HOKKAIDO UNIVERSITY

Title	Study on the Living Style and House Planning in the Snowy Region of Japan : in case of Sapporo, Nagaoka, Kanazawa
Author(s)	Noguchi, Takahiro; Adachi, Fujio; Majima, Jiro
Citation	北海道大學工學部研究報告, 145, 203-216
Issue Date	1988-12-27
Doc URL	https://hdl.handle.net/2115/42167
Type	departmental bulletin paper
File Information	145_203-216.pdf

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

北海道大学工学部研究報告
第145号（昭和63年）

Bulletin of the Faculty of Engineering,
Hokkaido University, No. 145 (1988)

Study on the Living Style and House Planning in the Snowy Region of Japan —— in case of Sapporo, Nagaoka, Kanazawa

Takahiro NOGUCHI, Fujio ADACHI and Jiro MAJIMA

(Received September 10. 1988)

Abstract

House planning should agree with the natural characteristics and various living conditions peculiar to the region. The living style and house plan in Hokkaido and Hokuriku district, both are located in the northern part of Japan and have a heavy snow, are greatly different from those in other warm- mild regions such as seen in Tokyo and Osaka. At the same time, we can also find some difference between Hokkaido and Hokuriku district. The purpose of this paper is to clarify the keypoints of living style and housing form in the snowy regions through comparative surveys among 3 cities ; Sapporo, Nagaoka and Kanazawa.

The main distinctive features about daily life in the households are as follows ;

1. People stay indoors almost all day long in winter. Therefore the time spent in the house is much longer than that in warm-mild regions.
2. Almost all domestic activities such as playing of children, working in the kitchen, cleaning and washing clothes and so on, are brought into the house in winter. The main space where most of these activities are carried out is the living space in Sapporo, and non-living space in Nagaoka and Kanazawa.
3. Family members frequently gather together in the living room. Accordingly the living rooms play a very significant role as many-sided living spaces especially in Sapporo.
4. Typical plan types suitable for the living style peculiar to each of the regions can be found.

It is an urgent and necessary problem to establish the original house planning system suitable for snowy regions.

1. Introduction

1. 1 Climate and housing—purposes of this study

Japanese traditional houses have distinctive characteristics in form, lay-out and structure. Most of them are made of wood. The outer wall is very thin and many houses have large openings called "engawa". "Engawa" is a characteristic space indispensable for the life in warm-mild regions such as Tokyo and Osaka. It is an indoor veranda with a big

Department of Architecture

window open to a garden. When the windows are opened, the rooms and the garden appear to be united into one large living space. That is to say, Japanese traditional houses are widely open to the exterior. For people to live through the hot, humid summer, a well ventilated space through the large window "Engawa" is quite necessary.

But the climate of Japan differs greatly from region to region because the country's north-south length extends over 3,000km. The northern part of Japan has a snowy, cold season. In Niigata Prefecture, for example, the annual snowfall often amounts to 3 to 4 meters depth. Such snowy regions cover more than 50% of Japan's land area.

Natural conditions such as these have a great influence on the life style and housing form. In fact the snowy regions have a characteristic life style and social customs peculiar to the region. Accordingly, the original form and lay-out of the house must differ distinctly from those of the traditional houses in the warm-mild regions.

With a view to improve the house in the snowy-cold district, we have continued our study on housing problems in Hokkaido Prefecture, the northernmost island of Japan. In the study so far, we have observed some clear significant living and housing features in the snowy country, and our study has thrown a new light upon the question of existing house planning ststem.

The theme of this paper is to clarify the characteristics of life style and house forms in snowy regions and to determines the original house forms suitable for the local conditions.

1. 2 Housing survey

In this paper, we principally use the research data obtained from two housing sample surveys (in 1986 and 1987). We carried out the surveys in 3 cities; Sapporo, Nagaoka and Kanazawa. The three cities are located in the northern part of the country with a heavy snowfalls. In particular, Hokuriku district including both Nagaoka and Kanazawa are the heaviest snowfall areas in the world.

We made an inquirement of the living style and housing requirements of 200—250

Table 1 Outline of the two sample surveys

		Survey method			Statistics					
		Survey area	Num. of questio-naire	Num. of inter-view	Household members per dwelling	Average age of house-holder	Ratio of owned houses (%)	Lot area per dwelling (m^2)	Floor area per dwelling (m^2)	Room numbers per dwelling
1986 Survey	SAPPORO	suburbs	251	15	4.0	45.1	96.3	250	121	5.9
	NAGAOKA	suburbs & downtown	259	10	4.0	49.3	96.4	255	137	6.1
	KANAZAWA	suburbs & downtown	334	0	3.9	52.9	95.0	197	136	6.2
1987 Survey	SAPPORO	suburbs	154	15	4.0	46.1	95.8	247	123	5.8
	KANAZAWA	suburbs	135	11	4.2	48.4	98.4	252	168	7.4

residents living in detached-houses and conducted a survey of their homes in 1986. The detached-house is the most popular housing form in Japan. In 1987, too, we carried out questionaires on the activities of the family members in the house and the latest living style of 100—150 residents in Sapporo and Kanazawa. The outline of the housing surveys in 1986 and 1987 is presented in Table 1.

