The Role of Cuteness Aesthetics in Interaction

Stuart Medley, Bieke Zaman, Paul Haimes

This is the accepted version of the published book chapter. Please cite the officially published version:
Medley, S., Zaman, B., & Haimes, P. (2020). The Role of Cuteness Aesthetics in Interaction. In R. Rousi, J. Leikas & P. Saariluoma (Eds.), *Emotions in Technology Design: From Experience to Ethics* (pp. 125-138). Springer. https://doi.org/10.1007/978-3-030-53483-7

Abstract
While many modern cultures around the world appreciate 'cuteness', few empirical studies have been conducted on the kinds of responses cuteness evokes. This chapter explores the results of two studies to examine people's perceptions and preferences regarding cute aesthetics. The first study investigated 2D online gambling aesthetics in video games and compared cute versus non-cute imagery of a croupier and a treasure chest. A total of 37 adults participated in this online experiment, which featured open and closed question items. The adult participants (n=17) who took part in the second study were shown a video of a 3D ambient media device, called Fuji-chan, designed to provide information about the meteorological conditions on, and the volcanic activity of, Mount Fuji in Japan. Participants were then invited to answer questions related to the perceived cuteness, information usefulness and importance of the Fuji-chan device.
The findings of both studies show that an aesthetic design that follows the principles of cuteness does not guarantee that the imagery is perceived as such, and that the content of the imagery determines whether people evaluated cuteness at a sensory, aesthetic level or whether they attached a symbolic, situated meaning to it. We call on future work to elaborate a clear operationalisation of what constitutes cuteness, at both linguistic operational and aesthetic levels, and further this preliminary work on how people's perceptions of and responses to cuteness in interaction depend on the context.

1. Introduction

Many modern cultures appreciate cuteness (Marcus et al. 2017). Yet there is no term to describe emotions related to the perception of cuteness (Buckley 2016). This lack of a linguistic description of a common, cross-cultural emotional response may explain why, in the field of psychology, cuteness perception is under-researched compared to other emotions, such as those related to fear (Buckley 2016).

An appreciation of cuteness clearly plays a social function. Beyond simple aesthetic choices, cuteness elicits a caring, parental response, and may evoke feelings of empathy and compassion (Kringelbach et al. 2016). 'Cute emotion' is thus recognized and used widely and pervasively in modern human societies (Marcus et al. 2017), despite having no specific name, other than vernacular expressions such as 'aww' in English. There are various possible

reasons for this. The most plausible is that only modern civilizations have had the luxury of recognising and responding to cuteness through the deliberate design, manufacture, marketing, and sale of items perceived as cute and used in social interactions (Buckley 2016).

In the context of interaction design, in addition to shaping emotions, artefacts perceived as cute are often employed to convey information to the user. Previous research has noted that cute artefacts can focus the user's attention (Nittono et al. 2012). However, our chapter may problematize the functions of cuteness in conveying information and focusing attention.

This chapter outlines some definitions of cuteness, particularly the accepted visual aspects, and explore previous research on how this visual aesthetic may be achieved. We find that there is some confusion in the literature regarding what constitutes 'cuteness', and use this finding to build a problem statement. We then discuss the results of a user study on visualisations within an online gambling system, as well as early user trials of a system for conveying meteorological and hazard information related to Japan's Mount Fuji. In our analysis, we discuss how the study participants perceived cuteness, and how this is related to interacting with a designed artefact. In both cases, the artefacts' users appear to have questioned the emotion conveyed by the cute aesthetics we have employed, suggesting that context strongly affects users' responses. Rather than eliciting an endearing response such as 'aww', the participant responses in our studies suggest that the aesthetics in these interactive contexts have produced cognitive dissonance among users.

1.1 The Aesthetics of Cuteness: Some definitions

Marcus et al. (2017, 93) define cuteness as 'a characteristic of a product, person, thing, or context that makes it appealing, charming, funny, desirable, often endearing, memorable, and/or (usually) nonthreatening'. In post-war Japanese culture, 'cute' is referred to as kawaii (可愛い) in Japanese, a term that is derived from the Chinese word keiai (可爱), which also means 'cute' (Chen 2014). Since the end of the Second World War, Japan's subservience and deference to the United States has manifested itself in a multitude of ways across a popular culture that values childishness and cuteness (Sato 2009). This symbolic trend of perceived pacifism is widely visible in Japan, where cute characters are frequently used to confer information to the public, provide warnings and even represent police authority (see Fig. 1).

