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Characteristics of Familiar Greenery and Images of a Few Green Spaces in Residential Areas

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Abstract

The purpose of this study was to find the characteristics of the assessment structure of perception of different types of greenery made by people living in residential areas in Sapporo. A questionnaire was made using familiar greenery and the semantic differential, which was distributed to residents.

In general, although the greenery recalled as being familiar was full of variety, consisting of different parks, private gardens and large scale greenery which ranked highly in every study area. The distance to the greenery seem to be limited to within 1400m, and about 80 percent was within 500m. Large-scale greenery had a longer distance of influence than small-scale greenery. Furthermore, the percentage of the greenery recalled was influenced by the degree of cognition, frequency of use and type of greenery.

The results of factor analysis of the three types of greenery showed that the factor for "cleanliness" in Sousei River, the factor for "pleasantness and safety" in Tonden Windbreak and the factor for "activeness" in Tondennishi Park were closely related to their assessment.

Key words : familiar greenery, perception, urban green space, residents

1. Introduction

In general, greenery located in residential areas largely varies in both their quality and quantity, such as type, spatial distribution, size and so on. The assessment of greenery is closely related to its degree of cognition and use. To examine the types of greenery which can be easily recognized and used by people is one of the important aims of greenery planning. In some studies related to this field, trials to clarify characteristics of "familiar greenery" or "easily familiarized greenery" have been conducted. For example, Ide et al. (1985) mentioned that the conditions of easily familiarized greenery are influenced by cognition distance, multi-use and degree of visual impact. Nemoto and Ide(1983) found that urbanized greenery, such as street trees and parks, are recognized more easily than semi-natural greenery, such as farm land and so on. Furthermore, Tabata et al.(1983) showed that the different types of ownership of greenery, including greenery open to the public, are conditions for easy cognition, as well as distance from greenery. Takahashi and Noda(1975) found that the cognizable distance from familiar greenery increase when the greenery is open to the public and the greenery has familiar characteristics, such as

landmarks. These results suggest that difference in types, characteristics and connection of greenery are related to the assessment of greenery.

The aim of this study was to examine the characteristics of greenery in detail which residents feel familiar with and to examine the relationships among the degree of cognition, frequency of use and distance from greenery, using three different types of greenery. Furthermore, the authors examined the structure of images of these three different kinds of greenery.

2. Method

The survey was carried out in October 1988 in six residential areas in Sapporo, which were chosen to include different distances from a part of Sousei River (Sousei River), a forest reserve for a windbreak at Shinkotoni (Tonden Windbreak) and Tondennishi Park, using a questionnaire survey (Table 1). Each study area covered an area of about 200m×200m.

Table 1 Distance from each greenery to each area and sample size

Survey area	Type of greenery			
	Sousei River	Tonden Windbreak	Tondenishi Park	Sample size
Area 1	250m	250m	1400m	88
Area 2	500	500	1200	81
Area 3	1000	1000	1000	75
Area 4	1800	250	250	82
Area 5	1900	500	500	73
Area 6	2100	1000	1000	80

In this survey, residents were asked to rate their degree of cognition and frequency of use for the three different types of greenery on the following scales: (1)degree of cognition, classified into four categories- a) extremely well known, b) known by name and some characteristics, c) known only by name, d) not known; (2)frequency of use, classified into five categories- a) almost every day, b) once or twice a week, c) once or twice a month, d) once or twice a year, e) no use at all. They were also asked to recall names of greenery with which they feel familiar using open-ended questions, and their perception of the three types of greenery using the semantic differentiation.

Briefly, the characteristics of the three types of greenery are as follows: Sousei River, a man made canal, is 12km long and about 16m in width, and its nearest part to the survey areas have poplar trees and lawns along the river banks; Tonden Windbreak, which was planted in the year 1857 for the purpose of protection of the agriculture lands from wind damage, is an artificial forest with a length of 2.5km, about 50m in width and almost all trees are about 10−15m in height; Tondennishi Park (9.9ha) was designated in March 1977 as a sports park with a baseball field, tennis court, pool and stadium. Tonden Windbreak and Sousei River are expected to play the role of the urban greenery rather than their respective original roles, it is revealed that how to maintain these greenery is an important problem.

3. Results

1) Cognition of familiar greenery

(1) Types of familiar greenery and distance to recalled familiar greenery

For each area, up to five names of greenery comprised 72−86% of familiar greenery, as shown in Table 2. This greenery was full of variety, including forest, parks, private gardens, street trees and so on. The authors can point out that different parks, private gardens and large scale greenery, such as Tondennishi Park, Shinkotoni Green Park and Tonden Windbreak, were ranked highly in every area. In certain cases, such as Area 3, the street trees (along Mizuho street) were ranked highly. The authors assumed that familiar greenery differed among respondents according to the distance from each area to each greenery, size of greenery and attributes of respondent.

Therefore, to examine the influence of distance, at first the authors showed the cumulated percentage according to distance of each greenery for which the authors know clearly the locations. In this case, distance was defined as the shortest straight distance when measured on a map from the center of each area to each greenery. However, the authors assumed that distance of private gardens from a respondent's house was located within 10m, and that gardens of others were located within 100m.

As shown in Figure 1, the distances to greenery recalled was distributed widely, from within 10m to over 2000m, and its scale varied from private gardens and children's parks to comprehensive parks and mountains. Even though the types and scales for the familiar greenery varied, about 60 percent were located within 300m, about 80 percent within 500m and only about 20 percent were over 500m. The main types of greenery which were located in each distance zone were as follows: a) within 50m distance zone-children's parks and street trees; b) from 51m to 250m distance zone-children's parks; c) from 251m to 500m distance zone-Tonden Windbreak and Tondennishi Park; d) from 501m to 1000m distance zone-Tonden Windbreak, Tondennishi Park and Shinkotoni Green Park (neighborhood park); e) from 1001m to 1400m zone-Tondennishi Park. As shown in Figure 2, even though the cumulated percentage of the greenery over distance was different for each area, the percentage consistently reached about 100% within about 1400m. These results suggest that greenery recalled as being familiar is influenced by the distance and scale of the greenery, and they seem to be located within 1400m.

