

“Potentials of Kawaii*¹ Robots” -Feasibility study that uses unique robot “Pirica”-

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*¹:”kawaii” means not only “cute” and “dear”, as well as “lovely” in Japanese

1. Introduction

As its kawaii was exhibited at the RoboCup Junior Montreal 2018*², Pirica is a unique robot that can become an autonomous agent of music therapists. Although a variety of types of robots have appeared in recent years, no robot is kawaii and useful in society and human life (social contribution). “Kawaii,” however, is thought to have a significant impact on a human behavioral science approach. Therefore, on the assumption that the “kawaii” of Pirica could be used not only as an agent of music therapists but also for social contribution, feasibility studies that use Pirica were conducted in such categories as “education” and “life” to verify “if a kawaii robot has the potential to play some role in social contribution.”

2. On Pirica



As mentioned in the introduction above, Pirica is the unique robot that can become an agent of music therapists, featuring its kawaii exhibited at the RoboCup Junior Montreal 2018 Onstage.

Pirica has two major features. First, its appearance adopts “baby schema.” As proposed by “baby schema”, Pirica was designed such that it has a large head, protruding and high forehead, large eyes, short and thick extremities, and plump body shape.

Designed small and light in weight, Pirica also adopts the characteristics of such an object as people feel it kawaii. As to color selection, it uses colors that give a soft impression, such as white and pastel colors.

It is considered that creatures and models having such characteristics as proposed by “baby schema” are felt kawaii, that they curb aggression by individuals around them, and that they are more likely to be subjected to such behaviors as approach, nurture, and protection. (Eible-Eibesfeld, 1970 Translated by Hidaka and Kubo, 1974 ; Zebrowitz, 1997 Translated by Hata and Nakao, 1999) ¹⁾

It is also considered that faces and body shapes containing the characteristics of “baby schema” enhances the motivation of people watching them to protect and take care of

what they watch (Alley,1983a,b ;Glocker, Langleben, Ruparel, Loughead, Gur & Sachser, 2009a)²⁾, and that people prefer round things to angled ones (Bar & Neta,2006)³⁾. Pirica has a feature that stimulates people’s psychological aspect.

Second, its structure is simple. Overall, Pirica was created in a simple structure. Protruding things on the appearance were minimized. Inside, a high priority was placed on operability, and it was designed in a way that allows for easier change and replacement of peripheral devices such as sensors according to purposes of use by unitizing as many parts as possible. For the microcomputer board, Raspberry Pi was used. This way of designing makes Pirica easy-to-use for both the manufacturer and users.

3. Feasibility Study (1) Biosignal and Application in Interaction



A. Experiment Description

By using Pirica as an autonomous agent of music therapists, we practiced Eurhythmics, one of the active music therapies, for six

middle-aged men and women.

B. Experiment Results (feedback from subjects)

- Before practicing it, I felt a bit uncomfortable imitating robots, but in practice, I had a less tense feeling than when imitating a music therapist. Even when I made some mistakes, I didn’t feel that I failed. (Man, 70s)

- At first, I felt a slight embarrassment, but once the session started, I was immersed in following the actions of Pirica. After the session, I found myself joining it without being conscious of others. (Woman, 50s)

- Due to cute robots (Pirica) leading the therapy, I didn’t feel myself “being treated” compared with when music therapists do so. I thought we took part in the session comfortably. (Woman, 70s)

- I think I enjoyed taking part in the session. Because not a human like me but Pirica led the therapy, there were no rules of movements. So, I was able to move my body just as I wanted. It was good. As I was expecting to see what movement or expression Pirica could show us next during the session, I think I was able to focus on my body movements naturally. (Woman, 40s)

4. Feasibility Study (2) Application in Education



A. Experiment Description

We held a programming course to program “kawaii” for fifty female students from elementary and junior high schools, using MiniPirica, a smaller version of Pirica, for their easier handling of the robot.

MiniPirica mainly uses light to express itself through LEDs on the face, cheeks, and body.

During the course, participants programmed what they felt “kawaii” by selecting the look in the eyes and the colors of cheeks, hands, and body of MiniPirica.

