The Characteristics of Home Environment Using Cognitive Map

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1. Introduction

Each of us has a personal and unique mental image of a environment that is the result of a two-way process between an observer and his surroundings. The mental image of residential environment shows how residents recognize their home environment. By interpreting this image, we can learn about the way in which residents understand and evaluate it. So residents' mental image could be a cue which suggests several guidelines to develop and plan a home environment.

A cognitive map has been used as a general method to analyze the mental image. Cognitive mapping has been defined as a process that enables us to collect, organize, store, recall, and decode information about the relative location and features of the geographic environment (Downs and Stea, 1977). A cognitive map is an individual's organized representation of it: it stands for or portrays the environment. This representation is both a likeness of the spatial environment and a simplified model of it. For this, Holahan (1982) noted that a particular person's representation of the environment was not an exact replica of the objective environment, but rather a shorthanded, distorted, and individually tailored version of the real world. So, he defined that the individual distortions in the cognitive map were not considered as the products of random error, but rather as a consistent relationship to the personal ways in which individuals have used the environment. In this view point, the cognitive map including a common and constant pattern for home environment can be interpreted to represent the important characteristics of home environment from the view of residents.

The environmental cognition research has been interested in how and why some features of the environment are remembered while others are forgotten, the processes of getting lost and getting found, and how we organize the physical features on our homes, cities, countries, and even the world as a whole. And the major psychological function of environmental cognition was generally indicated in the view of the following three points (Holahan, 1982). The first is to solve spatial problems. That is, cognitive maps tell us where to go to fulfill our needs and how to get there. Secondly, cognitive maps are to provide a basis for social communication about the physical environment. Shared environmental representations provide essential symbols and collective memories for social communication. Public images[1] of the city are also necessary for cooperative social activity. Thirdly, the environmental cognition is a basis for the individual's sense of personal identity. Cognitive maps can serve as a framework in which the individual can organize

1. Lynch (1960) defined public images as "the common mental pictures carried by large numbers of a city's inhabitants". He explains that the shared public image of a city is essential to cooperative activity between people.

memories, beliefs, feelings, and fantasies, as well as present and future activities.

Actually psychological interest for the way in which people form mental images of geographical environment was initiated by Lynch. Since his study, the environmental cognition has been generally studied in two fields: one field focusing on responses and cognitive mapping about environment; and the other one on the study of analysis for cognitive factors of environment and a predictive model for people's responses to it (Lee, 1988). This study belongs to the former field. In Korea, the study of former field is not enough to examine environmental cognition yet. Most of these studies have focused on downtown images of city (Yi, 1999; Ann, 1988; Keon, 1987; Kim, 1983) and partially on school environment (Yoon, 1989; Yoo, 1999). It is only a few studies that have dealt with home environment. They attempted to figure out the basic process of people's cognition for home environment of apartment sites (Kang, 1991) and that of districts of detached houses (Chang, 1984; Lee, 1984). So, it is necessary to study and comprehensively understand residents' mental images on home environment.

Therefore, the purpose of this study is to find out the characteristics of home environment based on residents' mental images by using their cognitive maps. It would suggest a new basic direction for the planning of home environment. The concrete contents of this study are as follows.

1) How big is the size of home environment recognized by residents?
2) What are the types of cognitive maps which residents draw for home environment?
3) What are the elements of the physical environment which are composed of home environment image?

2. Methods

A structured questionnaire survey including sketch map was carried out to find out the residents' image of home environment from July 7th to July 20th in 1998. A total of 285 questionnaire were collected, 167 used for analysis, and the rest deleted due to the missing information. The statistical package (SPSS PC+) was used for the analysis of data.

2-1. The subjects of research

The subjects were housewives with children in elementary or middle school in Pusan, Korea. Especially, housewives not only tend to include home-base activities in their cognitive mapping (Holahan, 1982), but also recognize the home environment better than other family members. So their cognitive maps are proper for seeking out the image of home environment.

2-2. The sketch map

The sketch map was a method to get residents' cognitive map. The subjects were given a blank sheet and asked to sketch from memory. They freely described the image of home environment on it. The cognitive map portrayed by

the subjects could be classified in many ways according to its form and the way of space composition. In this study, Appleyard(1970)'s 8 types[2] of the cognitive map were used to analyse the types of the residents' cognitive map and Lynch(1960)'s 5 compositive elements[3] were used to analyse the elements of home environment.