2. Living style and house plan

2. 1 Various activities in the houses

A garden in the warm-mild regions such as in Tokyo and Osaka serves as the site of various activities, such as a play-grounds for children, a work and storage area and the other items the year round. Even in the northern district like Hokkaido, the gardens are well utilized in summer. But in winter people cannot use the gardens because of the intense cold and snowfall. Consequently these various kinds of activities are done indoors, which distinguishes the living style in snowy regions from others to the south.

1) In winter people make a living in the house all day long except for shopping, clearing the snow away and so on. Accordingly the time spent in the house in both Sapporo and Kanazawa is much longer than that in warm-mild regions.

2) As seen in Table 2 various kinds of activities, such as children's play, associating with neighbors, drying clothes and doing light work take place within the confines of the house.

The living room serves as a multi-purpose space for these activities. In Sapporo people have a custom of receiving visitors in the living room, but in Kanazawa they are usually received in the reception room.

3) Members of a family frequently gather together in the living room and they spend most of the time there. Accordingly the living room is a space of great importance for the indoor life in snowy regions, especially in Sapporo.

4) In Sapporo, various kinds of activities are brought in from outdoors, these are done mainly in the common space such as the living room, the dining-kitchen and the room adjoining the living room. In contrast, in Kanazawa, people usually use the non-living space such as the entrance hall with the earth floor, "engawa" (open corridor or Japanese style veranda), and the garage for activities.

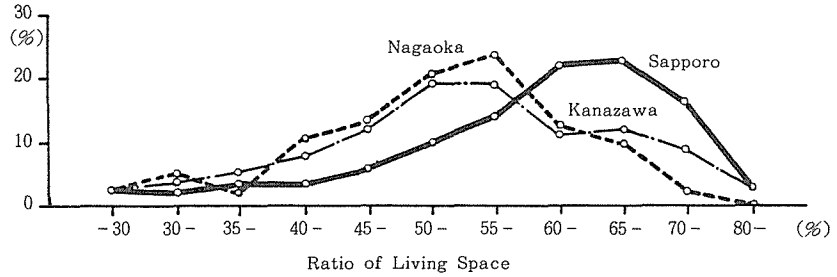


Fig. 1 Ratio of living space area to floor area

Table 2 Relation between activities and their places (Ratio of the houses where people usually carry on these activities)

Place / Activities	Living room	Dining room	Tatami room next to LR	Tatami guest room	Furnished guest room	Study	Bed room	Spare room	Sun-room	Utility	Lavatory	Bath-room	Boiler room	Store-room	Engawa	Corridor & hall	Entrance	Service entrance	Garage	Garden	Stop doing
Gathering together of family members	98.0	53.7	9.4	8.1	0.7		4.7								1.3					12.8	0.7
	93.1	51.1	9.9	7.6	4.6		3.8								0.8					3.8	0.8
Dining	48.3	79.2	4.7	9.4	0.7			—												12.1	—
	48.1	75.6	4.6	3.4	0.8			0.8												2.3	0.8
Meeting & party	84.6	10.7	23.5	29.5	2.7		4.7	2.0												12.8	3.4
	64.1	11.5	9.9	59.5	14.5		0.8	0.8												6.1	3.8
Receiving friends and neighbors	94.0	19.5	17.4	12.1	2.7	0.7		0.7									2.7			3.4	0.7
	83.2	17.6	7.6	24.4	9.9	0.8		—									3.8			2.3	0.8
Receiving formal guests	64.6	0.7	23.5	31.5	3.4	0.7											2.7			—	0.7
	24.4	—	6.1	71.8	21.4	0.8											4.6			0.8	0.8
Staying of guests	1.3		33.6	66.4	1.3		12.1	2.0													—
	3.8		11.5	84.0	—		7.6	3.8													0.8
Laundering		2.0						0.7			98.0	5.4				—		—	—	7.4	0.7
		7.6						—			80.9	3.8				0.8		10.7	2.3	6.9	1.5
Drying clothes (in summer)	4.0	0.7	6.0	1.3				—	0.7		43.0	5.4	1.3		1.3	3.4			0.7	93.3	—
	—	—	—	1.5				0.8	3.1		7.6	2.3	5.3		3.8	3.8			5.3	92.4	0.8
Drying clothes (in winter)	21.5	6.7	10.1	1.3			3.4	2.7	0.7	—	78.5	4.7	2.7	—	1.3	9.4			2.7	4.0	0.7
	16.8	3.8	0.8	1.5			1.5	5.3	6.9	1.5	22.1	6.1	6.9	1.5	13.0	13.0			11.5	29.0	3.1
Ironing	65.8	12.1	23.5	3.4			18.1	2.7	—	—	2.7			—	—	1.3					—
	67.9	6.9	15.3	3.1			13.7	0.8	0.8	3.1	3.1			2.3	2.3	1.5					2.3
Painting and reading	76.5	16.8	11.4	14.8	2.0	4.0	45.6	5.4	—	—					0.7					4.7	2.3
	71.0	11.5	7.6	17.6	6.1	2.3	36.6	1.5	0.8	1.5					5.3					2.3	4.6
Working and Sunday Carpentering	14.1	0.7	0.7				0.7	2.0							0.7	4.7	2.7		38.9	63.1	10.7
	8.4	1.5	—				1.5	0.8							0.8	3.8	6.9		37.4	47.3	20.6
Physical exercises (in summer)	25.5		2.0	0.7			4.0	0.7							—	3.4			0.7	77.2	9.4
	17.6		2.3	1.5			4.6	3.1							2.3	7.6			2.3	67.2	13.0
Physical exercises (in winter)	45.6		3.4	2.0			6.7	2.7							—	11.5			1.3	27.5	18.8
	38.2		3.8	2.3			7.6	1.5	0.8						3.8	16.0			5.3	16.8	24.4

upper figure SAPPORO under figure KANAZAWA

2. 2 Plan type

Remarkable features can be found in the plan of the houses in Sapporo, which are closely related to the conditions of nature and the living style.

