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Study of Environmental Cognition and Life Domains of Residents of Super High-rise Condominiums

-A Case Study of River City 21 in Okawabata-

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Abstract

This paper discusses the appropriate design for super high-rise condominium. The population of Tokyo, which had been decreasing, began increasing in 1997. High-rise and super high-rise condominiums, which allow people to live in urban areas, are the factor behind this population growth. Super high-rise condominiums are a new living environment, one that is cross-sectional rather than planar. Creating these residential spaces requires a design technique incorporating both 2- and 3-dimensional layer systems, as well as input from the prospective residents. This paper describes one part of the design technique for super high-rise condominiums. The research was conducted at Ohkawabata River City 21, a model of super high-rise urban housing. The research included a questionnaire, application of quantification III theory, and cluster analysis. The analysis provided appropriate attribution of the date for the design technique.

Keywords: Super high-rise condominium, environmental acknowledgment, Habitat life domain, Quantification III theory

1. Background

The population of Tokyo, which had been decreasing, began increasing in 1997. High-rise and super high-rise condominiums, which allow people to live in urban areas, are the factor behind the population growth. Recently, the supply of super high-rise condominiums has increased considerably. Sixty percent of the super high-rise condominiums that are planned are the in the 23 wards in Tokyo. It is expected that the number of super high-rise condominiums will increase in the future making the super high-rise condominium the primary type of housing project in the future. However, for the people that live in them, super high-rise condominiums are a new living environment that must reflect their needs and desires.

2. Purpose

Super high-rise condominiums are now the mainstream of current housing projects. As residences, their living environments are cross-sectional rather than planar in design. Designing super high-rise condominiums requires a technique that incorporates both 2- and 3- dimensional layer systems.

This paper studied the residents of the super high-rise condominiums in Ohkawabata River City 21, which is a model of super high-rise urban housing in Chuo-ku,

Tokyo. This research investigates, analyzes and considers the residents needs and desires regarding the residence floors. Previous studies of housing projects have paid little attention to these needs and desires. The purpose of this research is to grasp the residents' perceptions of the living environment in super high-rise condominiums.

3. Research area

The research was done in Ohkawabata River City 21. Located just 2km east of Tokyo station, this development contains super high-rise, high-rise, and mid-rise condominiums along the leafy waterfront of the Sumida-river. Ohkawabata River City 21 is one of several Tokyo Bay waterfront development projects that are pioneering new urban centers.

The site of the development was formerly a vacant lot owned by Ishikawajima-Harima Heavy Industries Co., Ltd. Development was carried out by the Tokyo Metropolitan Government, the Tokyo Metropolitan Government Bureau of Housing, the Housing and Urban Development Corporation (Urban Development Corporation), and Mitsui Real Estate Development Co., Ltd. The official name of the project is the Ohkawabata Area Urban Development Project.

The project contains seven super high-rise condominiums, each of which has 30 floors. The super high-rise, high-rise and mid-rise condominiums contain a total of 4000 residences. Several green areas and parks are situated along the Sumida-river. The project also contains many public facilities. The high-rise condominiums have a view of all of the Tokyo metropolitan area.

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Contents of questionnaire

- I. Appanage
- II. Perceived range of neighborhood
- III. Routine route
- IV. Perceived range of activities
- V. Elements of perceived range of activities
- VI. Perceived ranges of 'my town,' 'familiar waterside,' 'familiar green space,' and 'urban activity'
- VII. Elements of perceived regions
- VIII. Landmarks
- IX. Comparison of past and present habitats

The analysis considered the date on which the survey was executed as well as the above-mentioned method and contents.

4.2. multivariate analysis

The data obtained from the questionnaire was classified into 177 categories, and a multivariate analysis (quantification III theory and cluster-analysis) was performed.

Quantification III theory produced three factor axes. The characteristics of the surveyed residents' perceptions can be seen from the coordinates of each sample on those axes.

Using cluster-analysis, the inhabitants were classified into groups sharing similar perceptions about their living environment.

