article. Among the reviewed literature, Japanese social behavior has been often poorly understood and subjected to a great deal of speculations and negative images of Japan. And, what seems missing is the knowledge of the spatial characteristics of the individual in a specific social environment. The objectives of this article are largely exploratory. We will present an experimental study investigating the spatial characteristics of visitors’ micro-behavioral patterns in art museum environments in Japan. The case studies of ten exhibition galleries are used as subjects of this investigation.

2 | ART MUSEUMS AS PLACES OF “INDIVIDUAL” AND “SOCIAL” INTERFACE

Why art museums? Art museums are not merely containers of art-works, but also selective social environments for learning and explorations where visitors can experience strolling through their spatial configuration and seeking to view the art exhibited in them. In this experience, the spatial configurations play an important role, not only in how much of the displayed art will be accessible and viewed by most visitors, but also in relation to the probability of interface with other visitors. People may not necessarily visit museums to see or interface with others, but there is a public side as social or communal occasion of the museum experience, and the spatial configuration --the way in which an exhibition is spatially made-- has also a primary role in that (Brawne, 1993). By organizing an exhibition in which as many people as possible come together to see the same exhibits, art museums create an interface not only between individual visitors and exhibits, but also between the visitors themselves. A moment’s reflection on our own museum experience confirms this image. In some exhibitions, visitors individually move in only one direction, giving the museum visit a more formal or ritualistic character. The visitor-to-visitor (social)

interface seems constrained by this linear sequence. In contrast, visitors' movements in other exhibitions are more dispersed, as if they are engaging in a game of hide-and-seek. In a sense, their visit becomes more informal, individual and playful. Art museums thus allow us to study interactive processes of both "individual" and "social" behavior that take place in a specific and specially created (context-rich) public environment.

In addition, visiting museums is one of the ten most popular free-time activities among Japanese people (White Paper for Leisure Activities, 2020). The surveys indicate that the number of art museums has also dramatically increased in the post-war period of Japan, especially since the high-days of the so-called bubble economy, and many cities with population higher than 100,000 have been required to build their own art museums (Hakubutsukan Kenkyuu, 1985-1996; Japanese Association of Museums, 2008). This tendency has made art museums one of the most-built type of museums. Therefore, art museum environments in Japan seem appropriate case studies for this research investigation.

3 | SELECTION CRITERIA OF SAMPLES

Within a single use-type of museum --museums displaying art objects-- ten cases were chosen from among a larger sample built in the period of post-war Japan, in order to provide a wide variety in space configuration attributes (floor-area size, circulation, and layout), history, and programmatic concerns (two-dimensional, three-dimensional or object-based, and multimedia art). The inclusion of all the available varieties ensures the differences in gallery settings and spatial functions that will be investigated.

4 | FIELDWORK

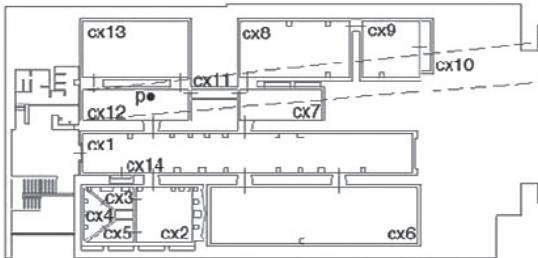
One-week fieldwork was organized at each art museum to survey the spatial environments and to observe visitors' behavior and space-use patterns. The chosen fieldwork periods were during spring and autumn, when the highest numbers of visitors are recorded in Japan (Hakubutsukan Kenkyuu, op. cit.; Japanese Association of Museums, op. cit.). During the fieldwork, five different kinds of data were collected: i) *Spatial layouts*, ii) *Spatial organizations of exhibits*, iii) *Visitors' movement patterns*, iv) *Viewing-time spent by visitors*, and v) *Locations of visitors*.

5 HOW TO DEAL WITH THE INTERRELATIONS BETWEEN SPATIAL ENVIRONMENT AND BEHAVIOR?

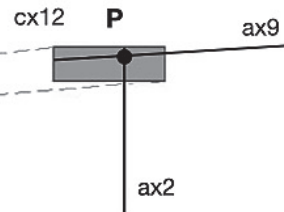
Prior to dealing with any relationships between spatial environment and behavior, two things should be known: how the environment the visitors occupy is made, and how to independently describe its configuration. After the fieldwork, a threefold analysis was undertaken to answer these questions; first, each museum environment was described as a spatial configuration or structure by using the models that will be introduced in Section 5.1; then, the observed patterns of visitors' occupational (navigation, viewing, and presence) behaviors in the same environment were mapped with these models; finally, a series of



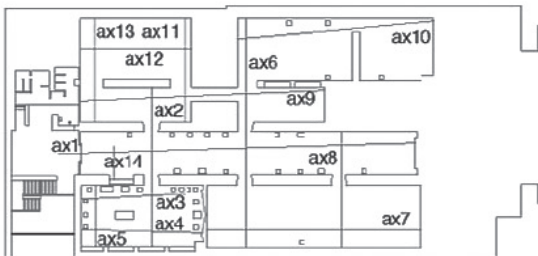
(a)



(b)



(c)



(d)

Figure 1a. Layout of sample exhibition gallery

Figure 1b. Convex map

Figure 1c. The observer point 'p' seen convexly and axially

Figure 1d. Axial map

comparative analyses were carried out to find out the possible interrelations between the observed patterns of behaviors and their spatial variables.