Figure 1: Pipo-kun, the Tokyo police department's mascot, featured on a sign near Meiji-Jingu shrine in Tokyo. Photo by Paul Haimes.

Previous research (Lorenz 1943; Ngai 2005, 816, 827; Marcus et al. 2017, 64–65) has suggested that artefacts with rounded and soft aesthetics are associated with cuteness, and that body proportions have an effect on perceived cuteness (Alley 1983, 621; Cho 2012). Caricatured features, such as unnaturally big heads or eyes, are often utilised to make a character or artefact appear cute (Weeks 2018, 131–132). Such features evoke a motivation to care or empathise by conjuring a form that resembles an infant human or pet. This was articulated in the concept of baby schema or Kindchenschema, first proposed by Lorenz (1943).

Distorting features through drawing has become a convention of Japanese illustration culture. Manga and anime often employ the 'super-deformed' style. Entire cartoons may be made in this way, or visually realistic animations or comics may momentarily switch to this mode. Exaggerating a character's features in this way – typically by enlarging their head – obscures their identity in order to amplify the emotion of a moment in the narrative.

Ohkura et al. (2013) have explored the cuteness of tactile materials, noting that yarn, cotton and sheep pile fabric were considered the most 'kawaii', while coarse materials such as sand or granite were not considered kawaii. These researchers highlighted that the

Japanese onomatopoeia (a word that suggests the sound of what it is describing) describing the tactile experiences of these materials also reflected whether they were kawaii or not. These findings were consistent across genders and all age groups. Onomatopoeia that began with a harder-sounding consonant (e.g., similar to the English consonants of j, z, g) were generally used to describe the less kawaii objects, while the more kawaii objects were described with softer consonants (such as p and m). Japanese onomatopoeia has been used to demonstrate that sound-symbolic words connoting sensory information can be easily taught to non-Japanese speakers, suggesting that their descriptive sounds of cute aspects may cross language boundaries. This distinction between harder and softer sounds and objects is also found with the bouba/kiki effect (Ramachandran and Hubbard 2001), where the coarser, sharper object (kiki) is considered, across language groups, to be coarser than the softer, rounder object (bouba).

In addition to this wide variety of sensory modes, Nenkov and Scott (2014, 327) observe: 'cute products (e.g., an ice-cream scoop shaped like a miniature person or a dress with tropical colours and pink flamingos) can also have a whimsical nature, which is associated with capricious humour and a playful disposition'. Unlike the application of Kindchenschema to elicit protective feelings or behaviours towards a defenceless creature, whimsical cuteness derives from a playfulness perceived in the artefact.

1.2 Problem Statement

In summary, we found that there is some ambiguity in the literature regarding what constitutes 'cuteness'. This confusion may be compounded by the absence of a clear term, in any culture or language, to communicate the emotional response to a beholder's perception of cuteness. Likewise, the literature contains several, quite different ways of achieving a cute aesthetic, including through the application of Kindchenschema – where the methods are relatively clear – or the more vague application of 'whimsical' or 'playful' aesthetics. Furthermore, as Nenkov and Scott explore in *'So Cute I Could Eat It Up': Priming Effects of Cute Products on Indulgent Consumption*, the effects of perceiving cute products on people's attitudes and behaviour (e.g. caring, self-control) are not univocal. To address this ambiguity, we present two studies – one based on 2-dimensional software graphics and another based on a 3D-printed interface – which rely on Kindchenschema and rounded visual elements and smooth textures to convey a sense of cuteness to the user. By empirically measuring and contextualizing people's responses to these different aesthetics of cuteness, we aim to better

understand how cuteness ‘works’, i.e. how people perceive it and how it may trigger certain cognitive and emotional reactions in particular contexts.

