Subjective Evaluation of Use of Babyloid for Doll Therapy

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Abstract—In line with the effects of Japan’s aging society with fewer children, the number of elderly with dementia who live alone and without care is increasing, therefore at-home care is beginning to be required. Doll therapy is a way of at-home dementia care. Doll therapy can help improve mental status of the elderly, because their logical and rational thinking is activated by imaging the child care experience with feeling and emotion at the times. In this research, we consider using Babyloid, a baby type robot, for doll therapy. As a first step of this research, we investigated whether elderly people in a nursing home for the elderly home accept Babyloid.

I. INTRODUCTION

As of September 2011, the estimated number of people older than 65 years in Japan was 29.8 million, 23% of the total population [1]. The proportion of elderly will continue to rise until 2025 there are about two people working for each elderly person. This trend is reflected in the compositions of households: 41% of households (about 20 of 48 million) included one or more persons 65 or over in 2008. In addition, the majority of elderly only households were one-person or married couple-only households, and the number of such households is expected to continue increasing [2], which means that the number of elderly households with a caregiver is declining. Moreover, the number of elderly with dementia is increasing, and many of them are not receiving appropriate care due to the fewer number of children and the aging. Symptoms of mental decline as dementia progresses are memory loss and forgetfulness in addition to abnormal behaviors such as wandering and aggression. If such symptoms occur, care to elderly only households want to be helped family members, because elderly only households are a tremendous burden. Care by family members has also been, but 74% of such care givers report having stress. This has become a severe social problem.

To meet this demand, there are a variety of psychotherapies for the elderly, including doll therapy [3]. Doll therapy helps improve the mental condition of the elderly because it activates their logical and rational thinking by recreating their child care experiences with their associated feelings and emotions. It has been reported that the use of doll therapy at welfare facilities for the elderly helps calm the elderly, reduces the number of instances that elderly patients report hearing a strange voice, and improves communication between the elderly and facility staff. From these effects, doll therapy can be expected to reduce the burden of care and to reduce psychological stress for both caregivers and those require nursing care. We hypothesized that a robot might have the same psychotherapeutic effects with it. We are currently investigating the use of a baby-type robot called “Babyloid” for doll therapy for elderly patients with dementia [4]. Babyloid can change its expression, respond to verbal input, show tears (simulated by light-emitting diodes (LEDs)), and produce other baby-like behaviors. Its unique robot distinct features can elicit strong emotions from elderly patients with dementia. Therefore, we guess getting in a different assessment than baby doll. Here we report the results of our investigation of whether elderly people in a nursing home for the elderly accept Babyloid and of our evaluation of its usefulness.

II. BABYLOID

A. Appearance

Babyloid (see Figure 1) is a robot designed to be taken care of by a user, specifically an elderly person requiring nursing care. It gives the user a social role, i.e., caring for a “baby.” The goal of introducing Babyloid is to reduce the psychological stress of the user [4]. Babyloid is about 44[cm] tall and weighs about 2.2[kg]. It is designed so that it appears to be unable to do anything. It
Babylloid has no legs, which gives the appearance of being unable to walk. Its arms are shorter than those of a typical baby the same size, which gives the appearance of being unable to roll over.

Babylloid is modeled beluga which suppresses the strange feeling typically created by a mechanized life form and eliminates the bias inherent in using a doll representing an existing character. Design of between organisms and machines adopt and we aim that better impression of the people. It is designed to produce a tactile sensation and to feel soft and warm.

**B. Construction**

Babylloid is constructed as shown in Figure 2. Two motors in the neck provide flexion, extension, and rotation movement. Touch sensors are located in the hands, abdomen, and back, enabling Babylloid to perceive when it is held by its body or hands and when it is laid down. A dimple is created in the abdomen and buttocks by means of silicon memory foam, giving them the softness of a human abdomen and buttocks. Voice interaction is supported by a camera, microphone, and speaker installed in the body (however, it don’t use verbal information). An acceleration sensor in the body detects sudden changes in speed due to appeasing, falling, and other sudden movements. A temperature sensor detects changes in the ambient temperature.