5.1 Method to Analyze Spatial Configurations

In this research, to model each art museum environment as a spatial configuration and to capture their quantitatively important structural properties (*i.e.*, ‘accessibility’, ‘space-use’, and ‘visibility’), the theory of ‘space syntax’ (Hillier and Hanson, 1984) was adopted, and a ‘visibility field’ method based on Benedikt’s ‘isovist’ theory (Benedikt, 1979) was developed. Space syntax, one particular approach to the analysis of the structural legibility of spatial environment, links our intuitive understanding of space to rigorous analysis and quantification. By offering quantitative descriptions of the spatial structure of environments as it affects human functions, including exploration, navigation, viewing, and presence, space syntax contributes to interdisciplinary research on spatial cognition (Peponis, 2016). In this research, the representations of space syntax particularly endeavor to gain insights into the properties of ‘accessibility’, ‘navigation’ and ‘space-use’. In contrast, the visibility field method deals mostly with the properties of ‘visibility’ or ‘transparency’. Space syntax as a descriptive theory of space has been extensively tested and seems potentially useful in behavioral modeling of the relationship between individuals and space (Hillier & Hanson, *op. cit.*; Hillier, 1999; Peponis, 2001; Peponis, *op. cit.*). In addition, analytical descriptions such as those offered by space syntax and the ‘isovist’ theory allow us: First, to specify and benchmark the properties of different types of environments, thus helping us articulate what is desirable in particular situations according to a growing body of systematic knowledge and evidence. Second, to evaluate design and planning alternatives in order to make decisions (Istek, 1998).

The framework of the space configuration analysis is based upon three basic representations, called *convex map*, *axial map*, and *visibility fields*. The convex map of a selected exhibition gallery (Fig. 1b) is the smallest part of the largest possible space, called the convex space, that can be fully perceived by a potential observer at a point ‘p’ within that space (Fig. 1c) and represents the ‘local constituents’ of a layout. In order to construct the convex map, first the ground plan is drawn or obtained in the usual architectural format (Fig. 1a). Then, its continuous open space structure is identified. Finally, the convex space representations are drawn. However, point ‘p’ is not only part of the convex space indicated by the shaded area, but can also be seen as a part of a linearly extended space. The axial map represents this type of extension in space. Figure 1d shows the axial map of the same gallery, being the smallest set of the longest possible straight lines-of-sight and -access that can connect all the available convex spaces. In other words, the axial map tries to capture the overall sense of connections that is available to a person while moving about the gallery and represent the ‘global constituents’ of its layout. On the other hand, to show



Figure 2. Visibility Fields from Convex Spaces

the three-dimensional visibilities that are available to visitors, the visibility fields were also drawn from the whole area of each convex space and repeated for all convex spaces at each gallery (Fig. 2).

As a direct implication of these representations, the spatial configurations can be seen at two different levels of operation at once. Whenever the observer at point 'p' moves about the gallery, it is through the convex spaces that the local organization of the space where the person is in is perceived. At the same time, the global organization of the space and the three-dimensional visibility are also perceived through the axial lines and the visibility fields (*i.e.*, the way in which the space where the person is located is related to the rest of the gallery).

On the basis of the convex and axial maps, and the visibility fields, the main aim of the space configuration analysis is to define quantitatively the extent to which each space is accessible and/or visible either directly or indirectly in relation to all the other spaces in the chosen environment, and thus to define how that environment might perform.

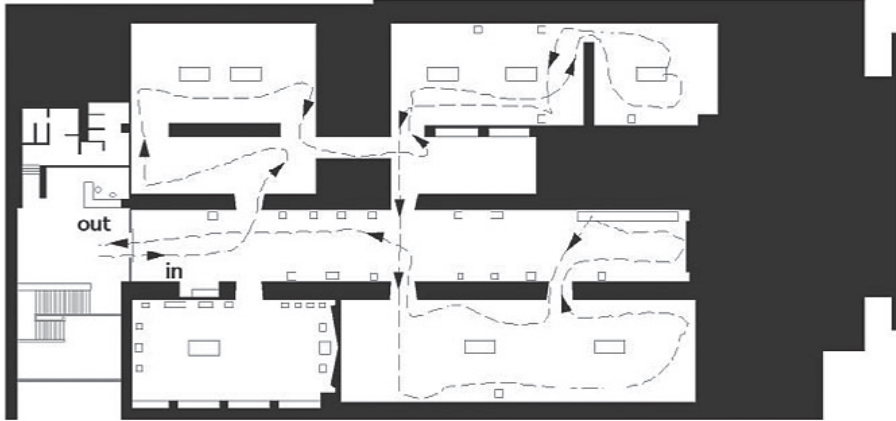
5.2 Method to Analyze Visitors' Behavior Patterns

Once the three basic representations -convex and axial maps, and visibility fields- were applied to model the exhibition layouts and to capture quantitatively their important structural properties, then the observed patterns of visitors' navigation, viewing, and presence behaviors were also mapped with these representations.