The relationship between the physical environment and the psychological characteristics is becoming clear.

Using the sphere graphic method, a cognitive region map was drawn of 'my town,' 'familiar waterside,' 'familiar green space,' and 'urban activity.' The factors on the map that form each region are classified on the map as point-like factors, striated factors and field factors.

Finally, the cognitive region map and cognition characteristics were used to determine the differences in the residents' perceptions about the living environments and regions according to the floor upon which they live.

5. Results

5.1. Examination of cognitive region measurements, with focus on residential floor

• My town, Familiar waterside

There is a bias in the measurement of the cognitive region of each residential floor. This is shown by the more widely spread cognitive regions.

• Familiar green space, Urban activity, Neighborhoods (horizontal direction)

Cognitive regions of 'urban activity' and 'neighborhoods' (horizontal direction) are limited since there are no outstanding differences among the inhabitants on each floor. However, the cognitive regions for 'familiar green space' become larger the higher the residential floor.

Table 4-1. Data on experimental subject

Sex	1 Man	72	54.5	Habitation apartment name	1 River point tower	18	13.6
	2 Woman	60	45.5		2 Sky light tower	14	10.6
	Total	132	100.0		3 City front tower	6	4.5
Age	1 ~10	6	4.5	Residence floor	4 Century park tower	37	28.0
	2 20~29	7	5.3		5 East towers	31	23.5
	3 30~39	35	26.5		6 East towers II	19	14.4
	4 40~49	37	28.0		7 Kosha tower TSUKUDA	7	5.3
	5 50~59	24	18.2		Total	132	100.0
	6 60~69	16	12.1		1 Low(1~3F)	5	3.8
	7 70~	7	5.3		2 Middle(4~5F)	7	5.3
	Total	132	100.0		3 High(6~19F)	44	33.3
					4 Super-high-rise(20~50)	76	57.6
					Total	132	100.0