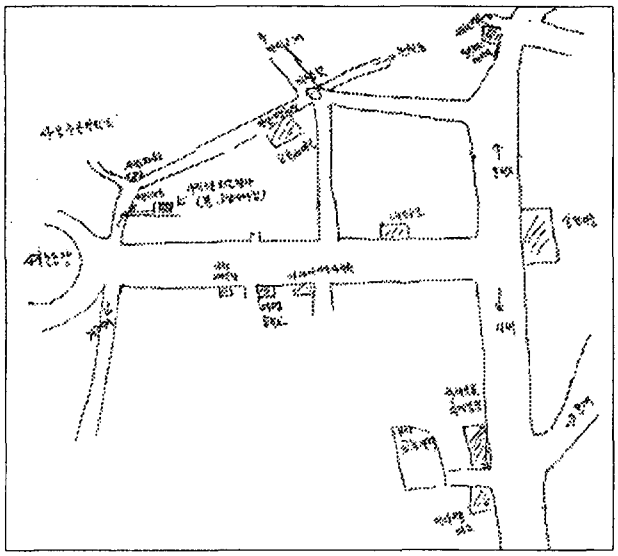

Figure 1. A sample of cognitive map sketched by a resident.
(Dongrae-Ku, Pusan)

2-3. Data Analysis

(1) Measuring the size of home environment

The size of home environment recognized by residents was measured by two ways. First, among the elements drawn up on the cognitive maps, the distance between two elements with the longest diameter was gauged to confirm the whole size of home environment. It was converted into a real distance with a 1/10000 or a 1/15000 scaled map. Second, the distance between the one's own house and the farthest point from it also was gauged and converted into a real distance. These two distances provided clues to grasp the size of home environment.

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2) The Appleyard (1970) method classified spatial maps and sequential maps according to the degree of accuracy and complexity. These are divided into 4 maps according to the degree of the development process which is from a rudimentary map to a positional form discriminated by location and direction. The spatial maps are classified as follows: scattered map, mosaic map, linked map, patterned map. And the sequential maps are classified as follows: fragmentary map, chained map, branch/loop map, and netted map.

3) Lynch (1960) noted that the legibility and quality of the environment would be improved when 5 elements are organized consistently. Paths are channels along which people travel, such as streets, bus routes, or railroad lines. Edges are linear elements that do not function as paths. Districts are medium to large sections of a city that are seen as having an identifiable character. Nodes are strategic points in the city where residents travel. Some nodes are formed by a crossing of important paths or by breaks in a transportation line. Landmarks are points that are viewed from an external vantage point.

(2) Classifying the types of cognitive maps

According to Appleyard's classification criteria, the cognitive maps were classified into sequential map and spatial map. Then, they were subdivided into more detailed types.

(3) Finding the elements of Home environment

The elements of home environment were defined as the representation of all physical elements of home environment described on each resident's cognitive map. The elements were identified as superior elements (21%-70%) and inferior ones (10%-19%) with accumulated frequency. They were classified according to item of Lynch's environment elements.

3. Results and Discussion

3-1. The size of home environment

As for the size of home environment, we found that the residents recognized area within walking distance as the whole size of home environment and the distance from the subjects' own house. Upon the whole size of home environment, "500 Meters through 1000 Meters" and "1000 Meters through 1500 Meters" were considered high with 30.5% and 22.2% respectively. Upon the distance from their own house, "500 Meters through 1000 Meters" was the most commonly represented with 46.2%.

Also, it was found that the residents' recognition of the whole size of home environment and the distance from the subjects' own house was similar irrelevant the household characteristics such as family income, dwelling size, age of house wife and the years of residence.

Table 1 . The whole size of home environment f (%)

	Dongrae-ku	Nam-ku	Book-ku	Saha-ku	Seo-ku	Total
under 500m	2(7.1)	6(14.6)	6(20.7)	3(7.1)	3(11.1)	20(12.0)
501-1000m	12(42.9)	9(22.0)	5(17.2)	13(31.0)	12(44.4)	51(30.5)
1001-1500m	4(14.3)	8(19.5)	8(27.6)	12(28.6)	5(18.5)	37(22.2)
1501-2000m	3(10.7)	7(17.1)	3(10.3)	7(16.7)	2(7.4)	22(13.2)
2001-2500m	3(10.7)	5(12.2)	2(6.9)	6(14.3)	0(0)	16(9.6)
2501-3000m	1(3.6)	1(2.4)	0(0)	1(2.4)	1(3.7)	4(2.4)
over 3001m	3(10.7)	5(12.2)	1(17.2)	0(0)	4(14.8)	17(10.2)
Total	28(100)	41(100)	29(100)	42(100)	27(100)	167(100)

Table 2. The distance from the subjects' own house f (%)

	Dongrae-ku	Nam-ku	Book-ku	Saha-ku	Seo-ku	Total
under 500m	7(36.8)	5(27.8)	2(18.2)	3(14.3)	6(66.7)	23(29.5)
501-1000m	9(47.4)	7(38.9)	4(36.4)	14(66.7)	2(22.2)	36(46.2)
1001-1500m	1(5.3)	1(5.6)	4(36.4)	2(9.5)	1(11.1)	9(11.5)
over 1501m	2(10.5)	5(27.8)	1(9.1)	2(9.5)	0(0)	10(12.9)
Total	19(100)	18(100)	11(100)	21(100)	9(100)	78(100)

3-2. The types of cognitive maps

As for the types of cognitive maps, the percentage of spatial maps (58.1%) was higher than the sequential maps (41.9%). This result was different from the one of the existing research for downtown area of city. Appleyard (1970) generated the sequential map with 77% and the spatial map with 23%. Also, in Korea, Keon(1987) and Kim(1983) generated the sequential map with 53.4%, 55.5% and the spatial map with 46.6%, 44.5%. It could be understood that residents have more spatial cognizance for their home environment than for the downtown area.

