STUDY OF LANDSCAPE COMPOSITION BASED ON PSYCHOLOGICAL EVALUATION AND SPACE RECOGNITION PROPERTIES IN JAPANESE ZAKANSHIKI GARDEN

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Introduction

In the traditional Japanese garden, the techniques to let the viewer experience it through the opening framed by pillars or the beam of the building. In addition, there is the method to adopt natural environments outside of the garden including mountains and the sky as an integral part of the garden. This paper clarifies the characteristics of such outside space intentionally designed to constitute “the garden and the landscape”. It is useful to clarify their characteristics for future building and the landscape design including outside space.

The purpose of this paper is to obtain the basic knowledge to contribute to the placement of the windows for the architecture, and the design of approach space and landscape.

In this study, I analyze the psychological evaluation of the landscape spaces, their constitutions, and the space recognition properties for Japanese gardens. I analyze the constitution of the landscape from the photographed image, the psychological evaluation from the experiment operated as the viewers sitting and looking at the gardens and the space recognition properties from the sketches of the gardens at the gardens. In addition, I clarify the relations between the constitutions of the landscape and the psychological evaluations, and between the constitutions and the space recognition properties of the landscape for the correlation analysis.
Method

For this study, collects gardens with the characteristic constitution reflecting various local climates and collected from add over Japan. The Japanese gardens can be categorized into Zakanshiki garden\(^1\) and circuit-style. In this study, 14 Zakanshiki gardens are examined. 6 gardens are KARESANSUI\(^2\) and 8 gardens are the ornamental-pond style garden\(^3\) (Tab. 1).

<table>
<thead>
<tr>
<th>Name</th>
<th>Kind of garden</th>
</tr>
</thead>
<tbody>
<tr>
<td>KISENAN, Jyomyo-ji</td>
<td>KARESANSUI</td>
</tr>
<tr>
<td>SANSONGOSO garden, Komyo-ji</td>
<td></td>
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<tr>
<td>TSURUKAME garden, Raikyu-ji</td>
<td></td>
</tr>
<tr>
<td>MUSENNIWA, Shido-ji</td>
<td></td>
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<tr>
<td>Enyu-ji garden</td>
<td></td>
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<tr>
<td>ITTEIKIKAI garden, Komyozen-ji</td>
<td></td>
</tr>
<tr>
<td>Zuisen-ji garden</td>
<td></td>
</tr>
<tr>
<td>HOJYO-TEIEN, Kencho-ji</td>
<td>The ornamental-pond style garden</td>
</tr>
<tr>
<td>North direction, Raikyu-ji</td>
<td></td>
</tr>
<tr>
<td>Kameishibob garden</td>
<td></td>
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<tr>
<td>Kenyobo garden</td>
<td></td>
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<tr>
<td>GYORAKUEN, Fujieshi</td>
<td></td>
</tr>
<tr>
<td>Yamamoto-tei garden</td>
<td></td>
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<tr>
<td>Shibamata-taysakuten garden</td>
<td></td>
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</tbody>
</table>

\(^{1}\) A type of garden designed to be experienced by sitting inside of building.
\(^{2}\) KARESANSUI is a Japanese garden consisted of rocks and white sand without the water element.
\(^{3}\) A style is a Japanese garden consisted of trees and bridges around a pond.
Grid analytical method

I check which position each landscape element is distributed by grid analytical method to clarify constitution of the landscape (view from the opening) based on a photograph taken under set conditions at the site (Fig. 2). Specifically, I divide the photographic image into $4 \times 6$ grids since they can capture the overall compositions of the elements.(Fig. 3).

![Fig. 2. Photography condition](Source: Kenji Fukushima, Hiroshi Tsumita, Misaki Shimazu.)

![Fig. 3. Example of the grid analytical method](Source: Kenji Fukushima, Hiroshi Tsumita, Misaki Shimazu.)
An element accounting for more than 50% of a cell is counted. I plot the ratio of the number of cells with the elements for each garden in a graph and express the distribution of the elements for all gardens with the gradation of the color.