1) The form is nearly rectangular and openings are relatively small in general.

2) The passage area of the house is quite small. In contrast, the floor area of the living spaces such as the living room, dining room and bed rooms are much larger than in other regions (Fig. 1, Fig.2). Namely the rooms are arranged compactly.

3) Most of the houses have a large living room about 10—12 "jo" (16—20m²) in size. The living room is of great significance for the life in snowy regions. And so many residents are desirous of enlarging their living room. In contrast the private space (bed rooms) area is relatively small.

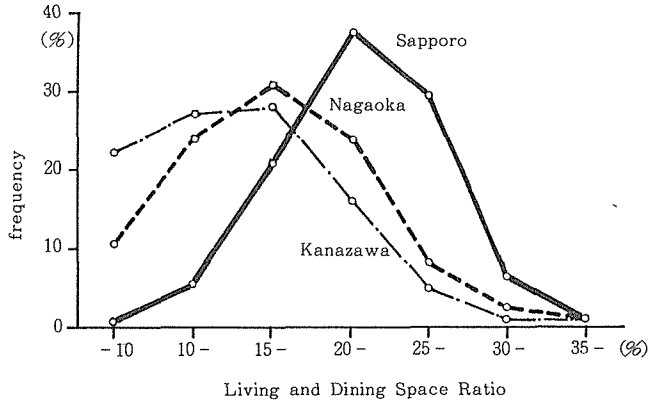


Fig. 2 Ratio of the living and dining room area to the floor area

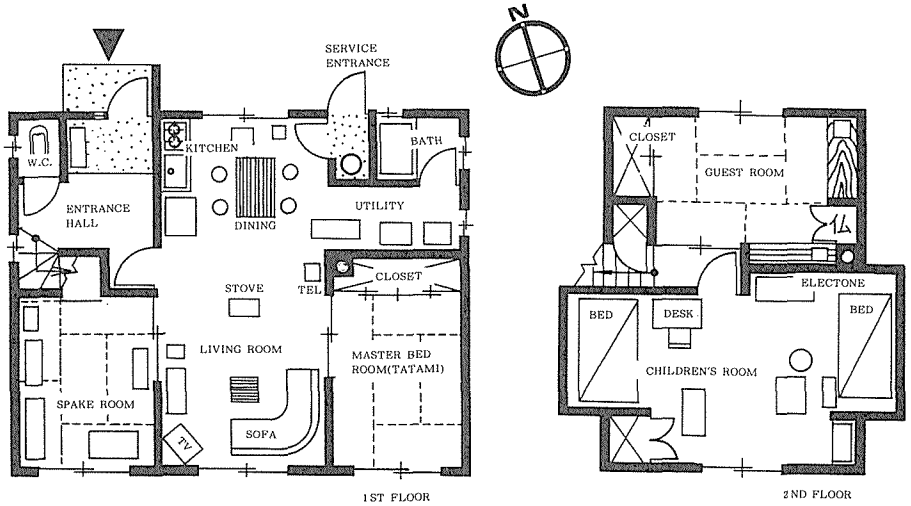


Fig. 3 The typical plan in Sapporo. The living room is in the center with various rooms around it.

4) There is a typical plan in which the rooms are arranged around the living room and these rooms are directly joined to the central living room (Fig.3). This plan style is closely related to the heating method and the peculiar living style that people gather together in one room. We refer to it as an LC-plan (Living-room Core plan).

On the other hand in Nagaoka and Kanazawa, the housing plans are generally traditional, compared with those in Sapporo, because "tatami" rooms are numerous in the house, besides larger non-living spaces such as corridors and "engawa". But unlike that in warm regions, these indoor non-living spaces are very useful for the people to conduct various activities indoors.

Moreover both in Nagaoka and Kanazawa, the characteristic spaces such as the entrance hood enclosure, the service entrance and the garage, which are generally joined to or built in the house, have come into wide use. They are well-designed spaces suitable for the life in the snowy coutry.

3. Common space for family living

3. 1 Living style

(1) Activities in the living room

As mentioned above, various activities (play for children, social life with neighbors, washing and drying, working and such) are done indoors. The living room is the main space where most of these activities are carried on.

