

A Study on the Psychological Feelings on Grades of Various Flooring Types

Kazuhiro Kubota

Tokyo University of Science

Yasuyo Takahashi

Koishikawa-Technical High School

Hideo Naoi

Tokyo University of Science

Abstract

As shoes are not normally worn indoors in Japan, Japanese people have always attached deep psychological importance to the type of indoor flooring. The purpose of this study is to analyze these psychological feelings on the grade of flooring, including areas for wearing shoes, using several quantitative methods. As the results of our paired comparison by comprehensive judgment were very similar to the results of analytical, on both indoor (for bare feet and shoes) and outdoor (for shoes only) flooring, we consider the grading of flooring that we observed to be relatively consistent regardless of analytical techniques.

Keywords: grade of flooring, psychological feeling of grade, flooring for shoes, flooring for bare feet, quantification theory type I

1. INTRODUCTION

With regard to indoor flooring materials, most Japanese have a vague, unconscious feeling that "tatami mats are the best material" and "vinyl chloride sheet or plastic tile (hereinafter, 'P tile') rank relatively low." We have been attempting to quantify such feelings on the grade of indoor flooring for bare feet¹⁾⁻⁶⁾. Assuming similar feelings on the grades of outdoor flooring (for shoes), we conducted an analysis of Quantification theory type I based on the reluctance to perform actions on floor in this study as a new analytical method. Since relatively consistent results are obtained with this type of analysis, we used this method again on various indoor flooring types for bare feet in an attempt to analyze psychological feelings on flooring grades from new perspectives.

The study design was based on previous reports submitted to the Architectural Institute of Japan and the Japan Society for Interior Studies^{7),8)}.

2. PSYCHOLOGICAL FEELINGS ON THE GRADE OF FLOORING FOR SHOES

2.1 Method of analysis

(1) Types of flooring

Twelve types of flooring were analyzed, including six types of indoor flooring (carpet, wooden flooring, ceramic tile, long-sized vinyl chloride sheet, P tile and mortar finishing) and six types of outdoor flooring (stone, ceramic tile, asphalt finishing, lawn, soil, and pavement blocks).

(2) Subjects

Subjects were 22 students in the architecture department of our university who were considered capable of recognizing the special features of flooring and giving appropriate answers.

(3) Analytical techniques

The following two techniques were used:

a. Floor grading by paired comparison

We conducted a questionnaire survey to compare the grade of each type of flooring with other types by paired comparison. The scores ranged from 5 for "Very high grade" to 1 for "Very low grade."

b. Analysis of Quantification theory type I based on the reluctance to perform actions on different floor types


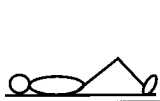
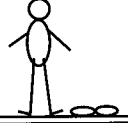



Regarding the four items in Table 1, each type of flooring was evaluated in terms of the reluctance to perform the six types of actions listed in Table 2 by scoring 3 for "Almost no reluctance," 2 for "Slight reluctance," and 1 for "Very great reluctance." Since the reluctance for "Dropping garbage" was evaluated in the opposite direction from the other actions, the scoring was also in the opposite direction.

Table 1. Analysis of Quantification theory type I (Reluctance to perform actions)

Item	Indoor	Outdoor
Flooring	○	○
Action	○	○
Building	○	×
Place	○	×

○: Analyzed ×: Not analyzed

Table 2. The six types of actions

Sitting	Lying down	Taking off socks
		
Placing a bag	Picking up and eating dropped food	Dropping garbage
		

2.2 Analytical results and discussion

(1) Results of floor grading by paired comparison

Figure 1 shows the results of grading 12 types of flooring. Carpet and wooden flooring were graded highest, followed by ceramic tile and long-sized vinyl chloride sheet. Conversely, soil was graded lowest, followed by asphalt finishing. Indoor flooring was generally graded higher; however, mortar finishing was graded third lowest after asphalt finishing. Among outdoor flooring types, lawn was graded highest.