Table 3 shows the results of the seven classifications of the familiar greenery in each

Table 2 Up to five familiar greenery sites which were recalled in each area

Area 1.	%	Area 2.	%	Area 3.	%	Area 4.	%	Area 5.	%	Area 6.	%	Over all	%
Tonden Windbreak	39.4	Tonden Windbreak	33.9	Tonden Windbreak	23.5	Tondennishi Park	42.0	Tondennishi Park	30.1	Shinkotoni Green Park	27.5	Tonden Windbreak	27.5
Sukoyaka Park	11.2	Tondennishi Park	16.4	Tondennishi Park	22.9	Tonden Windbreak	30.4	Tonden Windbreak	24.4	Tondennishi Park	22.0	Tondennishi Park	23.1
Tondennishi Park	8.8	Garden of others	12.7	Mizuho Street	19.0	Garden of others	5.1	Garden of others	11.5	Garden of others	11.9	Garden of others	9.0
Sousei River	7.1	Tondenchuou Park	9.1	Tonden Lilac Park	3.5	Own Garden	2.2	Megumi Park	7.1	Tonden Windbreak	5.5	Shinkotoni Green Park	4.5
Garden of others	7.1	Sousei River	7.9	Garden of others	6.5	Garden of hospital	2.2	Own Garden	4.5	Own Garden	4.6	Own garden	4.3
						Shinkotoni Green Park	2.2						
						Hamanasu Park	2.2						
N	167		165		153		138		156		109		891

Note: Number of recalled greenery is more than the survery sample size because of multiple replies.

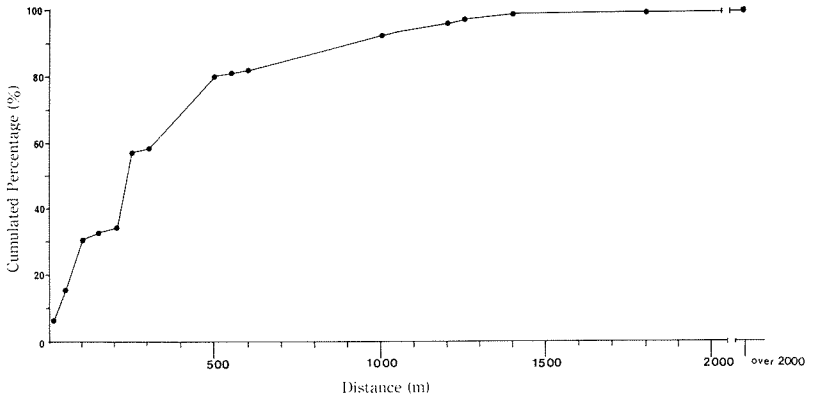


Fig. 1 Cumulated percentage of the greenery recalled as being familiar according to distace.

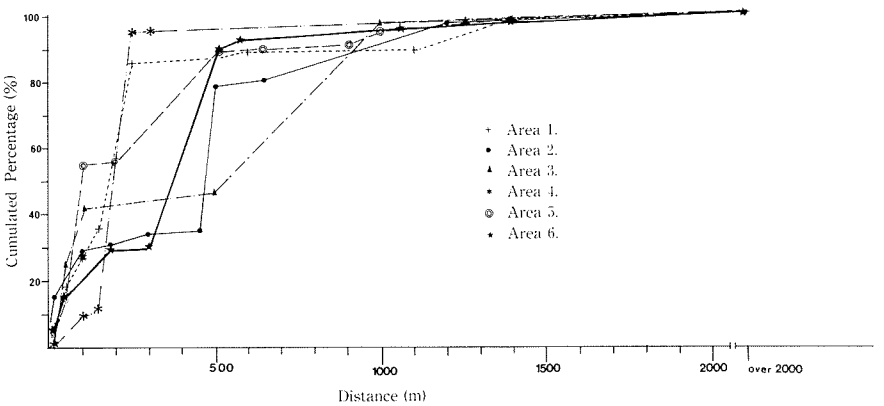


Fig. 2 Differences of cumulated percentage of the greenery recalled as being familiar by the areas.

area as well as for all areas. Although there were some differences between the areas, up to three types were parks, natural greenery and greenery in garden. Park and natural greenery occupied 73% of all greenery. Are there any differences in the types of recalled greenery as being familiar greenery based on respondents' backgrounds, Table 4 shows a few significant differences in not only the survey area but also age, length of residence. If the authors examined the significant variables in detail, people in the 30−40 year age group were more likely to recall parks, and people over fifty years old or long-term residents were more likely to recall private gardens. In addition, the relationship between the degree of cognition of quantity of greenery around the respondents' house and whether the respondents recalled the greenery as being familiar is shown in Table 5. In general, more respondents who recalled each greenery as being familiar recognized the quantity of that greenery than those who did not. The tendency was stronger in the case of "natural greenery" than for the others.

Table 3 Classifications of the types of greenery which were recalled as familiar greenery

Classifications	Area 1.	Area 2.	Area 3.	Area 4.	Area 5.	Area 6.	Over all
Parks	31.2%	27.3%	31.4%	47.1%	50.0%	61.5%	40.0%
Gardens[1)]	13.5	18.8	7.8	7.2	16.0	16.5	13.4
Greenery in some facilities[2)]	0.0	0.0	1.3	2.2	2.6	6.4	1.8
Natural greenery[3)]	48.2	40.6	28.8	34.8	27.6	9.2	33.0
Street trees	4.7	11.5	24.8	2.2	1.9	1.8	8.2
Vacant land under development and farms	0.6	0.6	3.3	1.4	1.9	2.8	1.7
Others	1.8	1.2	2.6	5.1	0.0	1.8	2.0
N	170	165	153	138	156	109	891

Note: Number of recalled greenery is more than the survey sample size because of multiple replies.
1) Garden of their own house or gardens of others.
2) School, hospital, company etc.
3) Including Tonden Windbreak, and forest and other vegetation along the Sousei River banks.

