

# Evaluating Psychological Aspects of Wood and Laminate Products in Indoor Settings with Pictures

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## Abstract

Natural materials in indoor settings influence the human organism positively. Wood is a natural material and shows similar positive effects on the individual's well-being. Because of similar looks and functional properties, wood can be compared with laminate. However, when investigating psychological differences, wood is usually compared with carpets, glass, leather, stone, or plastic, but not compared with a visually similar material such as laminate. The aim of this study was to analyze and compare the different psychological perception of wood and laminate products in an indoor setting. This study further investigated what specific psychological aspects can differentiate wood from laminate products, and if wood is preferred over laminate and is more likely to be purchased. Different pictures that depict wood and laminate products in an indoor setting were used to evaluate the psychological perception. This evaluation included measuring 11 quality criteria, the perception of the environmental atmosphere, and the purchase decision. The experimental design was a  $2 \times 2 \times 2$  design with repeated measures for material and sequence. The sample consisted of 93 experts as well as nonexperts for wood. The result shows that wood products are rated higher than laminate products regarding several psychological aspects, such as health, physical and mental stimulation, and performance enhancement. In addition, wood products were rated significantly more warming and cozy, and the participants would recommend, purchase, and accept more deficiencies for purchasing wood products than for laminate products. Overall, the material wood was preferred over the material laminate.

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Natural materials like wood are traditionally used for construction and interior design (Nyrud et al. 2010). The main reasons for choosing wood in interior settings are aesthetics, a good atmosphere, healthy climate, hygienic factors, and reducing the risk of allergies, as well as ecological reasons (Rametsteiner et al. 2007, Werner and Richter 2007). However, most studies examine the environmental or technical advantage of wood (Hansmann et al. 2006, Cobut et al. 2012, Istikowati et al. 2014). Psychological aspects, like mental health or well-being, often remain in the background.

There are some studies investigating the psychological and emotional attributes of wood, indicating that wood is perceived differently than other materials like carpets, glass, leather, stone, or plastic (Spetic et al. 2005, Rice et al. 2006, Sakuragawa 2006). A similar material to wood is laminate. It has a similar appearance and is commonly used as a substitute for wood. For this reason one could assume that the same psychological attributes of wood can be applied to laminate. However, there are only a few studies comparing wood and laminate, indicating that both materials are evaluated differently (Berger et al. 2006, Overvliet and Soto-Faraco 2011).

As pointed out before, empirical studies that investigate positive effects of wooden materials often only highlight technical or environmental aspects (Hansmann et al. 2006, Cobut et al. 2012, Istikowati et al. 2014). If emotional or psychological differences are investigated, wood is usually compared with materials such as carpets, glass, leather, stone, or plastic, but not compared with a visually similar material such as laminate. Therefore, the aim of the present study was to investigate which specific psychological aspects can differentiate between wood and a similar

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material, like laminate, and if wooden materials are preferred over laminate materials and are more likely to be purchased.

## Theoretical Background

The use of wood is based on its availability and has a long history. In countries like Austria, Canada, Estonia, Finland, Japan, Norway, Sweden, and the United States wood products have a long tradition, especially for construction and interior decoration (Nyrud et al. 2010). The main reasons for the choice of wood are aesthetics, a good atmosphere, healthy climate, hygienic factors, and reducing the risk of allergies (Rametsteiner et al. 2007). Additionally, wood products tend to have a more favorable environmental profile, contributing less to the greenhouse effect and having less solid waste than other materials (Werner and Richter 2007). However, wood is chosen as an indoor material for more than just environmental, hygienic, and aesthetic reasons. Arguments preferring wood can be based on psychological or emotional assumptions, which are described in the next paragraphs.

In a review study by Rice et al. (2006) various materials such as wood, ceramics, glass, paper, leather, stone, and plastic were evaluated. Wood has been described as warmer, more natural, more homely, more relaxing, and more inviting. A similar result was found by Sakuragawa (2006), where rooms with wood flooring were rated as places where a person feels homey. Another study compared wooden floor and carpets in Canadian households (Spetic et al. 2005). The participants were asked to evaluate the floor by six different criteria. These were pleasantness, attractiveness, health, durability, ecological acceptability, and affordability. Wood was rated better in all criteria than the carpet, except in the criterion affordability, which was evaluated equally for both materials (Spetic et al. 2005).