(2) Results of quantification analysis based on the reluctance to perform actions

Item	Category	1	2	3	4	score
Indoor	Carpet	[Bar chart showing scores for Carpet]				
	Wooden flooring	[Bar chart showing scores for Wooden flooring]				
	Ceramic tile	[Bar chart showing scores for Ceramic tile]				
	Vinyl chloride sheet	[Bar chart showing scores for Vinyl chloride sheet]				
	P tile	[Bar chart showing scores for P tile]				
	Mortar finishing	[Bar chart showing scores for Mortar finishing]				
Outdoor	Stone	[Bar chart showing scores for Stone]				
	Ceramic tile	[Bar chart showing scores for Outdoor Ceramic tile]				
	Asphalt finishing	[Bar chart showing scores for Asphalt finishing]				
	Lawn	[Bar chart showing scores for Lawn]				
	Soil	[Bar chart showing scores for Soil]				
	Pavement block	[Bar chart showing scores for Pavement block]				

Figure1. Floor grading by paired comparison

To quantitatively explain the data on reluctance, we conducted an analysis of Quantification theory type I. Figure 2 shows the results for indoor flooring and Figure 3 for outdoor flooring. When flooring, actions, buildings, and places were analyzed by category, indoor flooring type was found to have a greater psychological influence on the subjects than action type. For outdoor conditions, flooring type as well as action type greatly affected the psychological state of the subjects. Particularly characteristic was that, among all types of indoor and outdoor flooring, the reluctance to perform an action was the lowest on lawns. This is probably because most people have experienced playing, sitting, or lying on lawns from childhood.

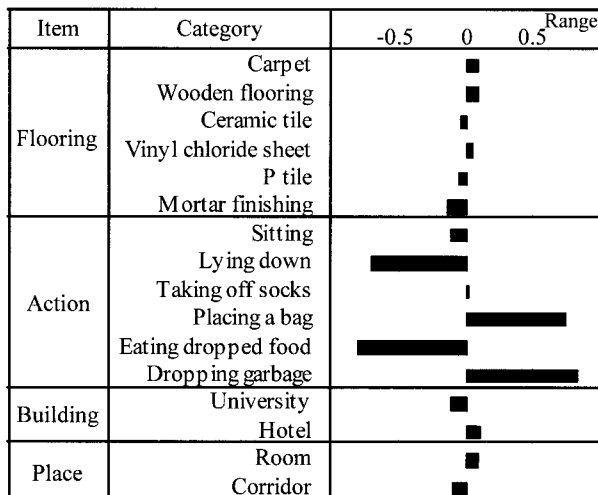


Figure 2. Result of quantification analysis (Indoor)

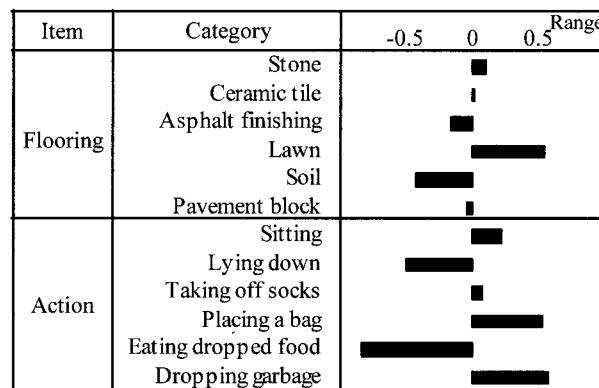


Figure 3. Result of quantification analysis (Outdoor)

(3) Comparison of the above two types of results

The ranking by paired comparison matched based on reluctance to perform an action, excluding long-sized vinyl chloride sheet and ceramic tile, was reversed in indoor conditions. Ceramic tile was ranked lower, probably because the coolness of the material increased the reluctance to perform actions, compared with long-sized vinyl chloride sheet.

(4) Cluster analysis on the tendencies of subject evaluations

From the questionnaire results, we conducted a cluster analysis on the characteristic reluctance to perform actions outdoors from the results of paired comparison and an analysis of reluctance to perform actions both indoors and outdoors. As shown in Figure 4, the subjects can be roughly divided into groups A and B. Group A was larger, with subjects with average 'reluctance' to perform actions, while Group B was smaller, with subjects with less reluctance, as shown in Figure 5.

