

Psychological Effects of an Art Program with Feed Back Systems Reflecting Achievement Levels in Rehabilitation Exercises

- Development of a VR Device Encouraging Squatting Movements -

Tokyo, Japan

Abstract

We developed an art program that connects rehabilitation exercises with the creation of art. The art program is called “Let’s stand up and draw art in the sky!” and utilizes a virtual reality (VR) head-mounted display device to create a landscape image in the device’s display area, through the movements of sitting down and standing up. When the subjects used the program they reported a significant increase in the “Level of Vitality” and the “Level of Pleasure”, compared to when they performed the exercises without the art program.

Keywords: Virtual Reality, Rehabilitation, Art Program, Feed Back, Psychological Effect, Active Art

Introduction

Sustaining patient motivation to perform simple and repetitive exercises is a problem in rehabilitation aimed at the recovery of physical function. In this research, to encourage patients to perform their rehabilitation exercises, we developed a collection of art programs, generally referred to as the “Active art rehabilitation program” (patent pending), that connects rehabilitation exercises with the creation of art and reflects the quality and level of rehabilitation exercise achieved in the outcome of the resulting artwork as feedback. The purpose of this research was to maintain patients’ enthusiasm and motivation towards performing simple and repetitive rehabilitation exercises and to promote the recovery of the patients’ physical functions.

