

# SCHOOLCHILDREN'S ADAPTATION TO WINTER IN COLD CLIMATES

**Masamichi Enai<sup>1</sup>, Norman Pressman<sup>2</sup>, Annie Lüttgen<sup>3</sup>,  
Mao Yu Zheng<sup>4</sup> and Jorma Heikkinen<sup>5</sup>**

1. Prof., Graduate School of Engineering, Hokkaido University, Sapporo, Japan

Postal address: N13-W8, Kitaku, Sapporo, 060-8628 Japan

Fax: +011-706-7828, E-mail: enai@eng.hokudai.ac.jp

2. Emeritus Prof., University of Waterloo, Waterloo, Canada

3. Landscape Architect, Municipal Management/International Affairs, Gatineau, Canada

4. Prof., Harbin Institute of Technology, Harbin, China

5. Senior Researcher, VTT Building Technology, Espoo, Finland

## ABSTRACT

In winter climates, it is required to understand schoolchildren's adaptation to winter in order to implement sustainable winter communities. The questionnaires dealing with adaptation and perceptions regarding winter in cold-climates form an initial component of a lengthier study of a cross-national comparative nature. The focus is on how to encourage children to participate in winter-based outdoor activities and to cultivate a more "positive" attitude toward the cold, snowy season. Such an investigation through a questionnaire has been presented to adults in Japan, Canada and China. Then, the same investigation with a questionnaire introduced to schoolchildren has been performed in Japan, Canada, China and Finland. The questionnaire for the adults consisted of perception's keywords ranking through six levels. The total of each reply to those six levels should be 100%. Why? Because everyone has multi-sided answers to winter. The questionnaire for schoolchildren consisted of perception's keywords ranking also through six levels. In this case, the perception's keywords for adults should be translated into appropriate keywords for schoolchildren and also voted on the above-mentioned six levels by using ten balls.

The response patterns of adaptation to winter were different for every country. There are also differences between adults and schoolchildren in lower grades. The adaptation of lower grades to winter is generally positive. However, the adaptation in higher grades becomes negative, as they grew older. Their adaptation patterns are similar to adults in each country. The more time that schoolchildren outdoor play increases; the more they reply, "I like winter". There is a relationship between the amount of time playing outdoors and the rates of positive adaptation replies to winter. Generally, schoolchildren in lower grades don't hate winter. Therefore, small open spaces in neighborhoods should be designed with winter in mind in order to be of effective uses, not only in mild seasons but also during the marginal periods of early spring and late autumn when there is a tendency to withdraw and spend more time indoors.

## INTRODUCTION

The physical length of winter cannot be changed, but changing our adaptation to winter can reduce the extension of winter in our mind.<sup>1)</sup> According to the newspaper “Hokkaido Shinbun”, it was reported that schoolchildren in Sapporo City love winter but they don’t like the outdoors. Based on Norwegian studies, architects Ralph Erskine and Boris Culjat from Sweden have suggested that the comfortable outdoor season could be extended by up to six weeks by simply using microclimatic planning and design principles.<sup>3)</sup> If we had activities in the urban outdoors for one or more weeks during the cold season and enjoyed outdoor activities, we could reduce the length of winter in our mind through enjoying outdoor play and other forms of winter activity.<sup>2)</sup>

In winter cities, it is important and necessary to understand schoolchildren’s adaptation to winter in order to implement sustainable winter communities. As a city planner, architect, engineer or designer, do you know how schoolchildren perceive winter? Anyone working in these professions should pay attention and listen to children’s perceptions and intentions about winter before formulating design criteria for setting up any community based on residents’ needs and respecting human scale. One needs to know and understand the children’s adaptation to winter particularly when planning and designing small open spaces for year-round use in community neighborhoods.

In this paper, an investigation through a questionnaire has been presented to adults in Japan, Canada and China. Then, the same investigation with a questionnaire introduced to schoolchildren has been performed in Japan, Canada, China and Finland. Hence, we could determine schoolchildren’s adaptation to winter changes from the lower to the higher grades. Facts about the adaptation to winter are revealed in this empirical study. The goal is to analyze schoolchildren’s adaptation to winter when designing communities, in cold-climates.

