

Kawaii Feeling in Tactile Material Perception

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Abstract: In the 21st century, the importance of kansei (affective) values has been recognized. However, since few studies have focused on kawaii as a kansei value, we are researching its physical attributes of artificial products. We previously performed experiments on kawaii shapes, colors, and sizes. We also performed experiments on kawaii feelings in material perception using virtual objects with various visual textures and actual materials with various tactile textures. This article describes the results of our new experiment on kawaii feeling in material perception using materials with various tactile textures corresponding with onomatopoeia, clarifying the phonic features of onomatopoeia with materials evaluated as kawaii. The obtained results are useful to make more attractive industrial products with material perception of kawaii feeling.

Key words: *kansei value, kawaii, tactile sensation, material perception, onomatopoeia*

1. Introduction

Recently, the kansei (affective) value has become crucial in industrials in Japan. The Japanese Ministry of Economy, Trade and Industry (METI) determined that it is the fourth most important characteristic of industrial products after function, reliability, and cost [1]. According to METI, it is important not only to offer new functions and competitive prices but also to create a new value to strengthen Japan's industrial competitiveness. Focusing on kansei as a new value axis, METI launched the "Kansei Value Creation Initiative" in 2007 [1,2] and held a kansei value creation fair called the "Kansei-Japan Design Exhibition" at Les Arts Decoratifs (Museum of Decorative Arts) at the Palais du Louvre in Paris in December 2008. Launched as an event of the "Kansei Value Creation Years," the exhibition had more than 10,000 visitors during its ten-day run and was received favorably [3].

In Japan, the cute aesthetic is widely used by many organizations and for many purposes, including police mascots [4] and warnings for dangerous areas [5]. Although using cute to motivate and inform might seem strange, cute offers potential. Dr. Cheok et al. at the National University of Singapore argued that Japanese kawaii embodies a special kind of cute design that reduces fear and increases the appeal of dreary information [6]. Various Japanese kawaii characters such as Hello Kitty and Pokemon have become popular all over the world. In this article, the cuteness of those characters is called kawaii, which is a Japanese word that represents an affective value; it has such positive meanings as cute, lovable, and small.

For the past several years, we have been focusing on the kawaii attributes of industrial products or the interfaces of interactive systems, because we consider kawaii as an important kansei value. However, since few studies have focused on kawaii attributes, we systematically analyze the kawaii interfaces themselves: the kawaii feelings caused by such attributes as shapes, colors, and materials. Our aim is to clarify a method for constructing a kawaii interface from our research results. We believe that kawaii has the potential to become an important kansei value for future interactive systems and industrial products.

We previously performed experiments and obtained interesting tendencies about kawaii attributes [7,8,9,10,11]. For example, such curved shapes as torii and spheres tend to be evaluated as more kawaii than straight-lined shapes [8,9].

In addition, we performed basic experiments for kawaii feelings of material perception using various visual textures of virtual objects and various tactile textures of actual materials [12]. This paper describes our further study about the kawaii feelings of material perception using materials with various tactile textures corresponding with onomatopoeia, clarifying the phonic features of onomatopoeia with materials evaluated as kawaii.

2. Previous Experiment for Kawaii Feelings of Visual Material Perception for Virtual Objects

2.1 Method

We employed a 46-inch-LCD monitor and polarized glasses to stereoscopically show virtual objects for the experimental setup. Based on the results of our previous experiments [9,10,11], we employed a cylinder for the shape of the objects, and pink for their color.

We employed nine textures (Figure 1). Participants were randomly presented nine objects one by one for 20 seconds to evaluate their kawaii degree on a 7-point Likert Scale, where -3 is extremely non-kawaii, 0 is neutral, and +3 is extremely kawaii. Participants also justified their evaluations.

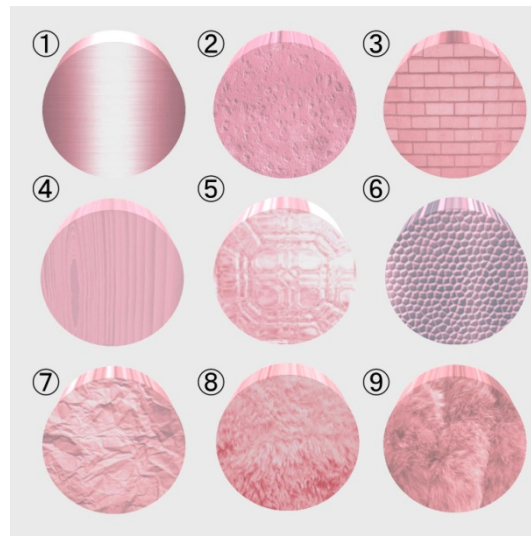


Figure 1 Nine displayed objects

2.2 Results and discussion

We performed our experiments with nine female and nine male students in their 20s. Figure 2 shows the results for each texture, where the vertical axis shows the kind and the horizontal axis shows the ratio of each scale. From this figure and free description of the reason of the scores, we obtained the following results:

- Each texture got both scores of the kawaii group such as +3, +2, and +1 and the non-kawaii group such as -3, -2, and -1.
- Textures #9, #8, #3, and #4 have relatively high scores.
- Textures #2, and #6 have relatively low scores.
- Although each texture has both positive and negative scores, a large difference exists among the averages of the textures; a product's texture affects its kawaii degree.

