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Avatar Design Focusing on Kawaii Motions

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ABSTRACT

Avatars and agents are one of the important products in the metaverse. Kawaii value could potentially enhance the sales of avatars. This study aims to identify the kawaii motions of avatar and to examine the relationship between kawaii motions and purchase intention via Kansei (affective) engineering methodologies. We made the anime-like female avatar with six kawaii motions. The semantic differential (SD) method was used to measure their motions. As a result of principal component analysis (PCA), two PCs were extracted. PC1 has “enjoyable”, “kawaii”, and “charming.” PC2 has “elegant”, “beautiful”, and “stylish.” We visualized the relationship between the two PCs and each motion. Correlation analysis further indicated that kawaii motions were positively correlated with purchase intention ($r = .67, p < .001$). This study showed that the impression of avatar changes with kawaii motions. Designing the motions of avatar is likely to help them sell more. Avatar creators should design the kawaii motions to draw out the appeal of avatars.

Keywords: Kansei (affective) engineering, Motions of avatar, Impression evaluation, Kawaii engineering, Metaverse

INTRODUCTION

Kansei engineering is being used to design better products for consumers. The avatars and agents are one of the important products in the metaverse. They serve as user interfaces. The creators involved in creating avatars should consider what kind of avatars design consumers like.

The development of technologies has increased digital product transactions. Virtual Market are held in the metaverse such as VRChat, where users and companies buy, sell, and promote digital products (Virtual market, 2023). The metaverse is a new area of business. Encouraging avatar sales could help the metaverse economy. One way to increase the value of avatars is to adjust their appearance. Some studies have shown that the appearance of avatars affects the impression evaluation (Kawakita et al., 2022; Kawakita and Kanai, 2023). Give the avatars a cool, beautiful, or other positive characteristic, and users will want to manipulate it. However, good-looking avatars are commonplace in the metaverse. Creators should consider not only the appearance of avatars, but also the motions, voice, and other designs.

In the Avatar Museum, after viewing various avatars, consumers can purchase the avatars they like through the electronic commerce site (Avatar Museum, 2023). Avatar creators can increase sales by devising ways to show

their avatars. For instance, avatars and agents can attract consumers' attention by singing, dancing, and talking like a self-promotion. Iwamoto et al. (2021) define self-recommending agents as the product promoting (recommender) themselves, indicating that they attract consumers' attention. In addition, Iwamoto et al. (2022) have shown that even without a detailed description of the products, that increases the purchase rate when the products behave enjoyably: it is called a playful recommendation. If avatars can behave attractively in the metaverse, and consumers can have a positive experience, that could increase their purchase intention.

What is the attractive behavior of an avatar? Japanese metaverse users often say "kawaii" for the motions of avatar. However, it is not clear what motions of avatar are kawaii. We consider the kawaii motions of avatar could provide a positive experience for consumers. Although the kawaii is conventionally translated in English as cute, its meaning is more nuanced than cute, and it is used for a wider variety of objects (Nittono et al., 2023). Kawaii design has become a popular consumer culture, especially in Asia (Urakami, Qie, Kang, and Patrick Rau, 2021). In Japan, there are many kawaii designs for product packaging, mascot characters (Yuru-chara), animation, manga, and virtual YouTubers (VTubers). Kawaii products win consumers' hearts and sell well. Therefore, designing kawaii motions of avatar could increase their product value and provides consumers with a good experience. Incorporating the concept of kawaii into product design is one of the Kansei engineering studies. It is also called kawaii engineering: a scientific verification of kawaii to the products. Kawaii engineering, born in 2007, analyses kawaii components of industrial products such as color, size, and shape (Ohkura, 2019). The semantic differential (SD) method is often used in Kansei engineering and kawaii engineering for the Kansei evaluation.

The purpose of this study is to identify the kawaii motions of avatar and to examine the relationship between kawaii motions and purchase intention. Revealing the characteristics of kawaii motions in avatars, creators can sell the avatars more attractively.

METHOD

Participants

Kansei data of thirty-five graduate students were analyzed ($M = 26.91$, $SD = 7.87$, twenty males, twelve females, and three others). No participants had color vision abnormalities.

Design of Avatar and Motions

Some Japanese VTubers choose a VTuber of different gender and sex because they want to be released from their physical gender identity and social norms, and they are reborn to bishôjo (Bredikhina, 2020). In the metaverse, users want to manipulate the kawaii avatars like bishôjo. Good-looking female avatars could tend to sell well. Also, metaverse users tend to use anime-like (cartoon) avatars rather than realistic ones. Therefore, we decided to design an anime-like female avatar.