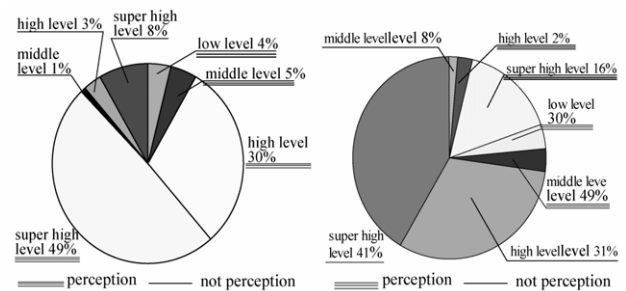


Fig. 4-2. The range of percept neighborhood

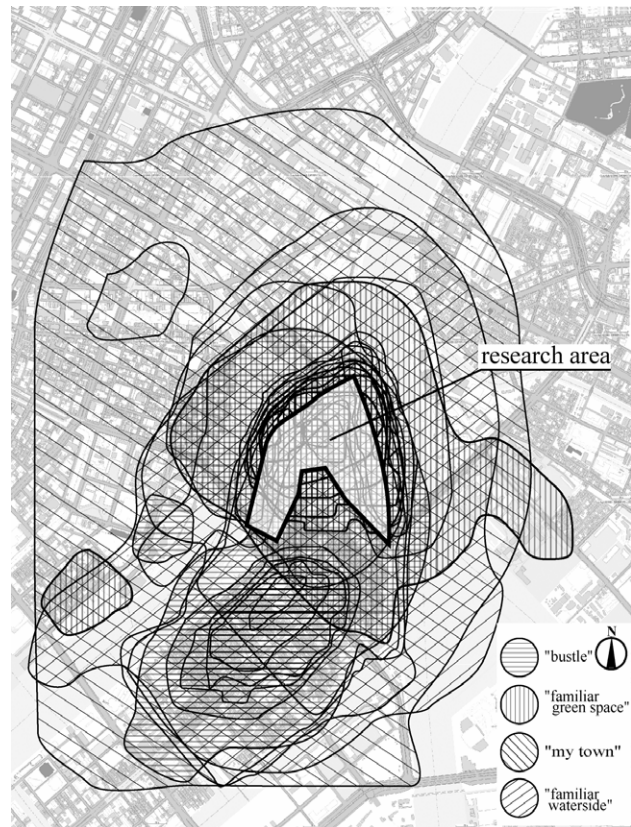


Fig. 4. Cognitive region map

5.2. Cognition characteristics of resident groups

Applying quantification III theory to the results of the Item-Category scores reveals the meaning of each axes. The first axis shows the degree of cognition of the regions. The second axis, 5, shows the relationship between living activities and their area, and the third axis shows the extent of the life region. (Table 5-1,2,3,)

The position of each of the 6 types of resident groups, derived from cluster-analysis, on the coordinates of the axes, derived from quantification theory, shows the cognition characteristics of that resident group. (Table 5-1, Fig. 5-1).

Table 5-1. each typology cognitive attribute

	axi- I degree of cognitive region	axi- II degree of interaction behavior and region	axi- III life region
I	semi-low	lowest(3)	semi-narrow (5)
II-1	semi-high(1)	variance	semi-wide (5)
II-2	highest(1)	semi-low(4)	semi-narrow (5)
III	variance	variance	semi-wide (5)
IV	lowest(2)	lowest(2)	semi-narrow (5)
V	semi-low	low	lowest(6)

(1)	No man have Interrelationship of each element of cognitive region
(2)	Number of man do not have Interrelationship of each element of cognitive region is many
(3)	Interrelationship of each element of cognitive region is variance
(4)	Interrelationship of each element of cognitive region is duplication
(5)	Number of man do not percept neighborhood with horizontal is 30%
(6)	No man do not percept neighborhood with horizontal

5.3. Examination of Type I and Type II-2 resident groups using 3 factor axes

The Type I resident group consists of those living on the low or middle floors of their buildings. In contrast, the Type II-2 resident group consists of those living on high or super-high floors. The formation of environmental cognition and life region depends on which floor the inhabitant lives. This relationship is examined by comparing the Type I and Type II-2 inhabitant groups.

Type I (Residents on low and middle floors)

□ it is difficult to find a relation between the cognitive regions and the residents in this group. Some samples show relationships among the cognitive regions but they are barely touching or are separated. Many residents in this group—53.8%—form vertical neighborhood communities.

□ Their neighborly ties did not lessen when they moved into super high-rise condominiums. Just 5% of inhabitants of this group said that neighborly ties lessened.

Type II-2 (Residents on high and super-high floors)

Every resident in this group has cognitive regions with relationships to the various items. More samples have overlapping item cognitive regions than have regions that just touch or are separated. 70% of the residents in this group said that neighborly ties had lessened. More than 30% of the residents in both groups formed horizontal neighborhood communities, showing that the residence floor and the cognition of horizontal neighbors is not related.

5.4. Examination of Type I and Type II-2 resident groups using the cognitive region map

□ My town: residents in the type I resident group have larger cognitive regions of ‘my town’ than do the residents in the Type II-2 group. Type I residents mainly based their cognitive region of ‘my town’ on their life activities, but the Type II-2 residents mainly based their cognitive region on their living environment.

