

# Is an Entertainment Robot Useful in the Care of Elderly People With Severe Dementia?

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**Objective.** An entertainment robot was used as occupational therapy instead of animal-assisted therapy to avoid any danger or injury to the patient and maintain cleanliness. This study compared the effectiveness of a robot animal, AIBO, with a toy.

**Method.** AIBO is made of metal and responds to spoken commands. We demonstrated AIBO to severely demented elderly people living in a geriatric home and observed their reactions.

**Results.** The most frequent reactions to AIBO consisted of looking at, communicating with, and caring for AIBO. The patients recognized that AIBO was a robot. However, once we dressed AIBO, the patients perceived AIBO as either a dog or a baby. Nevertheless, the presentation of AIBO resulted in positive outcomes for the severe dementia patients, including increased communication between the patients and AIBO.

**Conclusion.** AIBO was clearly an effective rehabilitation tool in the treatment of severely demented patients.

JAPAN'S elderly population is growing rapidly, and with it, the number of elderly with severe dementia. Patients with severe dementia are always a problem in geriatric health care facilities. In Japan, geriatric health care facilities are used for patient rehabilitation and therapy to train and prepare them for staying at home. Such patients tend to wander during their stay and are often agitated. Twilight syndrome is common after dinner. Patients with dementia tend to have progressively poor short-term memory and become increasingly disoriented. Ultimately, they lose their short-term memory, while retaining long-term memory. Consequently, they find it difficult to understand their situation, but can reminisce and talk about the past. We postulated that occupational therapy and rehabilitation could be used to help patients with severe dementia recall past feelings of comfort and past experiences. In addition, their latent abilities need to be restored so that the patients can be placed in a comfortable environment. We tried to help the patients to remember past happy experiences.

Animal-assisted therapy (AAT) has become a popular form of therapy (1–5). AAT requires trained animals, and the animals and patients must be screened (6,7). AAT improves physical, social, emotional, and cognitive function in humans. AAT requires a licensed caregiver, and most geriatric facilities cannot afford such people. Instead of real animals, we propose using an entertainment robot to treat patients.

This study evaluated the effectiveness of an entertainment robot called AIBO in occupational therapy with demented patients and compared its effectiveness with a toy dog.

## METHOD

### Participants

The participants were 13 patients (1 man and 12 women, average age 84 years) with severe dementia staying in a geriatric health care facility. Their GBS (Gottfries-Brance-Stein) score averaged  $66 \pm 21.8$  points. The experiments were approved by the ethics committee of Fujimoto Hayasuzu Hospital, and written informed consent was obtained from the patients' relatives.

### Materials

In this study, we used a toy dog and AIBO. The toy dog was a battery-driven toy that weighed 650 g and was 32 cm long from head to tail (Figure 1A). The toy could wag its tail and sit, and was covered with thick polyester fur.

AIBO was a metal entertainment robot that weighed 1500 g and was 24 cm in length. It recognized and responded to up to 75 spoken commands. It communicated using four senses: touch, sight, hearing, and balance (8) (Figure 1B).

### Experimental Set-Up

We conducted the following two experiments.

**Experiment 1.**—In the first experiment, we studied 4 groups of 3 patients each. Each experiment lasted 4 days. The toy dog was introduced in the first half of the experiment, and then AIBO was introduced. Occupational therapy was conducted for 5 minutes in a treatment room.

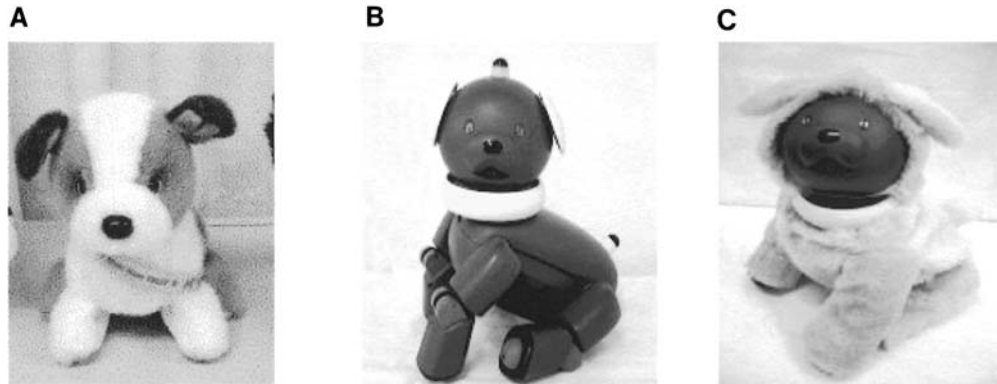


Figure 1. Materials: A, motor-driven toy dog; B, AIBO; C, AIBO with clothes.

During the experiment, patient activity was recorded on videotape.

After the therapy session, the occupational therapist (OT) observed the patient's activity on the videotape. The activity was classified into 6 categories: no interest, watching, talking, clapping hands, touching, and caring. A modified time study using barcodes was conducted. A barcode with 6 categories was listed. The OT scored the patient's activity using a barcode reader when the activity changed. The total number of activity changes in the therapy session was counted, and the totals with the toy dog and AIBO were compared.

In addition, interventions by the OT were counted. Interventions were classified into 5 categories: watching, talking, clapping hands, touching, and caring.

*Experiment 2.*—The second experiment lasted for 3 days. On the first and last days, AIBO was used without clothes. On the second day, AIBO was introduced with clothes. The therapy session and data analysis were the same as in Experiment 1. Figure 1C is a photo of AIBO wearing clothes.