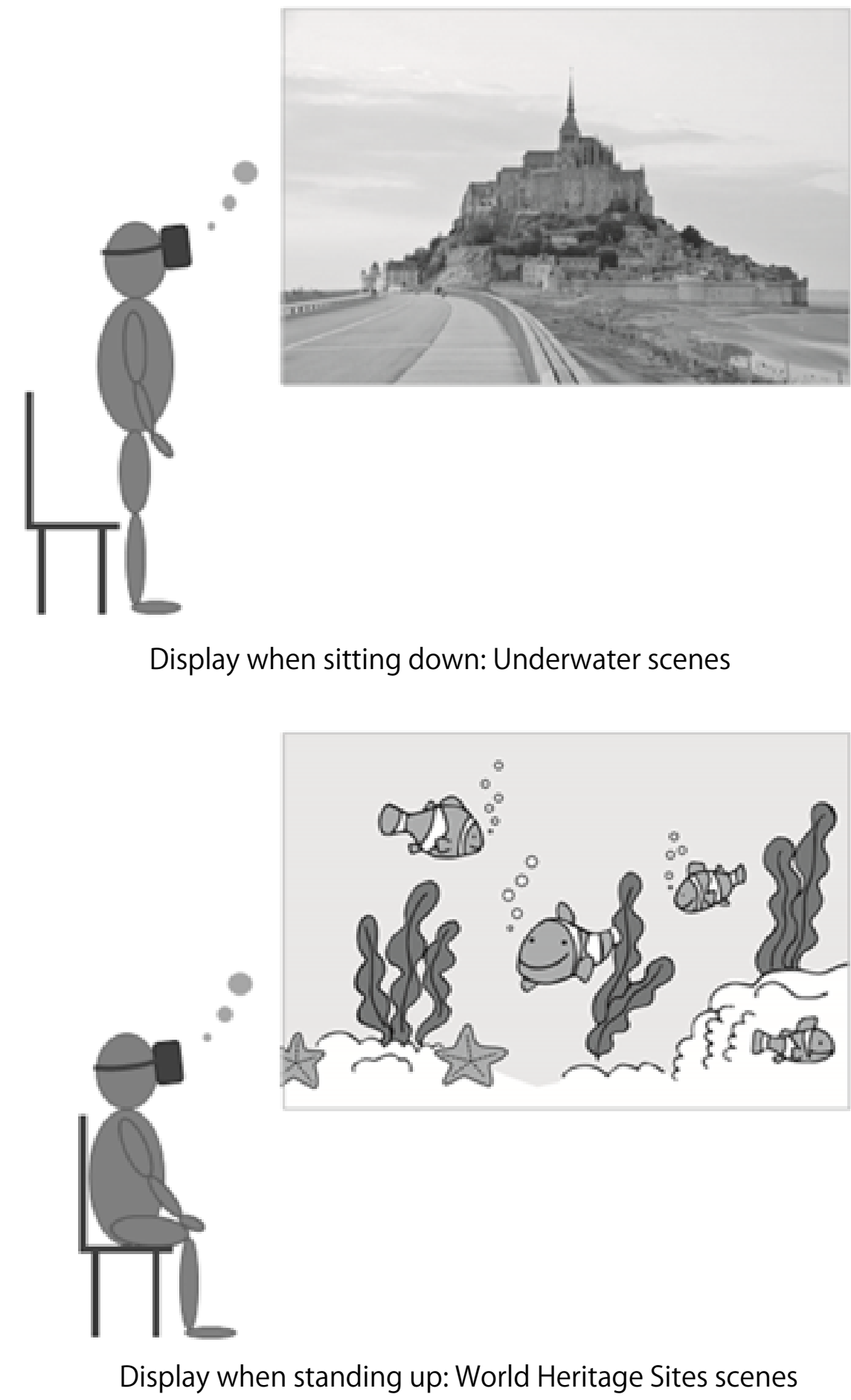


Fig. 1 “Let’s stand up and draw art in the sky!” Program

The “Let’s stand up and draw art in the sky!” program

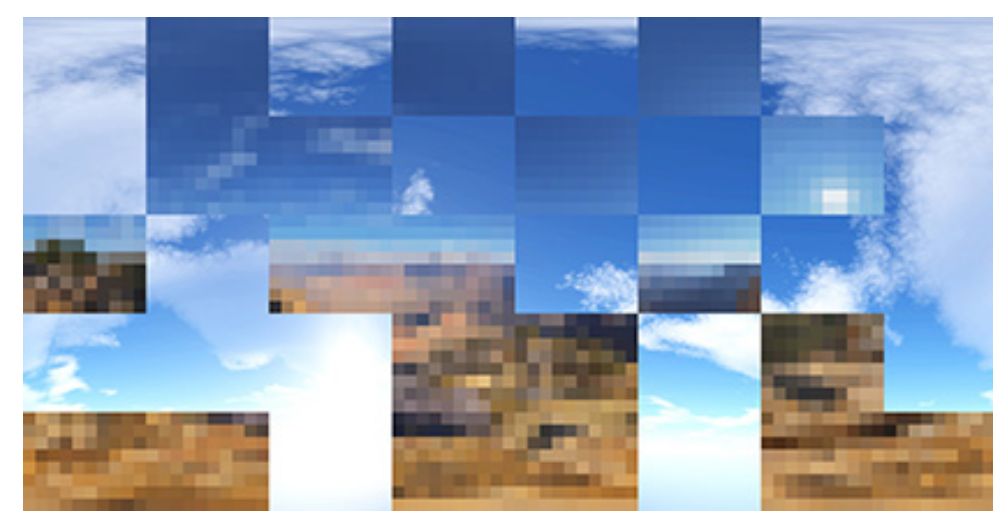
A virtual reality head-mounted display device (Oculus Rift) was used to execute the “Let’s stand up and draw art in the sky!” program and to create a landscape image in the device’s display area through the movements of sitting down in a chair and standing up.

Program Design

(1) Evaluation of Achievement Levels and Feedback

The maximum amount of exercise (target number of sitting-down and standing-up movements) to be performed by the patient was chosen as the evaluation criterion. The amount of exercise (number of sitting-down and standing-up movements) performed by the patient during the program was evaluated by using the evaluation criterion, and the level of achievement was reflected in the outcome of the resulting artwork as feedback.