Table 4 Relations between the types of familiar greenery and respondents' background factors (x^2 test)

Types of familiar greenery	Variables			
	Sex	Age	Length of residence	Survey area
Parks	−0.053	0.129*	0.008	0.240**
Gardens[1)]	−0.044	0.179**	0.115*	0.167*
Natural greenery[2)]	0.060	0.060	0.070	0.437**
Strees	−0.003	0.024	0.025	0.430**

Note: *;$p<0.05$, **;$p<0.01$, numerals show Crame's V.
Greenery in some facilities and vacant land under development and farms are excluded because the recalled percentage for familiar greendry was very low.
1) Own garden or gardens of others.
2) Including Tonden Windbreak, forest and other vegetation along the Sousei River banks.

Table 5 Relations between the types of perception as being familiar greenery and degrees of cognition of quantity for each type of greenery (x^2 test)

Whether perceived as being familiar greendry or not	Degree of cognition of quantity	Cramer's V
Parks	Parks	0.169**
Gardens[1)]	Gardens	0.162**
Natural greenery[2)]	Natural greenery	0.265**
Street trees	Street trees	0.166**

Note: 1) Own garden or gardens of others.
2) Including Tonden Windbreak, forest and vegetation along the Sousei River banks.

(2) The scale and distance to recalled parks

The parks which were recalled as familiar greenery ranked highly in each area, and included various scales. The authors presume that the difference in scale influences the recalled parks as being familiar greenery. Therefore, these relationships were analyzed. Parks were classified into two classes: small-scale parks (mainly children's parks), and large-scale parks (equal to or larger than neighborhood parks). Figure 3 shows the cumulated percentage of the parks according to distance. Although small-scale parks were recalled as far away as 600m, about 50 percent were within 50m and about 80 percent within 150m. The small-scale parks at a distance of 450−600m were mainly over 2000sq. m in size. Therefore, it is assumed that the influence of distance for small-scale parks was relatively strong within 150m. On the other hand, the influence of distance from large -scale parks reached as far away as 3000m, with 50 percent falling within 500m, 80 percent within 1000m and about 100 percent within 1400m. Thus, it is clear that there is a close relationship between the distance and scales of recalled parks.

2) The degree of cognition and frequency of use of the different types of greenery

Even though the scale and distance affected the recalled greenery, other variables, such as connection to the greenery and the types of greenery, may also affect recall. To examine the difference between the percentage recalled as being familiar greenery and the distance zone, degree of cognition and frequency of use, Sousei River, Tonden Windbreak and Tondennishi Park were selected. The Sousei River was excluded in a few analyses because the recalled percentage for familiar greenery was very low.

Table 6 shows the results of the correlations between background factors of Tondennishi Park, Tonden Windbreak and whether the respondents recalled the greenery as familiar or not using x^2 test, and shows that the three factors (distance, degree of use and cognition) were related significantly. Figure 4 shows the percentages of the two kinds of greenery in each distance zone. The percentage of Tondennishi Park was higher in any distance zone than that of Tonden Windbreak, and the variation of percentage of the two

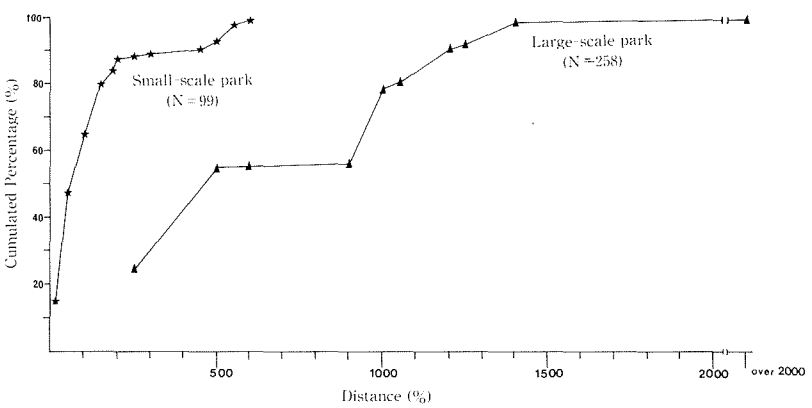


Fig. 3 Differences of cumulated percentage of the greenery recalled as being familiar by park scale.

Table 6 Relations between background factors of Tondnnishi Park, Tonden Windbreak and whether the respondents recalled the greenery as familiar or not (x^2 test)

Variables	Tondennishi Park	Tonden Windbreak
Degree of cognition	0.259**	0.205**
Frequency of use	0.261**	0.228**
Distance	0.375**	0.315**

Note: *;p<.05, **;p<.01, numerals show Cramer's V.
Sousei river is excluded because the recalled percentage for familiar greenery was very low.

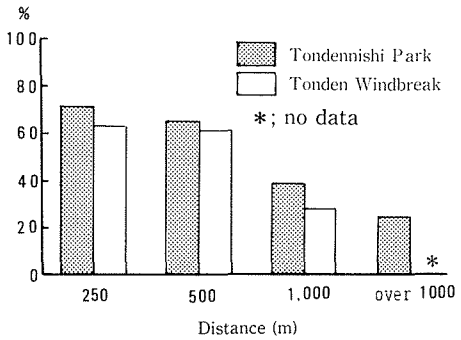
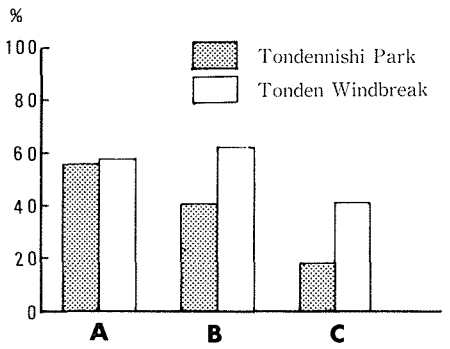


Fig. 4 Percentages of Tonden Windbreak and Tondennishi Park recalled as being familiar greenery by distance zone.



