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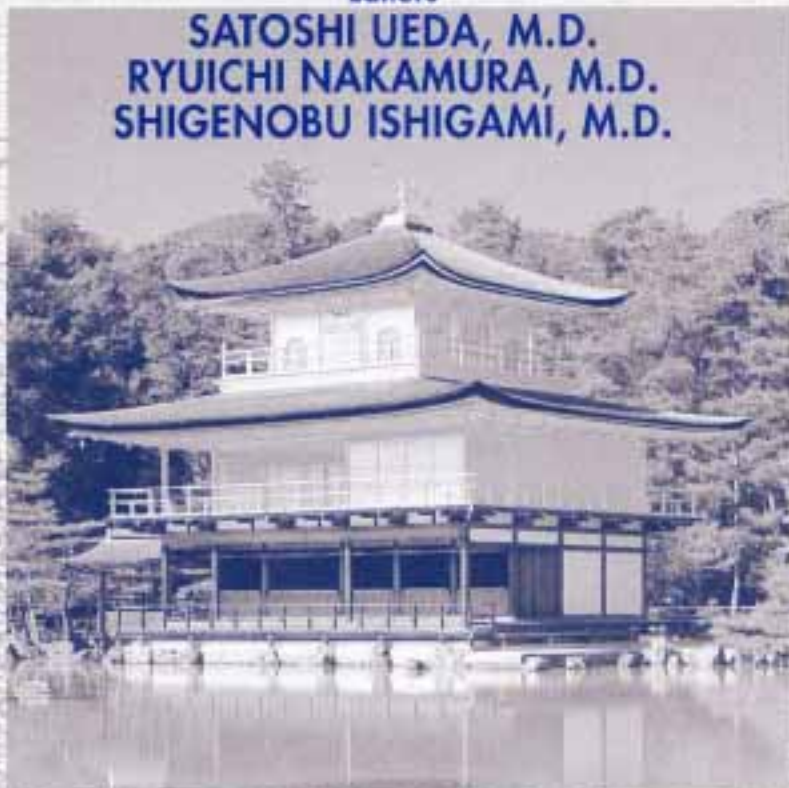


The 8th World Congress of the International Rehabilitation Medicine Association (IRMA VIII)

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Rehabilitation of senile elderly patients by theater-type virtual facility for entertainment

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SUMMARY

For the rehabilitation of senile elderly patients in geriatric institutions, a theater-type playing facility for their amusement is provided by techniques of virtual reality. The playing facility consists of a simple playing game in which the players touch and hit moving virtual balls accompanying special sounds. They enter the virtual inner space by combining their image with the playing game. The playing senile elderly patients are observed enjoying their play with their comrades who watch it around them or from the outside of the play area. Not only the playing elderly but also the watching elderly have been observed to have some chat with their expressive face change. There has been also seen decrease in their sudden abnormal behaviors in some while after their play. The present study can be a help to their nursing based on their psychological change resulting from the recreation.

INTRODUCTION

It is a great concern of individuals and institutions nationwide in Japan to deal with the rapid change of its society into the aged one. It is requested to provide the elderly a comfortable environment for the rest of their days without any increase of the burden of helpers¹⁾. The present authors have obtained a good prospect that the senile elderly are mentally and physically stimulated through their "play" of some computer games designed for infantile children²⁾. In the present study, some enjoyable facility is offered to the senile elderly, which leads to a nursing help for their better

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life⁹⁾. It is based on the change of environmental atmosphere resulting from the “play” and recreation created by a virtual facility, which basically provides both senile elderly and helpers “unavoidable intercourse but friendly association with a disease of senile dementia”. For the amusement of the senile elderly in geriatric institutions, a theater-type playing facility is provided by the techniques of virtual reality. The playing senile elderly are observed enjoying their “play” together with their watching comrades around them or from the outside of the play area. They seemed to pay a considerable attention to it and even to have an interest in the virtual “play site” which they have never experienced. Not only the playing elderly but also the watching elderly had some chat with their expressive face change. There was observed decrease in their sudden abnormal behaviors in some while after their “play” in virtual reality.