2. Study of Visually Cute Aesthetics in a Simulated Online Gambling Environment

2.1 Goal of the Study

The first of the two studies explored in this chapter investigates the effects of cuteness aesthetics on users in an online gambling environment. It seeks to better understand the role of aesthetics and its contribution to debates on gaming literacy. This project is an interdisciplinary response to what the researchers observe in the convergence between gaming and gambling aesthetics, in order to develop strategies that improve sensitivity to persuasive messages.

The study designers sought to determine the role of cuteness vs. non-cute aesthetics in the game environment in shaping gambling attitudes and aesthetic preferences. We were particularly interested in the potential paradox between (a) cuteness aesthetics eliciting a more caring approach to a task (as documented in Sherman et al. 2009) and (b) cuteness aesthetics eliciting a fondness towards an artefact that might relax the user’s defensive attitude, and perhaps cause financial harm.

We ran several experiments to test various hypotheses regarding the influence of game aesthetics on players’ attitudes and behaviours towards gambling. We tested whether cute aesthetic cues might lead to more or less indulgent gambling behaviour and more or less relaxed attitudes towards gambling compared to non-cute alternative conditions. Here we present only the manipulation check for the aesthetics portion of this series of experiments.

2.2 Participants

Anonymous participants (n = 43) aged 18 and over were recruited via social media to respond to a Qualtrics survey; 37 completed the survey (23 males, 14 females). Each respondent confirmed that they were over 18 years of age. Participants’ ages ranged from 19 to 73 (mean 35 years, SD = 13).

2.3 Measures

The survey consisted of seven main building blocks: (1) informed consent, (2) demographics and background, (3) questions on the aesthetics of the treasure chest, (4) questions on the aesthetics of the croupier imagery, (5) comparison treasure chest aesthetics, (6) comparison croupier aesthetics, (6) gaming and gambling engagement, and (7) debriefing and prize draw.

Two types of aesthetics represented the image of the treasure chest (Fig. 2) that respondents had to consider in order to answer the question items in blocks 3 and 5 of the survey, and two versions of the croupier image (Fig. 3) that was the subject of blocks 4 and 6. Except for blocks 5 and 6, where respondents were shown both versions to elicit their preference, they were assigned to one condition only for all previous blocks.

The illustrations were designed to accord with directions implicit in the literature on cuteness. The treasure chest was illustrated (a) with proportions exaggerated to evoke 'cuteness' (cute condition) and (b) with realistic proportions (non-cute condition). The croupier was designed (a) with exaggerated child-like features (large eyes relative to the face, large head out of proportion with the body) to evoke 'cuteness' (cute condition) and (b) realistically (non-cute condition) (Lorenz 1943; Alley 1981; Little 2012).

