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https://doi.org/10.15017/2559028

出版情報：九州大学心理学研究. 21, pp.15-22, 2020-03-16. 九州大学大学院人間環境学研究院
バージョン：
権利関係：

Kyushu University Psychological Research
2020, Vol.21, 15-22

The Effect of *kawaii* on task performance: Viewing cute images without baby schema

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Even though the word "*kawaii*" (cute) has become more broadly defined in recent years in Japan, almost all research on cuteness has used the baby schema as a stimulus. Based on the finding that feelings of cuteness toward the baby schema improves task performance (Sherman et al., 2009), this study will investigate the effect on task performance of feelings of cuteness toward things which don't have the baby schema. Eighty-two university students were presented with cute images without a baby schema and noncute images. Before and afterwards, they were asked to carry out fine motor dexterity task and visual search task. Performing a two-way ANOVA, taking the number of successful trials as task performance, showed that performance was significantly improved after the presentation of cute images. This suggests that feelings of cuteness toward things without a baby schema may elicit approach motivation, leading to improved performance. Because feelings of cuteness with a baby schema increase discretion, we may consider the possibility that these results show a unique effect toward cute things without a baby schema.

Key Words: cuteness, *kawaii*, baby schema, task performances, visual attentions

Introduction

"*Kawaii*" (a Japanese word meaning "cute") things are popular worldwide, and in Japan the word "*kawaii*" is familiar and is used to describe various phenomena. Furthermore, various types of anime and character goods, often described as kawaii, are produced and exported to many countries. An emotional response to cuteness has been widely recognized by marketing professionals and used in profit and nonprofit advertising campaigns (Duffy & Burton, 2000; Nittono, Fukushima, Yano & Moriya, 2012; Buckley, 2016; Nittono, 2016), environmental campaigns (Huddy & Gunnthorsdottir, 2000; Ruanguttamanun, 2014), and product designs (Nenkov & Scott, 2014).

"*Kawaii*" also means affection and attachment to young and small things. In the study by Lorenz (1943), it was proposed that the concept of a baby schema is based on the facial features and physical characteristics of infants and toddlers that felt cute. Lorenz (1943) coined the word "*Kindchenschema*," or baby schema, namely, a configuration of infantile physical characteristics. Baby schema is a set of features commonly observed in baby animals, for example, a large head relative to body size, a high and protruding forehead, large eyes, and round cheeks. Lorenz (1943) assumed that responses to baby schema are innate processes and are triggered by elemental features of stimuli. Baby schema stimuli are cute (Alley, 1981; Glocker et al., 2009), capture attention (Brosch, Sander & Scherer, 2007; Brosch, Sander, Pourtois, & Scherer, 2008), bring a smile to the viewer's face (Hildebrandt & Fitzgerald, 1978), and induce motivation and behavior in approaching and providing caregiving (Alley, 1981; Eibl-Eibesfeldt, 1970; Glocker et al., 2009). Additionally, when viewing cute images, the heart rate increases, which affects EEG event-related potential and increases oxytocin concentration.

Sherman, Haidt & Coan (2009) conducted two experiments and demonstrated that performance in a fine motor dexterity task (i.e., the children's game Operation) improved after participants viewed a slideshow of cute images (e.g., puppies and kittens; baby schema) more than after they viewed images that were not as cute (e.g., dogs and cats). Because high levels of carefulness seem more critical for fine-motor movements (e.g., brain surgery) than for gross-motor movements (e.g., running), Sherman et al. (2009) used performance on a fine-motor dexterity task as an index of behavioral carefulness. The performance measure was the number of plastic body parts that participants removed successfully from the image of the body of the patient depicted on the game board using the game's tweezers without touching the edges of the compartments. We interpreted improvement in the accuracy of this task as an index of increased attention to and control of motor actions. The operation task used by Sherman et al. (2009) suggests caregiving because the player is expected to act as a doctor who helps the patient depicted on the game board with removing foreign objects from the patient's body. If cuteness-induced behavioral

carefulness is caused by a heightened motivation for social interaction, the effect would not be found in simple perceptual-cognitive tasks that do not suggest social interaction (Nittono et al., 2012). Nittono et al. (2012) in their study demonstrated that when using a nonmotor visual search task, cute stimuli also improved the performance of the task. In their study(Nittono et al., 2012), whether the effect is specific to a motor task that suggests helping others was examined by using a non-motor visual search task that required concentration but did not involve fine motor skills nor suggest social interaction. Notably, the literature that has suggested that cute stimuli affect task performance has involved experiments that have used baby schema.