A female avatar was created by “VRoid Studio.” Six patterns of motions created by “3tene” were given to the avatar. The six motions are motion sets of 3tene. The description of each motion is shown in Table 1. Also, Figure 1 shows the six motions of avatar.

Table 1. Six motions of avatar.

Number	Motion description
#1	twisting one’s body from side to side
#2	introducing yourself with your hands
#3	shaking one’s finger
#4	expressing joy with one’s whole body
#5	turning your hands and pose
#6	waving one’s finger

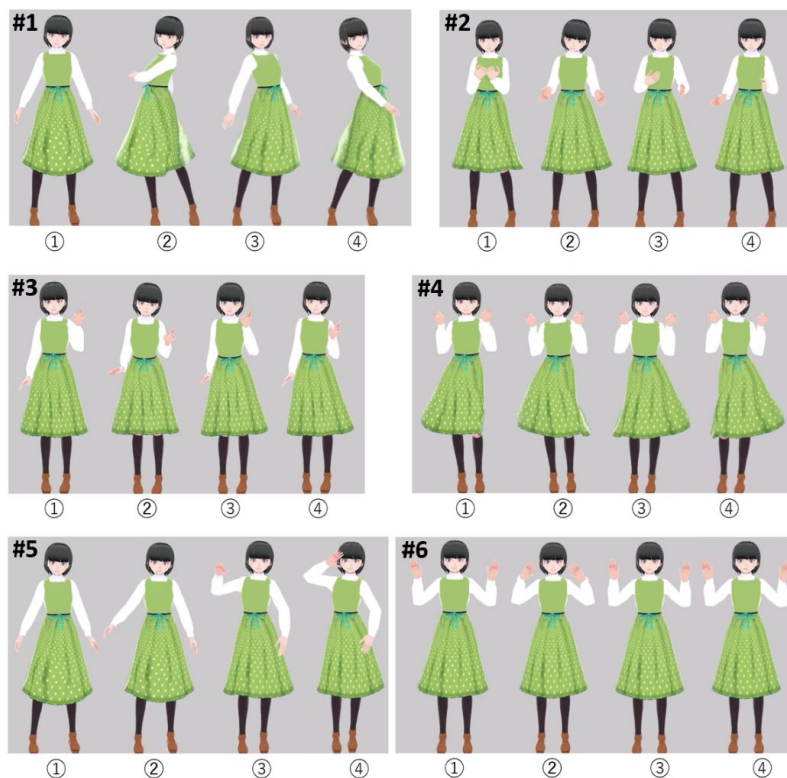


Figure 1: Image of the six motions of avatar.

Materials

The semantic differential (SD) method from 1 to 5 (5-point scale) was used as the evaluation. There were twenty-four pairs of Kansei words to evaluate the motions of avatar (Check the Kansei words in Table 2 of the results).

Participants were presented with Figure 2 and asked to answer the questions. The survey items were as follows.

- (1) What motion did you feel was a kawaii?
- (2) Which motions of avatar do you want most?

The first question identifies the most kawaii motion of avatar for participants. The second question measures participants' purchase intention. Because few people buy avatars at present, we asked the question indirectly. Both questions answer only one of the best.

Procedure

In this study, the survey was conducted using Google Forms. Participants were presented with six motions of avatar and responded to each survey item. Twenty-four pairs of Kansei words were presented randomly.



Figure 2: Six motions in this study.