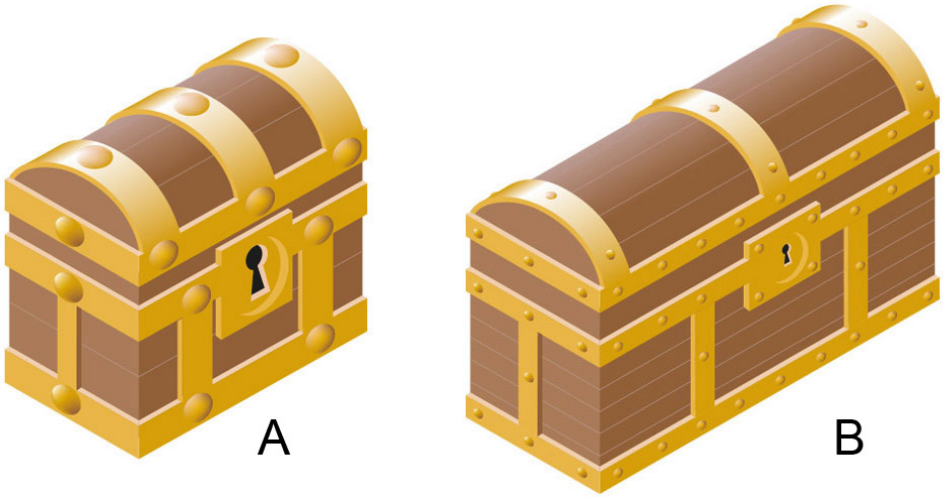

Figure 2: Cute (left) and non-cute (right) conditions of the treasure chest

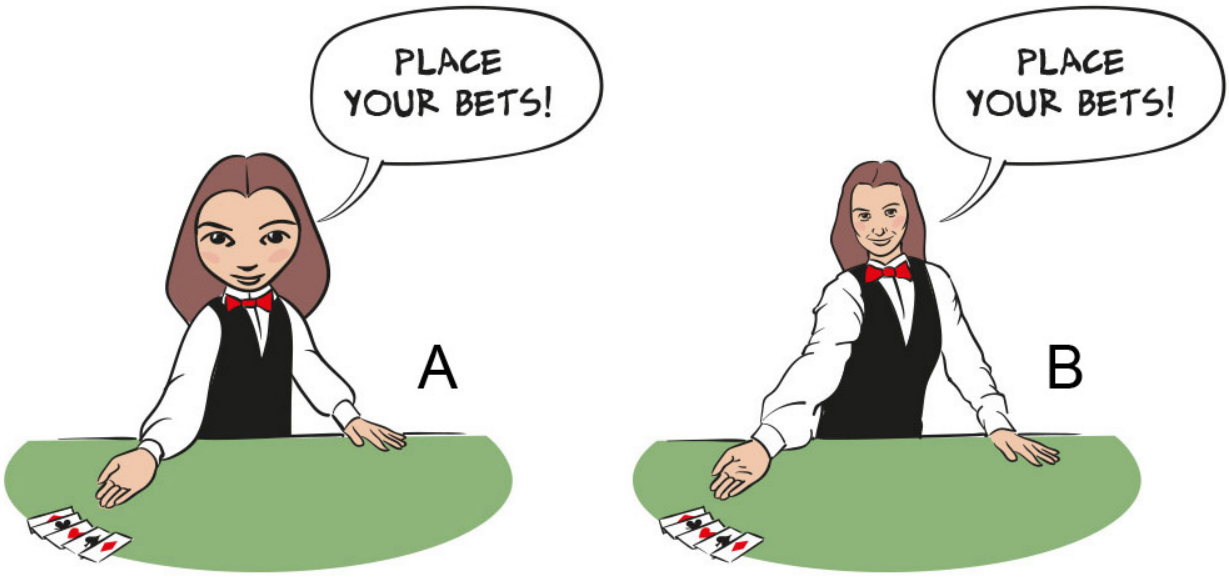

Figure 3: Cute (left) and non-cute (right) conditions of a gambling croupier

While the researchers developed two conditions (one cute, one non-cute) for each pair of subjects (treasure chest, croupier), participants were randomly assigned only one condition to evaluate, accompanied by the following question: 'We are interested in your opinion about an illustration and invite you to evaluate it.' We first asked open questions and encouraged them to, 'Please indicate the top five words that come to mind when seeing the illustration.' This prompt aimed to avoid priming respondents with any terms that may elicit responses about cuteness. We then asked a series of closed questions (e.g., rating the perceived level of cuteness on a 7-point scale from strongly disagree to strongly agree with the statement 'the illustration is cute'). Finally, each respondent was shown both versions to compare and indicate their preferred one and asked to explain why. Open questions were analysed qualitatively. Closed questions were analysed quantitatively using SPSS software.

3. Results

3.1 Online Gambling Experiment

3.1.1 Treasure Chest

Each respondent was randomly shown one version of the treasure chest and asked to 'indicate the top five things that come to mind when seeing the illustration'. No respondents included 'cute' in their five words. The closest in meaning to 'cute' were words such as 'small', 'toy'

and ‘casual’. Other word choices alluded to contexts in which one might expect to find cute illustrations: ‘video game’, ‘cartoon’, ‘mobile game’.

On average, respondents who were asked to evaluate the cute treasure chest illustration (M = 4.42 , SE = 0.32) did not evaluate this image as significantly cuter those who were shown the non-cute image (M = 3.56, SE = 0.40). Hence, the difference in perceived cuteness was not significant $t(35) = 1.71$, $p > 0.05$.

At the end of the survey, participants were encouraged to compare both versions of the treasure chest and indicate which one they preferred. This was the first time they saw the other version. Nearly three-quarters of respondents (27, 73%) selected the cute treasure chest; five respondents (13.5%) selected the non-cute condition and five respondents left this question blank (13.5%).

