

The possibility of the psychiatric treatment with a robot as an intervention -From the viewpoint of Animal Therapy-

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Abstract Recently, various pet robots are on market one after another including AIBO of the SONY company. These robots act as if they were alive and there is an interaction with the human being. Therefore, we feel that there is a communication with the robot. On the other hand it is proved that there is various effect due to the interaction with the pet in the field of Animal Therapy. The writer has been concerned with research and practice of applying a pet to medical treatment about this ten years. In this paper, Animal Therapy is surveyed first, next the trial of us who used a pet robot as the substitution of the pet is introduced in the hospital, a consideration is added, and, finally future directional movement is examined.

1. Animal Therapy [13]

It was a well-known fact that an animal was giving a human mind and body the positive influence. And it was the West from the 1960s that the theory formation and investigation began. It has become clear that there is a physiological, psychological, and social effect. The theory is applied and pets are used in some medical situation now. It is "Animal Therapy."

"Animal Therapy" is a coined word in Japan, and contains AAA (Animal Assisted Activity) and AAT (Animal Assisted Therapy). Both must be divided. AAA is activity which carries out an interaction to an animal, and it is close to a kind of recreation. As for AAT, the medical people concerned prescribe animal introduction with AAT as a treatment. On that occasion, a setup of a goal and measuring of the effect, reevaluation become necessary. The three major animals used for Animal Therapy are a dog, a cat, and a horse. The fields with a high possibility of raising an effect by introduction are the department of rehabilitation, pediatrics, psychiatry, and geriatric medicine. Practical classification is divided from the difference in the animal's possession by "visit type" "breeding type", and divided from the difference in the activities place by "establishment type" "an at-home type". There is a riding treatment (hippotherapy) and so on to do in the transitional

facilities.

It is stated just easily about the following, the AAA activities in the psychiatric ward of Tachikawa Hospital[12].

Activity was performed once per month in the ward or the courtyard. Participants are veterinarians, volunteers, doctors, and nurses.

The animal which participates are dogs, cats, rabbits, etc. The volunteers with the animal meet one by one with the patients who sat down circularly. A sickroom is visited directly for the patient for a bedridden patient or a patient who cannot move. AAA does not carry out to the patient whom a family doctor does not permit, for example after the operation and immunity decline. Activity is about 30 minutes per time, the reason is because taking into consideration the animal's own stress touched nonresistant. After therapy finishes, a patient's hand is disinfected, a hole is cleaned, and participants hold a meeting with making animals take a rest in the waiting room. Visit activities were no accident to the last, and the problem of allergy or infection did not occur at all, either. An actual patient's response is very good, and an expression and a movement appear on it. Especially, the schizophrenia patients and the dementia patients lifted in their arms or stroked the animal, and showed the positive and consistent reaction in many cases.

2. What is AIBO?

Sony Corp. which put AIBO on the market has regarded it as "the home entertainment robot." The size of AIBO is as much as the miniature dog. Weight is about 1.5kg. It walks in 4 feet. The founder AIBO (ERS-110) put on the market in 1999 imagined the little dog, and the second generation AIBO (ERS-210) put on the market in 2000 imagined the child lion. AIBO (ERS-311,312) like a bear and AIBO (ERS-220) which form is truly "a robot" were put on the market in 2001. AIBO is an autonomy pattern robot to act by the stimulus from the outside and the personal judgment. It has various emotion expressions and a learning/growth function. It grows with doing a communication with the person. For example AIBO grows by the communication such as "It is praised." "It is

scolded.”, and a user can raise AIBO which a character and a behavior pattern are different from in each. Various sensors and microphones, a speaker, a lamp, etc. are built in AIBO, it has a “tactile sense”, “hearing”, “vision”, and the “sense of balance”, and a motion, sound, and light express the “feeling” caused by the stimulus. At AIBO of the second generation, it works for about 1.5 hours by 2-hour charge.

3. Practice of the intervention activities by AIBO

Although the writer changed the place of work into the Yamato Municipal Hospital after performing AAA/T during six years as mentioned above in the Tachikawa Hospital, introduction of animal therapy was tried also there. However, the introduction was quite difficult. The big reason was in the way of thinking toward the animal by the Japanese. A Japanese shows a tendency to think about an animal with “It is dirty.” “It is dangerous.” It is a taboo by far that an animal goes into the medical spot in Japan. The thing that it could try in Tachikawa hospital was more special.

There was an opportunity to see AIBO in such circumstance, and tried to introduce a “pet robot” instead of the pet to the medical spot. Then after it got the permission of hospital and each department, activities by AIBO were done for one year every week with the children in the pediatrics ward [10,11].