## HOW TO VERIFY THE ADAPTATION TO WINTER

When we determine the adaptation to winter, it is too simplistic to use only “Yes” or “No”. We have to develop a scale in our mind by ranking the degree of “liking” or of “disliking”.<sup>4)</sup> A co-author, N. Pressman, discussed some keywords of adaptation to winter at a workshop he held in Luleå, Sweden, about ten years ago. The questionnaire to the adults consisted of keywords, ranking Pressman’s six levels as follows:

- (1) Enduring winter,
- (2) Tolerating winter,
- (3) Accepting winter,
- (4) Respecting winter,
- (5) Appreciating winter,
- (6) Celebrating winter.

The total of each reply to those six levels should be 100%. The reply reflects multi-sided perceptions to winter.

Naturally, the keywords used for adults cannot be directly applied to schoolchildren. They don’t speak and write the above rankings everyday. So, the keywords used for adults

must be translated into a simpler system for schoolchildren. Thus, the questionnaire for schoolchildren consisted of perceptual keywords ranked through six levels, as follows:

- (1) I hate winter, (2) I usually don't like winter, (3) I sometimes don't like winter,  
 (4) I sometimes like winter, (5) I usually like winter, (6) I love winter.

Then, we had another difficult problem. Schoolchildren generally learn the use of percentages in the fifth grade. It is difficult to ask the proportion in their mind by using percentages to lower grades. This difficult problem was resolved by having schoolchildren vote on the above-mentioned six levels by using ten balls, and distributing them among the six categories.

The two kinds of questionnaire for adults and for schoolchildren were translated from English version into Japanese, Finnish and Chinese. Examples are shown in Figures 1 to 3.

Figure 1. English version (Adults)

**Do you like winter or not? Would you please express your feeling to the winter season?**

Please cooperate with our questionnaire. The same questionnaire will be done in Japan, Finland and Canada. We hope to know your psychological adaptations to winter. Most people always indicate enduring winter. However, it is not 100% for them. When someone goes skiing, he certainly enjoys it and maybe appreciates winter in some measures. If another one sees a fine morning glow in winter, he would celebrate winter a little.

So, the rates of responses from enduring winter to celebrating winter in one's mind should be expressed by using percentage. Would you please express your feeling to the winter seasons by using percentage?

Your age is ( ) years old. You are a male ( ) or a female.

1. Enduring winter	( )%
2. Tolerating winter	( )%
3. Accepting winter	( )%
4. Respecting winter	( )%
5. Appreciating winter	( )%
6. Celebrating winter	( )%
Total	100 %

Thank you for your cooperation.

**Notes:** an equivalent of a word for six levels,

1. putting up with, suffering, submitting to,
2. swallowing, almost accepting, but not quite,
3. acknowledging, consenting to, recognition of,
4. esteem, almost admiration-but not quite, honoring,
5. enjoying-but not totally; taking kindly to, understanding, being thankful for,
6. exalting, glorifying, rejoicing

Figure 2. French version (Adults)

## AIMER-VOUS L'HIVER ?

Une enquête anonyme est menée simultanément au Canada, en Finlande et au Japon afin de déterminer le **degré d'appréciation de l'hiver** éprouvé par les personnes interrogées.

Veuillez répondre par le pourcentage que **vous** attribuez respectivement à chacun des six(6) degrés d'appréciation de l'hiver, le tout pour un total de 100%.

### Questionnaire

âge: 19

Homme: X

Femme : .....

Dans l'ensemble de vos activités, quel pourcentage attribuez-vous à chacun des degrés d'appréciation de l'hiver suivants:

<u>Degrés</u>	<u>Pourcentage</u>
1. Endurer l'hiver	( <u>30%</u> )
2. Tolérer l'hiver	( <u>20%</u> )
3. Accepter l'hiver	( <u>10%</u> )
4. Respecter l'hiver	( <u>10%</u> )
5. Apprécier l'hiver	( <u>10%</u> )
6. Célébrer l'hiver	( <u>20%</u> )
<b>TOTAL</b>	<b>100%</b>

N.B. Les six (6) degrés d'appréciation de l'hiver peuvent respectivement s'exprimer par les synonymes suivants:

1. Endurer: se résigner, se soumettre à l'hiver.
2. Tolérer: supporter, admettre l'hiver.
3. Accepter: consentir, convenir que l'hiver existe.
4. Respecter: considérer, tenir-compte de l'importance de l'hiver.
5. Apprécier: estimer, consentir une valeur à l'hiver.
6. Célébrer: se réjouir, faire l'éloge de l'hiver.