## RESULTS

### Experiment 1

Figure 2 shows the results of the first experiment. The patients responded with 985 different reactions to the toy

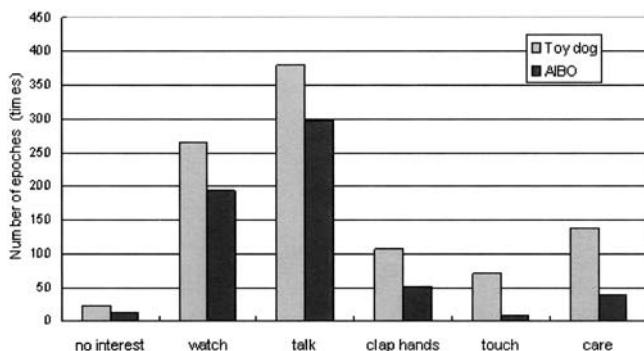


Figure 2. Patient activities during the occupational therapy session.

dog and 608 for AIBO. The most frequent reaction for both was “talking,” followed by “watching.” In the session with the toy dog, the participants clapped their hands, and touched and cared for the toy dog. There were also quite a few “touching” and “caring” reactions for the AIBO intervention.

The total number of interventions by the OTs was 374 and 749 for the toy dog and AIBO, respectively. As Figure 3 shows, the most frequent reaction was “talking” to encourage the patients to take an interest in AIBO. By contrast, the OTs made far fewer interventions in the session with the toy dog.

### Experiment 2

The effect of dressing AIBO was not significant (Figure 4). “Watching” and “talking” were frequent responses. In the 3-day therapeutic program with AIBO, with and without clothes, care for AIBO increased on the second and third days. Very few of the participants touched AIBO, regardless of whether it was clothed.

## DISCUSSION

This study investigated the effectiveness of an entertainment robot in occupational therapy. We compared a toy dog with AIBO. Both objects effectively increased patient activity during occupational therapy. Previously, we found that a toy dog can effectively reduce wandering and agitation in demented patients after dinner. In the interventions with the toy dog and AIBO, the patients often spontaneously began to talk, describing the object's performance and commenting on its physical features.

In addition, the patients communicated with other patients. The topics of conversation with both objects were similar. However, the patients did not talk about the past, not even reminiscing about their pets. They only relived the past when they were in a comfortable environment. Nevertheless, the results indicated that socialization and social activity increased in the presence of a toy dog and AIBO.

The difference between the toy dog and AIBO was critical. In the toy dog program, the patients understood that the toy mimicked a puppy. Consequently, the patients clapped their hands, touched, and cared for the toy. Some

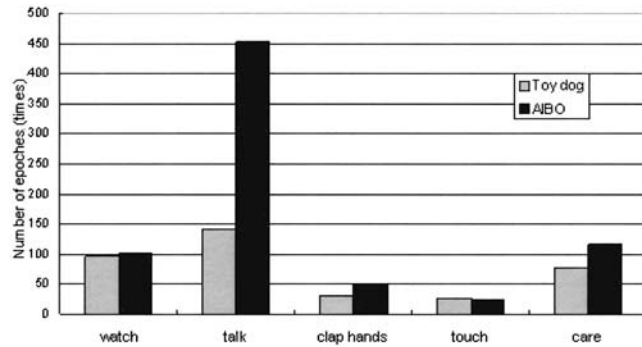


Figure 3. Activities of the occupational therapist during the occupational therapy session.

patients spoke to the toy dog and picked it up. We assumed that these patients were remembering past comfortable experiences with a dog. The patients in this facility have a history of good relationships with dogs.

In the AIBO program, the patients could not identify with AIBO, and intervention by the OTs was needed. The patients picked up AIBO when the OT suggested they do so. The patients understood AIBO to be a quadruped animal or that it mimicked a dog. Once we dressed AIBO, the patients identified AIBO as either a dog or a baby.

In general, choosing the proper toys or robot is critical to the success of an occupational therapy program. Unlike AAT, toys and robots do not run the risk of allergic reactions, bites, scratches, or bacterial infection (9). Robots and toy dogs can be used for occupational therapy programs in critical care units instead of real animals. They are safe and no special treatment is required for intervention by the OT.

Price is another issue. AIBO costs approximately US\$1,000. There are different opinions as to whether it is worthwhile. The current growth of interest in occupational therapy research and clinical trials suggests that robots may prove beneficial. The use of assistive devices, such as robots, might compensate for the shortage of caregivers and helpers.

### Conclusions

The usefulness of the entertainment robot AIBO and a toy dog as therapeutic tools was evaluated and compared. The toy dog triggered memories of past feelings of comfort. With the OT's intervention, AIBO also triggered emotions. We assumed that the patients understood that AIBO was a quadruped animal or mimicked a dog. In order to use these objects for occupational therapy, the OT must understand

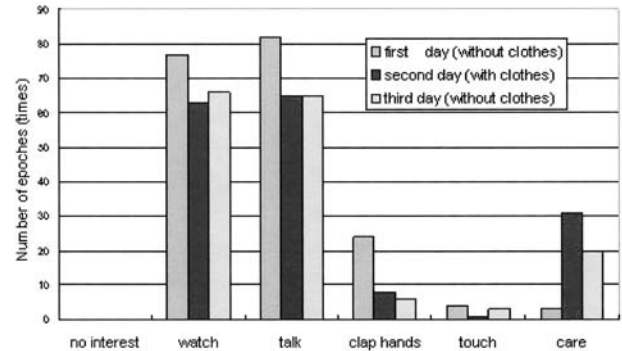


Figure 4. Patient activities in the sessions with AIBO, with and without clothes.

the characteristics of the toy and consider the dementia score of the patients.

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