**The Psychological experiment based the SD method**

The SD method is used to measure the quantity of psychology for each garden. Several viewers sat in the building and looked at the garden for the experiment. They rated the evaluation scales of 23 bi-polar adjective phrases at 5 grades. I analyze them according to KARESANSEI type and ornamental-pond style garden type. Furthermore, I perform a correlation analysis to grasp relations of “composition of view from opening by the grid analytical method” and “psychological evaluation by the SD method”.

**Sketching experiment**

The space recognition properties to express how people grasped a garden view were studied through the experiment by the sketching. The size of the sketch is 80*120mm. The viewers were to make sketches in five minutes. The sketches are analyzed by the grid analytical method. Furthermore, I compare the results with “the composition of view from opening by the grid analytical method” and “composition of the sketching by the grid analytical method” (Fig. 4).

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4 I call one divided with 4×6 grid ‘cell’.
5 Abbreviation of Semantic Differential, kind of the psychological assay.
PART 3. Communication of Heritage

Result

Composition of view from opening

I added up the distribution of each element for every KARESANSUI and the ornamental-pond style garden. In addition, I made a landscape model for every KARESANSUI and the ornamental-pond style garden (Fig. 5).

![Landscape model](image)

In KARESANSUI, [tree] was counted most at 30.6% and it existed almost all in rows of III, IV of the grid. In addition, [white sand] was counted second most at 19.4% and followed by [trimmed tree], [moss], [rock]. For the landscape model of 6 KARESANSUI gardens, I expressed the elements appeared in more than 3 gardens with the color gradation. In III and IV rows the cells were comprised of trees and they tend to be located at the right to the center. All the cells at I row were comprised of [white sand]. [trimmed tree] appeared at the row of II in only one case, but it did not appear in the other. [trimmed tree], [rock], [moss] all appeared in the row of II, and it may be said that II cell location is a key position to express the identity of the KARESANSUI.

In the ornamental-pond style garden, a tree was predominantly counted at 45.8%, and they existed in all cells. In addition, [rock] was counted second most at 18.0% followed by [moss], [rock], [trimmed tree]. For 8 landscape model of the ornamental-pond style gardens, I expressed an element appeared in more than 4 gardens with the color gradation. All III and IV the cells are comprised of [tree]. The cell of II had no element, and [moss] appeared two cases in the cell of I.
**Psychological evaluation analysis**

Data on 12 gardens which the experiment was performed are used for the psychological evaluation analysis. The results of the SD method experiment was added up by the evaluation scales of 23 bi-polar adjective phrases.

In addition, I calculated the mean values of the psychological evaluations for every KARESANSUI and the ornamental-pond style garden (Fig. 6).

As for KARESANSUI, a high evaluation was provided in <Border is clear>, <Directionality>, <Constitution is dense>, <Impressive>, <Low>, <Regular>, <Wanting to stay>, <Feeling of openness>. As for the ornamental-pond style garden, a high evaluation was provided in <Scenery has much green> and <Curvilinear>.

**Correlation analysis of ‘Composition of view from opening’ and ‘Psychological evaluation’**

The grid analysis is of the constitution of the landscape for each garden was compared with the psychology evaluation obtained from the SD method to understand theirs correlation (Fig. 6). Three psychological scales of adjective pairs in the figure 7 show a part of the relations observed.
For the psychological scale, <Open – Closed>, a tendency to feel <Closed> was seen in the garden where the bottom cell had many elements of [pond] like “North direction, Raikyu-ji” and “Kenyobo garden”. Conversely, a tendency to feel <Open> was seen in the gardens where [moss] appear in I and II [sky] in IV like “Shibamata-taisyakuten garden” and “HOJYO-TEIEN, Kencho-ji”. Between <Scenery has much green – Scenery has little green> in the ornamental-pond style gardens <Scenery to be that there much green> was generally rated high than KARESANSEI. Even in the gardens which have high ratio of [tree] and [hedge] as in “MUSENNIWA, Shido-ji”, the influence of a strong [white sand] would not let the viewer feel that there was much green. Between <Low – High>, a tendency was seen to feel that it was <Low> in the gardens where [white sand] is in I like “MUSENNIWA, Shido-ji” and “ITTEKIKAI garden, Komyozen-ji”.