Recently, the word "*kawaii*" has become more widespread in Japan, and because the term is used for animate and inanimate objects, the explanation of cuteness only in the context of baby schema is inadequate. Nittono et al. (2016) in their study asserted that the word "kawaii" was very familiar in Japan in the 2000s; for example, cute versions of digital equipment and daily necessities such as pink digital cameras, rounded humidifiers, and colorfully designed stationery were sold. These cute things did not necessarily have a baby schema, and their features could not be defined in the context of baby schemas (Nittono, 2009). Furthermore, individual differences were observed in cuteness other than for a baby schema (Koga, 2009), and that is considered to differ from innate instinct behavior when viewing baby schema. As the scope of the word "cute" expands, a common theme of cute things has emerged: Individuals' desire to get close and remain close to cute things is socially motivated (Ihara & Nittono, 2012). Thus, we posit that although feelings for cute things without a baby schema and feelings for babies differ, both types of feelings are positive include the motivation to approach the subject.

In this study, based on the literature that has demonstrated that the cuteness of the baby schema was related to task performance (Sherman et al., 2009; Nittono et al., 2012), we examined how the feeling of "*kawaii*" for those without the baby schema affected task performance. A study demonstrated positive emotions with the motivation to approach the feeling of "*kawaii*" for those who do not have a baby schema(Ihara & Nittono, 2012). In this study, we attempted to clarify the role of cute feelings in individuals' daily lives, and how cute feelings in response to stimuli other than those of the baby schema affect the performance of tasks for revealing the value of the daily use of cute things.

In this experiment, Task 1 used the same operation task as that of Sherman et al. (2009). Because caring for a small, delicate child requires one to act with great care, Sherman et al. (2009) reasoned that cuteness cues might stimulate increased attention to, and control of, motor behavior. The same task was used in this study to investigate the effects of cuteness cues. The changes to the completion time for the task and the performance score before and after viewing cute images were examined. We predicted that the participants' performance would improve more after viewing the cute images. Should this result be because of a behavioral shift toward slow and deliberate actions, the time to complete the task would increase (Nittono et al., 2012). Task 2 used the same visual search task as that of Nittono et al. (2012). The purpose of Task 2 was to assess whether the effect was specific to a motor task that was suggestive of helping others and that was examined by using a nonmotor visual search task that required concentration but was requisite of neither fine motor skills nor suggestive of social interaction. Koga (2009) asserted that what is cute depends on the individual, thus, we used four types of stimuli; "General Cute Stimulus" selected by the experimenter; "Individual Cute Stimulus" selected by the participants themselves; "Noncute Stimulus" selected by the experimenter; and "neutral stimulus" on the blank pages. None of these stimuli had a baby schema. The study tested the following two main hypotheses:

H1. "*Kawaii*" feelings for things with and without a baby schema will improve task performance in the same manner.

H2. The participant selected "individual cute stimulus" will improve task performance more than the "general cute stimulus."

Materials and Methods

Participants

Eighty-two university students (40 men and 42 women, 18-24 years old; $M = 20.8$, $SD = 1.47$) participated in this study. All participants were nonmothers, Japanese speaking, and right-handed.

The protocols of this experiment were approved by the Research Ethics Committee of the Graduate School of Human-Environment Studies in Kyushu University. All participants provided written informed consent prior to study participation. After the experiment, participants were debriefed on the purpose of the study. Participants consented to use their data in the analysis.

Stimuli

We used four types of stimuli. Each stimulus was a color photo (18×25 cm). None of these stimuli had a baby schema.