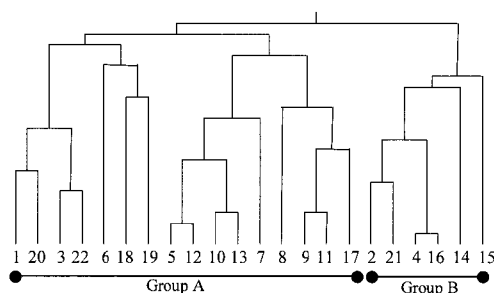


Figure 4. Cluster analysis of the tendency of evaluation by subjects

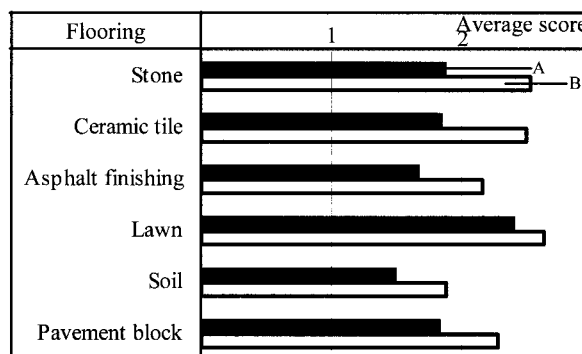


Figure 5. Comparison of reluctance between Groups A and B

3. PSYCHOLOGICAL FEELINGS ON THE GRADE OF FLOORING FOR BARE FEET

3.1 Method of analysis

(1) Types of flooring

For common indoor flooring types, six types of flooring were analyzed - carpet, wooden flooring, ceramic tile, long-sized vinyl chloride sheet, and P tile.

(2) Subjects

The subjects were 20 students in the architecture department of our university considered capable of recognizing the special features of flooring and giving appropriate answers. To avoid differences with regard to analytical method, the subjects participated in all analyses.

(3) Analytical techniques

The following three techniques were used:

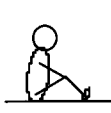
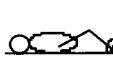
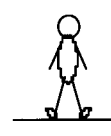
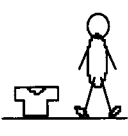



a. Floor grading by paired comparison

We conducted a questionnaire survey to compare the grade of each type of flooring with other types by paired comparison. The scores were from 5 for "Very high grade" to 1 for "Very low grade."

b. Analysis of Quantification theory type I based on the reluctance to perform actions on flooring

Each type of flooring was evaluated in terms of the reluctance to perform the seven types of actions listed in Table 3 at public facilities and houses by scoring 4 for "No reluctance" to 1 for "Very great reluctance." Since the reluctance for "Dropping eraser shavings" was evaluated in the opposite direction to other actions, the scoring was also performed in the opposite direction.

Table 3. The seven types of actions

Sitting 	Lying down 	Taking off socks 	Placing a jacket 
Eating dropped food 	Dropping eraser shavings 	Laying out bedding 	

c. Analysis of Quantification theory type I based on floor evaluation factor

Six types of flooring were graded on a scoring range from 4 for "Agree" to 1 for "Do not agree" regarding six representative types of evaluative expression (costly, clean, good appearance, durable, traditional, and good texture).

3.2 Analytical results and discussion

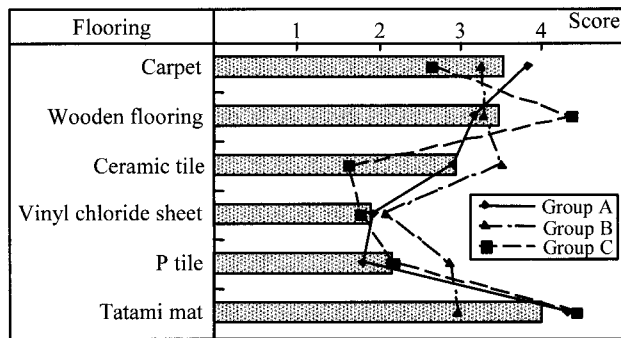
(1) Results of floor grading by paired comparison

Figure 6 shows the results of grading 6 types of flooring. (By cluster analysis, the subjects could be

average scores of all subjects). Tatami mat was graded highest, and carpet and wooden flooring were ranked almost equally, followed by ceramic tile. Conversely, long-sized vinyl chloride sheet was graded lowest, followed by P tile. These rankings closely matched the results of past studies at the laboratory.

(2) Results of quantification analysis based on the reluctance to perform actions

Figure 7 shows the analysis of Quantification theory type I based on the reluctance to perform actions: When flooring, actions, buildings, and places were analyzed by category, the reluctance to perform an action at a house was found to be almost proportional to the rank of flooring type by paired comparison. Reluctance is generally great at public facilities, irrespective of the flooring type, and does not differ between flooring types as markedly as at houses.



Bars indicate the average values.