Color and structure of the material have an effect on the evaluation of wood, because a smooth surface with a glossy coating leads to a cooler perception of wood, whereas a rough surface or untreated surface is evaluated as warmer (Grüll et al. 2012). Wood is also evaluated differently when different wood species are used (Bumgardner and Bove 2002). Interestingly, older participants with higher experience in furnishing interiors have a different psychological perception of wood than their younger, inexperienced counterparts (Bowe and Bumgardner 2004).

Reasons why wood has these positive psychological attributions have not been investigated in detail. Findings from other studies imply that natural materials or products in indoor settings—such as potted plants or pictures of landscapes—have a positive effect on the individual's well-being (Fjeld 2000, Chang and Chen 2005, Bringslimark et al. 2009, Han 2010, Kim et al. 2010). The attention restoration theory (ART; Kaplan 1995, 2001; Kaplan and Kaplan 2011) suggests that this restorative effect of watching natural materials is related to attention processes. Natural settings require less attention, allowing the individual to recover from stress, whereas urban settings require direct attention, where fast motion, loud noises, and other strong stimuli may be distracting. This restoration process is also possible when using pictures of plants, forests, or other landscapes (McSweeney et al. 2015). In line with ART, wood in indoor settings and even watching pictures of wooden interiors has a restorative effect, because attention

processes are not drawn to the surroundings, allowing people to recover.

Because of similar looks and same practical and functional properties, it could be assumed that the positive properties of wood can be transferred to laminate (Jonsson 2005, 2006). Owing to modern printing and processing techniques in the manufacturing of laminate floor, it is difficult to detect differences between laminate and wood floors, even for experts. However, findings indicate that both materials have different psychological characteristics. A study comparing wood with wood laminate showed that the participants were able to detect differences between both materials, and wooden material was attributed as more natural (Overvliet and Soto-Faraco 2011). In the study of Berger et al. (2006) participants had to feel three different floors (oiled wood, varnished wood, and laminate) with their hands and feet. The results showed that different properties were attributed to each material. Oiled wood appeared to the participants as warm, rough, and fairly soft. Varnished wood was described as rather cool, rather smooth, and rather hard; and laminate as cold, smooth, and hard.

Another psychological effect of wood is related to the individual's more exclusive and attractive rating of wooden materials (Spetic et al. 2005). One explanation for this result might be that natural products are generally preferred over synthetic products, because natural products are perceived as more healthy, sensory more attractive, purer, safer, and morally justifiable (Rozin et al. 2004). Wood is labeled as a natural material, and therefore these beliefs might influence the higher evaluation of wood (Overvliet and Soto-Faraco 2011). In line with this assumption, wood can affect the individual's purchase decision. Wood products are more likely to be purchased and consumers are more willing to pay additional money, especially if the wood product is certified or eco-labeled (Hansmann et al. 2006, Thompson et al. 2009). This so-called green consumer behavior motivates consumers to seek and buy green products (Roos and Nyrud 2008, Thompson et al. 2009).

The aim of this study is to evaluate the different psychological aspects of wood and laminate products in indoor settings with pictures. Laminate is used as a comparison because laminate has a similar appearance and is commonly used as a substitute for wood (Jonsson 2005, 2006).

In the present study, 11 quality criteria to evaluate both materials are analyzed (see Fig. 1). After ecological and technical aspects, these quality criteria also focus on psychological components, like atmosphere, physical and mental stimulation, performance enhancement, and values and symbolic functions. Additionally, the perceived atmosphere (Vogels 2008) and the economic aspect through purchase decisions were included. With the help of these criteria, the potential positive psychological and emotional impacts of wooden and laminate materials can be measured and analyzed.

In line with past research, it is assumed that wood has different psychological characteristics than other materials (Spetic et al. 2005, Rice et al. 2006, Sakuragawa 2006), and more specifically, than its laminate counterpart (Berger et al. 2006). In particular, we hypothesize that wood is rated differently in 11 quality criteria (Fig. 1) than laminate (Hypothesis 1). Further, we state that the indoor atmosphere is perceived as better when the interior is furnished with wood compared with laminate (Hypothesis 2).