Thus, It is understood that the elements of the ground(as in figure-ground) in the bottom cell greatly influenced the psychological evaluation of the gardens.

*Correlation analysis of ‘Composition of view from opening’ and ‘Space recognition properties’*

The sketches drawn at the sites are studied by the grid analytical method. In addition, they are indicated by the different shades for every KARESANSEI and the ornament-pond style garden. Furthermore, they are compared with the composition of view from the opening (Fig. 7, 8).

![Fig. 7. Psychological evaluation judging from the constitution of the garden](Source: Kenji Fukushima, Hiroshi Tsumita, Misaki Shimazu.)
1. Comparison of KARESANSUI

The elements which were perceived larger than the composition of view from the opening were [mountain ], [hedge ], [rock ], [bridge ], [moss] and [eaves]. The elements which were perceived smaller were [sky ], [tree ], [building] and [trimmed tree]. [white sand] did not differ very much. [tree] elements in the view from the opening(30.6%) were mainly distributed over III and IV, but in the sketches (17.8%) their center of gravity was in IV. [white sand] elements in the view from opening (19.4%) were in I, but in the sketches (19.4%) they are drawn in the rows of in the rows of I and II. [moss] elements in the view from the opening (12.5%) were in I and II, but in the sketches (24.4%) they were distributed widely over I and IV. [mountain] and [bridge] elements in the view from the opening were small and hardly existed but in the sketches they were greatly drawn. In KARESANSUI, the man-made “figure”, such as [bridge], as well as [rock] which is the symbol of KARESANSUI were greatly recognized.
PART 3. Communication of Heritage

2. Comparison of the ornamental-pond style garden

The elements which were perceived larger than the composition of view from the opening were [mountain], [building], [pond], [stone lantern], [bridge] and [eaves]. The elements perceived smaller were [sky], [tree], [rock], [trimmed tree] and [moss]. [tree] elements in the view from the opening (45.8%) had a center of gravity in III, but in the sketches (26.7%) their center of gravity was in IV. [pond] elements in the view from the opening (9.6%) had a center of gravity in left side of II, but in the sketches (14.7%) they had a center of gravity in right side of I. They were recognized to be larger than view from the opening. [moss] elements in the view from the opening (14.1%) were mainly distributed over I and II, but in the sketches (18.4%) they were distributed over -III. [building], [stone lantern] and [bridge] were hardly recognized small in view from the opening, but they were large and well recognized in sketches. From the above, the man-made figures (as in figure-ground) such as [bridge] and [stone lantern] perceived to be larger, and the natural figures such as [trimmed tree] and [rock] were recognized as small in the ornamental-pond style garden. [sky] and [tree] elements which mainly occupy III and IV were recognized to be smaller than the view from the opening. In addition, [trimmed tree] was the element which expressed unique character, but was recognized to be small. [moss] elements which spread widely over the same ground were recognized to be small in the ornamental-pond style garden but were greatly recognized in KARESANSUI.

It can be explained that [moss] elements are perceived with [white sand] as a background in KARESANSUI, while the elements are perceived with [pond] as look the center in the ornamental-pond style garden. When people view the scenery in front of them, they do not look horizontally but look a little low to grasp scenery. From this, I understood that there was a difference in perception in comparison with view from the opening.

Conclusions

1. Landscape models for KARESANSUI and an ornamental pond style garden were made based on the previous studies.
2. The characteristics of the psychological evaluations were clarified for KARESANSUI and an ornamental pond style garden.
3. The psychological evaluations were prone to be influenced by the elements in the position of I, IV in the view from the opening.
4. From the comparison between the view from opening and sketches scenery that the viewer perceives and the constitutions of the landscape showed discrepancies.

When a designer makes the landscape design for the modern architecture, the unique characters can be brought effectively placing modern elements in II location framed by the window. In addition, the choices of [pond], [white sand] and [moss] and the placement of [tree] become important since they influence the psychological evaluation depending on the elements in the rows of I and IV. For these two points, it is important to consider discrepancies between the view from the opening and the scenery which the viewer actually perceives.

From the above, I was able to clarify the constitution of the landscape in Japanese Zakanshiki garden.