MERCI DE VOTRE COLLABORATION!

Figure 3. Finnish version (Schoolchildren)

## Onko talvi mielestäsi hyvä vai huono vuodenaika?

Ole hyvä ja vastaa kyselyyn, jolla selvitetään miten eri maissa suhtaudutaan talveen. Sama kysely tehdään myös Kanadassa, Japanissa ja Kiinassa.

Useimmat pitävät talvea ainakin joskus ikävänä vuodenaikana. Mutta mukavalla hiihtoretkellä tai lumilinnaa tehdessä talvi voikin tuntua iloiselta asialta. Myös auringonnousu talviaamuna voi olla hieno kokemus.

Merkitse rasti kullekin riville sen mukaan miten usein maininta pitää kohdallasi paikkansa.

- |                                                                                       |                   |                          |                          |                          |                          |                          |                          |              |
|---------------------------------------------------------------------------------------|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------|
| 1. Suorastaan kärsin talven takia<br>Merkitse rasti yhteen ruutuun                    | <i>ei koskaan</i> | <input type="checkbox"/> | <i>usein</i> |
| 2. Talvessa on kestämistä<br>Merkitse rasti yhteen ruutuun                            | <i>ei koskaan</i> | <input type="checkbox"/> | <i>usein</i> |
| 3. Talvi tuntuu yhtä hyvältä kuin muutkin vuodenajat<br>Merkitse rasti yhteen ruutuun | <i>ei koskaan</i> | <input type="checkbox"/> | <i>usein</i> |
| 4. Talvi on hyvä vuodenaika<br>Merkitse rasti yhteen ruutuun                          | <i>ei koskaan</i> | <input type="checkbox"/> | <i>usein</i> |
| 5. Talvi on hieno vuodenaika<br>Merkitse rasti yhteen ruutuun                         | <i>ei koskaan</i> | <input type="checkbox"/> | <i>usein</i> |
| 6. Talvi on kaikkein paras vuodenaika<br>Merkitse rasti yhteen ruutuun                | <i>ei koskaan</i> | <input type="checkbox"/> | <i>usein</i> |

Merkitse alle vielä itseäsi koskevat tiedot:

Olen nainen/tyttö

Olen mies/poika

Ikäni on \_\_\_\_\_ vuotta.

Suomessa kyselyä hoitaa: Jorma Heikkinen, Valtion Teknillinen Tutkimuskeskus (VTT), p. (09) 4564742, Jorma.Heikkinen@vtt.fi

Japanissa: prof. Enai, Hokkaido University

Kanadassa: prof. Pressman, University of Waterloo

Kiinassa: prof. Zeng, Harbin Institute of Technology

## IDENTIFIED COUNTRIES AND ATTRIBUTES OF THE QUESTIONNAIRE

The investigations to adults were tried in Canada, Japan and China during winter season in 2001 to 2002. The ages of adults ranged from 18 years old to 62 years old. Most of ages were under 25 years old. Rate of male and female participation is shown in Table 1. The distribution of age in the investigated countries is shown in Figure 4.

The investigations for schoolchildren were tried in elementary schools in Canada, Japan, Finland and China in 2002 to 2003. The ages of schoolchildren ranged from 5 years old to 14 years old. Rates of male and female were almost half and half.