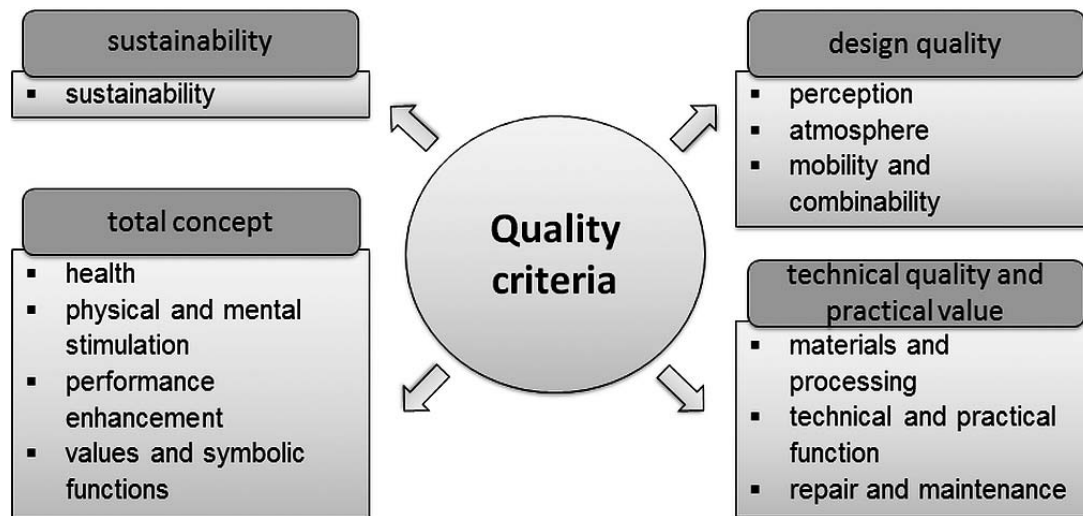


Figure 1.—Quality criteria for “green” product evaluation.

Next to these two hypotheses, further secondary research questions are relevant in this study: According to Bowe and Bumgardner (2004) individuals with more experience with wood products tend to rate wood differently than inexperienced individuals. Further, individuals paying attention to the conscious use of natural materials are more likely to purchase wood products (Roos and Nyruud 2008). Related to the purchase decision, we state that wooden products are more likely to be recommended as well as purchased and that individuals are more likely to invest more money.

## Materials and Methods

### Research design

The experimental design was a  $2 \times 2 \times 2$  within-between-subject design with repeated measures on the first and second factor. The first factor (IV1) was the product itself, which was subdivided into floor and cupboard. The participants either got to evaluate a floor or a cupboard. Floor and cupboard were used in this study because both products are typical furnishings where wood and laminate materials are used. The second factor (IV2) was the material of the product also subdivided into two parts, wood and laminate. And the third factor (IV3) was the sequence of the pictures. It was randomized so that the participants either got the wooden material first and then the laminate material or the laminate material first and then the wooden material to evaluate. The research design is shown in Table 1.

To avoid possible confounding variables such as color preferences or strong contrasts between the pictures, the comparison pictures were designed to be as similar as possible. For this reason the floor looks similar on both pictures but the label is different (hardwood vs. laminate flooring). The cupboard differs in the label (solid wood cupboard vs. laminate cupboard) and has minimal changes in color as well as in surface structure. However, it was ensured that both pictures look as similar as possible (Fig. 2).

The participants assessed just one of the products, either the two pictures of the floor or of the cupboard. Accordingly, they compared the wood floor with the laminate floor or the wood cupboard with the laminate cupboard. The sequence of the pictures was randomized.

### Participants and experimental conditions

The total sample of the study consists of 93 Austrian participants, including 40 men (43%) and 53 women (57%). The average age of the participants was 38 years ( $SD = 10.3$ ). Forty-eight percent of the participants worked with wood in their profession, for example in design, development/research, sales, or marketing. These people were rated as experts, whereas the rest (52%) were rated as nonexperts. The majority of the participants (69%) had studied at university level. An understanding of quality and awareness of quality was presented in the sample. Seventy-three percent of the sample was paying attention to the conscious use of natural materials. Moreover, 85 percent of the participants were working in a health related job.

### Measures

*Quality criteria catalog for green product evaluation.*—The quality criteria catalog for “green” products with 35 items was used. This questionnaire was developed in this project and used for the first time in this study. A copy of the questionnaire (in German) is available from the corresponding author upon request. The 35 items can be categorized into 11 subscales: (1) sustainability, (2) materials and processing, (3) technical and practical function, (4) repair and maintenance, (5) perception, (6) atmosphere, (7) mobility and combinability, (8) health, (9) physical and mental stimulation, (10) performance enhancement, and (11) values and symbolic functions. These subscales can be assigned to the four dimensions sustainability, technical quality and practical value, design quality, and total concept (Fig. 1). The items are worded as statements, e.g., “The

Table 1.—The research design.<sup>a</sup>

IV1: Product	IV2: Material	IV3: Sequence	
Floor	A: Wood	A/B	B/A
	B: Laminate		
Cupboard	A: Wood	A/B	B/A
	B: Laminate		

<sup>a</sup> Shown are the three independent variables (IV1–3): product, material, and sequence.