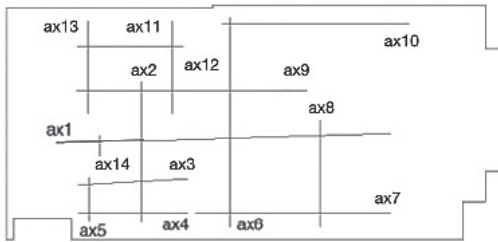
To determine the visitor navigation patterns, fifteen subjects in each art museum were selected randomly and their movements from the entrance to the exit of the gallery were recorded. When a group of people entered together, only one member was recorded consistently. In galleries with several entrances, a proportion of visitors were tracked from each of the entrances, according to the museum records of entrance use. In order to make the data collection as unobtrusive as possible, the subjects were not told that the observer was recording them. Figure 3 illustrates an example of how the navigation patterns are mapped and analyzed. The same figure also shows 'the proportion of the total visitors' that visited each space at least once and 'the number of visits' the visitors made. Then, all these numbers were assigned to the axial space. As seen in the figure, it is possible for a space to have a higher number of visits than the number of visitors since some visitors backtracked several times within the same space.

To find out the visitor viewing patterns, the total amount of time in the whole gallery, as well as the elapsed time in each convex space spent by the same fifteen subjects were recorded. The number of visitors' stops for a five-second-time lapse or more, and their locations, were also marked. Figure 4 illustrates an example of how the records of visitors' viewing time and stops are marked and analyzed. The same figure also shows 'how much time' (in seconds) spent and 'how many stops' made by each visitor in each space are assigned to the convex space.

Furthermore, to determine the visitor presence patterns, thus the extent to which the patterns of co-presence are available in the galleries, an observation technique was used in which a route was selected in each gallery to cover the whole setting most efficiently with a minimum amount of backtracking (Fig. 5). The observer walked along this route like Baudelaire's *flâneur* (French) referring to a person, literally



Plan



Axial Map

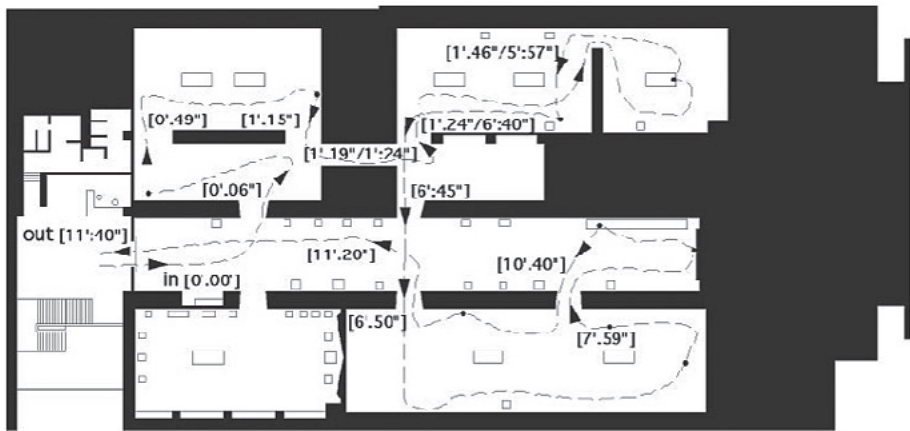
axial space no.	visitors	visits
1	1	2
2	1	1
3	0	0
4	0	0
5	0	0
6	1	3
7	1	2
8	1	1
9	1	2
10	1	1
11	1	1
12	1	1
13	1	1
14	0	0
TOTAL	10	15

Figure 3. Navigation Patterns in Exhibition Galleries

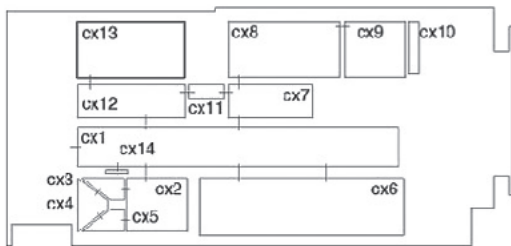
meaning “stroller”, “lounger”, “saunterer”, or “loafer” (Baudelaire, 1964) and recorded the visitors and their locations. It was Walter Benjamin, drawing on the poetry of Charles Baudelaire, who made this figure *flâneur* the object of scholarly interest in the 20th century, as an emblematic archetype of urban, modern (even modernist) experience. The recorded visitors were distinguished as to whether they were static (seated or standing), or mobile (walking). The route was observed twenty times in each gallery, taking care to cover all times of the weekdays as well as weekends by gathering approximately equal numbers of observations in each of four standard time periods: 10-12noon, 12-2pm, 2-4pm, and 4-6pm. At least an hour time lapse was allowed between any two rounds of observations. The direction of route was altered on each round in order to reduce any regularity that may have been imposed by following the same direction each time.

5.3 Method to Analyze Interrelations between Space and Behavior Patterns

Finally, a series of comparative analyses using the correlation coefficients (significance level: 95%) was carried out to find out whether any consistent relationships existed between the space configuration variables of art museums and the behavior patterns. If there were any consistent correlations between the spatial variables and the patterns with those spaces that were used by the visitors, it was concluded that the visitor behaviors were “spatially predictable”.



Plan



Convex Map

cx. space no.	viewing-time	stops
1	192"	1
2	0	0
3	0	0
4	0	0
5	0	0
6	109"	3
7	8"	0
8	62"	1
9	251"	1
10	0	0
11	5"	1
12	47"	1
13	26"	1
14	0	0
TOTAL	700"	9

Figure 4. Viewing Patterns Exhibition Galleries

6 FINDINGS

As introduced in Section 5, the ultimate objective of the threefold analysis is to explore comparatively the underlying characteristics, especially the spatial ones, of visitors' behaviors. The remainder of this article will concentrate on that, summarize, and interpret the findings of the analysis.