Participants were then prompted to explain the motivations behind their responses. Of the 33 motivational statements submitted, six of the responses that preferred the cute condition used the word ‘cute’ or ‘cuter’. Others alluded to aspects of cuteness as detailed in Marcus et al. (2017, 93), such as ‘appealing’ and ‘childlike’. The remainder mentioned the context in which cute aesthetics are often found, such as computer games or cartoons (as per the responses to the ‘top-of-mind’ question at the start of the questionnaire). The responses that indicated the cute condition as the preference are as follows:

> It's cuter in a sense. More appealing.

> [A, i.e. the cute version] is smaller and easier to see, it looks more like a cartoon illustration that i would imagine.

> It's more cartoon-like, plus would fit better on a portrait aspect ratio mobile phone ;)

> It’s cute, not overburdening.

> It's more visually appealing. The box on the left is something I'd expect to see in a casual mobile game. The box on the right is something I'd expect to see in an isometric game aimed at a core gaming audience. I wouldn't expect either to be used as a lootbox – more as an in-game container containing items.

There's a level of abstraction that I like. Plus it reminds of the treasure chests in Zelda (one of my favourite games).

More 'cartoon', therefore 'friendlier' in appearance – less thought provoking, i.e. less of a threat.

It looks cuter and more childlike due to the larger graphic elements. If the idea is to provide an image that is not serious then the one on the left does this better than the one on the right.

It looks cute, more cartoony, like you would see in a children's pirate cartoon show.

Looks more childlike.

Tighter design, more cartoony.

I think the bigger elements (bigger keyhole, more 'gold') and the smaller overall size make it... cuter, more appealing, more fun maybe. It's more cartoony.

3.1.2 Croupier

The top-of-mind associations linked to the two croupier illustrations yielded similar results: ‘gambling’ and ‘casino’ were the most popular words in both conditions, and cuteness did not feature in the top-of-mind associations for either croupier picture. However, there were subtle differences in the top-of-mind associations between the two conditions: one respondent in the cute condition mentioned ‘cartoon’ and another suggested ‘young’, and one respondent in the non-cute condition made a reference to ‘ugly’.

Respondents who saw and rated the cute croupier on cuteness ($M = 4.71$, $SE = 0.31$) did evaluate this image significantly cuter than those who were shown the non-cute croupier image ($M = 2.47$, $SE = 0.36$). This difference was significant $t(30) = 4.66$, $p < 0.01$. Also in contrast to the responses regarding the treasure chest illustrations, when participants were asked to indicate their preferences regarding the croupier illustrations, the choice was much more evenly split: 17 respondents (46%) chose the cute image and 15 (40.5%) the none-cute version; 5 respondents did not answer this question (13.5%).

Participants were again prompted to explain the motivations behind their preferences. At least one participant reported preferring the cute illustration of the croupier, citing the same reason as for their preference in the treasure chest choice ('Same reason as with the loot box. Seems more innocent.'). However, the majority of the responses suggested that the participants were somewhat disturbed by a croupier illustration employing child-schema techniques in the adult context of gambling. Reasons given for preferring the non-cute version included:

> At least I am playing with an adult.
>
> If this illustration is to be used in a casino themed/gambling game, the more realistic version would be better suited
>
> Closer to the appearance of a human, more fitting for a mature game about gambling
>
> It looks more realistic and less sinister. The one on the [left, i.e. cute version] is too childlike which makes me feel uncomfortable as children are not typically connected with casinos and gambling environments
>
> I prefer [B, i.e. the non-cute version] over [A, i.e. the cute version], as the woman looks old enough to be a croupier.
>
> The [second, i.e. the non-cute version] image establishes a (marginally) greater sense of trustworthiness and professionalism.

3.1.3 Discussion of the Findings

The survey highlights an empirical perspective on the perception and preferences of imagery that is designed to be more or less cute. The findings reveal that an aesthetic design that follows the principles of cuteness does not guarantee that the imagery is perceived as such. Our manipulation was successful for the treasure chest but not for the croupier image; respondents preferred the non-cute version of the croupier, in part because it appears to be more age appropriate in the gambling context. This seems to demonstrate that people can judge an image beyond the aesthetic, sensory level and attach a cultural, situated meaning to

it. The treasure chest did not seem to evoke this cultural level: respondents' preferences were more closely related to their evaluation of the image's aesthetic qualities.