Younger children than the junior high school student are in the pediatrics ward of this hospital. The disease leading to their hospitalization is various. For example, the orthopedics disease of the bone fracture and the sprain, surgical disease of the appendicitis and the ileus, internal disease of the diabetes and pneumonia, and the disease of the ophthalmology, the brain surgery, and the dermatology and so on.

The children hospitalized in pediatrics have much stress. Children are separated from the daily life, they are worried about their body condition, they must get accustomed to the new life, and delayed from learning as well. Children are exposed every day in these stress, and anxiety, depression, conversion condition, etc. appear depending on the case. They influence children's condition of disease negatively. The purpose of AAA/T in the pediatrics is to prevent them.

The children with comparatively light condition of disease had it play with AIBO in the play room. It was visited in the sickroom as well for the children who didn't had to get off a bed (Photographs 1 and 2)

When AIBO came into the room, many children did not approach soon. Perhaps because of fear and shyness. They feel specially afraid of AIBO's face. So when AIBO came to them , some children moved behind AIBO ,so as not to look directly into his eyes.

But all children were very interested in AIBO and continuously



1)Activity scenery in a play room with AIBO



2)Activity scenery in a bedside with AIBO

Photograph)

kept an eye on AIBO.

After a few minutes all children approached AIBO at a short distance.

Some quick movements of AIBO surprised them, but the distance between AIBO and the children gradually narrowed. And all children's first contact was petting AIBO's head. When AIBO was petted, it responded with eye's lights, friendly sounds and gestures. Children recognized their petting caused the reaction. At that time the interaction started between AIBO and children.

After initial contact children began to play with AIBO in their own way.

One called out to him. One touched other parts of AIBO. One continued to touch AIBO's head. One shook AIBO's paw. The children paid attention to the other children and adults around them. Children imitated the action of other children, for example touching petting and talking to AIBO.

The children concentrated for a longer time than we expected.

Children of different ages responded in different ways. Especially, infants showed a tendency to think about it as a real

“ dog “, and older children examined AIBO to see how it moved. The girls showed a tendency to love it in comparison with the boys from the viewpoint of maternity. All of the children thought of AIBO as a living thing, so everyone handled it carefully. This series of contacts resembled contacts with real animals.

4. Case Report

10 years old girl.

She had complained of left leg pain and walked with a limp since November, 2000. The X-ray and MRI examinations showed no problems. She entered the hospital for further tests in January, 2001. Bone scintigraphy and spinal secretion examinations were negative. The symptom was suspected to be psychosomatic. Before entering the hospital she complained of left leg pain and she said “when I put my left foot down, I feel pain here” She used the left tip of her toes when she walked.

She answered the nurses without hesitation, but she did not smile. She did not make contact with any other patients. She sat alone watching TV while the other children studied in the same room with a teacher. When her mother came to see her, she didn't speak, and played TV games.

After her examination she went directly to a room where children were playing with AIBO. She only participated for thirty minutes, but she quickly forgot her problem and played with AIBO just like the other children. She petted AIBO many times. She started to talk with one girl taking part in the same session. The next day the two girls spent a lot of time playing and talking. Soon she made dramatic changes in behavior such as smiling and talking with other children. Her limp disappeared completely in two days. She was discharged from the hospital after the third AIBO session. This case was diagnosed as the Conversion Disorder, with motor symptom or deficit (DSM-IV)

A limp symptom appeared on the body because the strain of the patient was strong and she could not do self-expression. However, when AIBO entered, it was buffered and unconscious mental conflict became weaker. Moreover, the feeling of the isolation decreased and the symptom eased it.

5. Consideration

First, It considers why a living animal has positive effects.

Recently, various assistant treatments, such as aromatherapy, musical therapy, horticultural therapy, movement expression treatment, and optical treatment, are tried. All the keyword of them is influence to our senses. And Animal Therapy has also worked on the senses in a certain view. The patients see the movement of the

dog, touches it, and speak to it. They are also stimulated by the smell and the sound.

With those stimuli, it is stable. That is, if the pet dog and the favorite cat have lain down underfoot, we can relax. An everyday rhythm is ready by giving a walk with and food to the animal. The exquisite balance of this “stimulus” and “stability” is the effect of Animal Therapy.

However, a time-axis brings big work to the stability. The act that it is kept “many years” produces feeling of unity with the dog, a life with an animal serves as an everyday part, and effect on relaxation of it increases.

And, the thing that an animal is “living existence” is important. In the field of psychiatry, although the psychodynamics between a family or a friend had been studied, the pet hardly became the object until now. Although a pet's role in a life was large, a patient seldom raised it in the clinical spot in the topic, and tended to overlook a treatment person, too. However, obviously a pet is a family's member. We meet a pet, raise it, train it, live with it, and tend it. If we aren't concerned properly, they will die. The direction of relations are not unilateral but bilateral. Unlike man, you may not have the rival heart in an animal. Moreover, various senses of values are also unnecessary. Social situations, such as a decrease in the birthrate, the trend toward the nuclear family, a rise of a divorce rate, aging, automation, and urbanization, are changing, and the opportunity to touch others and nature is decreasing rapidly. Therefore, our expectations to the pet increase further.