6.1 Navigation patterns

In this part of the analysis, two interrelated questions have been explored; firstly, “*which spaces did most visitors visit in the galleries?*” And, secondly, “*how frequently did their visits occur to these spaces?*” Two measures were found useful to answer these questions: *visitor* and *visit rates*.

6.1.1 Visitor rates

The visitor rate determines the proportion of the total visitors that each exhibition space attracts, therefore visitors' choice of spaces. It means that the higher the visitor rate is, the more the visitors visit the space. The correlations with the space configuration variables show that in seven out of ten cases, the visitor rates correlate significantly with *connectivity* describing how many other spaces are directly accessible from a given space. Connectivity is a local variable since it takes into account the relation of a space to its immediately neighboring spaces. The significant correlation with the visitor rate means that the more the space is accessible, the more the people visit that space from its neighboring spaces.

The visitor rate gives even better correlation with *control value* (another local variable) than the connectivity value. The control value expresses not only the number of neighboring spaces a space has, but also the extent to which that space has access to its immediately neighboring spaces. In seven cases, the control value is mostly related with the visitor rate. This means that the more accessible the space is, the more the people visit that space from its neighboring spaces.

However, with the global configuration variable of *integration* the correlations seem inconsistent. From the viewpoints of relative position and accessibility, integration is the important variable measuring how far a space lies from every other space in the gallery. A space is called ‘integrated’ when all the other spaces are relatively near, with few intervening spaces that must be traversed in order to get from one space to another. A space is called ‘segregated’ when all the other spaces are relatively far from it, and a large number of intervening spaces must be traversed in order to get from one space to another. While integration can only predict visitors' choice of spaces in four cases at most, the tendency seems inconsistent for the

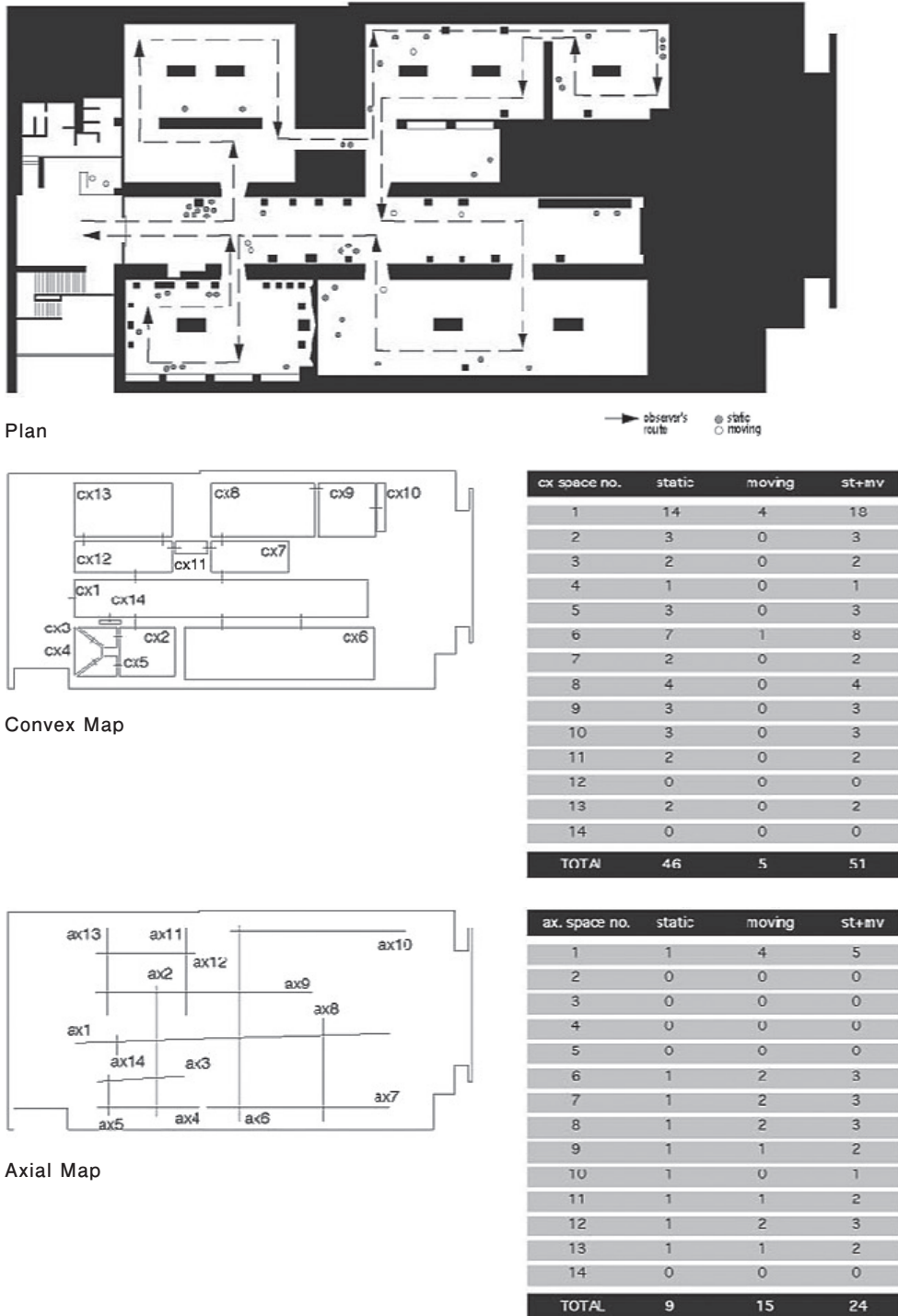
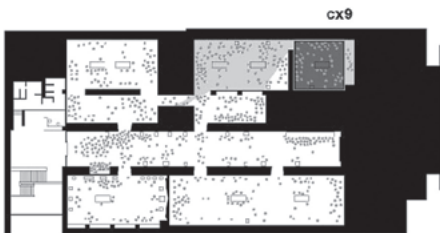
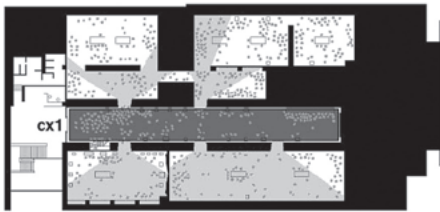


