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ORIGINAL ARTICLE

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Change in the impression of rooms with interior wood finishes arranged differently: questionnaire survey with the use of photographs for the analysis of impressions of rooms concerning living activities

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Abstract Efforts were made to quantify the impact of visual stimulation from interior wood finishes on the impression of room interiors, using feelings about living activities as indicators. Four types of room interiors with interior wood finishes used in different proportions were simulated. The room interiors were photographed from the same viewpoint. A survey was conducted by interviewing 200 test subjects. As a result of the analysis of principal components, it was found that desires of living activities obtained from the four photographs consisted of two factors: desires for calmness and desires for activities. A great desire for calmness was obtained from photographs showing wood materials. A weak desire for calmness and a strong desire for activities were obtained from a photograph that showed no wood materials. Great desires for both calmness and activities were obtained from a photograph showing wood materials used only as flooring material. As for an evaluation of "living," the photograph of a room interior without wooden materials was evaluated as a place that test subjects did not feel like living in. The photograph showing wood materials used only as flooring material was evaluated as the place that test subjects most felt like living in, and considered most suitable as a living space.

Key words Timber · Photos of room interiors · Living activities · Semantic differential method (SD method)

Introduction

The determination of ways to handle stress for long hours at home, in offices, and at school is an important issue. The comfort of living spaces is not determined only by the conditions of room interiors, but it is also affected by the impression of the interior materials used. It is thought that wood is natural to residents, and that it gives a comfortable feeling. It is also necessary to give consideration to the active use of wood for room interiors. Masuda and Yamamoto[1] investigated the relation between the proportion of wood used in the interior of rooms, and its images. It was found that the "natural" image increased when the proportion of wood was higher,[2] and that "closed," "less tense," and "dark" images increased when the proportion of wood was increased. Therefore, it was concluded that it was necessary to use wood in moderation, and to design wood appropriately.[3] Broman[4] investigated preferences for knotty wood, and pointed out that higher lightness and the grain of wood are important, and that the harmony and vitality of wood surfaces have an effect.[5] Ridoutt et al.[6] evaluated impressions by the semantic differential (SD) method using projected images of offices in which wood was used for furniture and floors in different proportions. As a result, it was concluded that offices in which more wood was used gave immediate impressions like "comfort" and "calmness."[6] In addition, they also investigated impressions received from wood using furniture manufacturers' catalogues with photographs, and consequently pointed out that interior decorations with the heavy use of wood were popular among women. They also pointed out that interior decorations with nonwood materials were preferred by men, and that wood decors were not favored because they gave a languid feeling (extremely relaxed).[7]

This study investigated what kind of living activities people feel like engaging in through the impressions of room interiors with interior wood finishes arranged differently, based on the results of the above studies. In this study, the impact of visual stimulation from wood on residents' desires for living activities (sleeping, lying down, relaxing, exercising, and working), and their evaluations as actual living spaces was examined with the use of four types of photographs of room interiors in which wood panels were used for floors and walls in different proportions.

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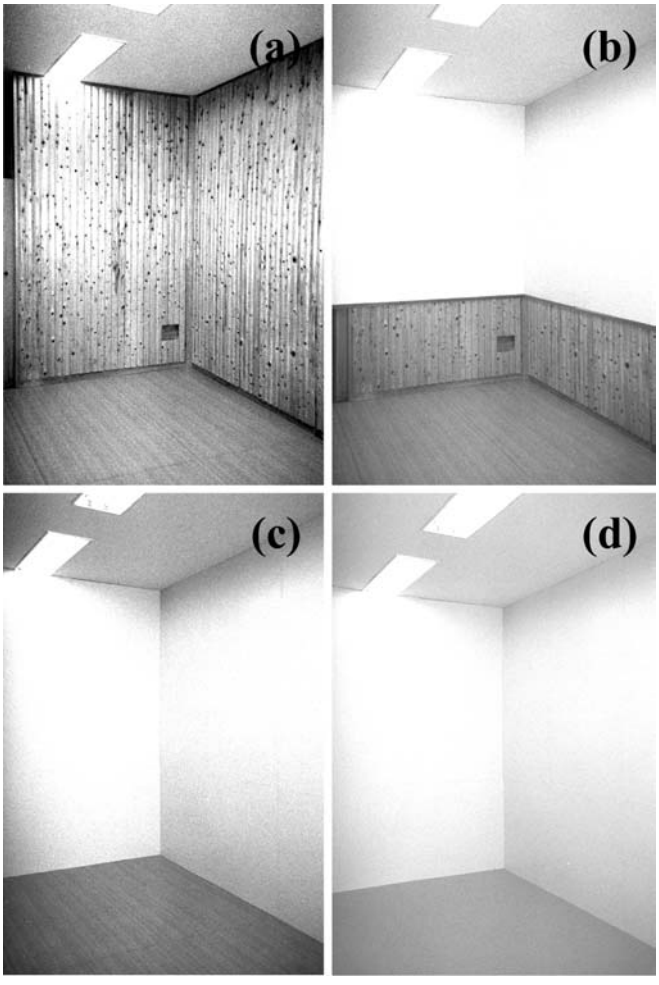