Table 1. Attributes of Adults

Country	Number of Sample	Mean age	Female/Male
Japan	59	21.5	0.55
Canada	57	20.3	2.00
China	92	33.8	0.88

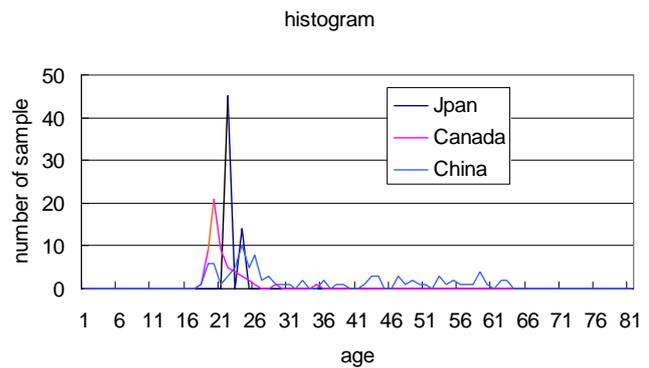


Figure 4. Histogram of Samples

## RESULTS OF QUESTIONNAIRE

Figure 5 and Figure 6 show the investigation results for adults in the Province of Quebec and in the Province of Ontario. When we pay attention to the pattern of mean value for six levels, the difference between French Canadians (Québécois) and English Canadians is very small. So, Figure 7 shows the result adding the total of Quebec and of Ontario. The replies for enduring and for celebrating are larger. Canadians may have multiple perceptions of winter.

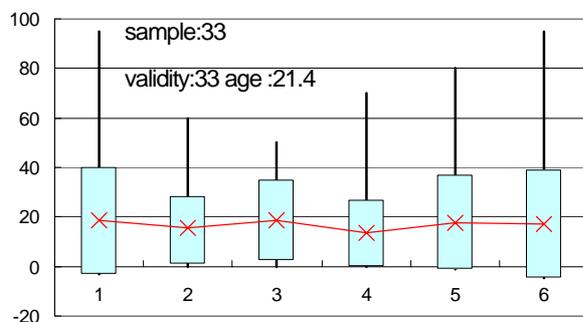


Figure 5. Ontario, Canada (Adults)

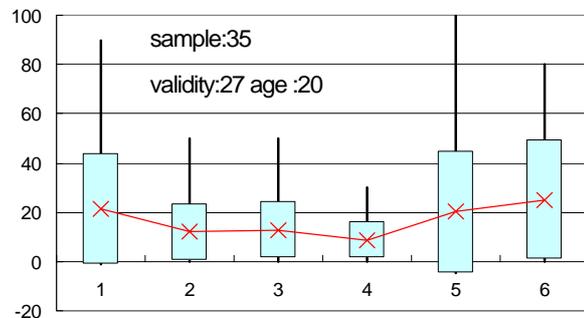
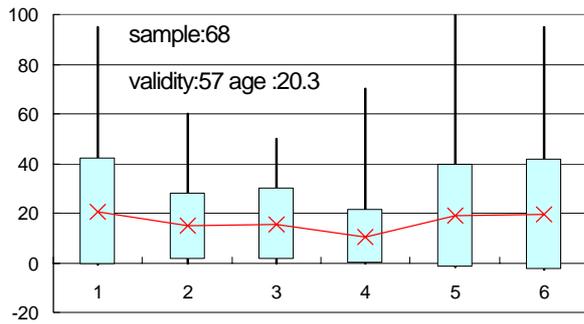


Figure 6. Quebec, Canada (Adults)



**Notes:** Vertical axis and horizontal axis are (%) and (six levels). From a higher rank in Figures, each explanatory note is a maximum value, i.e. [max], a value added a mean value and a standard deviation, i.e.  $[\mu + \sigma]$ , a mean value, i.e.  $[\mu]$ , a value reduced a standard deviation from a mean value, i.e.  $[\mu - \sigma]$  and a minimum value, i.e. [min], respectively.