(2) Projected Images



Movements 1 to 10, of a 30 Movement Program:
Addition of part images with coarse mosaics whenever subject stand up



Movements 11 to 20, of a 30 Movement Program:
Change to detailed images of fine mosaics whenever subject stand up



Movements 21 to 30, of a 30 Movement Program:
Change to part of the images seen clearly without mosaics whenever subject stand up

Fig. 2 Images of Feedback Reflecting Achievement Levels in Rehabilitation Exercises

(3) Design Factors Related to Motivation

Because the image appearing on the display area changed with the patient’s sitting-down and standing-up movements, the patient was able to visually acknowledge their movement. The patient heard a cheering voice telling them to “Keep up the good work!” The level of rehabilitation exercise achieved was reflected in the outcome of the resulting artwork as feedback.

Psychological Evaluation of the “Let’s stand up and draw art in the sky!” Program

Methods

Participants were twelve healthy university students (Ages: 18 to 28 years; male, 3, female, 9.) A set of 30 squats with the art program and a set of 30 squats without the art program were performed in random order.

Results

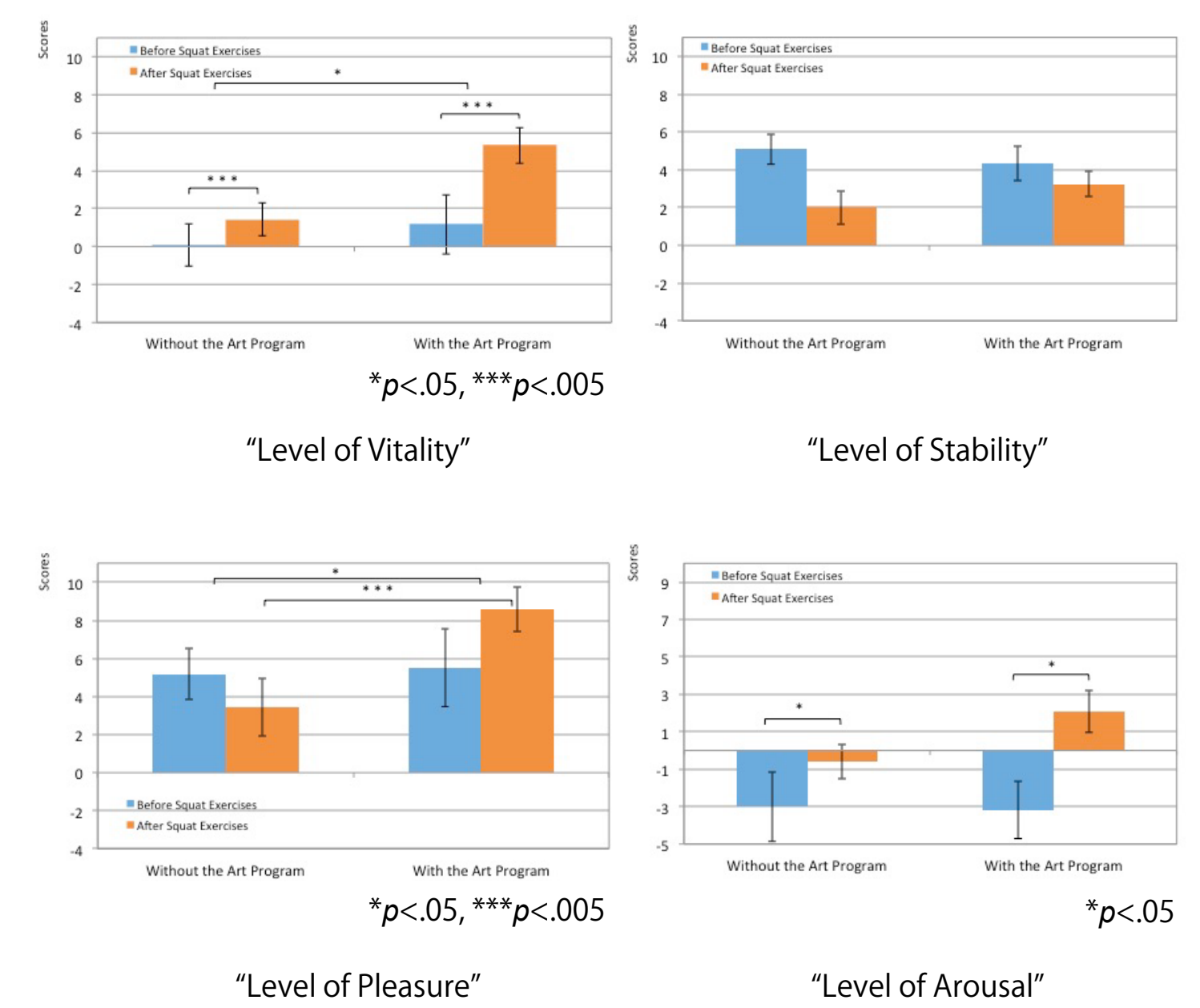


Fig. 3 Comparison of scores

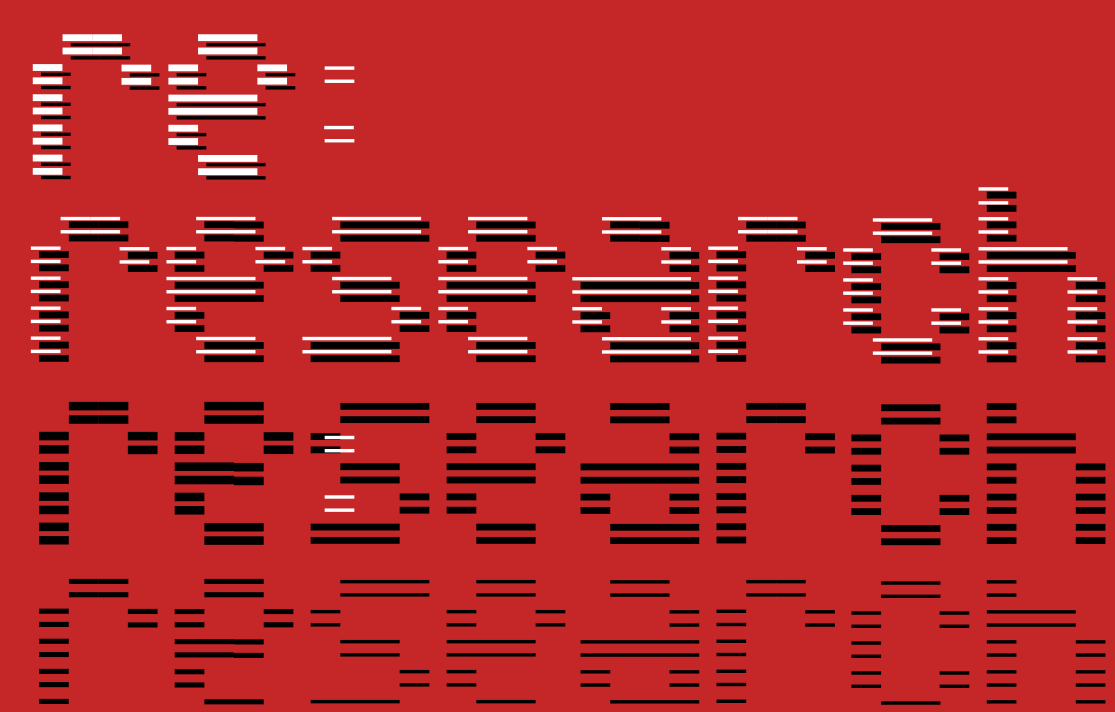
Discussion

We found that “Level of Vitality” and “Level of Pleasure” were increased by using the art program, compared with not using it. We confirmed that simple and repetitive squat exercises can be performed with excitement and liveliness in a positive and comfortable mood by using the program. Moreover, the “Level of Pleasure” was increased significantly and participants gained a comfortable and positive feeling by performing squat exercises with the program.

Conclusion

We developed an art program called “Let’s stand up and draw art in the sky!” which gives feedback on the levels of rehabilitation exercise achieved by patients. The participants’ “Level of Pleasure” increased significantly when the program was used with the performance of squat exercises. The program is expected to help patients to maintain their motivation and to become actively involved in performing simple and repetitive rehabilitation exercises.

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