Table 3 . The types of the Cognitive Maps f (%)

	Dongrae-ku	Nam-ku	Book-ku	Saha-ku	Seo-ku	Total
fragmentary map	1(3.6)	3(7.3)	5(17.2)	2(4.8)	2(7.4)	13(7.8)
chained map	6(21.4)	3(9.8)	2(6.9)	8(19.0)	4(14.8)	24(14.4)
branch/loop map	3(10.7)	2(4.9)	1(3.4)	9(21.4)	2(7.4)	17(10.2)
netted map	3(10.7)	4(9.8)	2(6.9)	6(14.3)	1(3.7)	16(9.6)
sequential map	13(46.4)	12(31.8)	10(34.4)	25(59.5)	9(33.3)	70(41.9)
scattered map	4(14.3)	7(17.1)	6(20.7)	3(7.1)	5(18.5)	25(15.0)
mosaic map	3(10.7)	5(12.2)	7(24.1)	8(19.0)	7(25.9)	30(18.0)
linked map	6(21.4)	6(14.6)	1(3.4)	2(4.8)	5(18.5)	20(12.0)
patterned map	2(7.1)	10(24.4)	5(17.2)	4(9.5)	1(3.7)	22(13.2)
spatial map	15(53.6)	28(68.2)	19(65.6)	17(40.5)	18(66.7)	97(58.1)
Total	28(100)	41(100)	29(100)	42(100))	27(100)	167(100)

3-3. The elements of home environment

As for the physical elements of home environment, the residents usually recognized a main road above 4 traffic lanes to be a path and an intersection on the main road to be a node. And schools and convenient, public and recreational facilities were recognized as landmarks or districts, while the elements of natural environment like mountains, hills, and rivers were represented as edges (Figure 2).

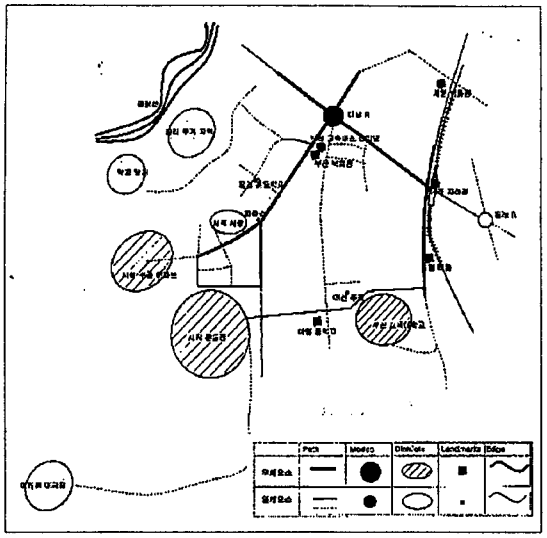

Figure 2. The example of elements of home environments
(Dongrae-Ku, Pusan)

The table 4 shows the elements represented on resident's cognitive map by accumulated frequency. They could be considered a main factors to affect the mental image. Among the elements represented as landmarks or districts, schools such as elementary, middle, high and university were the most highly recognized. Then the cognition was made in the order of apartment sites, banks and market places.

Table 4 . The elements of Home environment

(Accumulated Frequency)

	Elements	Dongrae-ku	Nam-ku	Book-ku	Saha-ku	Se-ku	Total
nodes	intersection on roads	9	31	3	22	3	68
districts/ landmarks	gymnasiums	12	-	-	-	7	19
	public parks	2	3	-	5	11	21
	community centers	-	14	-	-	3	17
	apartment sites	25	26	68	47	10	176
	schools	27	88	23	66	25	229
	village offices	1	6	7	3	2	15
	police offices	8	3	2	0	2	15
	post offices	2	7	1	3	1	14
	banks	6	37	13	10	2	68
	market places	5	14	16	6	11	52
	departments	21	-	-	2	-	23
	hospitals	2	6	2	6	16	32
	stations of subway	6	-	-	8	1	15
edges	mountains	9	15	6	7	6	43
	rivers	-	6	6	7	4	23

IV. Conclusion

This study is to find out the characteristics of home environment based on residents' mental images by using their cognitive maps. According to the results,

the residents recognized home environment as per a constant size of walking distance. And residents have more spatial cognition for their home environment than for the city downtown. Schools, apartment sites, banks and market places were found as important physical elements affecting the image of home environment.

Consequently, this study shows a necessity of user's experienced image in designing physical home environment. Many additional studies are required to fully understand and apply these results to a plan of home environment.

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