Figure 7. Canada (Adults)

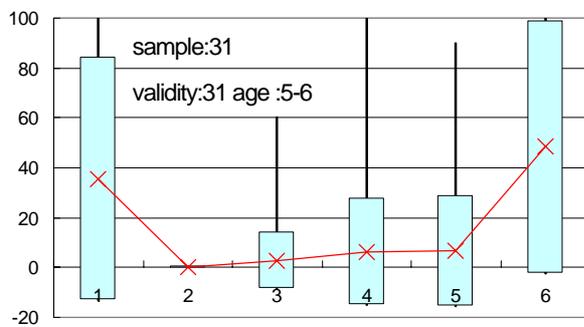


Figure 8. Ontario, Canada (age:5-6)

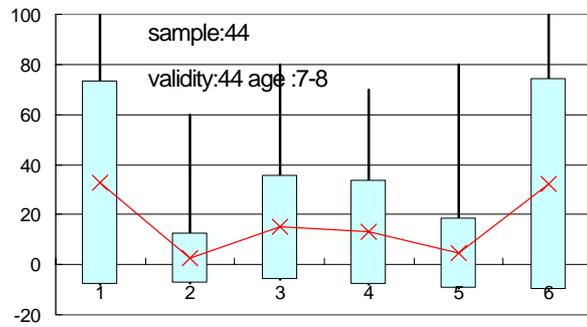


Figure 9. Ontario, Canada (age:7-8)

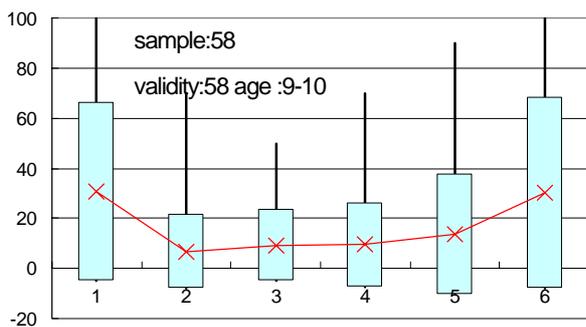


Figure 10. Ontario, Canada (age:9-10)

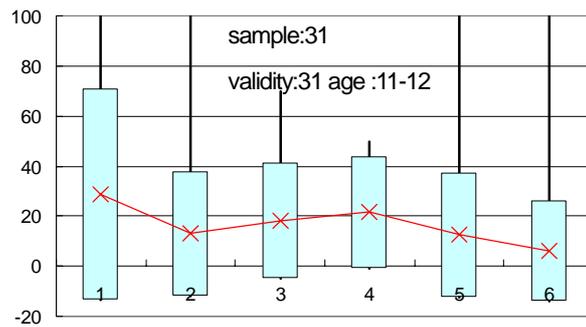


Figure 11. Ontario, Canada (age:11-12)

Figure 8 to 11 shows the investigation results for schoolchildren in the Province of Ontario. As the actual numbers of schoolchildren for statistics purpose is small, the results were statistically calculated and illustrated through the addition of two grades. When schoolchildren in Canada are in lower grades, they selected either "I hate winter" or "I love winter".

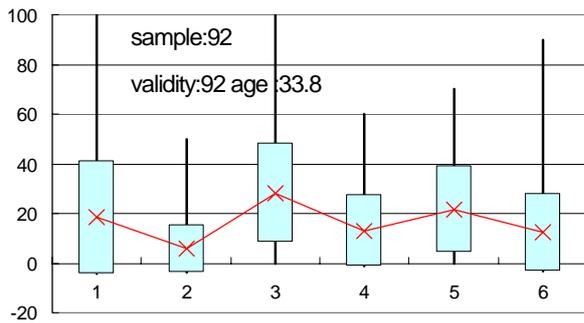


Figure 12. Harbin, China (Adults)

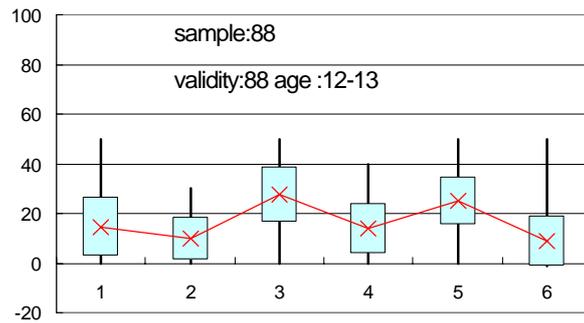


Figure 13. Harbin, China (age:12-13)

Figure 12 shows the investigation results to adults in Harbin City, China. They perhaps “accept” winter. But the negative replies regarding adaptation to winter are greater than positive replies.