Fig. 1a–d. Photographs of the rooms for research. **a** Room with wood materials used for the floor and walls, **b** room with wood materials used for the floor and wainscots, **c** room with wood materials used only for the floor, **d** room with a grey floor and white walls, without wood materials

Experimental

In one of the rooms of the Shizuoka Industrial Research Institute, four model rooms were constructed using interior wood finishes (small-diameter hinoki cypress timbers containing knots manufactured by Japan Wood Coop) and floorboards (overlay plywoods not containing knots) in different proportions: (1) a room with wood materials used for the floor and walls (as shown in Fig. 1a); (2) a room with wood materials used for the floor and wainscots (as shown in Fig. 1b); (3) a room with wood materials used only for the floor (as shown in Fig. 1c); and (4) a room with a grey floor and white walls, without wood materials (as shown in Fig. 1d). The rooms were photographed from the same viewpoint, which was selected in order to observe the entire interior layout of each constructed room. With A4-size color photographs of the four types of rooms as specimens for evaluations, researchers interviewed 200 men and women aged 20–69 years who lived in Shizuoka city. The photographs were shown to them in random order. Each subject was asked about their age, occupation, family structure, type of residence, daily schedule, and other individual attributes. The sex of the subject was also noted. Their desires felt for living activities were evaluated on a scale from one to five when the four photographs of the room interiors were shown as specimens for evaluation. Visual impressions are mostly evaluated with the use of paired adjectives (such as "warm vs cold" and "new vs old") by the SD method. However, in this study, paired verbs such as "want to exercise vs do not want to exercise," "want to work (study) vs do not want to work (study)," "want to relax vs do not want to relax," "want to lie down vs do not want to lie down," and "want to sleep vs do not want to sleep" were used for evaluations in order to examine desires that were obtained from the impressions of the photos, and felt for living activities, rather than from evaluations of the very visual impressions of room interiors. Habitability was evaluated based on the degree of their desire for "living there" on a scale from one to five: "I definitely want to live there," "Well, I want to live there," "I do not know whether I want to live there or not," "I do not want to live there," and "I definitely do not want to live there." Scores were given with +2 for the most favorable reply, followed by 1, 0, –1 and –2 in a descending order.

Results and discussion

The interviewees consisted of 101 men and 99 women, about the same number of male and female interviewees. There were 40 interviewees in each of the age groups 20–29 years and 30–39 years, 41 interviewees aged 40–49 years, 38 interviewees aged 50–59 years, and 41 interviewees aged 60–69 years; the number of interviewees in each age group was approximately the same.

Figure 2 shows the average scores of desires for living activities, obtained from each of the photographs. Desires for preferable activities are shown with higher scores radiating widely in all directions. The photograph with no wood materials prompted reactions like "I do not want to relax," "I do not want to lie down," or "I do not want to sleep." The photo with the wood floor and walls gave reactions like "I do not want to work (study)," or "I do not want to exercise." More interviewees felt like "exercising," "working," or "sleeping" in rooms with less wood finishes, except for the room without wood finishes. The photograph showing the wood floor tended to stimulate more desires for all the types of living activities in comparison with the other photographs.

Principal component analysis (varimax method) was performed for desires for living activities in each of the photographed rooms. As a result, when the proper value was assumed to be 1 or more, three repetitions resulted in the end of rotation, and two factors were extracted. Table 1 indicates extracted factors and factor loadings. For factor I, "relaxing" (0.930), "lying down" (0.917), and "sleeping" (0.853) were extracted, and factor I was designated "a desire for calmness." For factor II, "exercising" (0.875) and