- Textures evoking words related to such tactile sensation as soft, furry, and tangible are generally kawaii.

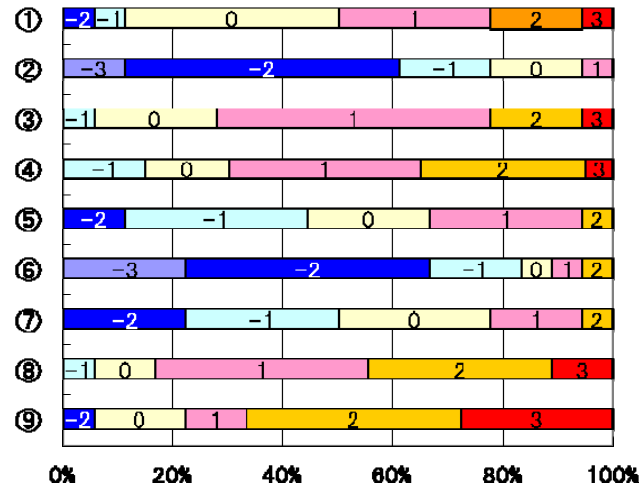


Figure 2 Questionnaire results for each texture

3. Previous Experiment for Kawaii Feelings of Tactile Material Perception

3.1 Method

From the results of the above experiment, we performed the experiment using real tactile materials.

We employed 109 materials with different tactile sensations [12]. The features of those materials were that they were linked to Japanese onomatopoeias such as “mocomoko” and “zarazara” [13]. Examples of tactile materials are shown in Figure 3.



Figure 3 Examples of tactile materials

Blindfolded participants were shown paired materials one by one and asked to determine which more kawaii. The answer of participant was “Right,” “Left,” or “Same.” All materials were ranked by a quick sort algorithm (Figure 4).

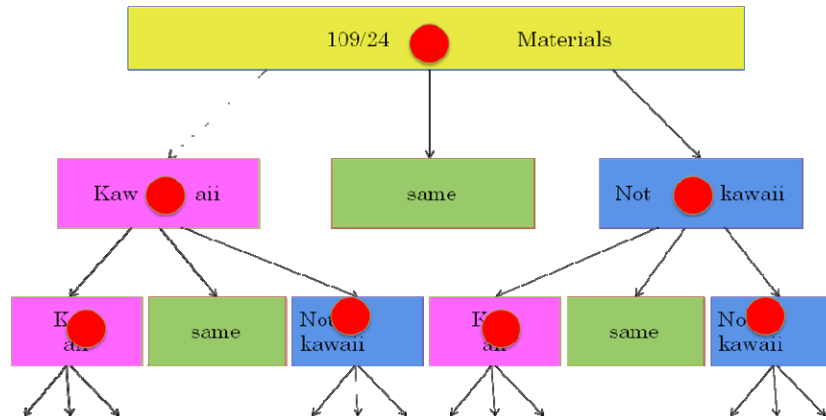


Figure 4 Quick sort algorithm

3.2 Results and discussion

We performed experiments with two female and two male participants. It took 2 to 3 hours for each experiment and learned that four materials were deemed kawaii the first two times by all participants and eight materials by three out of four participants. On the other hand, no materials were deemed not-kawaii the first two times by all participants and four materials by three out of four participants. Table 1 shows four kawaii and four not-kawaii materials with linked onomatopoeias. These results indicate that we can define kawaii (and not-kawaii) tactile materials using the materials we employed.

From the comparison results for each participant, we ranked the kawaii degree of each material, where the ranks were identical when the materials were judged the same by the participants. Then we averaged the kawaii ranks of all the participants. We defined the materials from the top and the 20th as the kawaii group, and materials from 90th to the bottom as the non-kawaii group. By comparing these two groups, we obtained the following:

- Kawaii group has such features as bushy, fluffy, soft, smooth, and elastic. On the other hand, non-kawaii group has such features as crumbly, hard, and rough.
- The onomatopoeias of the kawaii group have such consonants as /f/, /m/, and /p/. On the other hand, those of the non-kawaii group have /z/, /j/, and /g/.