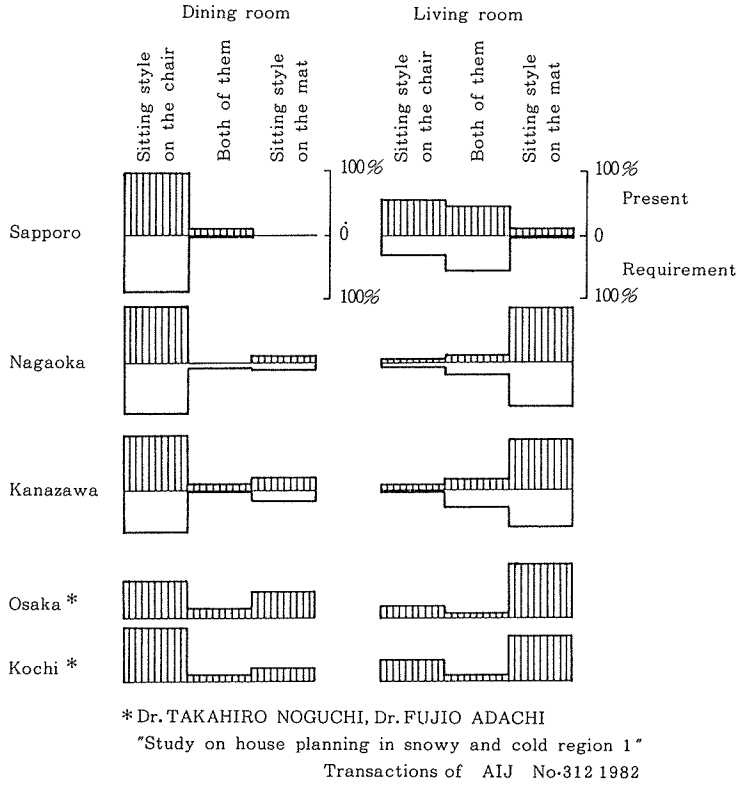
As shown in Table 3, many activities are brought into the living room; the feeling of family memlers at home, dining, receiving visitors, having home parties, meeting with neighbors and children playing, do-it-yourself carpentering and the like. These activities are so frequentlly done in the living room particularly in winter in all the 3 cities. In addition it is really remarkable that these various activities most frequently take place in the living room, especially in Sapporo among 3 cities. We think this is typical of Sapporo where it is brought about by the climate or the weather conditions in Sapporo.

(2) Sitting style

Today people usually take meals seated at the table in the dining kitchen. In all three

Table 3 Activities in the living room (Upper figures: in case of winter, lower figures: in case of summer) (%)

	Relaxation	Meals	Receiving guests	Meeting & Party	Studying	Drying clothes	Sewing	Work	Playing	Changing of clothes	Others
SAPPORO	98.3	49.8	93.4	61.0	40.2	35.7	48.5	6.6	40.2	20.3	0.8
	98.4	46.9	92.2	63.7	39.6	15.5	43.7	4.9	35.5	13.9	1.6
NAGAOKA	97.6	60.2	76.7	51.0	35.7	43.8	45.8	1.6	34.5	31.7	0.2
	98.0	50.4	76.4	52.4	31.5	10.6	45.3	2.0	32.7	23.2	—
KANAZAWA	97.3	74.7	74.1	42.3	36.9	32.4	46.7	3.9	33.6	22.3	0.6
	96.8	70.1	70.7	41.9	34.6	7.6	46.3	3.8	32.8	18.2	0.3



* Dr. TAKAHIRO NOGUCHI, Dr. FUJIO ADACHI
"Study on house planning in snowy and cold region 1"
Transactions of AIJ No.312 1982

Fig. 4 Sitting style in the dining room and the living room

cities about 80-90 percent of the families take meals sitting on chairs. Particularly in Sapporo, this percentage is higher than the other two cities.

In Nagaoka and Kanazawa, there are relatively many families who have meals sitting on the mat ("tatami"). It is because in these regions, people sit and take meals around a "kotatsu" heater (which is a Japanese traditional heating device, a low square table equipped with an electric heater and covered with a quilt) in winter.

The sitting-style in the living room in Sapporo is much different from that in Nagaoka and Kanazawa (Fig.4). That is, in Sapporo the living room is designed in a very modern style unlike in other regions. The room is floored or carpeted in most houses, so the sitting-style on chairs is an ordinary one. In contrast in Nagaoka and Kanazawa, most of the living rooms are floored with "tatami". People sit directly on the tatami floor, or on a cushion. They occasionally take meals seated around a very low table (coffee table). The living room, thus, has become multipurpose, serving as a living room itself, a dining room, and sometimes as a guest room.

About 80 percent of the families in Sapporo sit on chairs, while in Nagaoka and

Kanazawa the ratio is very low ; 20 percent or less .

3. 2 Arrangement of L.D.K.

There are four patterns of arrangement of a living room (L), a dining room (D) and a kitchen (K) in the houses in general (Fig.5). Among these four types the most popular is the "L+DK" type and the "LD+K" type is the next. "L+DK" comes to about fifty percent of all households in this survey.

The following is marked that there are far more houses with "LDK" type in Sapporo than in other 2 cities. And the house of this type tends to be more and more popular lately.

We consider that the "LDK" type (3 spaces of L,D,K are united as one large room) is more suitable for an active living indoor place in a snowy region.

3. 3 Space for meals and a living room

The space for meals, which is usually a dining kitchen in Japan, has 6—8 "jo(mat)" (10—13m²) in size on an average in all. In Sapporo measurement of the room is somewhat below the average, while it is above the average in Nagaoka and Kanazawa. In these two cities, we can find many houses with 8—10 "jo (mat)" dining room.