Figure 13 shows the investigation results to schoolchildren in an elementary school in Harbin City, China. When we pay attention to the adaptation patterns of mean value between the adults and the schoolchildren in higher grades, both patterns are very similar. However, in the case of the schoolchildren, positive replies about the adaptation to winter are greater than the negative replies.

Regrettably, we could not obtain the replies regarding adaptation to winter from adults in Finland. Figure 14 shows the investigation results to schoolchildren in an elementary school in Espoo City, Finland. It appears some schoolchildren feel negatively about winter and others do not celebrate winter. However, the rates of adaptation increase clearly from negative levels to positive levels.

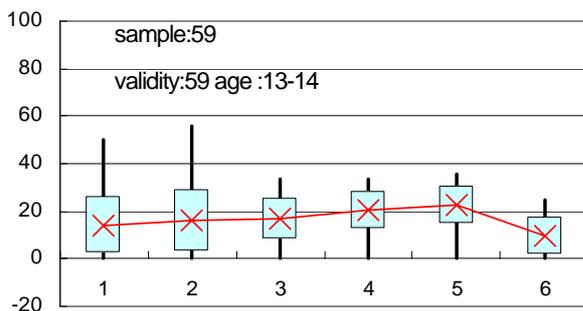


Figure 14. Espoo, Finland (age:13-14)

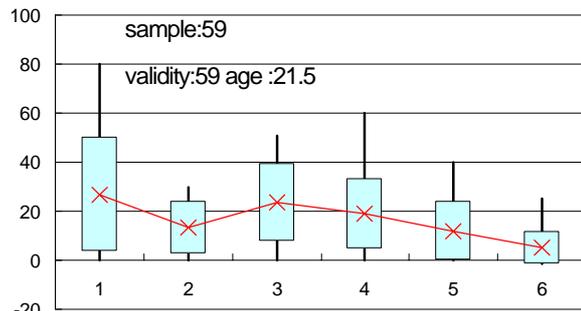


Figure 15. Sapporo, Japan (Adults)

Figure 15 shows the investigation results to students in Hokkaido University. They may “accept” winter. However, they tend to select negative replies regarding their adaptation to

winter.

Figure 16 to 18 shows the investigation results for schoolchildren in an elementary school in Sapporo City, Japan. Schoolchildren in lower grades “love” winter. As they grew older, they incrementally indicate a dislike for winter. Their adaptation patterns to winter in higher grades become very similar to adults’ ones. Why do schoolchildren respond to winter like adults’, as they grew older?

On another occasion in 2003, we asked schoolchildren in the elementary school attached to Education of Hokkaido University, “How many hours in a day do you play outdoors?” and also “How many days in a week do you play outdoors?” The more time that schoolchildren played outdoors increases; the more they replied, “I like winter”. There is a relationship between the rates of playing outdoors and the rates of positive adaptation replies to winter. A city planner, architect, engineer or designer working in winter cities has to acknowledge this fact.

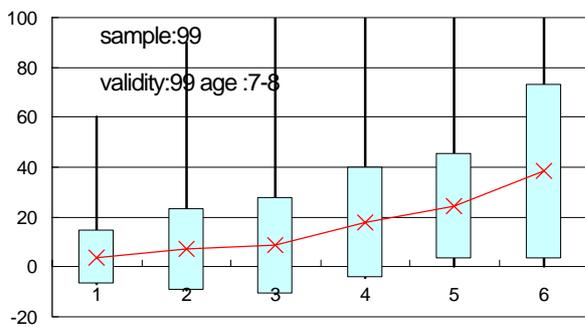


Figure 16. Sapporo, Japan (age:7-8)