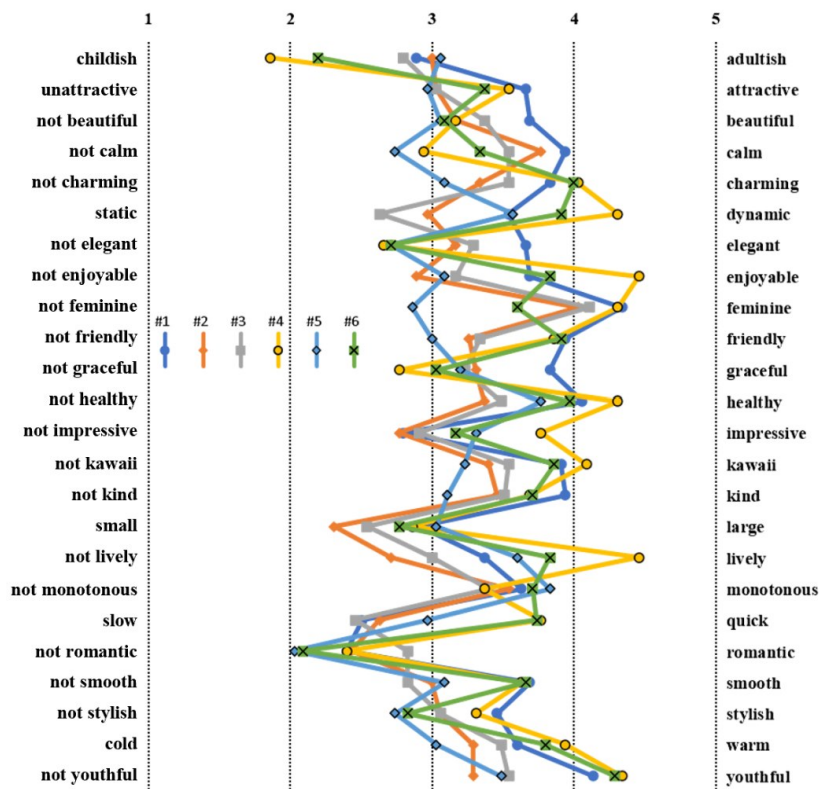


Figure 3: Semantic profile of Kansei words for each motion.

RESULTS

The semantic profile of Kansei words for each motion is shown in Figure 3.

In this study, we used twenty-four pairs of Kansei words. Therefore, twenty-four variables had to be reduced to a small number of variables by principal component analysis (PCA). The number of components was determined based on parallel analysis. Table 2 shows the results of PCA. Also, Table 2 shows the principal component loading in descending order. As a result of PCA, two principal components were extracted. PC1 has “enjoyable”, “kawaii”, “charming”, and “adultish (adults)”. It can be interpreted as a kawaii Kansei. PC2 has “elegant”, “calm”, “beautiful”, and “stylish”. It can be interpreted as a beautiful Kansei.

Table 2. Results of PCA.

SD scales	Principal Component	
	I	II
enjoyable - not enjoyable	.99	-.03
youthful - not youthful	.97	.05
kawaii - not kawaii	.94	.32
healthy - not healthy	.93	-.12
charming - not charming	.91	.25
warm - cold	.89	.07
smooth - not smooth	-.89	.20
adultish - childish	.88	.40
friendly - not friendly	.88	.40
attractive - unattractive	.86	.40
lively - not lively	.86	-.47
dynamic - static	.85	-.42
quick - slow	.75	-.60
large - small	.46	-.39
elegant - not elegant	-.29	.92
calm - not calm	-.18	.91
beautiful - not beautiful	.08	.89
feminine - not feminine	.39	.82
stylish - not stylish	.45	.77
kind - not kind	.68	.70
romantic - not romantic	-.19	.68
graceful - not graceful	-.35	.68
impressive - not impressive	.63	-.65
monotonous - not monotonous	-.24	-.46
Contribution rate (%)	50.72	30.50
Cumulative contribution rate(%)	50.72	81.22

We created principal component loading plot (Figure 4) and principal component score of motions (Figure 5). From Figure 4 and Figure 5, kawaii Kansei toward #4 is highly rated. Also, beautiful Kansei toward #1 is highly rated.

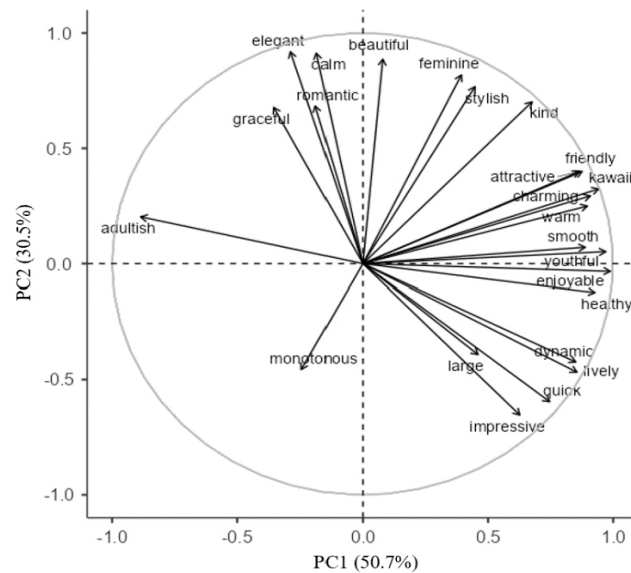


Figure 4: Principal component loading plot.