3.2 Fuji-chan Device Experiment

Fuji-chan is an ambient media device designed to provide information about the meteorological conditions on, and the volcanic activity of, Mount Fuji in Japan. Although it is one of the country's best-known sights, few people are aware that Mount Fuji is an active volcano (JMA 2018). Although it has not erupted in over 300 years, the Japanese government predicts that an eruption would require widespread evacuations of several nearby towns and prefectures, and debris and ash could reach as far as Tokyo (Aramaki 2007).

Figure 6: Second prototype of the Fuji-chan device

The exterior was created with a 3D printer and was inspired by abstract, comical representations of Mount Fuji (e.g., Fig. 7). The interior contains LED lights, a piezo buzzer and a Wi-Fi module. The device is powered by a standard mini-USB connection. Photo by Paul Haimes.

The Fuji-chan device uses 'internet of things' technology to connect to a remote server that uses weather data sourced from myweather2.com. It also retrieves the current eruption warning level from the National Institute of Informatics, which uses data from the Japan

Meteorological Agency. The peak of the device uses a programmable multi-colour LED (light emitting diode) light to convey weather information (warmer (cooler) colours represent warmer (cooler) temperatures), while the base colour corresponds to the level of volcanic eruption warning (Table 1). If the warning level is three (which requires evacuation) or above, the device will flash and an alarm will sound.

Figure 7. A comical representation of Mount Fuji on a Fujisan Express train between Otsuki and Kawaguchiko in Yamanashi prefecture, Japan

Photo by Paul Haimes

The device was designed to be cute. Its exterior features rounded, soft edges and is based on comical representations of Mount Fuji such as that shown in Fig. 7, which bear little resemblance to the real volcano. Indeed, its name is a play on Japanese suffixes to emphasise its cuteness. Mount Fuji is referred to as 'Fuji-san' in Japanese; 'san' refers to a mountain but is also a standard suffix used when addressing adults regardless of gender. 'Chan' is a suffix usually applied to those who the speaker feels a great deal of affection for, such as young children, pets and romantic partners (Mogi 2002). The cute, playful nature of Fuji-chan's exterior and name may seem at odds with an object created to warn of possible disaster, but as explained earlier (e.g., Fig. 1), there is a tendency in Japan to use cuteness in contexts of authority.

Table 1. Japan Meteorological Agency volcanic eruption warnings

Level	**Colour**	**Meaning**
1	White	Potential for increased activity
2	Yellow	Do not approach the crater
3	Orange	Do not approach the volcano
4	Red	Prepare to evacuate
5	Purple	Evacuate

Note: the Fuji-chan device uses the same colour warning system for its volcanic eruption warnings.
Source: JMA 2019

The Fuji-chan device has been demonstrated at multiple exhibitions throughout Asia. Without being prompted, several observers at these exhibitions have noted that the device had a cute appearance. Two noted that the name was 'kawaii' (cute). An unexpected outcome of these demonstrations was that no attendees reported that the device was useful or provided important information. This outcome highlighted the need to conduct further user testing of the device.

A testing session was thus conducted with 17 users (10 female, 7 male) over the age of 18. For this user study, participants watched a short video explaining how the Fuji-chan device works and could also see it being demonstrated in a scenario with both live data (i.e., near real-time conditions) from the server and testing data to demonstrate the device's behaviour during a major (Level 5) eruption event. The live data showed a temperature of 17 degrees Celsius and an eruption warning of Level 1. Afterwards, participants were asked three questions, as described in Table 2. Answers were provided in the form of a Likert scale,

where 1 = Strongly disagree, 2 = Slightly disagree, 3 = Neither agree nor disagree, 4 = Slightly agree and 5 = Strongly agree. All participants were current residents of Japan, both Japanese nationals (n=8) and foreign residents (n=8), with the exception of one visitor to Japan who had visited within a month before the study.