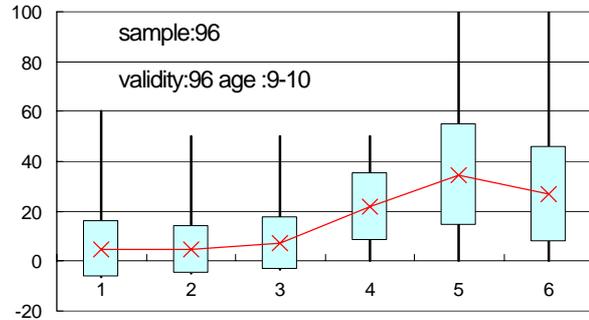


Figure 17. Sapporo, Japan (age:9-10)

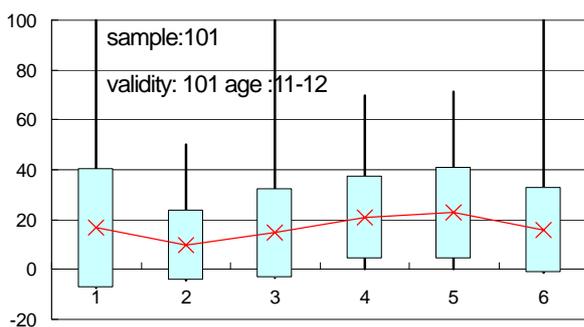


Figure 18. Sapporo, Japan (age:11-12)

**Notes:** Representation of six levels for schoolchildren is not the same as those for adults. When the six levels translated for schoolchildren were used for university students in Hokkaido University, the results used the translated questionnaire were not in keeping with those used questionnaire by Pressman’s six levels. So it is very difficult to compare directly with replies by adults and by schoolchildren.

## **PARTICIPATION BY INHABITANTS AND ENJOYMENTS OF WINTER**

As there is much snow in Hokkaido, it is possible for children to enjoy sledding on snow slopes or making snow statues and lanterns in a small open space. Children need the participation by inhabitants for enjoying snow, coldness and long night. If parents and elders join together to celebrate winter, it is easy to continue a snow festival, spontaneously, in any neighborhood. Then, such participation and cooperation in the community will help and encourage children to discover, appreciate and celebrate winter.

Children enjoy making snow statues, snow lanterns or ice lanterns in the daytime while they are imagining the illuminating effects during the night. Spaces for making such statues and lanterns will be used in a small block park, an alley or a small vacant lot in front of building entrances. Of course, children have to join independently. On the other hand, enthusiasm and moderate assistance by inhabitants will be required for safety and continuance.



Photo 1. Talking about what to carve



Photo 2. Making snow statues



Photo 3. Making snow lanterns



Photo 4. Lighting candles in lanterns



Photo 5. Making ice lanterns



Photo 6. Lighting in front of entrance



Photo 7. Candles in deposit snow



Photo 8. Illuminations in a vacant lot

## CONCLUSIONS

The questionnaires dealing with adaptation and perceptions regarding winter in cold-climates form an initial component of a lengthier study of a cross-national comparative nature. The focus is on how to encourage children to participate in winter-based outdoor activities and to cultivate a more “positive” attitude toward the cold, snowy season.

Further, in-depth analysis is anticipated - working with teachers in schools - and one of the objectives will be to develop design and planning criteria and standards that will assist decision-makers (architects, landscape designers, planners) in shaping play spaces for children of various ages thus helping them to enjoy the outdoors during winter.

Furthermore, the results, which are, at this point in time, still tentative, should enable higher quality design of both childrens’ play equipment and site organization. Together, the outdoor season can be extended in a way that feels comfortable to all users, especially during the marginal period of early spring and late autumn when there is a tendency to

withdraw and spend more time indoors.

(1) The response patterns of adaptation to winter were different for every country. There are also differences between adults and schoolchildren in lower grades. The adaptation of lower grades to winter is generally positive. However, the adaptation in higher grades becomes negative, as they grew older. Their adaptation patterns are similar to adults in each country.

(2) The more time that schoolchildren outdoor play increases; the more they reply, "I like winter". There is a relationship between the amount of time playing outdoors and the rates of positive adaptation replies to winter. Generally, schoolchildren in lower grades don't hate winter. Therefore, small open spaces in neighborhoods should be designed with winter in mind in order to be of effective uses, not only in mild seasons but also throughout the year.

### **Acknowledgments**

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