Table 1. Extracted factors and factor loadings

Evaluated items	Factor loading	
	Factor 1	Factor 2
Do not want to relax – Want to relax	0.930	0.096
Do not want to lie down – Want to lie down	0.917	0.113
Do not want to sleep – Want to sleep	0.853	0.267
Do not want to exercise – Want to exercise	0.091	0.875
Do not want to work (study) – Want to work (study)	0.202	0.845
Proper value	2.48	1.57
Contribution rate (%)	49.63	31.46
Accumulated contribution rate (%)	49.63	81.09

Factor extraction method: principal component analysis; rotation method: varimax method

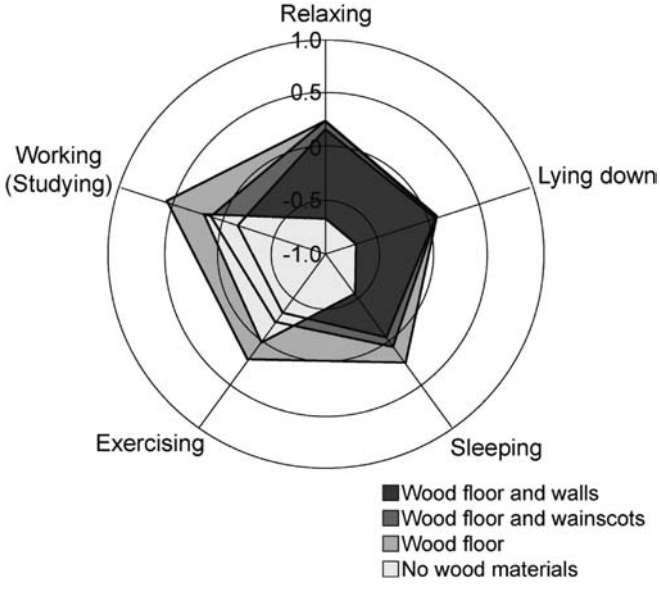

Fig. 2. Desires obtained from each photograph for living activities

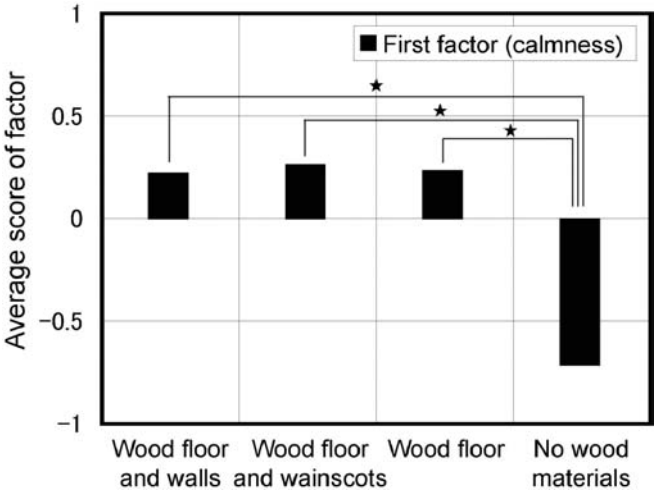

Fig. 3. Average scores of a desire for calmness. *Stars* indicate significant difference at the 5% level

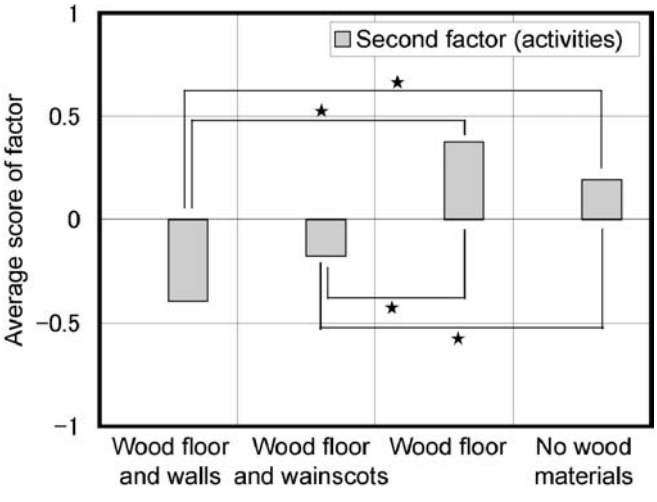

Fig. 4. Average scores of a desire for activities. *Stars* indicate significant difference at the 5% level

"working (studying)" (0.845) were extracted, and factor II was designated "a desire for activities."

Figure 3 shows the average score of each photograph with regard to the first factor (a desire for calmness). Significant difference was examined at a level of significance of 5% by the one-way analysis of variance. The three photographs with wood finishes (wood floor and walls, wood floor and wainscots, and wood floor) stimulated greater desires for calmness. The photograph without wood finishes induced an extremely low desire for calmness in comparison with the other photographs.