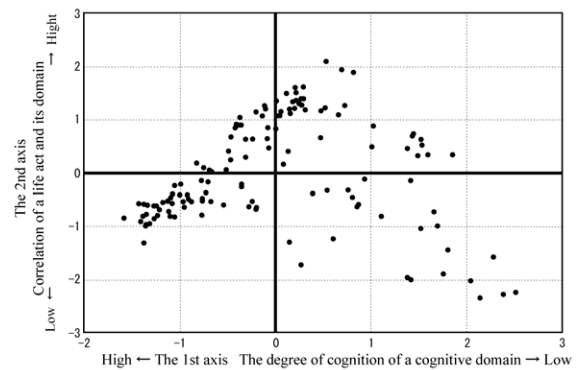


Fig.5-1.1-2Axes Sample plot

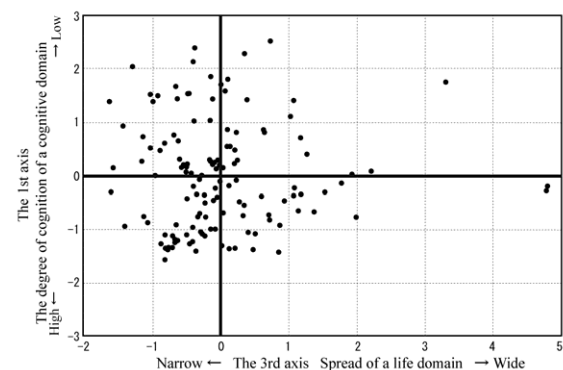


Fig.5-2.1-3Axes Sample plot

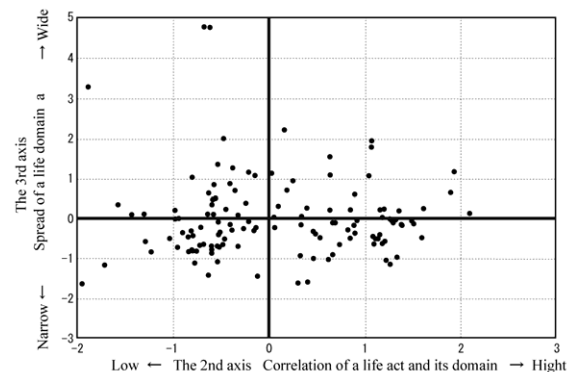


Fig.5-3.2-3Axes Sample plot

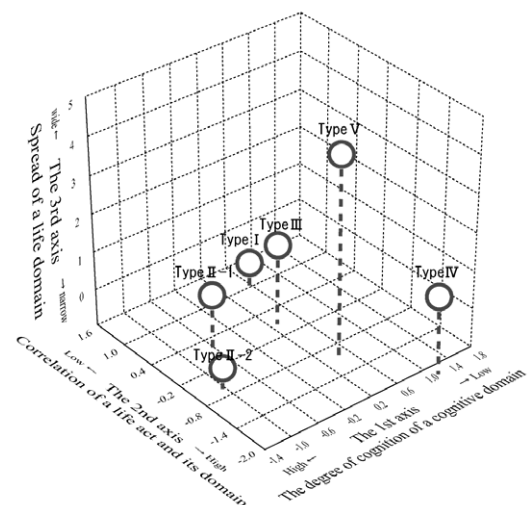


Fig.5-4. Plot quantification III

□ Familiar waterside: The answers of Type I residents encompassed both sides of the Sumida-river but the answers of Type II-2 residents tended to focus on the riverside close to their homes.

□ Familiar green space: Type II-2 residents had larger cognition regions for 'familiar green space' than did Type I residents. Type II-2 residents also had larger areas of strong cognition of familiar green spaces than did Type I residents. In other words, the size of the cognition region of familiar green space was proportional to the floor on which the resident lived. For most Type I residents, the cognitive region for familiar green spaces was the same size as that for 'my town.' The basis for this was their life activities. For most Type II-2 residents, however, the primary basis was their living environment.

□ Urban bustle: Type II-2 residents had larger cognitive regions for 'urban activity' than did Type I residents. Type II-2 residents also had larger areas of strong cognition of 'urban activity' than did Type I residents. The Nishinaka shopping street and the Monjayaki restaurant (Japanese traditional dishes) were noted by inhabitants of Type II-2 as part of the 'urban activity.' The cognitive region of 'urban activity' was 11.84ha in size for Type II-2 residents, which was the highest value among all groups.

□ The range of the cognitive region of 'activities' for Type II-2 residents was larger than that for Type I residents, and the intensity of cognition for the whole area was high. The range of the cognition region of 'activities' for Type II-2 residents contrasted with those of 'my town' and 'familiar green space' due to the residents' life activities. The range of the cognition region of activities for Type II-2 residents was larger than that for Type I residents.