General cute stimulus. Referring to Ihara & Nittono (2011), we selected six items from cluster of items that were rated as cute but not infant (e.g., accessories, and pastel color). We used six images, namely, flowers, accessories, glasswork, confectionery, check patterns, and polka dots, as cute items without a baby schema (Appendix 1).

Individual cute stimulus. The participants selected this stimulus. The participants answered questions of "what I think is cute" prior to the experiment. We prepared the answers from the participants as stimuli. All stimuli did not include a baby schema.

Noncute Stimulus. As control stimuli, Sherman et al. (2009) in their study used furniture, and Nitono et al. (2012) used pleasant foods. Notably, furniture may cause a feeling of "*kawaii*" depending on the design, and we avoided using food because confectioneries are among the cutest stimuli. Thus, we used the following six noncute stimuli: pipe chairs; scissors; personal computers; wall clocks; staples; and desks(Appendix 2).

Neutral Stimulus. A blank paper was used as the control stimulus to avoid evoking emotions.

Tasks

The experiment comprised two types of tasks.

Task 1 (Operation game). This task was a children's game (Bilibili Dr. game, Megahouse, Tokyo, Japan), and was the same game used by Nittono et al. (2012). Using the tweezers provided in the box, the participants were asked to remove 14 small pieces from holes on the image of the patient's body depicted on the game board without touching the edges of the holes, which would result in a buzzing noise. Dropping a piece while attempting to remove it was considered an unsuccessful attempt. After watching a demonstration performed by the experimenter, the participants were instructed to perform the task at their own pace with the goal of obtaining the highest score possible. The participants started the task on the experimenter's cue. The holes were sequentially numbered. After each trial, regardless of success, the participants immediately moved on to the next hole. When the participants finished all 14 trials, the task was completed. The number of successful removals and the time to complete the task were recorded.

Task 2 (Visual search task). This task was a visual search task on matrices (Allen, Gilchrist, Hollis, 2008), and the same task used by in the study by Nittono et al. (2012). Each matrix comprised 40 digits (0-9, 4 rows by 10 columns) distributed randomly. Ten matrices were printed on one sheet of paper. No two matrices were the same. Participants were asked to search a matrix for the designated digit (shown on the left side of each matrix) without pointing at the digits and to orally communicate the number of counts. The range of answers was two to six. The target digit differed by matrix. Participants were told to provide as many accurate responses as possible within a time limit of three minutes.

Procedure

Participants were randomly divided into two groups. Group 1 (N = 42, M = 20.4, SD = 1.62) presented general cute and noncute stimuli, and Group 2 (N = 40, M = 21.2, SD = 1.31) presented individual cute stimuli and neutral stimuli. Participants attempted to complete Tasks 1 and 2 ("pre"), viewed the presented stimulus image for one minute, and worked on Tasks 1 and 2 ("post") again. The participants were asked to perform a task requiring a high level of concentration twice, with a break of a few minutes for mental recovery between the tasks. To use this spare time beneficially, the participants were asked to help select stimulus images for another experiment. The experiment was performed twice, and the experiment was performed again 15 to 28 days after the first experiment. In the second experiment, the stimulus image was the type not presented previously, and the procedure was the same as the first experiment. The order of presentation of the two types of stimuli was counterbalanced between participants. To confirm the emotions caused by the stimulus image, we asked if the stimulus was cute after the "pre"/ "post" task. We also asked questions about the participants' feelings other than cute when they saw the stimulus.

Results

Table 1 summarizes the mean rating scores. General cute stimulus and individual cute stimulus were rated as cuter than noncute stimulus and neutral stimulus (M = 4.4, M = 5.0 vs. M = 1.6, M = 1.0, t (41) = 19.22, p < .01, t (39) = 22.77, p <

Table 1
The cuteness mean rating score.

	general cute stimulus		individual cute stimulus		noncute stimulus		neutral stimulus	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
cute	4.4	0.4	5.0	0.0	1.6	0.6	1.0	0.0

.01). Individual cute stimuli were rated higher on average than cute stimuli, but no significant difference was observed (M = 4.4 vs. M = 5.0, t (80) = 4.77, p = n.s.).