Figure 5.Visitors' Presence Patterns in Exhibition Galleries

remaining six cases. On the whole, the findings suggest that the number of visitors a space attracts seem to be associated more with the local or immediate spatial configuration variables rather than the global ones.

Furthermore, the visitor rate is also not related with *the number of exhibits in space* and *the inner-visibility of exhibits*, but with *the presence of other visitors per space*. The inner-visibility of exhibits determines the total number of exhibits that are visible from a space. To calculate this, the visibility field of each convex space is overlaid on another map recording the locations of exhibits (Fig. 6). The number of exhibits entering into the visibility field is identified and assigned to the convex space. On the other hand, the presence of other visitors per space defines the numbers of static, mobile, and total present people observed in each space. Then, the accumulated numbers of all visitors are identified and divided by the total number of observations (twenty). The significant outcome of this space-use variable is, in fact, quite surprising, and suggest that both the exhibits displayed in and those visible from outside a space do not have much effect on visitors' choice of spaces. However, the presence of other visitors in a space is far more effective in attracting others to that space.

(a)



(b)



0 10 m.

Figure 6. Visible Exhibits and Accumulated Visible People from Convex Spaces in Sample Exhibition Galleries A and B

6.1.2 Visit rates

The visit rate determines how often visitors use or visit a space. The total number of visits that each space receives is divided by the total number of visitors and assigned to that space. The higher the visit rate is, the more visits the space receives from the visitors. In the previous section, it was reported that the local variables of space configurations predict better the number of people who visit a space than the global variables. A similar tendency is also, yet more strongly, revealed in the analysis of the visit rates. The visit rate is most related with *connectivity* and *integration3* in eight out of ten cases, the meaning of which is the more connected and the better integrated the space is, the more the space receives visits from its immediately neighboring spaces. *Integration3*, in comparison with *integration*, offers a more local perspective. This is computed in a similar manner as the *integration* value for all the spaces, but within their three spaces only, thus the galleries are literally read at different scales. Further to that, in nine cases, the control value is the best predictor, indicating that the more the space has a control of access, the more the space receives visits from its neighboring spaces. On the other hand, in seven cases the correlations show that the visit rates are not related with the numbers of exhibits. While this confirms the previous finding, it also indicates that the exhibits have little effect in determining which spaces receive the most number of visits. Similarly, the inner-visibility of exhibits, indicating the total number of exhibits that are visible from a space, does not have much effect on the number of visits to the space.

Another important outcome of the analysis is the presence of visitors per space. It is again more strongly correlated with the visit rate than with the number of exhibits. In seven cases, the mobile people particularly provide significant correlations. In five cases, the static people correlate significantly. Therefore, the previous result with the visitor rate is further highlighted here in the analysis of visit rates. The *number of other visible people from space*, defining the total number of other people that are visible from a space, has also some influence on the frequencies of visits. To calculate that, the visibility field of each convex space was overlaid on another map recording the locations of people (Fig. 6). The accumulated number of people entering into the visibility field is identified and assigned to the convex space.

6.2 Viewing patterns

The analysis in Section 6.1 has shown that visitors' navigation patterns in the galleries are mostly influenced by the spatial configurations. The local space variables, especially, of control, connectivity, and *integration3*, have a strong influence on both which spaces attract more visitors and how frequently the visits occur to these spaces. In fact, their influences seem more subtle in regard to the number of visits than the number of visitors. It has been also found that the presence of visitors per space has more influence on

the visitor navigation patterns than the exhibits displayed in that space. Some of these findings will be further explored in the analysis of visitors' viewing patterns, where again two interrelated questions have been dealt with. Firstly, "*in which spaces of the galleries did individual visitors spend the most of their time?*" And, secondly, "*how frequently did visitors stop and view the exhibits in these spaces?*" Two measures were particularly found useful to answer these questions: *viewing-time* and *viewing-stops*.

6.2.1 Viewing-Time

The measure of viewing-time determines the proportion of the total amount of time spent by the visitors in each space. The total time is divided by the total number of visitors and assigned to the convex space. The higher the viewing-time rate is, the longer the visitor stays in a given space.

In eight cases, the space configuration variables are not correlated with the viewing-time, and they seem to have minor influences on the amount of time spent by individual visitors. On the other hand, the space-use variables, such as the presence of other visitors per space and the number of exhibits in space, predict better the viewing-time than the spatial configuration variables.