The living room also differs much in size among the 3 cities. Measurement of the living room in Sapporo is largest of all. Most of the houses have a large living room, which

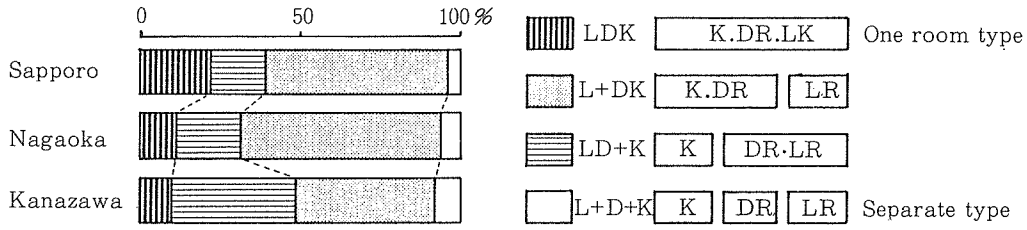


Fig. 5 Form of a living room, a dining room and a kitchen

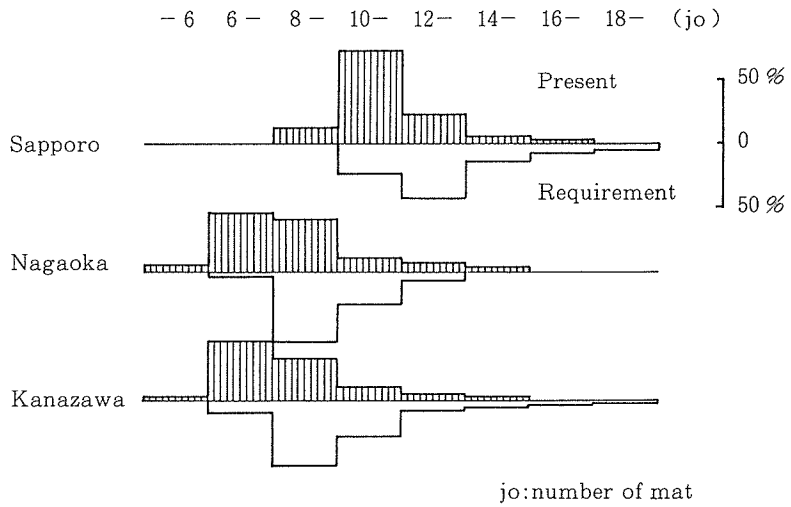


Fig. 6 Living room size

is about 10—12 "jo" (16—20m² Fig.6). Only a few houses, less than 15 percent of the total have smaller living rooms 8 or less "jo". The living room is highly significant for a typical life style in Sapporo ; that is family members may gather together at any time with ease, so that many people wish to improve the existing living rooms, especially in size.

In contrast, in Nagaoka and Kanagawa, the living room is generally small in size. It is about the size of 8 "jo" (13m²) on an average. There are a few houses with a very small-sized living room of 6 or less "jo" (about 10m²),likewise. But even this size of the living room in Nagaoka and Kanazawa is somewhat larger than that of the living rooms in the warm-mild regions like Osaka and Tokyo.

It is because of the snowy region that houses usually have a large living room compared with Japanese traditional houses.

3. 4 Space for visitors

(1) Two types of guest rooms

There are two types of a guest room in the houses in Japan. One is the "tatami" room, the other is the room floored with carpet or board and furnished with a sofa and chairs.

Table 4 Two types of guest room (existence of them and room size) (%)

	Tatami guest room							Furnished guest room						
	nil	−6	6−	8−	10−	12−JO	TO.	nil	−6	6−	8−	10−	12−JO	TO.
SAPPORO	17.4	1.3	60.6	13.1	0.4	7.2	100.0	88.6	0.5	2.4	2.4	5.2	1.0	100.0
NAGAOKA	16.7	2.1	30.9	35.6	0.9	13.7	100.0	66.7	1.1	9.3	11.5	7.7	3.8	100.0
KANAZAWA	24.3	1.0	21.6	37.5	7.4	8.4	100.0	65.7	2.1	12.8	12.1	4.8	2.3	100.0

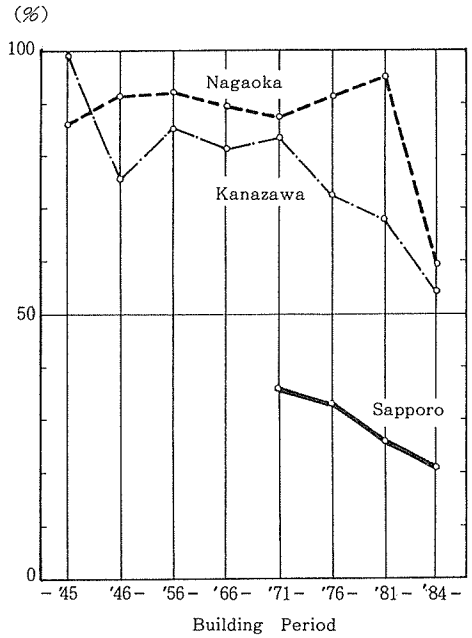


Fig. 7 Ratio of the houses with "tsuzukima"

Both of the rooms are as large and are about 6—8 "jo".

The tatami room is more popular,as the space to receive guests. Therefore, percentage of the houses with a "tatami"-style guest room is very high, more than eighty percent in all cities (Table 4).