Hardwood flooring



Laminate flooring



Solid wood cupboard



Laminate cupboard

Figure 2.—Pictures of flooring and cupboard.

product has a calming effect” (for the subscale physical and mental stimulation) and are rated on a 5-point rating scale “not fulfilled (0 percent)” to “fulfilled (100 percent).” The reliability for the quality criteria catalog for green product evaluation (QCC-GPE) was calculated with the data of the present study. The questionnaire has a high reliability by having internal consistencies of 0.67 to 0.97 for the 11 subscales. The participants filled in the questionnaire two times—for material wood and material laminate—and thus the results show the temporal stability of the questionnaire as well. Internal consistencies, retest-reliabilities, and sample items are shown in Table 2.

*Environmental atmosphere.*—To evaluate the environmental atmosphere of the pictures, an adapted version of the questionnaire “Atmosphere Metrics” (Vogels 2008) called “Environmental Atmosphere” (EA; Denk et al. 2011) was used. This questionnaire uses different adjectives to measure the ambient atmosphere of an environment. On a 7-point rating scale, the participants rated the atmosphere of the environment subjectively between the response options 1 “not at all” to 7 “completely.” Items were, for example, “secure,” “inspiring,” and “spacious.” Of the 40 original adjectives that have been translated from Dutch, 16 adjectives were chosen for statistical analysis. These 16 adjectives can be classified into four dimensions (this adaption differs from the four dimensions of Vogels 2008).

The dimensions are coziness, negative emotional appraisal, dynamics, and objectivity.

*Purchase decision.*—In addition to the quality criteria, questions about the purchase decision were asked: “Would you recommend the product?” “Would you buy the product?” “Would you accept deficiencies (for example availability, cost, etc.) for the purchase of the product?” These questions were evaluated on a 5-point rating scale from “unlikely” to “very likely.”

Table 2.—Internal consistencies (Cronbach’s alpha) and retest-reliability of the 11 subscales of QCC-GPE.<sup>a</sup>

QCC-GPE subscales	$\alpha$
Sustainability	0.89/0.93
Materials and processing	0.91/0.90
Technical and practical function	0.89/0.82
Repair and maintenance	0.75/0.67
Perception	0.95/0.96
Atmosphere	0.94/0.96
Mobility and combinability	0.92/0.91
Health	0.94/0.95
Physical and mental stimulation	0.92/0.97
Performance enhancement	0.93/0.94
Values and symbolic functions	0.85/0.91

<sup>a</sup> QCC-GPE = quality criteria catalog for green product evaluation;  $\alpha$  = Cronbach’s alpha.

## Procedure

The survey took place between February and March 2012. The participants got access to the questionnaires via an online link. The link to the survey was sent to the Styrian Group of Wood Organizations (Holzcluster Steiermark) and its cluster members. In addition, participants were recruited in various online forums and on websites. The sample of interest consisted of experts and nonexperts in the field of wood (production, sales, etc.). There was no selection or exclusion criterion for taking part in the study.

The procedure was as follows: the participants in this online survey either got a color photograph of a cupboard or a floor to evaluate, which was selected randomly by the computer. This means that the participants evaluated only one of the products (either floor or cupboard) but both materials (wood and laminate). Accordingly, they compared the wood floor with the laminate floor or the wood cupboard with the laminate cupboard. The sequence of the pictures was also randomized, e.g., the participants either got to evaluate the picture with the wood product first followed by the laminate product or they got the laminate product first followed by the wood product. In addition to the pictures, the participants got a short text (“product description”) about the product they should evaluate. Both pictures had to be evaluated separately by filling in the questionnaire’s QCC-GPE (for the evaluation of the product), EA (for the evaluation of the atmosphere of the room), and finally the three items for purchase decision two times.

## Statistic methods

Data analyses were carried out using SPSS 20.0 for Windows. For the data analyses, the significance level was set at 5 percent. To analyze the results of the questionnaires, univariate and multivariate analyzes of variance with repeated measures were calculated. Additionally, performed canonical correlation was performed with the data from the quality criteria catalog and the data from the purchase decision.