Table 1. Outline of kawaii and not-kawaii tactile materials

Kawaii/Not-kawaii	Tactile materials	Onomatopoeia 1	Onomatopoeia 2
Kawaii	Yarn	Jashijashi	Wasawasa
	Cotton	Fukafuka	Mokomoko
	Sheep boa fabric	Pofupofu	Mofumofu
	Cotton cloth	Fusafusa	Mosmosa
Not-kawaii	Large drop of sand	Jarijari	
	Granite stone	Gorogoro	Zaguzagu
	Vibration-absorbing pad	Kunikuni	Pokopoko
	Sand paper	Jusajusa	Jorijori

These results resemble those of the experiment for virtual visual objects and suggest that common features of kawaii feeling exist in material perception.

4. New Experiment for Kawaii Feelings of Tactile Material Perception

4.1 Method

We selected 24 materials out of 109 materials based on their averaged orders obtained the previous experiment described above and their corresponding onomatopoeia as follows:

- The 24 materials are spread from the most kawaii to the least kawaii.
- Each selected material has /a/, /u/ or /o/ as the vowel of the first syllable of its corresponded onomatopoeia.
- All consonants such as /p/, /m/, have at least 2 corresponding materials which have those consonants in their first syllables of corresponding onomatopoeia.

Blindfolded participants were shown paired materials one by one and asked to determine which more kawaii, as the same way as the previous experiment.

4.2 Results

We performed experiments with thirty participants, ten female in their 20's, ten male in their 20's, five female in their 40's or 50's, and five male in their 40's or 50's. Averaged orders for all materials of four participant's groups are shown in Figure 5, where the vertical axis shows the averaged kawaii order and the horizontal axis shows the tactile materials. The material table in averaged kawaii order is shown in Table 2. The correlation coefficients for four participant's groups are shown in Table 3.

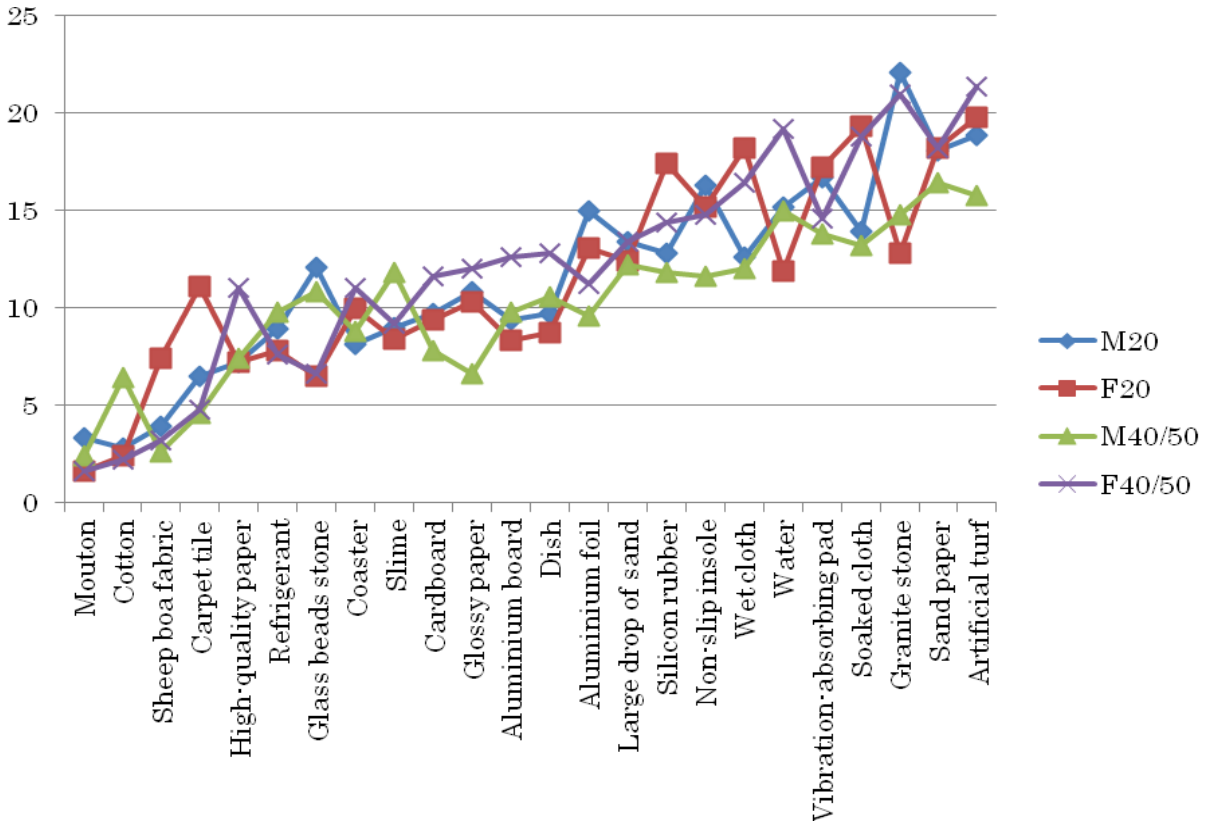


Figure 5 Averaged orders of all materials

Table 2. Material table with averaged kawaii order with corresponding onomatopoeia