The furnished room for guests is not so popular as the "tatami" room. In Nagaoka and Kanazawa, comparatively many houses have a furnished guest room. About 30 percent of the houses have such a furnished guest room in both cities. But in Sapporo, only a few houses are provided with a furnished guest room. It is a social convention in Sapporo that people usually receive their guests not in the guest room, but in the living room. The "tatami" guest room is regarded significant not only as a guest room, but also as a spare room or multipurpose room.

(2) "Tsuzukima"

"Tsuzukima" is a Japanese traditional living space. The room is generally arranged with two or three "tatami" rooms, divided by the movable partition walls,"fusuma" (a sliding door or screen). Accordingly "fusuma" when opened up, the "tatami" rooms can be used occasionally as one large room.

In Nagaoka and Kanazawa, a large number of houses have the "tuzukima". The ratio of the houses with "tuzukima" tends to decrease lately, but more than 80 percent of the houses still have (Fig 7). The "tsuzukima" serves not only as the usual living space, but also as the space for a party, a meeting of neighbors, Buddhist service and the like. Since the large space ,which is usually partitioned into two or three roomes by sliding screens, is available for indoor life in winter, there is still a great demand for the "tsuzukima" in the two cities.

However, the "tsuzukima" is not so popular in Sapporo. In place of "tsuzukima" the

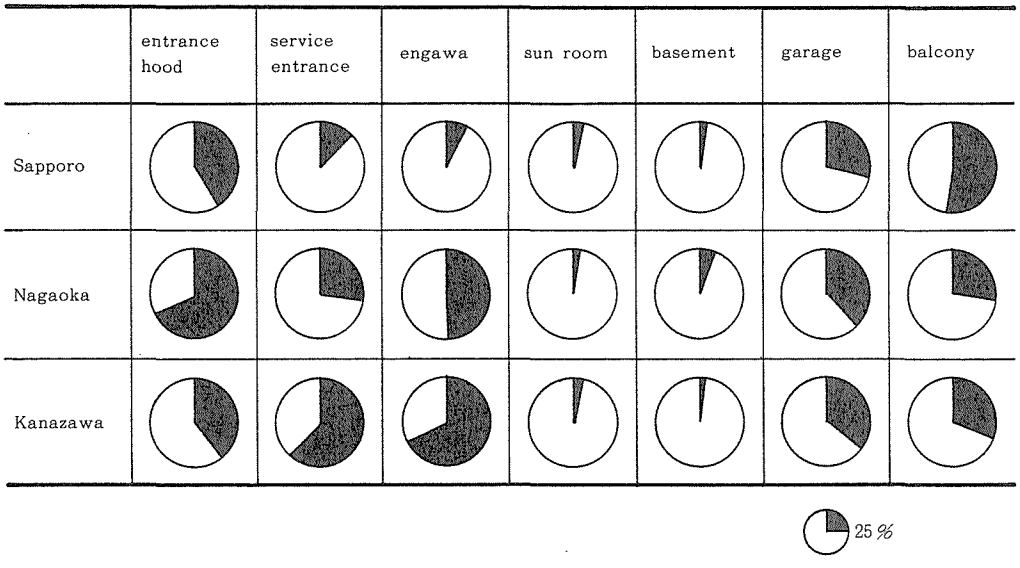


Fig. 8 *Ratio of the houses provided with intermediate space*

houses have a large-sized living room.

4. Intermediate space

4. 1 Various forms of I.S.

In the warm regions, people are able carry out various activities, such as washing, drying clothes, playing, doing light work and so on, usually in the garden all the year round.

But in the snowy regions, people are obliged to do these activities indoors in winter. Consequently, special spaces, where people can conveniently do various activities indoors, are necessary to be provided within the confines of the house. We can call these intermediate spaces (I.S.) or service spaces, which link indoor life to outdoor life.

There are many types of I.S. even in the existing houses. For example an entrance hood enclosure, a service entrance, "engawa", a sunroom, a balcony, a basement, a garage and so on. Among them, the entrance hood, the sunroom, the basement, and the garage have come to be more and more popular in recent years in the three cities.

The houses are provided with a variety of intermediate spaces, particularly in Nagaoka and Kanazawa (Fig.8) It is remarkable in Nagaoka that so many houses are supplied with the entrance hood canopies and garages. The entrance hood is of great importance to shelter the entrance way from the heavy snowfalls, which often lies about two meters deep. The garage, which is usually built in or joined to the house, is also significant for daily life. The garage space, usually about 15—20 square meters, serves not only as a parking space, but also as a storage and a drying place.