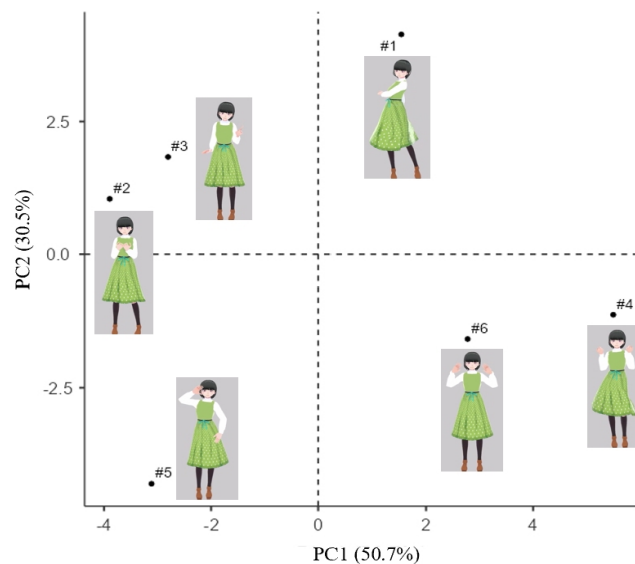


Figure 5: Principal component score of motions.

#1 (43%), #4 (26%), and #6 (11%) were highly evaluated as kawaii motions. Also, #1 (54%), #4 (11%), and #6 (11%) were highly evaluated as desired motions. Correlation analysis further indicated that kawaii motions were positively correlated with purchase intention ($r = .67, p < .001$).

Nittono (2016) found gender differences in the attitudes and behaviors regarding kawaii, and females are more likely to perceive kawaii than males. We considered gender comparisons of the motion data on “kawaii – not kawaii (Table 2)”, except for data on gender “other (small number of participants)”. The Shapiro-Wilk test for each motion of kawaii showed significant

differences. Therefore, the Mann – Whitney U test was performed with the independent variable as gender (males / females) and the dependent variable as kawaii. The results are in Table 3.

Table 3. *U*-test for each motion of kawaii.

Motions	Mean		Mann - Whitney <i>U</i> test
	Male	Female	
#1	3.7	4.17	$p = .16, d = .29$
#2	3	4.08	$p = .009, d = .54$
#3	3.4	3.75	$p = .189, d = .27$
#4	3.9	4.42	$p = .164, d = .28$
#5	2.7	4.17	$p < .001, d = .70$
#6	3.4	4.58	$p = .006, d = .55$

In Table 3, we confirmed significant differences in #2, #5, and #6. The results showed that females had a higher rated of kawaii than males.

DISCUSSION

The purpose of this study is to identify the kawaii motions of avatar and to examine the relationship between kawaii motions and purchase intention. In Figures 4 and 5, #1 is given the impression of “beautiful,” “feminine,” and “stylish.” #4 is given the impression of “enjoyable,” “healthy,” “dynamic,” and “lively.” Also, #4 seems “childish” compared to #2 and #3. #6 is given the impression of “large,” “quick,” and “impressive.” The motions of #1 and #4 are considered to have the positive impression. These motions are qualitatively different. #1 emphasized the woman’s beautiful motion and is mainly suited to beautiful Kansei (PC2). #4 emphasized the enjoyable motion and is mainly suited to kawaii Kansei (PC1). #1 and #4 were favorably evaluated by males and females. From #1 to #6 are the same avatars, however, the results show different impressions depending on the motions.

Figures 3, 4, 5, and Table 3 showed that the motion of #4 was rated as kawaii. In the end, however, #1 was rated as the most kawaii motion overall (43%). Also, #1 was the highest purchase intention (54%). Correlation analysis indicated that kawaii motions were positively correlated with purchase intention. Why did participants evaluate #1 as a better motion than #4 and want it? The avatar used in this study was a female type, wearing a one-piece dress. The #1 was a body twisting motion from side to side, which made the outfit and body line look beautiful. The #1 was highly regarded because it was both kawaii and beautiful. Designing motions that match the avatars, including clothing, is necessary for a good impression.

CONCLUSION

We made the anime-like female avatar with six motions and verified the motions via Kansei engineering and kawaii engineering methodologies. Participants rated #1 (twisting one’s body from side to side) and #4 (expressing

joy with one's whole body) highly as kawaii motions. Kawaii motions and purchase intention are positively correlated. Creators should consider the kawaii motions for their avatars when designing them. That will improve the impression of avatars and make consumers want to buy them. Creators can draw out the appeal of avatars by designing kawaii motions that match the way the appearance of avatars.

RESEARCH ETHICS

This study was approved by Life Science Committee of Japan Advanced Institute of Science and Technology. The approved number is “ λ 04-037.”

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