Figure 4 shows the average score of each photograph with regard to the second factor (a desire for activities). Significant difference was examined at a level of significance of 5% by the one-way analysis of variance. The photographs with a large proportion of wood finishes (wood floor and walls, and wood floor and wainscots) induced a low desire for activities, but the photograph with the wood floor, and the photograph without wood finishes stimulated significantly greater desires for activities. The photograph with the wood floor stimulated high desires for both calmness and activities, so it is thought that it can produce feelings suitable for various living activities.

Figure 5 shows the average scores for the two factors according to sex. Significant difference was examined at a

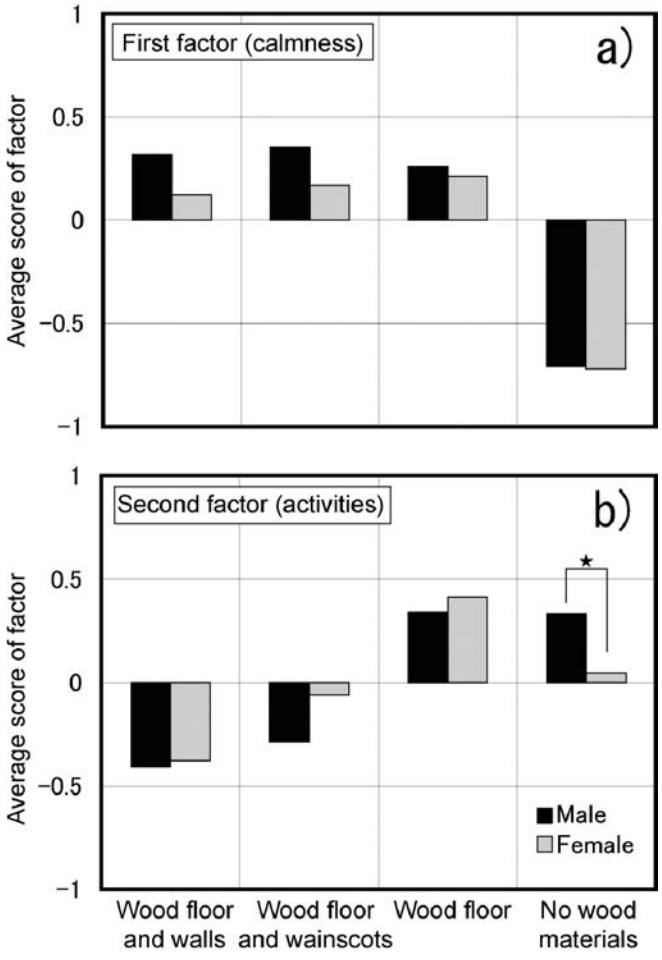

Fig. 5a,b. Average scores of factors by sex difference. **a** Desire for calmness, **b** desire for activities. *Stars* indicates significant difference at the 5% level

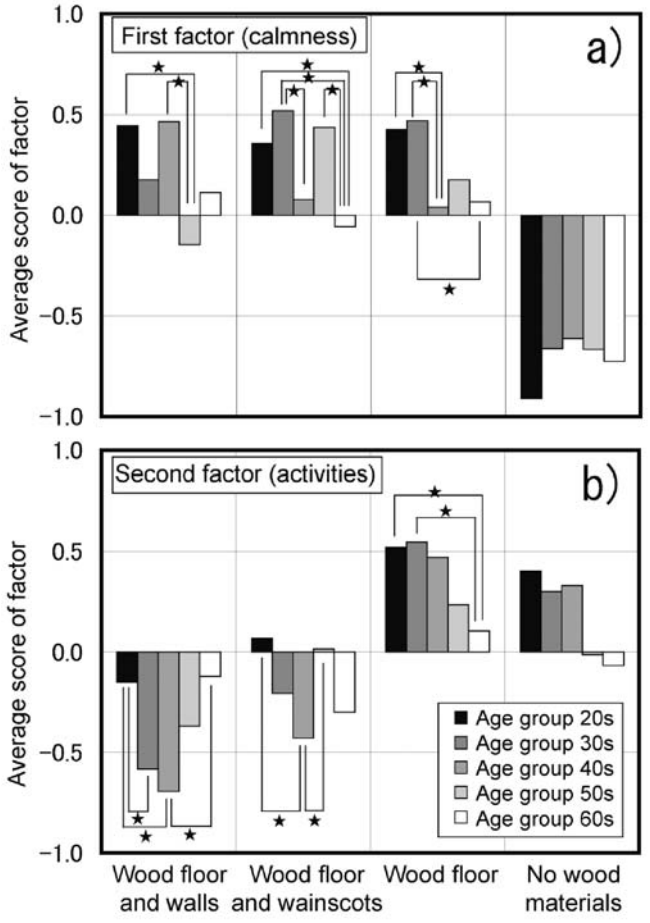

Fig. 6a,b. Average scores of factors by age group. **a** Desire for calmness, **b** desire for activities. *Stars* indicate significant difference at the 5% level