□ The perception of neighborhood in the horizontal direction: The range of the cognition region of 'activities' for Type I residents was larger than that for Type II-2 residents, and the intensity of the cognition for the whole area was high. Residents on the lower floors showed a higher perception of 'neighborhood' in the horizontal direction and had a larger cognition region.

□ Routine route: Type I residents use the roads more often than do type II-2 residents. This is due to the number of students and unemployed residents in the Type I group.

6. Conclusion

The data was classified into six types using multivariate analysis (quantification III theory). Two types concerned the residence floor: 'low and middle floors,' and 'high and super-high floors.' The attributes of both types are proved by comparing the two types using the factor axis and the cognitive region map.

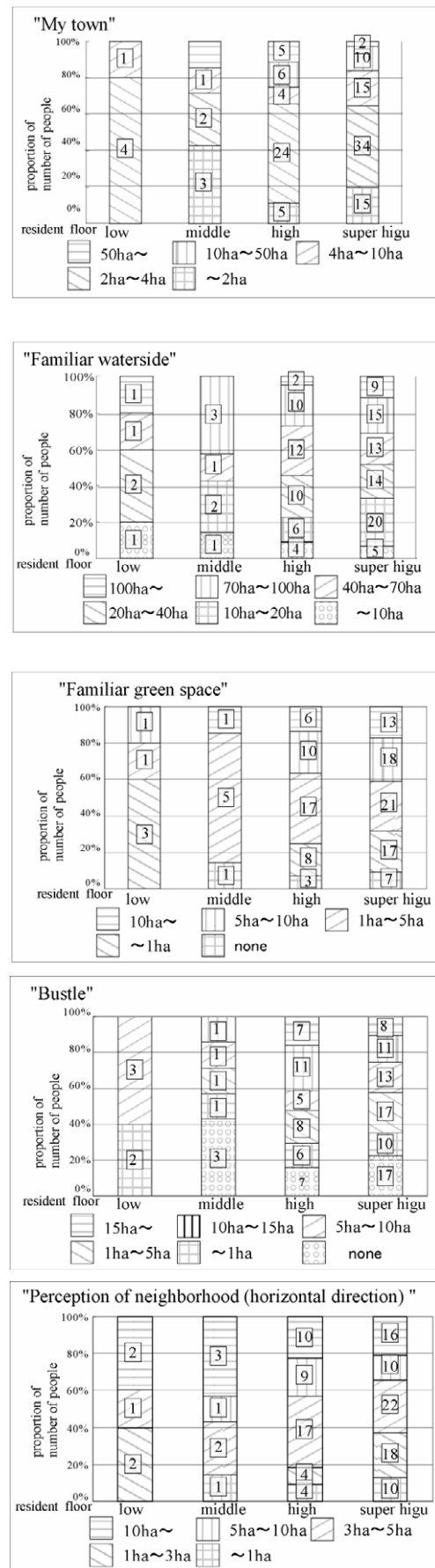


Fig. 6. Cognitive region area classified by resident floor

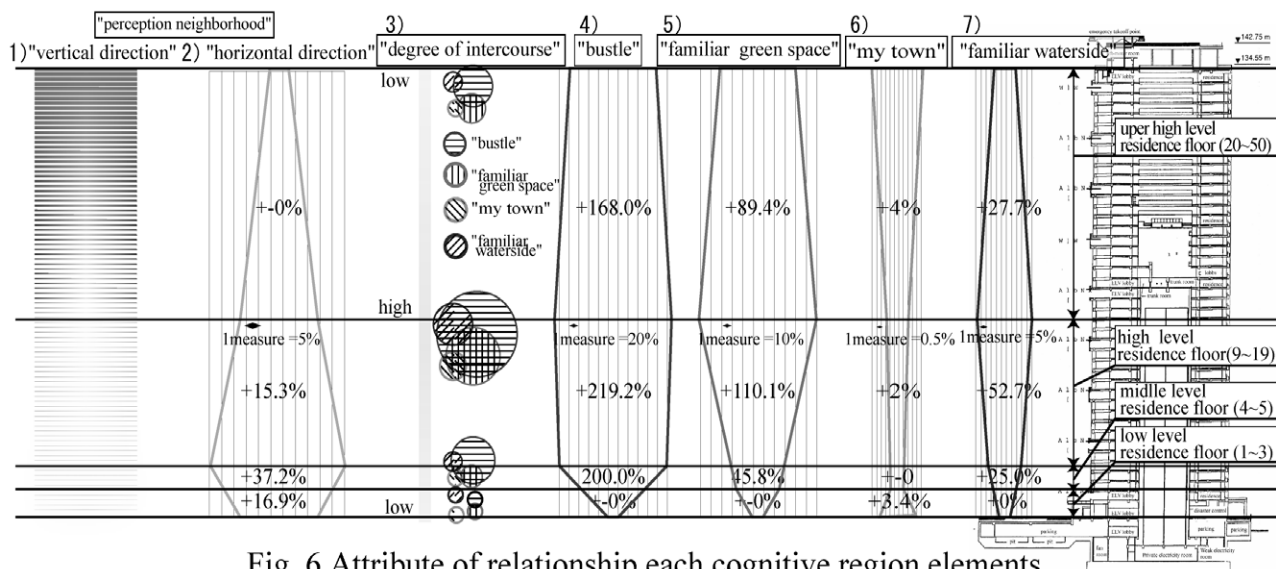


Fig. 6 Attribute of relationship each cognitive region elements

Fig. 6 shows the attributes for the residence floors and the relationship between each cognitive region ('my town,' 'familiar waterside,' 'familiar green space,' urban activity,' and 'perception of neighborhood') (Fig. 6, Table 6)

The cognitive regions for 7) 'familiar waterside' 5) 'familiar green space,' and 4) 'my town' increased in size between the low to middle floors, but decreased in size between the high to super-high floors.

The cognitive region for of 6) 'urban activity,' decreased in size between the low to high floors, but increased in size between the high to super-high floors.

The area of overlap for the four elements increased between the low to high floors, but decreased between the high to super high floors (Fig.6-3).