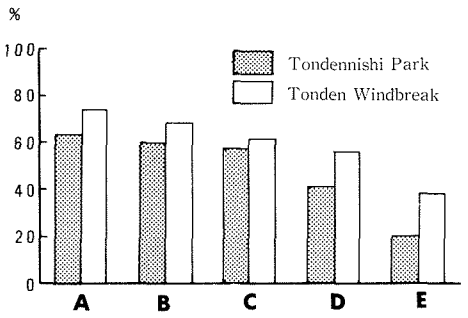
A ; extremely well known
B ; known by name and some characteristics
C ; known only by name

Fig. 5 Pecentages of Tonden Windbreak and Tondennishi Park recalled as being familiar greenery by begree of cognition.

types of greenery is reduced in accordance with distance and drastically reduced in the 1000m zone. The recalled percentages of the two types of greenery by degree of cognition are shown in Figure 5. While the degree of recall for Tondennishi Park clearly increased according to degree of cognition, that of Tonden Windbreak was not so clear. Furthermore, Figure 6 shows the difference of recalled percentage according to frequency of use of the two types of greenery. Although the two types of greenery had the higher degree of recall by the more frequent users, Tonden Windbreak was not so clear. These results correspond to Cramer's V in Table 6.

The authors also examined the degree of cognition and frequency of use of the three types of greenery. As shown in Figure 7, almost all people knew the name of the greenery, and many people knew Tondennishi Park well. As for frequency of use of the greenery, Tondennishi Park was most frequently used, and Sousei River was least frequently used compared to other greenery. In addition, the authors examined the effects of distance from the greenery, sex, age, length of residence on degree of cognition and frequency of use

of the three types of greenery using x^2 test. As shown in Table 7, distance, sex, and length of residence are relatively significant for degree of cognition and frequency of use. Furthermore, using the Quantification Theory II, the authors examined the effect of the background factors on these variables of each greenery. Table 8 shows their partial correlations. The correlations show that the cognition of Sousei River was more influenced by sex and length of residence, Tonden Windbreak was more influenced by length of residence, and Tondennishi Park was more influenced by age and distance. In detail, men and long-term residents recognized the Sousei River, and residents of under 9 years did not recognize the Tonden Windbreak well. Men, the 30−40 age group and long-term residents recognized Tondennishi Park better. For level of use, distance and sex were more influential variables in the three greenery types, especially sex in Sousei River and distance in Tonden Windbreak. In detail, with Sousei River and Tonden Windbreak, the frequency of use decreased with increasing distance, and men used it more frequently. As for Tondennishi Park, men, the 30−40 age group and residents who live nearest to it used it more frequently.



A ; almost everyday
B ; once or twice a week
C ; once or twice a month
D ; once or twice a year
E ; no use at all

Fig. 6 Precentages of Tonden winbreak and Tondennishi Park recalled as being familiar greenery by the frequency of use.

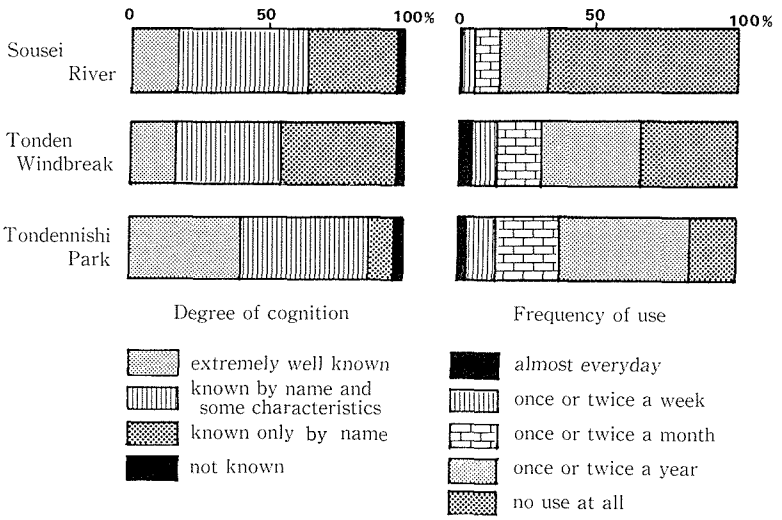


Fig. 7 Degree of cognition and frequency of use of the three types of greenery.

Table 7 Correlations between degrees of cognition, frequency of use for each greenery and background factors (x^2 test)

Variables	Sousei River		Tonden Windbreak		Tondennishi Park	
	1)	2)	1)	2)	1)	2)
Distance	0.167**	0.179**	0.109*	0.217**	0.174**	0.211**
Age	0.093	0.065	0.099	0.081	0.119*	0.106*
Sex	0.272**	0.292**	0.089	0.161**	0.099	0.190**
Residence length	0.158**	0.063	0.162**	0.120*	0.116*	0.099

Note: *;p<.05, **;<.01, numerals show Cramer's V
1) Degree of cognition, 2) Frequency of use

Table 8 Partial correlations of background factors based on the Quantification Theory II analysis by degree of cognition and frequency of use for each greenery

	Sousei River		Tonden Windbreak		Tondennishi Park	
Variables	1)	2)	1)	2)	1)	2)
Distance	0.106	0.238	0.112	0.295	0.210	0.263
Age	0.054	0.059	0.062	0.017	0.225	0.163
Sex	0.258	0.298	0.061	0.155	0.143	0.239
Residence length	0.196	0.061	0.202	0.131	0.195	0.105
η^2	0.119	0.139	0.070	0.125	0.119	0.134
N	445	446	426	436	446	440

Note: 1) Degree of cognition, 2) Frequency of use

3) The assessment structure and perception of three different types of greenery

(1) The perception of each greenery by the free association method

To examine the perception of three different types of greenery, at first, a free association method was applied. As shown in Table 9, up to ten word categories comprised about 70−90 percent of all association words. The main association words which made up the three were as follows: a)Sousei River-"duck, bird, fish", "dirty, dirty-river" and "fishing, fisherman"; b)Tonden Windbreak- "green, tree", "insects, birds" and "windbreak, snowbreak, etc."; c)Tondennishi Park- "exercise or sports", "playing field" and "child, children".