Figure 6. Floor grading by paired comparison

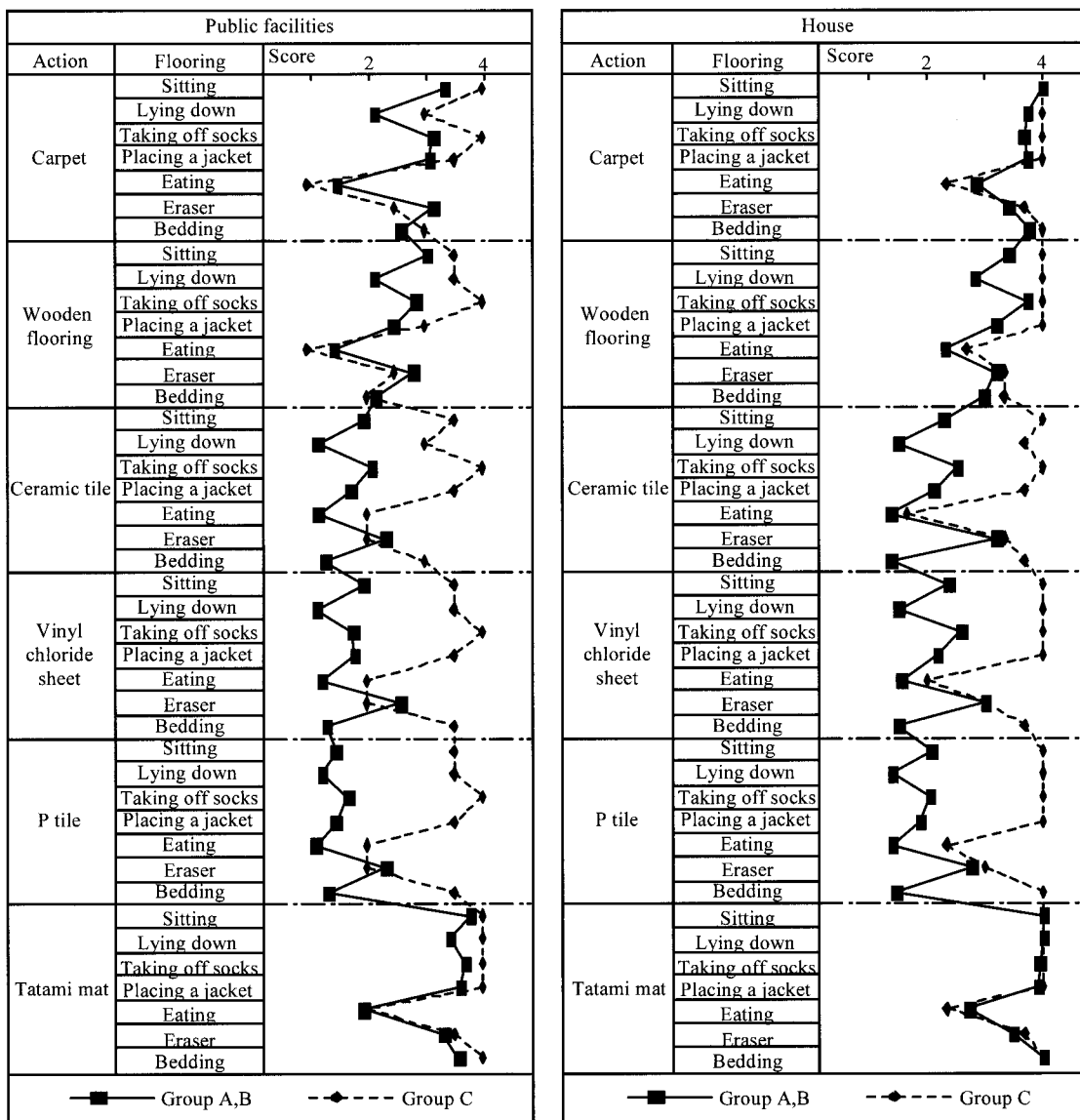


Figure 7. Analysis of Quantification theory type I (reluctance to perform actions on floor)

(3) Results of quantification analysis based on floor evaluation factor

Figure 8 shows the results of the analysis of Quantification theory type I based on floor evaluation factor using adjectives. Consequently, floor grading is primarily affected by appearance and then by cleanliness, and is not greatly affected by tradition or pricing.