The area of each cognitive region element correlated with the overlapping areas of the four elements. The area for 2) 'perception of neighborhood (horizontal direction),' increased up to the middle floors, then decreased. The degree of neighborhood perception in the vertical direction continued increasing up to the super-high floors (Fig.6-1)). In other words, there was contra-correlation.

This study described the attributes of the residents on different floors of super high-rise condominiums, the formation of environmental cognition, and the habitation life domain.

Type I: Attributes of residents on 'low and middle floors'

I-A Residents have a tendency not to draw overlapping elements on the cognitive region map. Namely each elements Interrelationship of cognitive region disunites

I-B. The neighborhood' (local friends) extends above and below their floor. The extent of this perception of a vertical neighborhood is high.

I-C. The perception of 'neighborhood' extends

horizontally rather than vertically.

Type II: Attributes of residents on 'high and super-high floors'

II-A The elements of the cognitive region overlap, but become separated in the higher floors.

II-B. The extent of the perception of 'neighborhood' is low in the vertical direction and disappears completely in the higher floors.

The range of 'familiar green space' on the cognitive region map is broad and become broader in the higher floors.

III. The perception of 'neighborhood' in the horizontal direction is low on all floors.

This research got attribution of environmental cognition and life territory regards to residence floor in residents of super high rise condominium

7. Evolution of research

This study needs further consideration of the details in order to provide support for urban housing.

Concretely, each resident's perception of their building, the relationship between the resident's perception and the vicinity, and the prospective area, should be considered. This data can be used to develop an appropriate design technique that incorporates both 2- and 3-dimensional layer systems.

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