Although the differences in the areas which include the influence of distance from greenery were not clear, these words differed by degree of cognition and frequency of use of each greenery. For instance, the respondents who more frequently used Sousei River tended to associate it with "green, tree", and those who recognized it as better, frequently associated it with "river". The respondents who had little recognition more frequently associated it with "fishing, fisherman". With Tonden Windbreak, the respondents who had a high recognition frequently associated it with "Sapporo", and those who used it more frequently associated it more with "insects, birds". With Tondennishi Park, the respondents who had a high recognition and more frequently used the park, associated it with "child, children".

Table 9 Association words for each type of greenery

Sousei River	%	Tonden Windbreak	%	Tondennishi Park	%
Duck, Bird, Fish	14.4	Green, Trees	23.7	Exercise or Sports[1)]	22.4
Dirty, Dirty-River	12.8	Insect, Bird	17.9	Playing field	14.2
Fishing, Fisherman	12.1	Windbreak,		Child, Children	14.2
Green, Trees	9.1	Snowbreak, etc.	8.3	Wide, Large	9.1
Water	6.1	Stroll	7.1	Green, Trees	7.6
Ishikari street	3.2	Danger	5.8	Play, Play ground	6.2
River	2.7	Nature	4.3	Pool	6.1
Flood, Flood damage	2.6	Dirty	3.0	Stroll	5.5
Sapporo	2.0	Fresh	2.4	Relaxation	3.7
Playing in water	1.8	Basking in the forest	1.7	Play facilities[2)]	1.9
		Play ground	1.2		

Note: 1) Includes various kinds of sports or exercises, such as baseball, basketball, jogging,etc.
2) Includes various kinds of play facilities, such as seesaw, slide, etc.

(2) The assessment structure of perception of the three different types of greenery by the semantic differentiation

The authors examined the structure of assessments of the three different kinds of greenery using twenty scales as shown in Table 10. In this case, respondents were asked to rate their feelings on each scale from left to right : extreme, moderate, neutral, moderate and extreme with values of five points to one point, respectively.

Figure 8 shows the profiles of the three types of greenery. It is easy to understand the differences between them. Tondennishi Park had generally the best images and tended more towards "wide", "harmonious", "used", "active", for example, than for the other types of greenery. The perception of Tonden Windbreak, as "reminds one of Hokkaido", "quiet", "pastoral", "natural", and "birds seem to live in" and "near" was higher than the other type of greenery. For Sousei River, only the perception of "long history" was highest than the other types of greenery.

Table 10 shows two levels of significance which were drawn up by the analysis of one -way variance with respect to distance, degree of cognition and frequency of use, sex, age and length of residence. When the authors examined significant differences ($p<.05$), Tonden Windbreak and Tondennishi Park were more influenced in many scales by the degree of cognition, and frequency of use than by respondents' attributes (age, length of residence and sex) and distance. But Sousei River was more influenced by age and distance.

Figure 8 shows the different profiles by the variable which showed the greatest number of significant differences using mean scores. The perception of Sousei River was most influenced by age. The higher age classes, especially the equal or over fifty year age group, perceived Sousei river better in all scales except one. The differences were great in "beautiful", "friendly", "like to live near", "safe" etc. The perception of Tonden Windbreak was most influenced by frequency of use, and was perceived better with growing frequency of use. That is to say, frequent-user groups had a better perception of "used", like to live near", "friendly" etc. As with Tonden Windbreak the perception of Tonden-

nishi Park had many scales which were rated better by frequent-user groups and groups who perceived the park well. But some differences were found. For example, there were significant differences by frequency of use in the ratings of "well maintained", "trees seem to fall down", "unique" etc. which were not significant for the Windwbreak.

In order to examine the systematic differences in response among the three types of greenery, a correlation matrix (20×20) was factor analyzed by the principle axis method and the factors with eigenvalue greater than or equal to 1.0 were extracted. The factors were rotated to a simple structure using varimax rotation.

Table 11 shows the high factor loadings in factors of each greenery. Sousei River and Tonden Windbreak results show the existence of five factors, while Tondennishi Park has four factors. Each factor was labeled based on factor loadings in each greenery.