The duration used to complete Task 1 was "time," the number of pieces removed without an error was "score," and the number of correct answers in Task 2 within the time limit was "number." In this study, we analyzed the "time," "score," and "number" as task performance.

First, we analyzed Group 1. A two-factor analysis of variance (ANOVA) was performed with the stimulus type and "pre"/ "post" as the independent variables and task performance (time/score/number) as the dependent variable. No interaction was observed (F (4, 164) = 2.27, p = *n.s.*, F (4, 164) = 6.00, p = *n.s.*, F (4, 164) = 11.59, p = *n.s.*). No significant difference in "pre"/ "post" task performance was observed for the general and noncute stimuli (F (2, 82) = 21.53, p = *n.s.*).

Fig.1 shows the results of Group 2. A two-factor ANOVA was performed with the stimulus type and "pre"/ "post" as the independent variables and task performance (time/score/number) as the dependent variable, such as in Group 1. We observed an interaction between performance of "score" and "number" (F (4, 156) = 21.00, p < .05, F (4, 156) = 7.24, p < .01). "Score" and "number" had a simple main effect in "pre"/ "post" when individual cute stimuli were presented, and "post" performed significantly better than "pre" (F (2, 78) = 3.73, p < .05, F (2, 78) = 0.65, p < .01). In "pre", no significant difference in performance between individual cute stimuli and neutral stimuli were observed, but in post, individual cute stimuli had significantly higher performance than neutral stimuli (F (2, 78) = 4.86, p < .05, F (2, 78) = 9.89, p < .01)

To examine the significant differences between cute stimuli, the performance of Group 1 for the general cute stimuli and Group 2 for the individual cute stimuli were compared. A two-factor ANOVA within the subject was used, with the stimulus type and "pre"/ "post" as independent variables and task performance (time/score/number) as dependent variables. As a result, interaction was observed in the performance of "score" and "number" (F (2, 78) = 11.50, p < .05, F (2, 78) = 8.56, p < .05, Fig.2). "Score" and "number" had a simple main effect in "pre"/ "post" when individual cute stimuli were presented, and post performed significantly better than "pre." In "pre" (F (1, 78) = 25.10, p < .05, F (1, 78) = 8.56, p < .05), no significant difference was observed in performance between individual cute stimuli and general cute stimuli, but in post, individu-

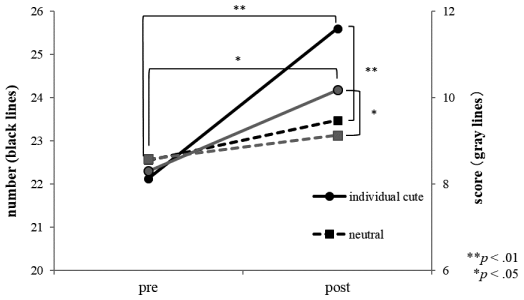

Fig.1 Mean "score" and "number" of task (group 2)

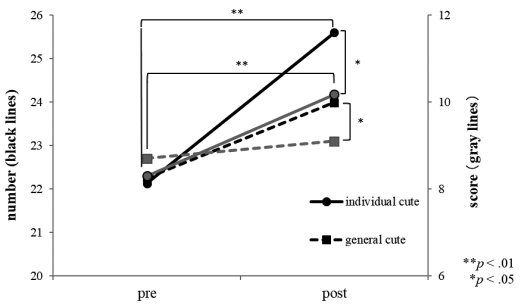

Fig.2 Mean "score" and "number" of task (comparison between individual cute and general cute)

Table 2

Things felt on seeing the "individual cute stimulus"

Answers	*N*	percentage
I like it	29	72.5
It's one of my favorite	21	52.5
It makes me relaxed	19	47.5
It's calming	18	45
It's beautiful	11	27.5
It's fashionable	10	25
I want to wear it	8	20
I want to touch it	7	17.5
I want to see the real thing	3	7.5
Others	8	20

Note. N = 40, multiple answers

al cute stimuli had a significantly higher performance than general cute stimuli (F (1, 78) = 7.56, p = *n.s.*, F (1, 78) = 2.18, p = *n.s*).