B. Experiment Results (feedback from subjects)

- Although I tried programming for the first time, I was satisfied that I was able to create my special “kawaii.” (Female student, 4th grade)

- I thought it was great to be able to change the shape of eyes, the colors of cheeks and body. I wish I could create my special Pirica by adding more various functions. (Female student, 6th grade)

- I am a beginner in programming and didn't have much interest in robots, too. But in practice, I enjoyed it. A robot like Pirica is different from a radio-controlled toy or a plastic model of "Gundam," and even I, as a girl, thought, “what kind of robot is it?” and I became interested in it. (Female student, 8th grade)

- I enjoyed programming a robot. It was a good chance to have an interest in robots. (Female student, 5th grade)

5. Feasibility Study (3)

Application in Medical Care and Healthcare



A. Experiment Description

Using Pirica, we reminded people of five different ages about possible risks in a situation where heatstroke or influenza may occur.

In hot and humid conditions of summer in which symptoms of heatstroke are highly likely to occur, Pirica reports heatstroke's symptoms such as "too hot, groggy, and dizzy."

In winter conditions in which the humidity level is low, and influenza virus is highly likely to survive and grow, Pirica shows expressions reminding people that they are in

such environments preferred by influenza virus as "water is not enough, or virus exists."

B. Experiment Results (feedback from subjects)

- When the robot had a troubled expression on its face, I felt like helping it. Its kawaii makes me feel like keeping it at hand at all times. I thought it's also good that it is of practical use. (Woman, 20s)

-The robot's face is expressive, and feelings arose that "I want to protect or help it." But, I thought it would be better for the robot to have acoustical or behavioral expressions because such expressions grab attentions instantly. (Man, 50s)

-I thought it's interesting because I don't often see a heads-up by a robot. I thought it's convenient for the robot to tell us the current temperature or humidity as we don't often check them. In fact, when I turned on the air-conditioner when it seemed to be hot, the robot put a delighted look on its face, which also made me feel delighted and actually feel cooler. So, I thought it's useful. (Man, 20s)

6. Discussion

What can be said to be common about three feasibility studies through the completion of the experiments as reported in chapters 3 to 5 is that Pirica, the kawaii robot that uses baby schema, tends to invite such

actions as approach, nurture, and protection, and that it makes it possible for people to treat it with affinity in various situations.

Next, the purposes of each study and whether such purposes have been accomplished are analyzed below.

First, the study that uses Pirica in chapter 3 aimed to ease a sense of shame and tension that is said to be felt by subjects of music therapy when music therapists perform their therapy.

The result of the study shows that Pirica can soothe a sense of shame and tension, which is created between people. Therefore, it can be concluded that the purpose has been accomplished.

Next, the study that uses MiniPirica in chapter 4 aimed for students who seldom have a chance to be exposed to robots or who have never experienced programming to learn to program in a pleasant and friendly manner by holding, stroking, and having physical contact with it.

The result of the study shows that Pirica makes it possible for people to respond to things or events they encounter for the first time in their life without a sense of hesitation by lessening a sense of tense caused by such things or events. Therefore, it can be concluded that the purpose has been accomplished.

Lastly, the study in chapter 5 set a goal for subjects to be induced by Pirica to take actions on the assumption that the subjects have a stronger incentive to make the environment surrounding them more

comfortable when they are driven by their caring feelings such as “I want to do something for Pirica because it looks painful due to the heat” than when the subjects take actions for themselves to check the temperature or humidity of the place where they are in using a thermo-hygrometer, turn on the air-conditioner, or use a humidifier.

The result of the study shows that Pirica can change people’s behavior or create an incentive for them to take actions due to its kawaii. Therefore, it can be concluded that the purpose has been accomplished.

7. Conclusion

From the result of these feasibility studies, it can be concluded that “kawaii” affects a human behavioral science approach, and that “kawaii robots” have the potential to be used for various purposes.

Therefore, based on these feasibility studies, it can be assumed that it will be meaningful to implement a larger experiment to verify what effect kawaii robots have on various generations or environments.

It would also be possible to deepen the understanding about the human behavioral science approach that is affected by “kawaii” if relations between colors, shapes, positions of parts, and human psychology were to be studied, and a control experiment were to be conducted.

Furthermore, for the realization of Pirica that can contribute to society under the current social trend, it can be considered that the practicability of Pirica will be improved by

expanding the area where its “kawaii” can be applied and by upgrading its durability and safety.

*²: Individual Team World Champion, Best Technical Demonstration



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