Table 10 Results of one-way variance in each greenery

Scale			Sousei River						Tonden Windbreak						Tondennishi Park					
			a)	b)	c)	d)	e)	f)	a)	b)	c)	d)	e)	f)	a)	b)	c)	d)	e)	f)
1.	Wide	-Narrow	*	-	*	**	-	-	-	-	*	*	-	**	**	*	-	-	-	**
2.	Harmonious	-Disordant	-	-	-	-	-	-	**	*	-	-	-	**	*	**	-	-	-	-
3.	Used	-Unused	-	**	*	-	*	-	*	**	-	-	**	-	**	**	-	-	**	-
4.	Active	-Static	-	-	-	-	-	-	-	*	-	-	-	-	**	**	-	-	*	-
5.	Remind one of Hokkaido	-Do not remind one of Hokkaido	-	**	**	-	*	**	**	*	-	-	-	-	-	-	-	-	**	-
6.	Like to live near	-Do not like to live near	-	**	**	**	**	-	**	**	-	**	*	-	**	**	-	-	-	-
7.	Well maintained	-Unmaintained	-	-	-	-	*	-	-	-	-	-	-	-	**	**	-	-	-	-
8.	Beautiful	-Ugly	-	*	-	-	**	-	**	**	-	-	-	-	**	*	-	-	-	-
9.	Friendly	-Unfriendly	**	**	**	*	**	-	**	**	*	-	*	-	**	**	-	-	-	-
10.	Safe	-Danger	-	-	-	*	**	-	-	**	-	**	**	-	**	-	-	**	-	-
11.	Urban	-Pastoral	-	-	*	-	-	-	-	*	-	-	-	-	-	-	-	*	**	-
12.	Quiet	-Noisy	-	-	-	*	*	-	-	**	-	-	-	-	-	-	-	-	*	*
13.	Long history	-Short history	**	**	-	-	**	**	**	**	-	-	-	-	-	-	-	-	-	*
14.	Natural	-Man-made	-	-	*	**	-	-	-	-	-	**	-	-	-	-	**	**	-	-
15[1].	(Fishes) seem to live	-Do not seem to live	**	**	**	-	**	*	X	X	X	X	X	X	X	X	X	X	X	X
15[2].	(Birds) seem to live	-Do not seem to live	X	X	X	X	X	X	**	**	-	-	-	-	-	-	**	**	-	-
16.	Clean	-Dirty	-	-	-	-	**	-	-	**	-	-	**	-	*	*	-	-	-	-
17.	Diverse	-Uniform	-	-	*	-	-	-	-	-	-	*	-	-	-	*	-	-	-	-
18[1].	(River) do not seem to flood	-Seem to flood	-	-	**	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X
18[2].	(Trees) seem to fall down	-Do not seem	X	X	X	X	X	X	-	-	-	-	-	-	-	**	**	*	-	-
19.	Unique	-Common	-	-	-	-	**	-	-	-	-	-	-	-	-	**	-	-	-	-
20.	Near	-Disatnt	**	**	**	-	-	**	**	**	**	-	-	-	**	**	**	-	-	-

Note: **;p<.01, *;<.05, -;not significant, X;no data

1) limitied Sousei River, 2) limitied Tonden Windbreak and Tondennishi Park

a) Degrees of cognition; known, by name and characteristcs, known only by name and not known

b) Degrees oa frequency of use; at least once or twice a month, once or twice a year, no used at all

c) Distance; Sousei River, Tondennishi Park were classfied 250m, 500m, 1000m, over 1000m
Tonden Windbreak was classaied 250m, 500m, 1000m

d) Sex

e) Age; under 30 years old, 30-50 years old,over 50 years old

f) Risidence length; over or equal 20 years, 19~10 years, 9~2 years, under 2 years

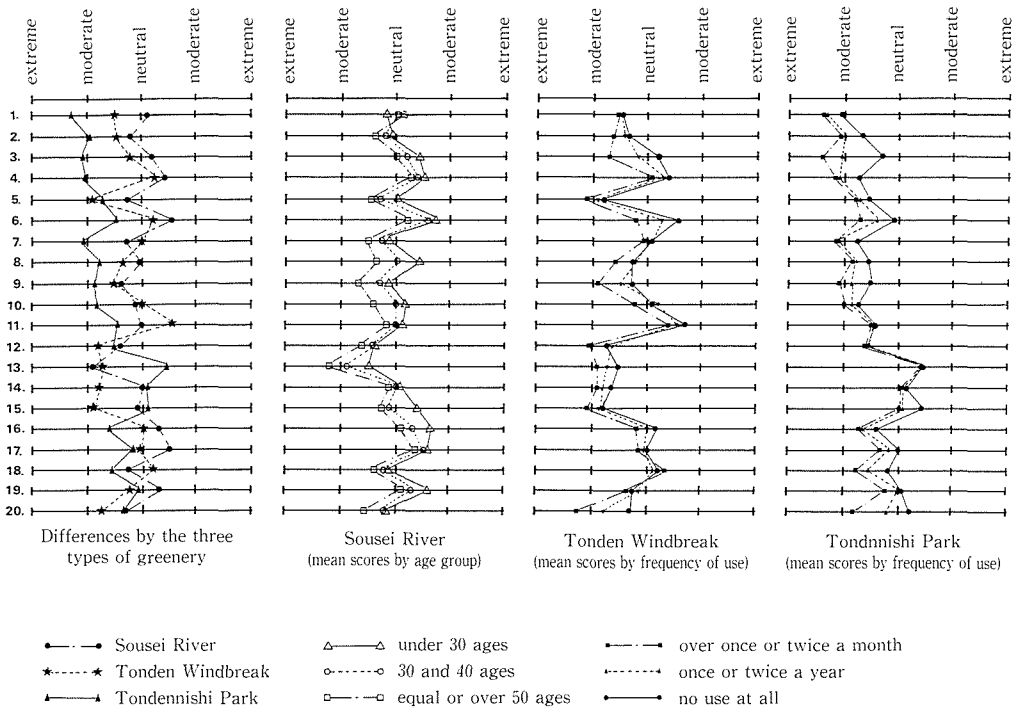


Fig. 8 Profiles of mean scores of the three types of greenery.

The variance in Sousei River factors accounted for 56 percent of the total variance. The first factor, which is labeled "openness" included "wide", "reminds one of Hokkaido", "active", etc. The second factor, labeled "cleanliness", had high factor loadings such as "clean", "beautiful", and "like to live near" were included in this factor. The third factor is labeled "use" included "urban-pastoral", "well maintained" and "used". The fourth factor, labeled "quietness", had high loadings such as "quiet", "near" and "long history". The fifth factor is labeled "safety" and included variables with high loadings, such as "river do not seem to flood" and "safe". When the authors compared these factors with associated words, "cleanliness" related to the image of "dirty, dirty-river", "use" related to image of "fishing, fisherman" and "playing in water", and "safety" related to "flood, flood damage".