The face is made of 1.5[mm] thick silicone resin. Expressions are created by means of a motor that changes the angle of the mouth and extends the resin. The eyes are opened and shut by means of a motor for each eye. Two LEDs are used to represent the cheeks and tear. Figure 3 shows examples of expressions. Babylloid expresses its emotions, moods and other feelings on its face by using unique facial-expression mechanisms. A light sensor on top of the head and one in the forehead enable Babylloid to respond appropriately when its head is stroked. A pyroelectric sensor on each side of the head enables it to detect the presence of a person.
III. CONVENTIONAL DOLL THERAPY

Psychotherapy designed to slow the progression of dementia through interactions with a doll like baby is called “doll therapy.” Even as people lose their ability for logical and rational thinking, they continue to feel emotions and have feelings up until the end. Doll therapy apparently slows the progression of dementia because touching the baby doll and caring for it stimulates the user to imagine or remember childcare experience, thereby creating feelings that activate their thinking and reasoning processes. Dolls used for such therapy can be divided into two types: those like a real baby, such as “Tatan” and “Tomochan” and those like a deformed baby, such as “Namaketarou” [5]. For elderly people with severe dementia, the use of the first type is no problem. However, its use can be problematic for those with mild dementia while the second type may be acceptable.

IV. PROBLEM DEFINITION

Since Babyloid expresses its emotions, moods and other feelings on its face and voice, unlike a doll or PARO, we hypothesized that it would be better accepted by our target users. Moreover, Babyloid has a deformed appearance which is designed for reducing the negative feelings generated by embodying an animal, and for eliminating the bias appearances of existing characters. However, we do not know whether they are accepted elderly. In this paper, we evaluate the degree of acceptance of Babyloid by the elderly.

V. EVALUATION

A. Method

We evaluated the degree of acceptance of Babyloid by elderly patients in a nursing home for the elderly using the questionnaire shown in Table I, and a survey using the questionnaire was carried out in an event sponsored by the Aichi Prefecture on October 22, 2010. In this table, first and second items are prepared for a evaluation of first impressions of Babyloid. Third through sixth items evaluate psychological impression obtained from interaction with Babyloid. Especially, third and fourth items assess the effect of therapy that Babyloid has.

The participants had experience using Babyloid or PARO (29 for Babyloid and 12 for PARO). We evaluate the degree of acceptance of Babyloid by the questionnaire result.

B. Results and Discussion

The leftmost items in Table I were assigned 5 points and the rightmost ones were assigned 1 point. As shown in Figure4, both PARO and Babyloid were highly rated. However, Babyloid was graded significantly lower for “Movements,” “Feel better,” and “Want to.” The lower score for “Movement” was expected because Babyloid has fewer moving parts than PARO. The lower scores for the other two items are partly explained by such comments as “I can’t leave alone if it is handy, but I cannot dry nurse” and “I want to take care of it, but that would be difficult because I’m elderly.” These results indicate that the elderly would have concerns about taking care of Babyloid. We think that these have led to reduction of fear of this evaluation. We can conjecture the large no difference between the two robots because some item the difference was about 0.5 to 0.7.

One feature of Babyloid is its ability to make facial expressions although the expressions don’t give it a human appearance. Nevertheless, Babyloid was liked by the participants. An example comment from a PARO participant was “I like animals because I had one.” Example comments from Babyloid participants were “I like Babyloid because I like taking care
VI. RELATIONSHIP WITH OTHER THERAPIES

There is doll therapy which is similar to psychotherapy using animals [8], [9]. Animal therapy, which is more commonly used than doll therapy, has been shown to slow down the progress of dementia as well as to cure depression. Doll therapy doesn’t draw out a response from the doll while animal therapy draws out a response from the animal. However, animal therapy is more costly and time-consuming. Moreover, it carries the risk of disease. In contrast, using Babyloid for doll therapy is less time-consuming and carries no risk of disease. Moreover, it is not seen as “playing with dolls” (See Table II).

Robot therapy is a form of recreational therapy in which a robot becomes a pet, instead of an animal [6], [7]. Recent research has focused on finding an effective therapy utilizing the characteristics of a robot and robot therapy is deliberated robotic movement or intervention method. The PARO seal robot is used therapy by one of the using robot one. It can such a movement of animals and it can react to its name, and can produce cute vocalizations when it is caressed.

Besides animal and doll therapies, there are a variety of other therapies, such as music therapy [11], art therapy and horticulture therapy. There are many therapies because satisfying point of the hearts of the elderly is different in individuals. The use of Babyloid for doll therapy improve the spirit of the elderly.

VII. CONCLUSION

We investigated the degree of acceptance of Babyloid, a baby-type robot, by elderly patients in a nursing home for the elderly. We didn’t found a clear difference between Babyloid and a conventional therapy robot.

In addition to the results we obtained, Kanoh [12] has suggested that Babyloid may be effective for relieving depression. However, giving the elderly motivation in life rather than relieving their depression is more important whether or not they have dementia. One way to get in life is to recognize that it is required by themselves. For example, that person is stopped crying real baby when he cries. By so doing, that person can recognize his or her existing needs and can attain a social role and/or motivation. Future work includes developing therapies that utilize Babyloid in order to help the elderly attain motivation.

REFERENCES