The thing synthesizing these all is an effect from a pet. According to the effect, the probability of survival after myocardial infarction is raised [3] (physiological effect), depression is restrained [5] (psychological effect), and contacts with others increase [2] (social effect).

The accident of biting and scratching, zoonosis, the animal's own stress, and pet loss etc. are the problem of Animal Therapy. However, if it is coped with appropriately, the merit from animals is considered to be far higher than the risk and the demerit.

Next, it tries to compare AIBO introduction with the animal introduction.

The advantage by using a pet robot in a hospital is mentioned simply.

First, it is clean. There is no necessity of considering zoonosis, allergy, etc. Next, it is safe. It is never bitten, never scratched, and never excreted at all. It doesn't need to think about stress for the animal, too. Finally, a robot can be programmed. It may be merit about “care is not needed”, “it not dying”. The owner doesn't necessarily need to participate in the case of the robot activities. These deny the risk of the animal activities certainly.

But can we expect the robot of the inanimate object effect on treatment?

It was stated before stimulating the senses leads to medical treatment, and much research suggests that the senses are deceived for the stimulus. For example, if a hearing stimulus is added to a vision stimulus, the vision stimulus effect will double clearly [7]. The senses which we have increase by some artificial stimuli. Moreover, there have been many data that, while it is unconscious, our attitude toward the computer is the same as our attitude toward the human being [1].

Therefore, if we see a robot like an animal even if it turns out that it is a robot, the feeling to the animal which we have from the first appears, and the effect from an animal may be reproduced. As for the “sense of the communication with the animal”, it doesn't know whether it has it by nature or a breeding experience is greatly concerned. Only, though a pet breeding experience varied, children seemed to think about a robot with a kind of creature.

It was said that the advantage which the live animal exerts on us is caused by a balance of the “stimulus” and the “stability”. Although the “stimulus” received from AIBO was strong, about “stability”, it was quite weak compared with the living animal.

That is, if we meet AIBO or an animal for the first time, for a while, we will be stimulated and we will move. However, a relaxed effect it is feeling that is stroking the dog kept for a long time is not felt from AIBO.

Therefore, it is appropriate for AIBO that “a stimulus” uses when required; For a depressed man, or for those who have to move.

6. Other Robots

Since the reaction in AIBO was good as mentioned above, trial with other robots was also performed.

-Robot A : It has the form of the stuffed animal of the bear, and it sometimes nods by reacting to our voice.

-Robot B : there is no motion in a form like a smaller cassette deck. If our personal information is inputted, it suitable reply will be carried out in response to our language, and conversation will be urged.

-Necoro(OMRON Corp.): Both touch and shape are the robots modeled after the cat. It reacts by the behavior and the voice which is the same as the cat. It cannot walk.

-Robovie (Mitsubishi Heavy Industries, ATR) [4] human typed robot.

About Robot A, children hardly showed interest. Although interest is shown to B, it is troublesome in respect of an information input or language input, and it has given up immediately. That is, the robot that a motion is modest and monotonous, the robot with difficult usage, or the robot that aimed at only language understanding had children's weak reaction.

It was to Necoro and Robovie that there was children's good



3)The girl who gives a tight hug to Necoro



4)The inpatient of the persons of middle or advanced age who contact with Robovie

Photograph)

reaction.

Although we were expecting that children got tired so that Necoro might not move around like AIBO, children's reaction was very good from the start. Necoro is often liked rather than AIBO with the infant. Moreover, a four-year-old child expressed Necoro “Though it is a cat, it is not the real thing.”, and a two-year-old child expressed it with “the real cat”. Furthermore, the popularity of AIBO and Necoro of the elderly people in a nursing home was as high as the same. Communication with Necoro is different toward AIBO. In both the elder people and the children, the action hardly seen in AIBO of “giving a tight hug” and “continue to stroke” was ordinarily seen by Necoro. (Photograph3)

From these things, as for Necoro, “Stability” seemed to be rather higher in comparison with the “stimulus”. If a pet robot was different, the possibility that a mentality response was different was suggested.

A further different reaction was seen to Robovie of a human

typed robot. Robovie is a large size, it is moved, the eyes and hands are moved, it speaks from itself, and it answers to the patient's voice. Although children contacted Robovie interestingly, compared with the pet robot, They were comparatively passive. Conversely, the patients of middle or advanced age in the general ward tried contact positively. (Photograph4)

It seemed that we became "active" to the pet robot and became "passive" to a human typed robot as a result of observation. That is, we influence to a pet typed robot. We wait to be influenced from a human typed robot to it. It will be because the interaction with a human typed robot is verbal communication, and the interaction with a pet typed robot is non-verbal communication.