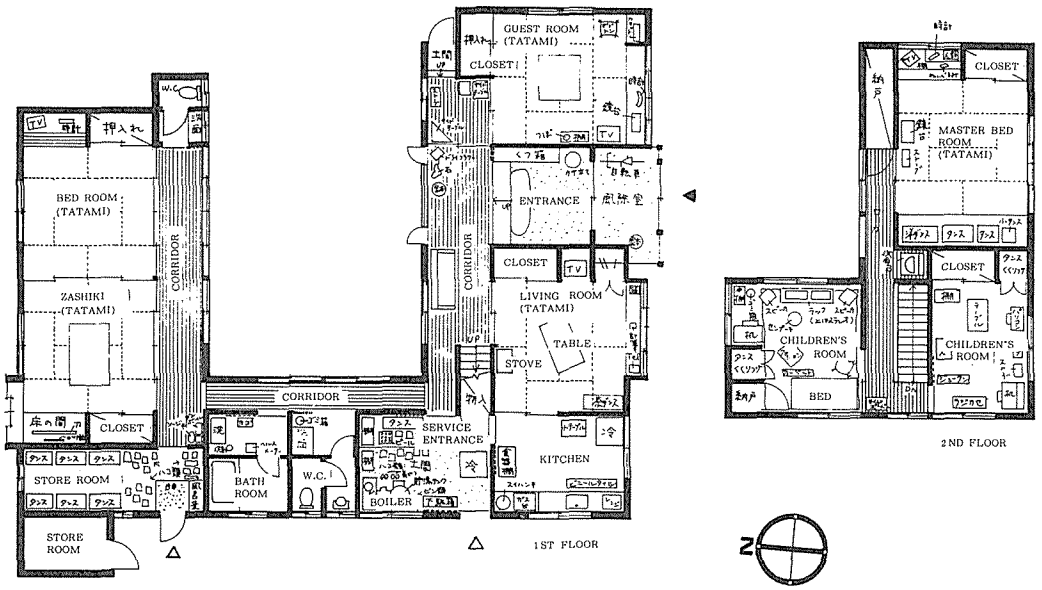


Fig. 9 The typical plan in Kanazawa. There are many tatami rooms linked each other by a long corridor and provided with a large size service entrance.

In Kanazawa, many homes are provided with service entrances. Since the space of the service entrance is comparatively large in size and leads to the backyard, the space is commonly used as a utility, a storage, and a drying place etc (Fig.9).

In case of Sapporo I.S. except for the entrance hood and the balcony, is not so popular as in Nagaoka and Kanazawa. This entrance hood plays a unique role in protecting the house from the bitter cold in Sapporo. The balcony, which is widely open to the exterior, can not effectively be used in the winter, because of the snowfall and the intense cold.

4. 2 Basement and garage as I.S.

Only a few houses, less than 10 percent, have a basement at present in Sapporo. The installation of a basement, however, is largely in demund.

The basement serves as a multipurpose space ; as a storage, a utility, a workshop, a play room, a boiler space and a unique living space where people can enjoy their indoor lives.

Besides, the basement has a great advantage judging from the thermal conditions of the house. From these viewpoints it is thought that the basement is a useful space for life in the

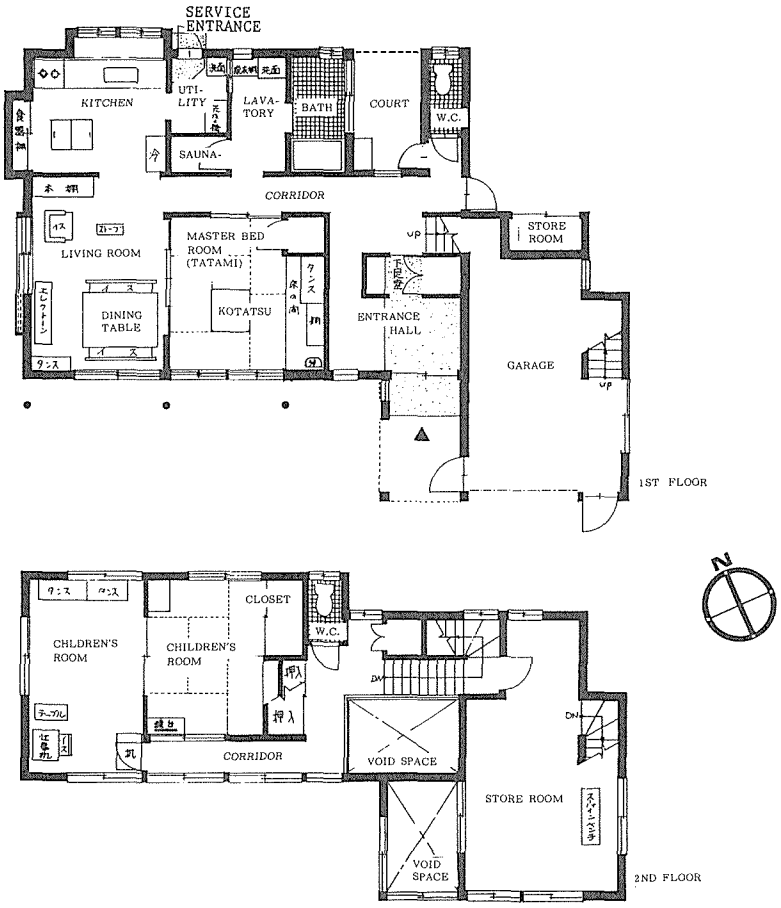


Fig. 10 The typical plan in Nagaoka. The garage serves as a storage space, a passage, a drying place and so on, as well as the parking space.

snowy-cold regions, especially in Sapporo. Therefore we propose that the houses in Hokkaido should be provided with a basement as a standard reqwriment, or one of daily necessities.

As mentioned above, the typical garages in Nagaoka and Kanazawa are used as various service spaces as well as a parking space. Since the garage is a very convenient place for storing, there can be kept many kinds of articles like spare tires, bicycles, a baby buggy, many types of tools for snow-removal, oil tanks for heating and so on.

In Nagaoka the garage is frequently used as a useful passage, through which people can easily go in and out even on the day of the heavy snowfall (Fig.10). In Kanazawa, we can often find the houses provided with the canopy space around the entrance. Like the garage this canopy space plays an important role, likwise. We are of the apriuin that these spaces should be improved and completed as a space peculiar to the snowy regions.