One important outcome supporting the above is the cross-comparison among all ten cases by using the square of correlation coefficient (R^2) between the viewing-time rates and the space-use variables. The correlations show a stronger trend with the presence of other visitors (static) per space ($R^2 = 0.782$) than with the number of exhibits per space ($R^2 = 0.707$). This finding is quite unexpected, and suggests that the visitors spend more time and stay longest where there are other visitors. In contrast, the correlation with the number of exhibits in space is less significant, and complies with the intuition, meaning that the visitors spend more time in those spaces where there are more exhibits. Therefore, as the outcomes of the previous analysis summarized in Sections 6.1.1 and 6.1.2, the effect that the presence of people in a space has to attract more visitors to that space is once again emphasized in this part of the analysis.

On the other hand, the correlations of the viewing-time with the inner-visibility of exhibits defining the total number of exhibits that are visible from a space ($R^2 = 0.176$) and those with the rate of visible people from a space ($R^2 = 0.390$) show insignificant trends. The lack of statistical correlation makes it quite clear that the visibilities of neither the exhibits nor the people have a strong influence on the counts of visitors' viewing-time. Even the negative tendencies of correlations, though insignificant, suggest that people spend less time in those spaces that are more visible from other spaces.

Especially, this last finding has been further emphasized by the correlations with the measures of *inner-*

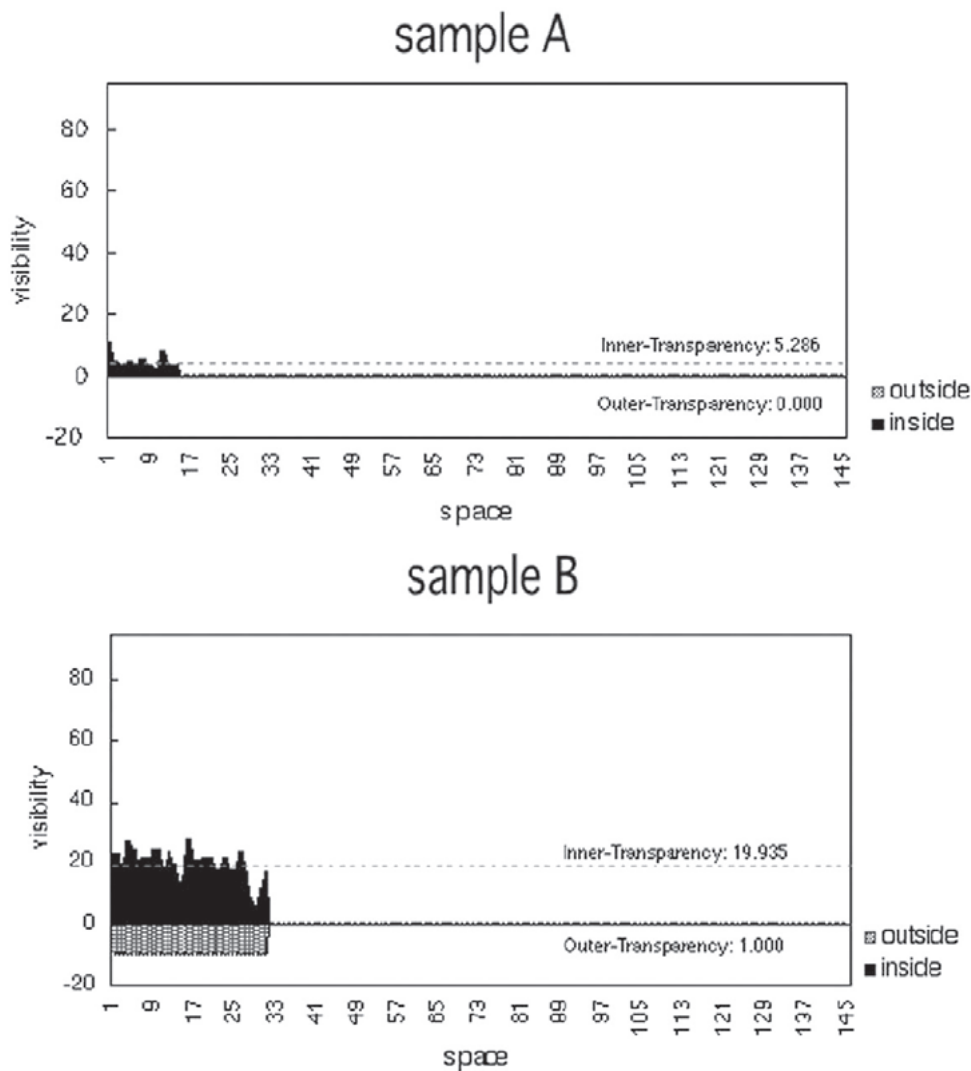


Figure 7. Bar-Histogram Representations of Inner-and Outer-Transparencies in Sample Exhibition Galleries A and B

transparency and outer-transparency. The inner-transparency identifies how much can be seen in proportion to the entire gallery environment from each convex space. In order to define that, a visibility field drawn from each convex space was overlaid on the convex map of a museum, and the convex spaces, at least partly, entering into this field were identified. A bar-histogram was also drawn to represent the extent to the visibility fields of all convex spaces and their overall distribution within the galleries (Fig. 7). The x-axis of the histogram illustrates all convex spaces in the configuration and the plus part of the y-axis their visual fields in numbers of convex spaces that are visible from each space.

The outer-transparency, on the other hand, refers to a larger scale of visibility measuring how much of the exterior context can be seen from the interior of the galleries. By this measure, the total number of convex spaces from which the exterior is visible was indicated as a proportion of the total number of spaces in the whole configuration. Those museum environments with no visibility of the exterior are directly given a value of 'zero'. The outer-transparency values are calculated for and ranked among the museums that make the exterior context visible, at least partially, from their interior spaces. The higher the outer-transparency value is, the more the gallery environment is visually related to its exterior context. In Figure 7, the minus part of y-axis shows the outer-transparency.