level of significance of 5% by the one-way analysis of variance. There was no difference based on sex for any of the photographed rooms with regard to the first factor (a desire for calmness, Fig. 5a). For the second factor (a desire for activities), the room without wood materials received a significantly low average from female interviewees in comparison with an average score made by male interviewees (Fig. 5b).

Figure 6 shows the average scores for the two factors by age group. Significant difference was examined at a level of significance of 5% by the one-way analysis of variance. For the first factor, there was no significant difference in the photographed room without wood finishes. However, the photographs with wood materials generated a difference in a desire for calmness according to age group: older age groups tended to have a lower desire for calmness (Fig. 6a). For the second factor, there was a tendency that the photograph without wood materials generated a lower desire for activities among age groups in their 50s or older, but there was no significant difference in comparison with the other age groups. The photographs with wood materials generated desires for activities differently according to age group (Fig. 6b). As for the room with the wood floor, there was a significant difference among age groups in their 20s, 30s, and 60s, and there was a tendency that older age groups had a lower desire for activities (Fig. 6b). In the result of the analysis according to age groups, the existence of knots in interior wood finishes may be a cause of the different tendencies with age.

Figure 7 shows the compared scores of desires for living in the photographed rooms. Significant difference was examined at a level of significance of 5% by the one-way analysis of variance. The room with no wood materials was unambiguously evaluated as “Do not want to live there” in comparison with the other photographs. The room with the wood floor was evaluated as “Want to live there” more so than the room with the wood floor and walls, and the room without wood finishes.

Conclusions

Efforts were made to quantify the impact of wood materials on the impression of rooms with feelings about living activities as indicators. The colored photographs of the rooms

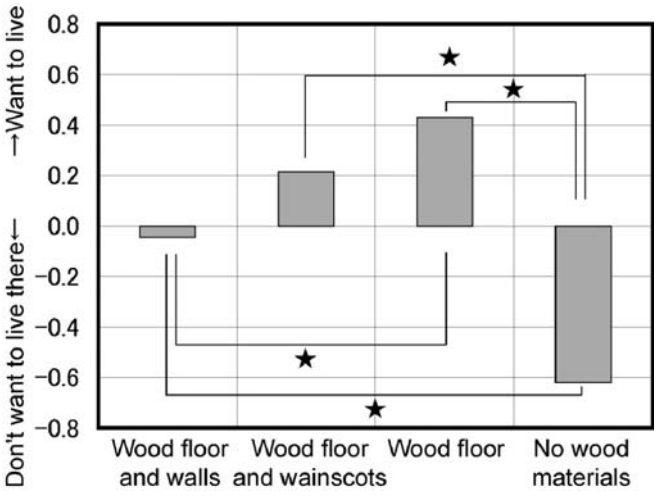

Fig. 7. Evaluation of habitability of each photographed room. *Stars* indicate significant difference at the 5% level

with wood materials used in different proportions were evaluated by the SD method with the use of comparative verbs based on living activities, such as "exercising," "working (studying)," "relaxing," "lying down," and "sleeping," and comparative evaluations of habitability as living spaces.

As a result, it was found that feelings about living activities obtained from the four photographs consisted of two factors (desire for calmness and desire for activities). The photographs with wood finishes (wood floor and walls, wood floor and wainscots, and wood floor) stimulated greater desires for calmness. The photograph without wood finishes induced an extremely low desire for calmness in comparison with the other photographs. The photographs with large proportions of wood finishes (wood floor and walls, and wood floor and wainscots) induced a low desire for activities, but the photograph with the wood floor, and the photograph without wood finishes stimulated significantly greater desires for activities. The photograph with the wood floor stimulated high desires for both calmness and activities, so it is thought that it can produce feelings suitable for various living activities. By analysis of the results according to sex difference, the room without wood materials generated a greater desire for activities among male interviewees in comparison with female interviewees. By analysis of the results according to age group, there was a tendency that older age groups had lower desires for both calmness and activities.

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