Averaged order	Tactile material	Onomatopoeia 1	Onomatopoeia 2
1	Mouton	Fusafusa	Mofumofu
2	Cotton	Fukafuka	Mokomoko
3	Sheep boa fabric	Pofupofu	Mofumofu
4	Carpet tile	Fusafusa	Mowamowa
5	High-quality paper	Sawasawa	Subesube
6	Refrigerant	Bunyabunya	Bnyubnyu
7	Glass beads stone	Shakashaka	Tsubutsubu
8	Coaster	Kasakasa	Shurushuru
9	Slime	Zubuzubu	Zubozubo
10	Cardboard	Kasakasa	Kasukasu
11	Glossy paper	Subesube	Tsurutsuru
12	Aluminium board	Tsurutsuru	Subesube
13	Dish	Tsurutsuru	Gochigochi
14	Aluminium foil	Kasakasa	Gashigashi
15	Large drop of sand	Jarijari	-
16	Silicon rubber	Kunyukunyu	Nyuninyuni
17	Non-slip insole	Zarazara	Butsubutsu
18	Wet cloth	Gushogusho	-
19	Water	Jabujabu	-
20	Vibration-absorbing pad	Kunikuni	Pokopoko
21	Soaked cloth	Guchogucho	-
22	Granite stone	Gorogoro	Zaguzagu
23	Sand paper	Jusajusa	Jorijori
24	Artificial turf	Zakuzaku	Jogijogi

Table 3. Correlation coefficients

	Male 20's	Female 20's	Male 40's 50's	Female 40's 50's
Male 20's	-			
Female 20's	0.78	-		
Male 40's 50's	0.88	0.73	-	
Female 40's 50's	0.88	0.82	0.87	-

From these results, we obtained the following:

- The averaged orders for four groups have strong positive correlations, which mean that there are no differences between genders and generations.

- The most kawaii materials in the average are Mouton, Cotton, Sheep boa fabric, and Carpet tile regardless of genders and generations.
- The onomatopoeias of the most kawaii materials have such consonants as /f/, and /m/. On the other hand, those of the least kawaii materials have /z/, /j/, and /g/.

In addition, the most kawaii materials have physical features as bushy, fluffy, soft, and “like animal hair.” This tendency is similar to both previous experiments for visual and tactile material perceptions.

5. Discussion

As the results of our previous studies for visual attributes of objects, we obtained the following:

- We can evaluate kawaii shapes, and the round shapes are judged more kawaii regardless of genders.
- We can evaluate kawaii colors, and there exist a certain differences for kawaii colors between genders.

From the experimental results for tactile attributes of objects described above, we obtained the following:

- We can evaluate kawaii tactile feelings.
- There is no difference between genders and generations for kawaii tactile sensations of material perception.
- The onomatopoeias of the most kawaii materials have such consonants as /f/, and /m/. On the other hand, those of the least kawaii materials have /z/, /j/, and /g/.
- The physical features of kawaii tactile materials are similar to those evoked from kawaii textures, which are bushy, fluffy, soft, and “like animal hair.”

For manufacturing process, shapes and tactile features of materials for an industrial product are more difficult to prepare various types compared with the preparation of various colors. Therefore, it is a useful finding to clarify the tendencies of attributes of materials with kawaii tactile feeling in common between genders and generations.

6. Conclusions

In the 21st century, the importance of kansei (affective) values has been recognized. However, since few studies have focused on kawaii as a kansei value, we are researching its physical attributes of artificial products. We performed experiments on kawaii feelings in material perception using virtual objects with various visual textures and actual materials with various tactile textures.

This article describes the results of our new experiment on kawaii feeling in material perception using materials with various tactile textures corresponding with onomatopoeia. From the experimental results, we obtained the following:

- We can evaluate kawaii tactile feelings.
- There is no difference between genders and generations for kawaii tactile sensations of material perception.

In addition, we obtained both features of corresponding onomatopoeia and physical attributes for kawaii tactile materials.

These results are useful to make more attractive industrial products with material perception of kawaii feeling.

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