Table 2. Results of user testing (n=17)

Question	Mean	SD	Positive
1. Do you think the Fuji-chan device's appearance is cute?	4.94	0.24	17/17
2. Do you think the information provided by Fuji-chan is important?	3.47	0.70	10/17
3. Does the Fuji-chan device seem useful?	3.76	1.11	12/17

Note: this table shows the three questions asked, the mean (average) answers, the standard deviation (SD) and the number of positive responses (4 or 5 on the five-point Likert scale).

Overall, participants strongly agreed that the Fuji-chan device was cute (Question 1), with little deviation in participant answers. Responses were less positive to the question (2) regarding the importance of the information provided. For example, one participant, a first-time visitor to Japan, was unaware that Mount Fuji was an active volcano. Responses regarding the usefulness of the device (Question 3) showed the greatest deviation, but were overall slightly more positive than the answers to Question 2. Due to a lack of strong positive or negative correlation, it is unclear whether cuteness has a positive or negative impact on users' perceptions of the importance of the information being conveyed and perceived usefulness, but based on responses from the exhibition attendees and the data in Table 2, it is possible that cute aesthetics could cause users to overlook the importance of the information being presented to them.

4. Discussion and Conclusion

The online gambling study, the deployment of two sets of illustrations (treasure chest and croupier), with cute and non-cute versions of each, demonstrated that what is depicted as cute affects participants' preferences. The survey questions did not clearly elicit words from respondents that could be construed as meaning 'cute' about any of the illustrations when they were viewed in isolation. However, when the pairs of illustrations were shown together and respondents were asked to explain their preferences, the findings suggest that the content of the image determines whether respondents evaluate it at a sensory level or a more

symbolic level. The manipulation of the aesthetics of the treasure chest was not successful, as several respondents did not rate the design that was meant to be cute as such. However, most respondents clearly preferred the cute version. While there was a definite consensus on which croupier image was the 'cute' illustration, preferences were evenly divided between the cute and non-cute versions. While Marcus et al. (2017, 93) define cuteness as 'a characteristic of a product, person, thing, or context that makes it appealing, charming, funny, desirable, often endearing, memorable, and/or (usually) nonthreatening', some participants observed that one of the croupier images was indeed cute, but did not find it 'appealing', 'charming' or 'endearing' due to the perceived inappropriateness of cuteness in the context of gambling.

Based on the results from the exhibition and user research of the Fuji-chan device, we suggest that when designers create an artefact to elicit an appreciation of cuteness from the user, it is worth considering whether this response may inadvertently detract from the device's intended purpose. That is, the aesthetic level should not negatively influence the cognitive processing required for the user to process the information provided. Further studies are required to determine whether cuteness can be a distracting factor when conveying meaning in an interaction. After all, underlying Japan's facade of modern culture steeped in cuteness and childishness belies a stagnating economy and society. Rather than eliciting a response of 'aww', cute designs in inappropriate contexts appear to have generated cognitive dissonance.

The study suffers from at least three limitations. First, the aesthetics we presented as part of our research instruments were removed from their natural settings, which threatens the ecological validity of our findings. Other elements of the digital and – in the case of Fuji-chan – physical environment where our artefacts would normally be found may affect the user's aesthetic response.

Second, our survey participants were instructed to comment on the visual conditions developed for our manipulation checks. Palmer et al. (2012b) suggests that everyone has an aesthetic response to everything they see, but they may not be conscious of this response except under extraordinary conditions, such as when their attention is directed to respond because of the context. Our directing the participants may have affected, if not their response, at least the intensity of that response.

Finally, we acknowledge that while we have striven to design our test artefacts according to the principles of cuteness, these principles are not consistently defined in the literature. Overcoming the relative vagueness regarding the principles of cute aesthetics is a more protracted and complex problem. Developing a clear operationalisation of what

constitutes cuteness, at both the linguistic and aesthetic levels, will advance experiments in cuteness response, but will take time and a concerted effort. We hope our work has helped to highlight that this effort should consider how cognitive, symbolic and contextual parameters co-shape the aesthetic experience.

Acknowledgements

The Fuji-chan device was created as part of a research project supported by a Grant-in-Aid for Scientific Research (KAKENHI project number 15F15052) from the Japan Society for the Promotion of Science (JSPS). The study on the lootbox and croupier design was partly funded by the FWO Travel Grant (2018) and the Short Term Scientific Mission of the COST Action IS1410, call number 5.