One of the 93 participants had to be excluded because of too many missing data. With the remaining 92 participants, the first hypothesis could be tested. For the second hypothesis, 86 participants were analyzed because six participants cancelled their participation during the online survey.

## Results

### Evaluation of psychological effects with the QCC-GPE (Hypothesis I)

First, the sequence effects were analyzed. The multivariate analyzes of variance showed no significant sequence effects ( $F_{11,77} = 1.8$ ,  $P = ns$  [not significant]). This means that the sequence of the pictures (wood–laminate or laminate–wood) did not affect the evaluation of wood or laminate products. The picture with the floor showed significantly better evaluation than the picture with the cupboard ( $F_{11,77} = 5.343$ ,  $P < 0.01$ ). This result was independent of the material (wood and laminate).

In the first hypothesis it was stated that wood is rated differently in 11 quality criteria than laminate. We found significant differences in the evaluation of the material ( $F_{11,77} = 35.689$ ,  $P < 0.01$ ). In 10 of 11 quality criteria the wood products were rated significantly higher than the

laminate products (see Fig. 3). All means, standard deviations (SD),  $F$  values, degrees of freedom, and  $P$  values for the univariate tests are listed in Table 3.

After testing the first hypothesis, the secondary research questions were analyzed. Significant differences could be found for experts versus nonexperts for rating the materials ( $F_{10,81} = 2.507$ ,  $P < 0.05$ ). Experts evaluated wood products significantly higher than nonexperts in the criteria physical and mental stimulation ( $F_{10,90} = 7.829$ ,  $P < 0.01$ ) and performance enhancement ( $F_{10,90} = 4.438$ ,  $P < 0.05$ ).

Participants who consciously use natural materials rated the following quality criteria significantly higher: perception ( $F_{10,90} = 7.733$ ,  $P < 0.05$ ), atmosphere ( $F_{10,90} = 7.233$ ,  $P < 0.05$ ), health ( $F_{10,90} = 4.039$ ,  $P < 0.05$ ), and sustainability ( $F_{10,90} = 4.062$ ,  $P < 0.05$ ).

Regarding gender or occupation, no additional differences for the evaluation of wood and laminate products could be found.

### Evaluation of the EA (Hypothesis 2)

The multivariate analyzes of variance showed no significant results for sequence effects ( $F_{4,79} = 1.575$ , ns). Comparing the two products, the room with the floor was rated significantly more friendly than the room with the cupboard ( $F_{4,79} = 5.809$ ,  $P < 0.01$ ).

A large difference was found in the evaluation of the material ( $F_{4,79} = 26.149$ ,  $P < 0.01$ ; see Fig. 4). The rooms with wood products were rated significantly better than the rooms with laminate products in the dimensions coziness and dynamics, and significantly worse in the dimension negative emotional appraisal (results of the univariate tests; see also Table 3). In this context, the laminate cupboard was assessed very negatively. The picture of this room was rated very high in the dimension negative emotional appraisal ( $F_{1,82} = 8.792$ ,  $P < 0.01$ ).

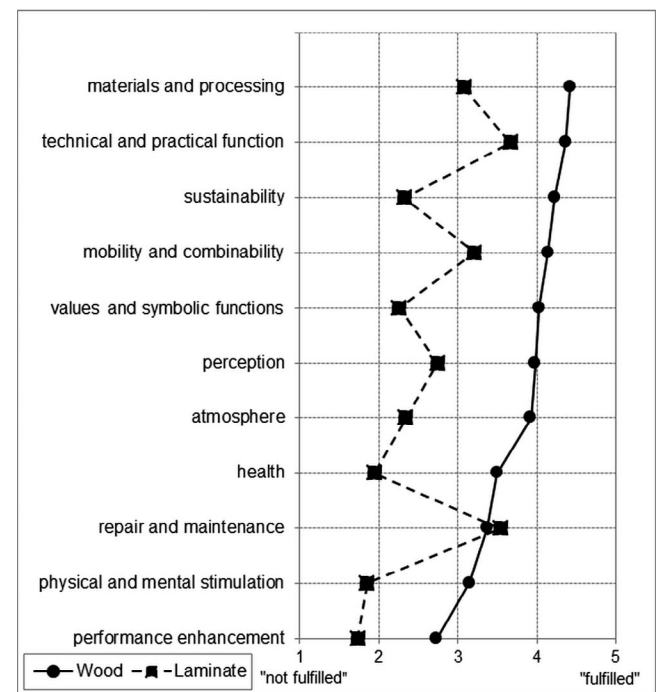


Figure 3.—Evaluation of the quality criteria subscales for wood and laminate products.