The outer-transparency has been found to significantly, but negatively, correlate with the viewing-time ($R^2 = -0.781$). This finding indicates that the more the gallery is visually related to the exterior context, the less viewing-time the visitor spends in that gallery. Though less strong than the outer-transparency, the inner-transparency is also negatively correlated with the viewing-time ($R^2 = -0.653$). In other words, the more the gallery is visually related to its own interior context, the less viewing-time the visitor spends in that gallery.

6.2.2 Viewing-Stops

The outcome of the previous analysis is that the proportion of the total amount of time spent by visitors is influenced positively by what is contained inside a given space rather than what lies beyond that space, and the presence of other visitors influences that pattern more than the exhibits in the space. Exploring the cases in relationship with the viewing-stop measure further confirms this finding. The viewing-stop measure identifies the total number of frequencies, in percentage, that the visitors stopped and viewed the exhibits. The total number of stops in each space is divided by the total number of visitors and assigned to the convex space. The higher the viewing-stop rate is, the more frequent the visitor stops are for the exhibits in a space, and thus visitors' attentions are more focused on the content of the exhibition.

Similar to the viewing-time measure, the number of frequencies that visitors stop in each space is almost independent from the spatial configurations. In half of the cases, the counts of visitors' viewing-stops are not even correlated with any of the spatial configuration variables. In the other half, the correlations are inconsistent. Therefore, with just few exceptions, the space configurations seem to have a little effect on how frequently visitors stop and focus their attention on the exhibits.

On the other hand, the space-use variables predict individual visitors' viewing-stops in each space better than the spatial configuration variables. A cross-comparison among the cases illustrates significant correlations between the viewing-stops and the space-use variables. For example, the correlation with the

number of other visitors (static) per space is strongly significant ($R^2 = 0.824$), meaning that the more other people are present in the galleries, the longer the individual visitors stop to view the exhibits. Another significant, but less strong, correlation is found with the number of exhibits in space ($R^2 = 0.699$). This secondary strong correlation means that visitors stop more frequently in those spaces where there are more exhibits. In comparison, the correlations with the number of other visitors (static) per space are stronger than those with the number of exhibits, and the prediction that “other visitors in the gallery attract more visitors to that galleries” is once again emphasized.

Finally, as the gallery environments become more visually connected with their outside context, this has also a significant, but negative, influence on visitors’ viewing-stops ($R^2 = -0.754$); therefore, their attentions seem to be less focused on the exhibits. Similarly, the inner-transparency is also negatively correlated with the viewing-stop measure ($R^2 = -0.647$), and that means that the more the space is visible from other spaces in the gallery, the less the visitors stop for the exhibits in that space.

7 | DISCUSSION AND CONCLUDING REMARKS

What has been attempted above is an approach to overcome a wide gap implied by the available theories in understanding the spatial characteristics of Japanese individuals. Our review of these macro-theories that start at a level higher than that of the individual has shown that the Japanese behavior have been often subject to assumptions based on the dichotomies of individual and society in Western origin. However, as long as these theories focus their point of attention upon the absence of individual autonomy, they have certain limitations: Japanese behavior cannot be understood in the interactive processes involved in the specific public environments, and it is more based on observable qualities rather than being more rigorous and descriptive. In fact, within these theories, what is most problematic is the lack of knowledge of Japanese behavior in relation to the environment as well as to the presence of others.

This article has presented the possible interrelations between the patterns of visitors’ micro-behaviors and their spatial variables based on an investigation of the art museum environments in Japan. Our study has shown that the way people move about in the art museums is influenced to a great deal by the spatial configurations. The role of the spatial configurations has been clearly demonstrated: The local connections and controls of access describing how a space is positioned according to its neighboring spaces in the gallery layout, strongly predicts not only which spaces most visitors might visit, but also how frequently

their visits might occur. In fact, these predictions seem subtler in terms of the number of visits rather than the number of visitors each space attracts. This is because it is possible for an exhibition space to have a higher number of visits than the number of visitors, since some visitors revisited the same space more than once. The global space configuration of integration also plays a role in the visitors' navigation patterns, but this is weaker than the local space configurations. In summary, because of the strong correlations, the numbers of visitors and visits each space gets are spatially predictable. On the other hand, the visitor navigation behaviors, such as visitors' choice of spaces and how frequent visitors use these spaces, are independent of the exhibits displayed in the galleries. These behaviors, however, are far more influenced by the presence of other visitors. Those visitors that are at a distance, but visible from these spaces, also play a role.

Our experimental study has also shown that, with few exceptions, the spatial configurations of the galleries have only a minor influence on visitors' viewing patterns. Instead, they are better predicted by the space-use patterns. The role of the space-use patterns is as follows: Not only how much time spent by visitors, but also how frequently visitors stopped for viewing the exhibits are influenced by what is contained inside a given space more than what lies beyond that space. In that, the presence of other visitors, especially the static ones, crowded in a given space is more effective than the exhibits.