MATERIALS AND METHODS

Virtual Interactive Performance System has been introduced to create an enjoyable environment for the elderly. The actual play area is a day-care room which is related to 2-dimensional virtual “play site” on the screen, in which the senile elderly enjoy games together with the moving image of themselves as illustrated by Fig.1. The system consists of a computer (FM TOWNS: Fujitsu), a software “VIP-Ball” (CSK Research Institute), video camera and wide monitor screen . Some of the elderly (with helpers together) are to enter the virtual space created on the monitor screen. Their

figures reflected by the mirror are acquired into the computer and synthesized into the image with the game displayed on the screen. Thereby, the image of the senile elderly is reversed, i.e. a right hand-up is recognized as a left hand-up in the virtual space. Thus, they can readily make themselves play a game looking at themselves on the screen. The playing elderly are in front of a blue or a green curtain in order to keep a sharp contrast to the color of their clothes. The hospitalized senile elderly patients (4 men and 3 women, 63-87 years of age) were requested to join the game with the consent of their family. The subjective elderly

had sufficiently enough sight to see televisions from the distance of 4.0m. Who could walk, sit down and eat without any help were chosen as the subjects according to the criterion item of the ADL⁹⁾. The moving image in the virtual space is controlled by the software “VIP-Ball” using previously mentioned system. The “play” is the simple one which concerns falling down of balls in a vertical direction around the senile elderly in the virtual inner space. The image balls rebound making various sounds on their collisions to any part of a human body given by image or to the boundary of the virtual space. If virtual balls are touched by some parts of the body, their movement

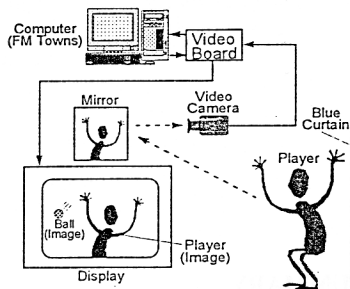


Fig.1 Block diagram of the system using “VIP-Ball”.

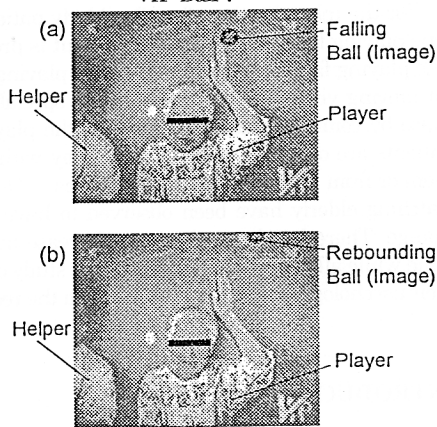


Fig.2 A playing elderly patient in the virtual space (on monitor-screen).

can be arbitrarily changed. In other word, they can feel as if they played with balls through screen by hearing sounds and seeing their image, although there exists actually no ball around themselves. The important thing is that they can observe their playing environment by themselves together with others and that there is no need of its special accessories. It is important that they can experience the "play" together on the whole and that they become unified with the game on the scene of the virtual space. Figure 2 gives an outlook how the senile elderly plays in the day-care room. This is a scene that the senile elderly herself in the inside of the screen gives a touch and a hit to moving balls by her hands in the virtual space. The duration of their playing has been limited from 10 to 20 minutes including the time for the explanation of the game taking into account their concentration to it.

EXPERIMENTS AND RESULTS

All the experiments were performed by using the wide monitor screen in the traditional Japanese style day-care room (3.6m×4.5m). Before beginning of the "play", helpers explained repeatedly the senile elderly patients how to "play" in appropriate gestures and adjusted the positions of video camera so that the patients can see themselves, helpers and nurses in the virtual space projected on the monitor screen. The explanation was precisely given a patient, paying attention to whether he could recognize or not (a) his image on the screen as "himself", (b) who it is, when someone appears on the screen, and (c) the movement of balls in the virtual space.

The patients were made occasionally sit down on the chair or straw mat floor in such a position as illustrated Fig.3 so that they freely play as they like. The reason for the occasional choice of such a sitting posture is to release the subjects from their unsteady gait at their advanced age.