Table 3.—Means, standard deviations, F values, and P values of the QCC-GPE, EA metrics, and purchase decision for wood and laminate products.

Variable <sup>a</sup>	Mean (SD)		F	df	P
	Wood	Laminate			
<b>QCC-GPE</b>					
Sustainability	4.23 (0.60)	2.32 (0.82)	373.109	1.87	0.000
Materials and processing	4.42 (0.58)	3.08 (0.97)	163.185	1.87	0.000
Technical and practical function	4.36 (0.68)	3.67 (0.93)	40.598	1.87	0.000
Repair and maintenance	3.37 (0.90)	3.54 (0.81)	1.686	1.87	0.198
Perception	3.98 (1.01)	2.74 (1.16)	91.605	1.87	0.000
Atmosphere	3.92 (1.02)	2.34 (1.04)	150.169	1.87	0.000
Mobility and combinability	4.14 (0.91)	3.21 (1.06)	55.540	1.87	0.000
Health	3.50 (1.03)	1.95 (0.86)	161.725	1.87	0.000
Physical and mental stimulation	3.15 (1.04)	1.85 (0.87)	107.326	1.87	0.000
Performance enhancement	2.73 (1.10)	1.74 (0.85)	70.842	1.87	0.000
Values and symbolic functions	4.03 (0.95)	2.26 (0.89)	185.277	1.87	0.000
<b>EA</b>					
Coziness	4.65 (1.25)	2.90 (1.38)	94.420	1.82	0.000
Dynamics	4.44 (1.19)	3.16 (1.21)	62.971	1.82	0.000
Objectiveness	4.03 (0.69)	4.11 (0.89)	0.492	1.82	0.485
Negative Emotional Appraisal	2.27 (1.07)	3.60 (1.45)	55.467	1.82	0.000
Would you recommend this product?	2.22 (0.99)	3.92 (0.95)	181.680	1.88	0.000
Would you buy this product?	2.65 (1.21)	4.25 (0.91)	116.882	1.88	0.000
Would you accept more deficiencies for the purchase of this product?	3.23 (1.20)	4.53 (0.80)	97.741	1.88	0.000

<sup>a</sup> QCC-GPE = quality criteria catalog for green product evaluation; EA = environmental atmosphere.

Regarding gender, expert status, and occupation, no group differences were found.

### Purchase decision (secondary research question)

The analysis showed that there was a sequence effect for the question “Would you buy the product” ( $F_{3,86} = 3.768, P < 0.05$ ). This means in detail, when first a laminate product is shown and next a wood product, then people prefer buying the wood product ( $F_{1,88} = 5.597, P < 0.05$ ). The different products (floor vs. cupboard) do not influence the purchase decision ( $F_{3,86} = 1.928, ns$ ).

For material (wood vs. laminate) significant differences could be found ( $F_{3,86} = 60.862, P < 0.01$ ). Compared with laminate products, people would recommend wood products ( $F_{1,88} = 181.680, P < 0.01$ ), and people also were interested in purchasing the wood product themselves ( $F_{1,88} = 116.882, P < 0.01$ ). They even would accept more deficiencies for the purchase of the wood product ( $F_{1,88} = 97.741, P < 0.01$ ) than for laminate products (see Table 3).

People who pay attention to the conscious use of natural materials showed significantly different responses to all three questions ( $F_{3,88} = 3.271, P < 0.05$ ). They would rather recommend and purchase a wood product and rather accept more deficiencies for the purchase of the wood product compared with a laminate product. Regarding gender, expert status, and occupation, no difference could be found.

In addition to the analyses of variance, a canonical correlation was calculated. This serves to predict the purchase decision by the QCC-GPE. In the condition “wood” the question “Would you recommend the product?” in relation with the 11 quality criteria reached a correlation coefficient of 0.85, and in the condition laminate it reached a coefficient of 0.81. Taking a deeper look at the results, this means that for a recommendation of both materials, the quality criteria mobility and combinability

(wood,  $\beta = 0.31, P < 0.01$ ; laminate,  $\beta = 0.30, P < 0.01$ ) and perception (wood,  $\beta = 0.32, P < 0.01$ , laminate,  $\beta = 0.31, P < 0.05$ ) were particularly important. Additionally, the criteria health ( $\beta = -0.30, P = 0.05$ ) played a relevant role for the material laminate, as did the criterion sustainability ( $\beta = 0.25, P < 0.01$ ) for wood products.