The variance in Tonden Windbreak factor accounted for 57 percent of the total variance. The first factor is labeled "pleasantness and safety" had high factor loadings, such as "well maintained", "clean", "beautiful", "safe", etc. It is surmised that this factor may form the base evaluation of Tonden Windbreak. The second factor labeled, "naturalness" included "quiet", "long history", "natural", etc. The third factor, labeled "activeness", had high factor loadings, such as "wide", and "active". The fourth factor included "trees seem to fall down" and the fifth factor included "near". When the authors compared these factors with associated words, "pleasantness and safe" related to "fresh", "dangerous", "windbreak, snowbreak" etc. "naturalness" related to "green, tree", "natu-

Table 11 Factor loadings with varimax rotation (over. 50)

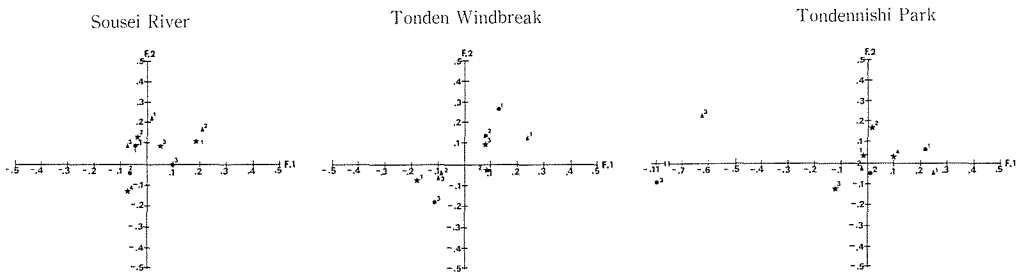
	Sousei River		Tonden Windbreak		Tondennishi Park	
	Scale[1]		Scale[1]		Scale[1]	
Factor 1.	1. Wide	.73	7. Well maintained	.78	4. Active	.80
	5. Like Hokkaido	.71	16. Clean	.76	3. Used	.75
	4. Active	.63	8. Beautiful	.75	7. Well maintained	.72
	17. Diverse	.57	10. Safe	.70	9. Friendly	.71
	14. Natural	.54	9. Friendly	.65	2. Harmonious	.67
	2. Harmonious	.53	6. Like to live near	.60	1. Wide	.61
			2. Harmonious	.52	8. Beautiful	.61
			3. Used	.52	10. Safe	.51
Variance (%)		14.0		20.9		21.6
Factor 2.	16. Clean	.79	12. Quiet	.69	11. Urban	.70
	8. Beautiful	.66	13. Long history	.65	12. Quiet	.68
	6. Like to live near	.61	14. Natural	.60	16. Clean	.63
	15. (Fishes) seem to live	.53	15. (Birds) seem to live	.59	10. Safe	.55
					8. Beautiful	.55
Variance (%)		13.7		13.0		13.9
Factor 3.	11. Urban	.69	1. Wide	.75	14. Natural	.79
	7. Well maintained	.62	4. Active	.69	13. Long history	.75
	3. Used	.59			17. Diverse	.62
					19. Unique	.61
Variance (%)		10.5		9.6		13.2
Factor 4.	12. Quiet	.67	18. (Trees) seem to fall down	.72	20. Near	.76
	20. Near	.62			15. (Birds) seem to live	.66
	13. Long history	.57	11. Urban	.59		
Variance (%)		9.7		7.0		7.8
Factor 5.	18. (River) do not seem to flood	.77	20. Near	.64		
	10. Safe	.57				
Variance (%)		7.7		6.7		
Comulated variance		55.6		57.2		56.5

Note: 1) see Table 10.

ral", "insect, bird", and "activeness" related to "stroll" and "play, playing field".

The variance in Tondennishi Park factors accounted for 57 percent of the total variance. The first factor, labeled "activeness" included "active", "used", "well maintained", "friendly", etc. It is assumed that this factor is the base evaluation for Tondennishi Park. The second factor, labeled "moderness", included "urban", "quiet", "clean" etc. The third factor, labeled "naturalness", included "natural", "long history" etc. The fourth factor included "near". When the authors compared these factors with associated words "activeness" related to the image of "exercise or sports", "playing field", "play, play ground" and "naturalness" related to "green, tree", etc.

Figure 9 shows the relations between the mean scores of Factor 1 and Factor 2 by degree of cognition, frequency of use and the distance in each greenery. For Tonden Windbreak, when the frequency of use was higher, the perception of "pleasantness and safety" (Factor 1) feels relatively strong, and when the degree of cognition was higher, the



● ; Degree of cognition :
1. extremely well known
2. known by name and some characteristics
3. known only by name and unknown

▲ ; Frequency of use :
1. at least once or twice a month
2. once or twice a year
3. no use at all

★ ; Distance : 1. 250m, 2. 500m, 3. 1000m, 4. over 1008

Fig. 9 Scattergrams of mean factor scores for the three types of greenery by degree of cognition, frequency of use and distance.

perception of "naturalness" (Factor 2) feels relatively strong. For Tondennishi Park, when degree of cognition and frequency of use was higher, the perception of "activeness" (Factor 1) feels strong. But, with regard to Sousei River it was not so clear.

4. Discussion

In recent years, some studies have shown that assessment of greenery in residential areas is important both in quantity and quality. As one method to determine the quality of greenery, characteristics of greenery that are recognized as familiar were analyzed.