If the subjects intended or could touch balls at their own will in the inner space of the screen, they were regarded as having "played". There were always observed 4 or 5 persons,

sometimes about 10 persons including playing elderly patients in the play area. On such occasions, smiles have been seen and chats heard among the observers (audiences). Some of them have been seen to join actively the game ignoring a present playing patient. They tended to join the "play" very quickly, when they were invited to the game. The content of the game was differently understood by individual patients. Some could hardly understand it, others understood even its interpretation. All the subjects told the helpers that they did not remember the content of the game on the next playing opportunity. With the iteration of the "play", they became easily induced to begin the "play" in a shorter time or to gather to the play area at their own will. It is remarkable that the senile elderly had an interest in what they had never experienced, although they were generally inclined to have very little interest in something new.

The important points of the care of the senile elderly usually lies in "aid to remembrance of the past", which has been however proved not particularly important in the present study. It is essential to introduce them to the "play" as one of the means of making opportunity to enjoy something. They had a tendency to tell their impressions on the "play" and criticize the behaviors of others, once they began to play. There were some senile elderly patients who recalled their past pleasant time in their playing or who had some chat with their expressive face inducing laugh among the

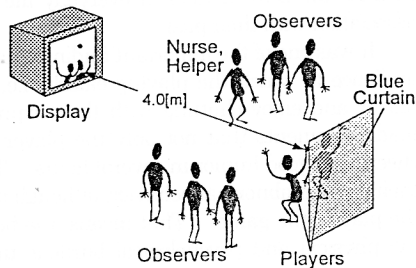


Fig.3 Senile elderly patients playing on the monitor screen and their comrades as observers.

patients. It was so observed as if they had been the audiences after enjoying the performance of theaters or sports. The reason lies in that the present "VIP-Ball" system has a structure of "theater-type play site" to classify "player" and "audience". That is, they played a role of the hero and another role of the audience, through which they could share and enjoy the common experiences.

The playing environment created by the computer system can be easily changed by the reform of the software. Thus, it is possible to arrange the special stage for a theater-loving elderly, so that they could perform on the "actual" stage of the theater. It is also possible for them to come across their lost relatives in the virtual space by utilizing their pictures. That is, it is possible to make the senile elderly enjoy more, if various kinds of software are used according to their individual character, interest, hobby and former occupation. In many cases, they had an considerable interest in the "play" with the virtual image facilities, which finally led them to a chat with their comrades, nurses and helpers.

From the experiments, the following items were confirmed important to lead the subjects to the game: Only the "play" is never emphasized and never forced to do. It is necessary to know precisely the state of a patient on the day for the "play" and on its previous day. Careful hearing is necessary from the helpers and/or nurses, concerning sleep, sudden abnormal behavior or something pleasant such as their family's visit. Respecting the pride of the elderly, it must be very careful not to use such words as "simple", "easy", "anyone can" and so on in the explanation of the game, which are inclined to make them unpleasant and uneasy. In order to meet such requirements, it is necessary to keep a close relation with the relevant elderly, helpers and nurses, because the conversation in everyday life is a keystone to know their behavior in association with their past.

It was one of the important findings that the elderly gathered as a spectator or an audience to watch the playing elderly, i.e. some other elderly gathered around the player and enjoy chatting with their expressive faces. The helpers and the nurses made comments that not only the player but also the rest around him remained cheerful in good humor in several hours. They had an impression of the decrease in their sudden abnormal behavior, although it could not be kept until the next day after the play of the game. That means, the helpers and the nurses were released from the physical and psychological burdens that they had to always stick fast to the patients, in an environmental atmosphere change resulting from the "play", which can be at least contribute to keep them stay within a certain area in a certain while. That is, it is emphasized that the helpers and the nurses can utilize their time enough to promote the comfort of the senile elderly, while the playing and watching elderly are concerned with the "play" and the "play site".

CONCLUSIONS

In the present study, the method has been proposed to offer the senile elderly patients the "play" and the "play site" created by virtual reality. The proposed system does not require any peculiar facilities which can be set in the ordinary day-care rooms. The present "theater-type play" is confirmed to provide the senile elderly a safe and comfortable environment, requiring only the aids of a few helpers or nurses. The elderly could be easily persuaded to play with much more experiences of the "play", although they usually forgot all of its content. That ensures it a great possibility of a useful help of nursing service. In order to have more effect of the "play" on their rehabilitation, it is necessary to investigate the content of such a "theater-type play" that may attract them more. That is, their physical and/or mental memory of the "play" and "play site" should be precisely investigated to make this kind of "play" really contribute to the development of a new type of "play rehabilitation".

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