For the other two purchase questions (“Would you buy the product?” and “Would you accept deficiencies (for example availability, cost, etc.) for the purchase of the product?”) no significant results were found.

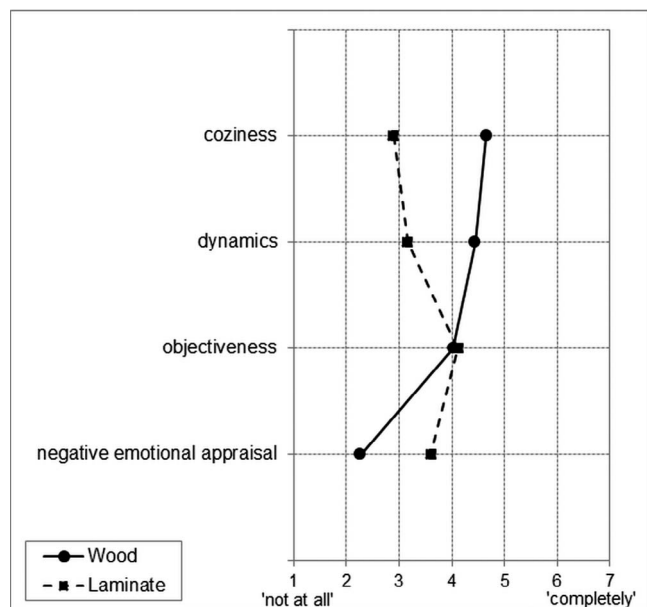


Figure 4.—Evaluation of the environmental atmosphere.

## Discussion

The aim of this study was to analyze the different psychological aspects of wood and laminate products in indoor settings with pictures. To reach this aim, 11 quality criteria, the perceived atmosphere, as well as the purchase decision, were investigated.

### Psychological aspects of wood products

The results of the present study verify our first hypothesis: Wood in interior settings, like flooring and cupboards, has different psychological attributes than laminate. The findings show that wood products are rated higher than laminate products in 10 of 11 quality criteria.

To interpret the findings with focus on psychological effects, it is necessary to look closely at the single results of every questionnaire. For the quality criteria (QCC-GPE), this study shows that wood is rated higher than laminate, for both nonpsychological (sustainability, materials and processing, technical and practical function, mobility, and combinability) and psychological criteria (health, physical and mental stimulation, performance enhancement, values and symbolic functions, perception, atmosphere). This particularly means that the participants' think that wood has a positive effect on health, is more stimulating, and is able to enhance their performance. Furthermore, wood products have more symbolic functions and values than laminate products. Wood products are perceived as more natural, modern, and exclusive than their laminate counterparts. This result is supported by previous research, where wood is rated as more exclusive and attractive (Spetic et al. 2005).

Berger et al. (2006) as well as Nyrud et al. (2010) already postulated that the use of wood in indoor settings positively influences the human organism. The presented results also show that wood products have been attributed a potential positive effect on health in comparison with laminate products. The criteria "health" and "physical and mental stimulation" are rated significantly higher for wood than for laminate products. People believe that wood is a material that can reduce stress, raise well-being, and increase the quality of life. Previous research found similar results of this effect on psychophysiological parameters for wood products (Kelz et al. 2011) and natural outdoor settings (Kaplan 1995, Laumann et al. 2003). This health-beneficial effect of wood can be explained with ART (Kaplan 1995, 2001; Kaplan and Kaplan 2011). According to this theory, natural settings such as wooden interiors have a restorative effect because natural settings require less attention, allowing individuals to recover.

In our second hypothesis, we stated that the indoor atmosphere is perceived as better when the interior is furnished with wood compared with laminate. In the present study, wood products were rated significantly higher in the criterion atmosphere, which includes the items "warming and cozy" (QCC-GPE) and on the scale coziness of the EA. On the other hand, the environmental atmosphere of laminate products was rated as emotionally negative. Wood is often associated with characteristics like warmth and coziness (Rice et al. 2006), and our findings support these findings.

We also found a difference between experts and nonexperts. If a person was working with wood (expert), the criteria physical and mental stimulation and perfor-

mance enhancement were rated higher for wood. This is in line with previous research, where more experienced individuals rated wood differently than inexperienced individuals (Bowe and Bumgardner 2004). Participants who pay attention to the conscious use of ecological materials rated the criteria perception, atmosphere, health, and sustainability better for the wood material.