In general, it is well reported that although greenery recognized as familiar were full of variety, private gardens are recognized well, as shown in this study. Furthermore, Tabata et al. (1983) found that the percentage of recognition of private gardens was higher in old residential areas. Their results seem similar to the results of the present study in which private gardens were defined as familiar greenery more by the long-term residents and older age group than by others. On the other hand, when the respondents recalled public greenery as being familiar, such as parks and Tonden Windbreak, the attributes of respondents, degree of cognition, frequency of use and distance from greenery were strongly related to these types of greenery. A few studies showed that trees and wood surrounding temples and shrines were highly recognized as familiar greenery (e.g. Takahashi and Noda, 1975; Tabata et al., 1983), and a few studies showed that parks were highly recognized as familiar (Araki, 1974; Ide et al., 1985). In the present study, parks were highly recognized as being familiar greenery, while trees and woods surrounding temples and shrines were poorly recognized. The authors think the differences between these

types of greenery are mainly due to the differences in history and social tradition, that is to say, Sapporo is a new city. Furthermore, some studies have shown that familiar greenery which are strongly recognized are commonly characterized as landmarks by having tall trees (symbolic trees) in the surroundings (Takahashi and Noda, 1975; Maruta et al., 1986). Our study in Tonden Windbreak showed similar results. On the other hand, Sousei River, which has tall trees along the river banks, was not recalled as strongly as Tonden Windbreak. This is due perhaps to the difference in kinds of greenery and whether or not the greenery is easily accessible etc.

With the degree of cognition of familiar greenery, studies have shown that the amount of greenery does not always influence the degree of cognition of familiar greenery. It is influenced by the type of greenery where urbanized greenery, such as street trees and parks, are recognized more easily than semi-natural greenery, such as farm land, etc. (Araki, 1974; Asakawa, 1976; Nemoto and Ide, 1983). The present study is relevant to these results, because in Area 3, where there is a large amount of farm land, the cognition was low for familiar greenery. Degree of cognition of greenery may differ with regards to a resident's daily life and how the greenery is maintained.

With distance of familiar greenery, one study showed that mean distance from residential area was within 300−500m, which increases with public accessibility to it (Takahashi and Noda, 1975). Another study showed that the mean distance of the greenery was about 500m (Ide et al., 1985). This study clearly shows that the distance for recalling greenery as familiar was limited to within about 1400m, i.e. small-scale parks (under 0.5ha) were recalled up to about 600m, and large-scale parks (about 10ha) were recalled up to about 1400m. But the influence of distance for the small and the large parks was strong within 150m and 1000m respectively. With the usage of the familiar greenery in this study, all types of greenery except private gardens were open to everybody.

Using many mean scores of perception of the three types of greenery, the authors can show the differences between them by image profiles and also show the differences between their factor structures. In general, it is easy to say that Tondennishi Park has the best images compared to others, with the next best being Tonden Windbreak. Also, the same order of ratings in the scale "like to live near" means evaluation of residents. In the structure of factors among each type of greenery, the perception of "activeness" of Tondennishi Park especially scored better than the other types of greenery, while the perception of "naturalness" of Tonden Windbreak and the ratings of "long history" of Sousei River was better than the other types. These results show the characteristics of the three types of greenery.

Furthermore, the authors think that the percentage of recalled greenery as familiar seems to be related to the perception of "friendly". The mean scores of this perception for each greenery showed that Tondennishi Park was higher than for the other greenery, and those of Tonden Windbreak and Sousei River were low. Thus, it is surmised that Tonden Windbreak, where the percentage of recall as familiar was high, is perceived as familiar but not the extent of being perceived as friendly because of relatively low usage.

Studies have shown that the perception of "pleasantness" is important for use of recreation in forest, and perspective and safety are related to assessment of forest land-

scape (Fujimoto, 1978; Kajigaeshi, 1987). Furthermore, preferred conditions in the forest and trees as attraction", "safety" and "clean". These factors are similar to the first factor of Tonden Windbreak, "pleasantness and safety". This factor is suggested as a fundamental because it included "friendly" and "like to live near", but the mean score of the perception of "safe" and "well maintained" in the Tonden Windbreak were lower than for other greenery because many respondents imagined "danger", "dirty" and "dust". These images probably reduced the value for residents. Although the people perceived "naturalness", it seems that the factor does not relate to the total value of the greenery. It is interesting that user groups had relatively high factor scores in "pleasantness and safety" and well known groups had relatively high factor scores in "naturalness". If it is possible to increase the usage level without losing the natural characteristics, the greenery will have a higher total value.

The perception of "friendly" of Tondennishi Park closely correlates to the factor of "activeness", such as the perception of "well-maintained", "harmonious" and "active". The mean scores of this factor were high in the frequently-used groups and well known groups. This result indicates that Tondennishi Park is highly perceived as a space for active use. Hayward and Weitzer(1984) reported that the public image of urban parks by local residents was favorable, describing it as valuable, convenient and pleasant. This positive orientation was strong among regular users of the park, but it was also true for ' non-users'. These results are similar to the results of the present study. Even though people have a favorable image of the park, the ratings of "like to live near" was not as high. Thus, there is also considerable evidence concerning negative factors and inhibitions toward park use: for example, noise of users and dust pollution, concerns about safety and security when using the park, potential for conflict between different types of people and styles of recreation.

The perceptions of Sousei River were not as good. The scale of "like to live near" related to the second factor "cleanliness", but ratings of many scales which contained in this factor were low, and not only "used", but also the scales which included in "naturalness", were low. The authors think that, because the Sousei River is located along the main street (Ishikari Street) which is crowded with cars, the accessibility by foot is not good and this influenced the frequency of use. Furthermore, studies have shown that the image of rivers is related to their scale (width of canal), and a "clean water" image is necessary for small rivers (e.g. Suzuki, 1983). The perception of "friendly" of Sousei river related to the perception of "beautiful" and "clean", but the mean scores of these perception were lower than for the other two types of greenery. It is surmised that these variables reduced the frequency of use, and the image of friendly. Consequently, clean water, easy accessibility and the easy use condition of the river banks are important variables for promoting frequency of use and making the river familiar.

Based on the three types of greenery, it is suggested that beauty, use, safety and clean are important factors in green spaces even though the types are different. The three types of greenery are typical examples, that is to say, Tondennishi Park is a relatively large park, Tonden Windbreak is a forest which should be conserved and Sousei River is a canal which should be renewed as a water front. Thus the results shown in this paper will

provide useful materials for conserving and planning similar types of greenery.

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