5. Conclusion

The typical living style peculiar to the snowy regions in Sapporo, Nagaoka and Kanazawa have been determined. The distinguished characteristics are summarized as follows:

(1) The time spent indoors is very long

(2) The various activities done outdoors in summer, must be done indoors in winter.

(3) Family members frequently gather together in the living room

These characteristics are common to the 3 cities.

Nevertheless, the way of living differs each other in these cities. In particular there is a great difference between in Sapporo and other cities. For example, in case of Sapporo the activities done in the living room are full of variety and actively done. And the time that people spend while gathering together in the living room is much longer as compared with the other two cities.

Also we found a typical house plan in those regions. The house has many rooms which are laid out around one large living room in Sapporo, and the houses in Nagaoka and Kanazawa are provided with a large intermediate space.

In conclusion we think that a original house planning theory in the snowy regions should be established as soon as possible. The house planning will surely be different from the existing one in many respects. It is also very important to make the image of the house form suitable for the climate and the living conditions in each regions.

In conclusion we illustrate a house plan in Fig. 11 as an example model of the house for snowy regions. This house was designed by ourselves and built in Sapporo in 1985. When we designed this house, emphasised the arrangement of living spaces, circulations of the entrance, the utility, and the kitchen for service, and equipment of the basement as a multipurpose space, and the thermal insulation and airtightness of the house.

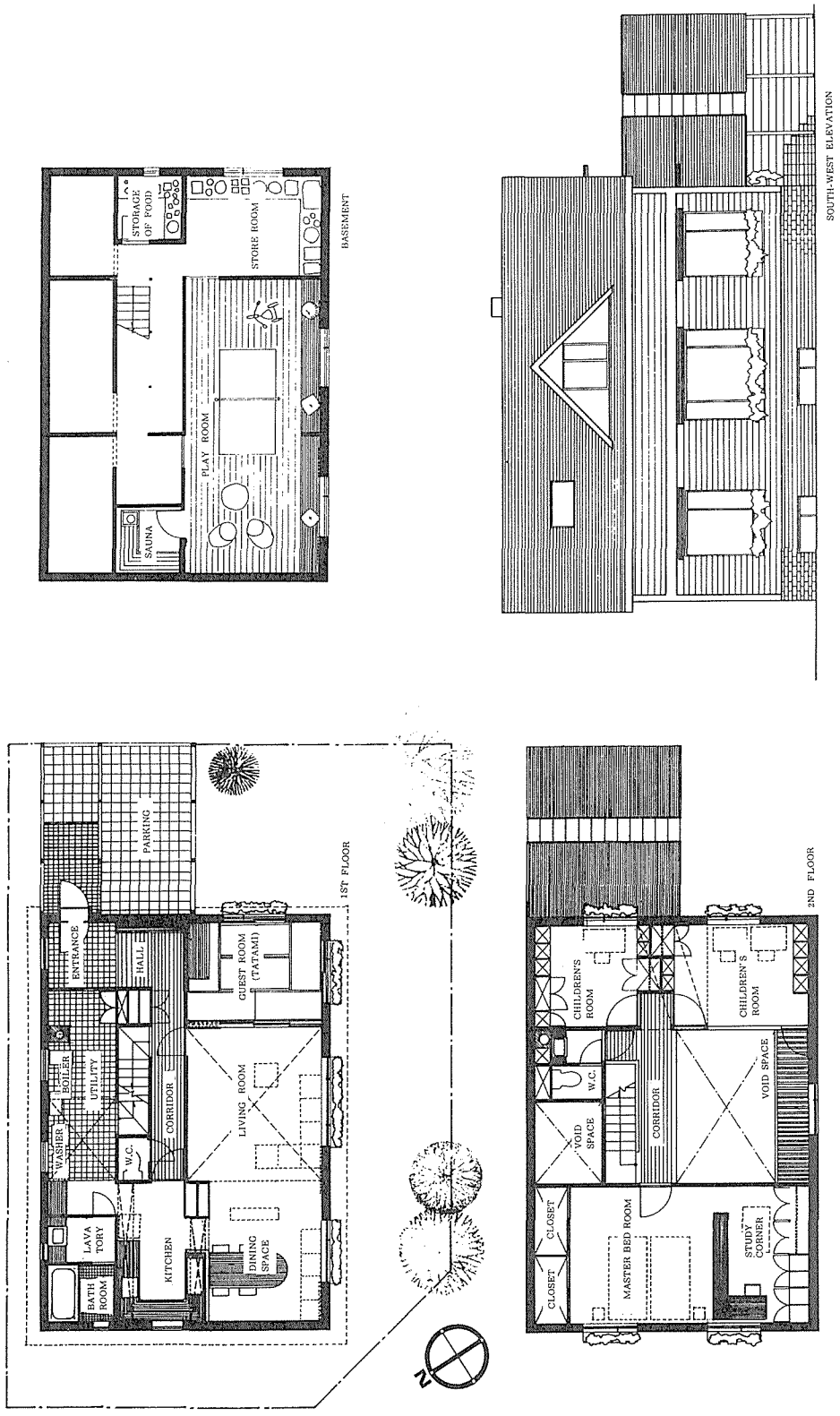


Fig. 11 The house for the snowy-cold regions, designed by the authors in 1985.