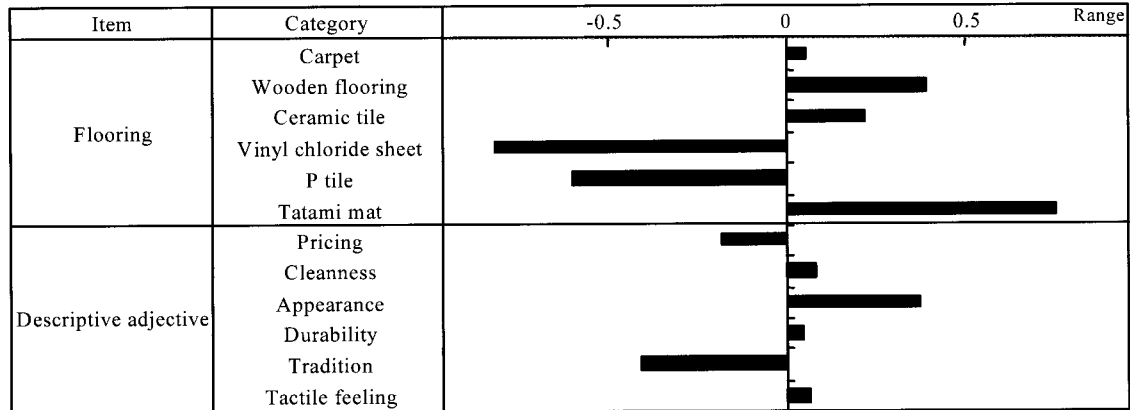


Figure 8. Analysis of Quantification theory type I based on floor evaluation factor (using adjectives) (Average)

(4) Comparison of the above three types of results

In the grading of flooring by paired comparison and reluctance to perform actions, the ranks of vinyl chloride sheet and P tile were reversed in paired comparisons, but the other ranks were matched. In the analysis of Quantification theory type I by floor evaluation factor (using adjectives), ceramic tile consequently ranked as high as tatami mat and wooden flooring and carpet ranked fourth. The appearance and cleanliness of ceramic tile seem to have contributed to their high grade. The representative adjectives in this case appear to have been compatible with ceramic tile and not with carpet. Considering the ranking of flooring, tactile feeling and tradition may greatly contribute to grading. Meanwhile, the ranking of flooring for durability was very different from that by paired comparison. This indicates a weak relationship between durability and ranking.

4. CONCLUSION

In this study, we were able to obtain quantitative information on the psychological feelings on the grades of various types of flooring.

Several analytical techniques were used in this study. Since the results of the analysis of Quantification theory type I based on reluctance to perform actions on floor were almost similar to the results of paired comparison by comprehensive judgment, both for outdoor flooring for shoes and indoor flooring for bare feet, the results here can be considered as relatively consistent, regardless of analytical technique.

The investigation of differences in grading by origin, age, sex, and background will be the subject of future studies.

REFERENCES

1. Kaori Kawamura, Kesanori Iwai, and Hideo Naoi(1993), A Study on Japanese Hierarchical Sense to Dwelling Floor by Finishing Materials, Summaries of Technical Papers of Annual Meeting Architectural Institute of Japan E-1, pp.983-984
2. Miyo Kunimitsu, Kesanori Iwai, and Hideo Naoi(1994), A Study on Japanese Hierarchical Sense to Dwelling Floor by Finishing Materials(2) - An Added Study on this Sense Itself and a Study on

- Relation to Difference of Floor Level, Summaries of Technical Papers of Annual Meeting Architectural Institute of Japan E-1, pp.1003-1004
3. Norio Yajima, Kesanori Iwai, and Hideo Naoi(1996), A study on Japanese hierarchical sense to Dwelling Floor by Finishing Materials - Concerning the Relationship with Footwear and Human Posture on Floor, Summaries of Technical Papers of Annual Meeting Architectural Institute of Japan, E-1, pp.769-770
 4. Asako Hara, Kesanori Iwai, and Hideo Naoi (1997), A Study on the Order of Sense of Cleanliness or Dirtiness to Surfaces of Dwelling Space, Summaries of Technical Papers of Annual Meeting Architectural Institute of Japan E-1, pp.687-688
 5. Hiroki Machida, Kaori Kawamura, and Hideo Naoi(1998), A Study on the Order of Sense of cleanliness or Dirtiness to Surfaces in Dwelling Space (2), Summaries of Technical Papers of Annual Meeting Architectural Institute of Japan E-1, pp.811-812
 6. Norio Yajima and Hideo Naoi(2005), Study on Quantification of Feeling of Rank for Floors in Japanese Dwellings, Transactions of Japan Society for Interior Studies No.15 pp.15-18
 7. Yasuyo Takahashi, Kazuhiro Kubota, and Hideo Naoi(2005), A Study on the Sense of Order to Floor on which We Walk with Shoes, Summaries of Technical Papers of Annual Meeting Architectural Institute of Japan E-1, pp.869-870
 8. Jun Inayoshi, Kazuhiro Kubota, and Hideo Naoi(2006), A Study on the Sense of Order to Floor in Dwellings, Summaries of the 18th Annual Conference of Japan Society for Interior Studies, pp.55-56