References

Alley, T. R. (1981). Head shape and the perception of cuteness. *Developmental Psychology*, *17*(5), 650–654.

Alley, T. R. (1983). Age-related changes in body proportions, body size, and perceived cuteness. *Perception and Motion Skills*, *56*, 615–622.

Aramaki, S. (2007). *Volcanic Disaster Mitigation Maps of Fuji Volcano and Overview of Mitigation Programs*. Yamanashi Institute of Environmental Sciences. http://www.mfri.pref.yamanashi.jp/fujikazan/web/P451-475.pdf.

Bloch, P. H. (1995). Seeking the ideal form: Product design and consumer response. *Journal of Marketing*, *59*(3), 16–29.

Buckley, R. C. (2016). Aww: The emotion of perceiving cuteness. *Frontiers in Psychology*, *7*, 1740.

Chen, H. (2014). *A Study of Japanese Loanwords in Chinese.* Master's thesis, University of Oslo.

Cho, S. (2012). *Aesthetic and Value Judgment of Neotenous Objects: Cuteness as a Design Factor and its Effects on Product Evaluation*. Dissertation, University of Michigan.

Dale, J. P., Goggin, J., Leyda, J., McIntyre, A. P., Negra, D. (2016). The aesthetics and affects of cuteness. In J. P. Dale et al. (Eds), *The Aesthetics and Affects of Cuteness* (pp. 11–44). Abingdon: Routledge.

Japan Meteorological Agency. (2018). Volcanic Warnings. http://www.jma.go.jp/en/volcano/.

Kringelbach, M. L., Stark, E. A., Alexander, C., Bornstein, M. H., Stein, A. (2016). On cuteness: Unlocking the parental brain and beyond. *Trends in Cognitive Sciences*, *20*(7), 545–558.

Little, A. C. (2012). Manipulation of infant-like traits affects perceived cuteness of infant, adult and cat faces. *Ethology*, *118*(8), 775–782.

Lockwood, G., Dingemanse, M., Hagoort, P. (2016). Sound-symbolism boosts novel word learning. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *42*(8), 1274–1281.

Lorenz, K. (1971). *Studies in animal and human behavior*. Cambridge, MA: Harvard University Press.

Marcus, A., Kurosu, M., Ma, X., Hashizume, A. (2017). Taxonomy of cuteness. In A. Marcus et al. (Eds), *Cuteness Engineering* (pp. 93–118). Cham: Springer.

Mogi, N. (2002). Japanese ways of addressing people. *Investigationes Linguisticae*, *8*, 14–22.

Nenkov, G. Y., & Scott, M. L. (2014). 'So cute I could eat it up': Priming effects of cute products on indulgent consumption. *Journal of Consumer Research*, *41*(2), 326–341.

Ngai, S. (2005). The cuteness of the avant-garde. *Critical Inquiry* 31(4), 811–847.

Nittono, H., Fukushima, M., Yano, A., Moriya, H. (2012). The power of kawaii: viewing cute images promotes a careful behavior and narrows attentional focus. PLoS ONE 7:e46362.

Ohkura, M., Goto, S., Higo, A., Aoto, T. (2011). Relationship between kawaii feeling and biological signals. *Transactions of Japan Society of Kansei Engineering*, *10*(2), 109–114.

Ohkura, M., Osawa, S., Komatsu, T. (2013). Kawaii feeling in tactile material perception. In *Proceedings of the 5th International Congress of International Association of Societies of Design Research*, Tokyo.

Ramachandran, V. S., & Hubbard, E. M. (2001). Synaesthesia – a window into perception, thought and language. *Journal of Consciousness Studies*, *8*(12), 3–34.

Sato, K. (2009). A postwar cultural history of cuteness in Japan. *Education About Asia*, 14(2), 38–42.

Sherman, G. D., Haidt, J., Coan, J.A. (2009). Viewing cute images increases behavioral carefulness. *Emotion 9*(2), 282–286.

Weeks, K. K. (2018). *Cuteness and appeals: Unleashing prosocial emotions*. Dissertation, University of Connecticut.