These social implications detected by the spatial analysis point out certain grounds of Japanese public behavior. Some earlier works in Japanese studies, although they were not specifically about space, also support these grounds. Nakane's work on the critical influences of group formation and interpersonal relations on individual behavior in Japanese social life is one example (Nakane, 1973). According to Nakane, the social group formation in Japan depends on individual's daily integration or situational position within a given 'frame' of one group or locality rather than the individual's common 'attributes' (Nakane, *op. cit.*, p. 136). Our study has shown that this is precisely the case in art museums. When the gallery environment becomes more spatially rigid, or sequential, and stronger in boundary controls with both the interior and the exterior contexts of the galleries, individual visitors tend to be more concentrated not only on a higher level of attention to the exhibits, but also on a denser social behavior and communication with other visitors, whose organization is spatial, or locally orientated, and functionally interdependent rather than dispersed.

Kuwayama's work also stresses the same point: in a dense social environment, Japanese people often become excessively sensitive to the observation of others, and their behavior and attitudes are regulated by what he calls the "mechanism of mutual observation" (Kuwayama, 1992, p. 139). That is also the key

reason why, in the spatially rigid and strongly boundary-controlled gallery environments, the visitors observe others just as carefully as they are observed. The crowding thus leads to this mechanism of mutual observation, in which the individual visitor is constantly exposed to the curious glances of others.

Furthermore, the visibilities of not only the interior spaces, but also the exterior context of the galleries have a strong influence on visitors' experience. In that, however, the visibility of the exterior context seems more effective than the interior. As the gallery environment becomes more spatially dynamic and weaker in terms of boundary controls between the interior and exterior, individual visitors tend to be less influenced by others and rather individualistic, walking and viewing freely, making self-discoveries of 'things to see', and establishing individual relations to the content of the exhibits.

In summary, as shown in the preceding parts of this experimental study, the Japanese behave as collective subjects when the space and surrounding context (such as the context of others) are right for that. Otherwise, they are individualistic, or a range of other alternative behaviors between these two extremes can be observed in varying degrees. Describing narrowly the Japanese or the individuals of any other culture as being either predominantly *groupist*, or contradictory in their behaviors is not only misleading, but also underestimates the spatial setting, occasion, and surroundings, which are important attributes for fundamental principles of human behavior and functions to consider when socially interacting, communicating with others and communal orientation. Future studies should carefully consider the implications of these factors not only on the behaviors of Japanese individuals, but also on those of other cultures.

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References

- Baudelaire, C. (1964). *The Painter of Modern Life and Other Essays* (translated by J. Mayne). London: Phaidon.
- Benedict, R. (1946). *The Chrysanthemum and the Sword: Patterns of Japanese Culture*. Tokyo: Charles, E. Tuttle Company.
- Benedikt, M. L. (1979). To take hold of space: Isovists and isovist fields. *Environment and Planning B*, no.

- 6, pp. 47-65.
- Benjamin, W. (1997). *Charles Baudelaire: A Lyric Poet in the Era of High Capitalism*. Verso.
- Brawne, M. (1993). *Jorgen Bo, Wilhelm Wohlert: Louisiana Museum, Humlebaek*. Tubingen/Berlin: Ernst Wasmuth Verlag, pp.6-11.
- Hakubutsukan Kenkyuu (1985-1996) Yearly Surveys of Museums in Japan*. Japan National Association of Museums (Japanese).
- Japanese Association of Museums (2008) *Present Status of Museum in Japan*. Ministry of Education, Culture, Sports, Science and Technology-Japan. An online edition is also available on the internet, https://www.bunka.go.jp/seisaku/bijutsukan_hakubutsukan/shinko/pamphlet/pdf/r1409436_02.pdf
- Hillier B. and Hanson J. (1984). *The Social Logic of Space*. Cambridge University Press.
- Hillier B. (1999). Guest editorial: The need for domain theories. *Environment and Planning B: Planning and Design*, vol 26, no 2, pp 163-167.
- Istek, C. (1998). *The Spatio-logic of Art Museum Experience: Ten case studies in Japan*. University of Tokyo, PhD. thesis (博士論文:「日本の美術館の空間構成に関する研究:美術と空間の体験」東京大学, 甲第13328号, 1998年3月30日).
- Kato, S. (2009). Borrowed Surfaces. *New Perspectives Quarterly*, vol. 26, no. 4, Fall 2009, pp. 55-65. An online edition is also available on the internet, <https://doi.org/10.1111/j.1540-5842.2009.01112.x>
- Koike, S. (2009). *Rational Japanese: A Guide to Understanding Ordinary Japanese Behavior*. Marnavi. An online edition is also available on the internet, <http://www.marnavi-jp.com/RationalJapanese.pdf>
- Kuwayama, T. (1992). The Reference Other Orientation. *Japanese Sense of Self* (edited by Rosenberg N. R.). Cambridge University Press, pp. 121-151.
- Nakane, C. (1973). *Japanese Society*. Pelican Books.
- Peponis J. (2001). Introductory Remarks: Interacting Questions and Descriptions- How do they look from here? *Proceedings of Space Syntax 3rd International Symposium*. Georgia Institute of Technology, Atlanta, May 7-11, pp. xiii-xxvi.
- Peponis J. (2016). The Space Syntax of Intelligible Communities. *Community Wayfinding: Pathways to Understanding* (editors: Rebecca H. Hunter, Lynda A. Anderson, Basia L. Belza). Springer International Publishing, pp. 35-60.
- Van Wolferen, K. (1989). *The Enigma of Japanese Power*. Vintage Books.
- White Paper for Leisure Activities* (2020). Surveyed by Japan Productivity Center, Tokyo. An online edition is also available on the Internet, https://www.jpc-net.jp/research/assets/pdf/Leisure20200824_release.pdf

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