The analysis further shows that the pictures of the floor were rated significantly higher than the pictures of the cupboard. This result is independent of the researched material (wood or laminate). The same result was found for the evaluation of the environmental atmosphere. The participants found the floor significantly friendlier than the cupboard. A reason for this result could be that the pictures with the floor were more attractive or more beautifully designed. An additional reason could be the positive association of the floor picture with a bedroom and the negative association of the cupboard picture with an office. Chang and Chen (2005) showed that pictures of office workplace environments are able to effect peoples' physiological condition by influencing the degree of tension and anxiety.

### Purchase decision

Next to hypothesis testing, analyzing the purchase decision was the secondary research question in the present study. The study results show that people would rather buy and recommend wood products instead of laminate products. Additionally, they accept more deficiencies for the purchase of wood product than they do for the purchase of laminate product. These findings support previous research, where wood products are preferred over synthetic products and are more likely to be bought because of their environmental characteristics and eco-friendliness (Hansmann et al. 2006, Thompson et al. 2009, Overvliet and Soto-Faraco 2011). Potentially, the value and quality of a product are important aspects for a purchase decision (Toivonen 2012). Because wood is perceived as more sustainable and more exclusive/modern in the present study, the participants would also recommend, buy, and accept more deficiencies for purchasing a wood product. Recommending wood products to other people is in accordance with the results that wood is always preferred over laminate and that people would buy it themselves.

Similar to previous studies (Roos and Nyrud 2008, Thompson et al. 2009) participants with a conscious use of natural materials would rather recommend, purchase, and accept more deficiencies for the purchase of wood products compared with laminate products. Therefore, by putting emphasis on the quality and environmental characteristics of wood, the consumer's decision to invest money in wooden products can be affected (Toivonen 2012).

A very interesting result is that the QCC-GPE could predict a recommendation of the products. After a person has evaluated a wood product with the quality criteria it is possible to predict whether the person recommends a wood product or not. This specifically means that if people give high ratings in the following three criteria—mobility and combinability, perception, sustainability—they would recommend buying the product. This result is supported by previous research, where the appearance, technical characteristics, and environmental aspects of wood products are linked to the consumer's positive perception of the product

(Roos and Nyrud 2008, Toivonen 2012). However, with the QCC-GPE it is not possible to predict a purchase.

## Limitations

Most studies use visual (Nordvik and Broman 2005) or tactile (Berger et al. 2006) properties for the evaluation of natural environments, materials, and products. For the present study we focused on the visual evaluation of pictures (photographs). One could argue that using pictures is not appropriate to evaluate wood and laminate surfaces. In the study of Nordvik and Broman (2005) participants rated pictures of rooms with different wood products (e.g., floors, cabinets, wall coverings, tables). The results of the study showed that it is difficult to evaluate wood products using only pictures. Many factors such as texture, light, shadow, and similar effects cannot be accentuated on photos. Nevertheless, looking at pictures only corresponds more to the real-life situation of first looking at products on the Internet, and then buying the products, and finally touching the products. Using pictures only to assess the perception of nature therefore is in line with previous research (Manning and Freimund 2004, Martín-López et al. 2007, Kaplan and Kaplan 2011). Manning and Freimund (2004) even stated that the research validity of this method is similar to conventional tests and is not greatly influenced by methodological problems. Nevertheless, future studies should investigate whether our findings can be replicated with real products including other senses (e.g., haptic, acoustic) to evaluate wood and laminate materials. A second study using real wood products was conducted by the authors of this study and currently is in preparation.

Another limitation relates to the structure of our sample. The sample consists of a high number of university participants (69%) and also participants working with wood (48%), which does not represent the general population. Additionally, more educated consumers are more likely to purchase “green” materials, such as wood products (Roos and Nyrud 2008). Therefore, the study findings should be interpreted for a more educated sample, which is also the potential target group for purchasing wood products.

## Conclusions

In this article, the psychological attributes of wood and laminate products were investigated in an online study with pictures. The results show that the psychological aspect of the material wood is evaluated significantly higher than the material laminate by assessing photographs of floors and cupboards. Particularly, the study participants rated wood as healthier, as physically and mentally stimulating, and as able to enhance performance. The participants also rated wood products as significantly more warm and cozy than laminate products. Further, wood products are more likely to be purchased and recommended, and people are more likely to accept deficiencies for the purchase of wood products than for the purchase of laminate products.

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