The tendency that we tried to find meaning in the behavior of the robot was always seen during the activities with the robot. The remark like "It is glad." "It is angry." was observed by all the groups, and it was more active by the activities in the great many people. A robot can be seen as a creature by making the movement of the robot have meaning. It seemed that furthermore, patients' sympathy was produced and a robot's significance of existence was born. Those feelings became rich further by smooth intervention of a person who stand in between. The importance of these semantic attachments and intervention persons is often seen also in the AAA.

7. Future directivity

The method of our trial is really the same as AAA, and the animal and the robot were only replaced. Therefore, I want to advocate a coined word called RAA (Robot Assisted Activity) and RAT (Robot Assisted Therapy). Our trial can be called RAA. Then, the patient who improved it by chance by the interaction with the robot was introduced. If this can be done intentionally, a way to RAT may be opened, too.

Although "stability" of present AIBO is weak, it is rich in "stimulus". This type of robot may be able to be used as "one assistance which gives a stimulus and encourages energy for a short period of time". For example, there can be an aim that child's rehabilitation is done with the pet robot in the pediatrics inpatient. This is also already carried out in AAT. And, the robot like Necoro with which "stimulus" is weak and "stability" is rich may be able to use in the condition, such as uneasiness and depression.

However, about a long-term effect, it is still an unknown. The necessity of the interaction disappears with the robot when a switch is cut unlike the living animal. Though it is the strong point of the robot, the thought of "I get bored with it." "I am permitted to get bored with it" comes out. An influence on the human mental condition by living in the long run with the robot isn't really clear. Depending on the case, it may become damage. If children are not concerned with the live animal but live only with a robot for a long period of time, the view to a life, death, and a sex may be distorted.

It was the easiness of the introduction of the robot to the medical institution that I was most surprised at in this trial. Japanese people are races with shallow association with an animal. It seems as for it, to show a tendency to consider a robot a good thing conversely by the influence such as "Atom; Astro Boy", although Japanese people are the shallow races of association with an animal. One of the reasons why Japan is the advanced country of the robot research is the attachment to the robot. This has the possibility of the tendency which is reverse to the Euro-American people. That is, the Japanese people of the affinity to an animal may be low, and to a robot may be high. Conversely, since Japan does not have a barrier, we Japanese must make the society advancement of the robot more careful.

It was not only an observation fact in this paper, and the introduction process was explained. It is because they do not exist independently, and the society common idea, the culture and the religion as well must be taken into consideration when a robot or an animal is introduced in the medical treatment.

8. Conclusion

The living animal is a completed form, and after Homo Sapiens is bone, we have spent about 100000-year together. A dog is living for 14000 years with us. It is certain that the influence which we take from the animal and the nature soaks to us.

And a robot evolves still more and nobody still knows in what direction the figure form is changed. It is also important to take out the hint to the directivity from the needs of the medical spot. For example, it has already been proved that we become stable when we only look at the fish swimming in the water tank [6], and there is physical effect on rehabilitation in horse riding [8] The knowledge is applied. The television type tank adapting picture technology and the chair which reproduces a motion of a horse faithfully [9] are already put on the market. Robot researchers are searching for the future of the robot. We must examine and tell them what is missing in the medical spot, and what kind of "articles" is necessary. Not an empty dream but technology is already coming to the stage.

We were concerned with this research, and we had an opportunity to speak to many robot developers. They say that, in a viewpoint efficient, development of a 2-pair-of-shoes bipedal robot is meaningless. Because a balance is bad, a very heavy robot is dangerous as for a walk by 2-pair-of-shoes. It is meaningless when it thinks about the research of a expression and a voice of the robot in the efficiency side, too. However, when we see the robot which included them, we are all charmed generally. The researchers declare "These researches are not for efficiency and are only for communication."

Thus, the robot which a market looks for is a communication

type. When a communication exists, our emotion is moved. So, various interactions are surely appear. As for the society advancement of the robot, mind science and psychology must become centers. Therefore, we will be rich, and we will be protected.

If possible in medical treatment, I will want to use the living animal. As for the effect, it is because there is an actual feeling that obviously a living animal is higher in comparison with the present robot. But, when it is difficult because of the cultural background or the special situation, I want to prepare for the menu of the robot, too. Possibly, there may be effect which exists only in the robot. And a robot continues evolving into it still more.

Anyway, we will have to examine the difference in the effect of a pet and a pet typed first and from now on. As for the research, both value will be enhanced.

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