Table 2 shows the results of an interview survey on the emotions that emerged when participants saw individual cute stimuli. Twenty-nine out of 40 individuals presented with individual cute stimuli said "I like it," 21 individuals said "it's one of my favorite," 19 individuals said "it makes me relaxed," and 18 individuals said "it's calming."

Discussion

In this study, we examined the effect of viewing cute images without a baby schema on the subsequent performance of unrelated tasks. All participants rated individual cute stimuli and general cute stimuli as cute and rated noncute stimuli and neutral stimuli as not cute. The results of this study suggest that individual cute stimuli improve the score of Task 1 (the game Operation) and increase the number of correct answers of Task 2 (visual search task). No improvement in task performance was due to general cute stimuli. Thus, among the cute stimuli with no baby schema, we posit that the self-selected cute stimuli improve performance.

We posit that cute things may, regardless of the presence or absence of the baby schema, have led to the motivation to want to approach, touch, or be beside the stimulus and the improved performance. However, although the general cute stimuli were rated "cute," these stimuli did not improve performance. We posit here two possible reasons for this observation. Firstly, "cute" is an individualized feeling (Koga, 2009), and a singular definition is not available because the use of the word "cute" has spread (Nittono, 2009). Therefore, individual cute stimuli caused "cute" positive emotions along with the motivation to approach, but in general, cute stimuli did not cause it, which may have led to the results of this study. Secondly, individual cute stimuli may elicit emotions other than "cute." The results of the interview survey suggest that feelings related to the words "like," "favorite," and "relax" are caused when individual cute stimuli are observed. In general, regarding cute stimuli, few mentions were described, and such emotions may have improved task performance.

Notably, we observed a point of discrepancy with the literature. Sherman et al. (2009) and Nittono et al. (2012) in their studies have suggested that cute stimuli improve alertness. However, no significant difference was observed in task execution time ("time") in this study. This suggests that the feeling of "cute" for individual cute stimuli improves motor function and visual attention of the hand but not cautiousness. Therefore, "cute" for the baby schema and "cute" for other than baby schema may have different effects. Thus, "cute" for those without a baby schema may have other effects.

The results of interviews showed that feelings such as "it makes me relaxed" and "it's calming" were evoked in 18 out of 40 subjects. From this, we can infer that they relaxed on seeing the "Individual Cute Stimulus," and that this led to improved task performance. In addition, the fact that there were some —though few— responses such as "I want to wear it" and "I want to touch it," suggests that the Individual Cute Stimulus may have elicited approach motivation (in terms of wanting to get close to it, touch it, and be near it).

This study has several limitations. Firstly, revealing the meaning of individual cute stimuli for individuals was impossible. Interview surveys demonstrated participants' self-reported feelings regarding individual cute stimuli, but the details remain unclear. Further research could clarify this point to further discuss effects of cute emotions. Secondly, we could not organize the feeling of cuteness for things with no baby schema. Because the emotion of cuteness is highly individual, different types of emotions of cuteness are possible and worthy of further research. Thirdly, the psychophysiological state underlying the feeling of cuteness must be explored. Shiota, Neufeld, Yeung, Moser & Perea (2011) in their study reported that viewing baby animals was associated with increased heart rate and increased respiratory rate, implying increased arousal. Sherman et al. (2009) also observed that, as participants viewed baby animals, the heart rate increased from the baseline. Details of psychophysiological responses to cute stimuli are to date unknown, and responses also to stimuli other than baby schemas should be determined in further research.

Cute things with no baby schema improve our visual attention and improve the performance of hand-held tasks. In this study, individuals' thinking for what is cute was critical to their improvement in task performance. We suggest that the display of cute things at home and at work would improve task performance.

Acknowledgements

The authors would like to thank all participants for cooperation with the experiments. We also thank Professor Toshihide Kuroki for useful discussions. Finally, we are grateful to the referees for useful comments.

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Appendix 1

General cute stimulus.(*flowers, accessories, glasswork, confectionery, check patterns, and polka dots*)

Appendix 2

Noncute Stimulus.(*pipe chairs, scissors, personal computers, wall clocks, staples, and desks*)