

Eyes Open or Closed: is a virtual beach more relaxing than an imagined beach?

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Abstract

This paper describes a virtual reality (VR) island that has recently been developed within the EMMA Project to induce relaxed mood states. The island is designed to augment standard relaxation techniques such as progressive muscular relaxation and breathing techniques. The effectiveness of such techniques may usually depend on an individual's ability to visualise relaxing scenarios, but the VR island brings a relaxing island into a user's perceived reality and users are taught a variety of adapted procedures to elicit a state of calm. Users can explore the island using a wireless "seashell" with a pearl as the navigation tool. Different zones on the island have specific visuals, narratives and biofeedback to relax the user. For example, in the beach zone the user learns relaxed breathing as the narrative reminds her to take slow deep breaths and to be in the moment. The body joystick, a sensor-based device for measuring chest expansion, responds to the user's breathing by altering the rhythm of the waves on the shoreline, providing a form of biofeedback. The design rationale is of interaction for experience, requiring that the style of interaction be intuitive and in harmony with the user's body, movements, sense impressions and responses to the ambient world. The paper also describes a pilot test that has been conducted with the relaxation island and the new interaction device, the Seashell.

Key words: Stress, Relaxation, Breathing, Biofeedback, Virtual Reality

Introduction

A major problem in today's society is that more and more people suffer from stress and burn-out. At the same time people want to be available anytime and anywhere. Recently several airlines proclaimed that soon their travellers will be able to access their e-mail during flights,

and this means that the travellers will be able to work during the whole trip instead of as today when they have some uninterrupted time to relax, read a book, watch video and so on. It seems probable that such anytime and anywhere availability is one of the causes of stress and burn-out, which is expensive both for society and the individual. Society has to pay in the form of rehabilitation and lost work labour, while the individual has to pay in the form of lost salary and bad health which also entails a decreased life quality. Another perspective of this development is that it supports abstract thinking and reasoning at the expense of our more concrete abilities. A serious disadvantage of this is that it may have bad effects on people's potential creativity in that it does not support the necessary switches between presence and absence (see Waterworth E. L. 2001). We believe that creativity is a necessity of everyday life in order to cope with the same, and that relaxation can play a role in creativity.

This paper describes a virtual reality (VR) island that has recently been developed within the EU funded EMMA project (<http://www.emma.upv.es/>) to induce relaxed mood states. The island is designed to augment standard relaxation techniques such as progressive muscular relaxation and breathing techniques (Bernstein and Borkovek, 1973). The effectiveness of such techniques may depend on an individual's ability to visualise relaxing scenarios, but the VR island brings a relaxing island into a user's reality. As the aquamarine water gently laps onto the golden sandy shore, and the palm trees gently sway in the wind, users are taught a variety of adapted procedures to elicit a state of calm. Users can explore the island using a wireless "seashell" with a "pearl" as the navigation tool. This paper describes the design of the island and the navigation tool called the Seashell.

The design is based on the idea of using Perceptually-Seductive Technology (PST), a design approach that uses information technology to stimulate multiple senses at the same time in order to evoke emotions. It could be viewed as a general class of sensory augmentation that can appeal to multiple modalities. The information is presented in concrete forms, signifying that the information is interpreted non-linguistically and is more directly interpreted by the body rather than through abstract thinking. This form of presentation is interpreted much faster than information that has to be processed via the intellect, i.e. in a linguistic form. Usually the information in PST is presented in a 3D space. This 3D space could either be a personal or a shared space. Furthermore it could be based on and implemented as physical, virtual or as mixed realities (see Waterworth 2001).

Our Focus Locus and Sensus model (Waterworth and Waterworth, 2001) provides a basis for richer understanding of the psychological realities of virtual experiences. The model consists of three orthogonal dimensions, *focus*, *locus* and *sensus*. The sense of presence is a key aspect of experience in virtual worlds, but in order to understand and evaluate those experiences fully we need to consider more than mere presence – which we characterise as a conscious emphasis on direct perception of currently-present stimuli rather than on conceptual processing (Waterworth and Waterworth, 2003a). We consider these two types of conscious mental activity as end points of the focus dimension of the model. This suggests that an imagined or remembered world would evoke low presence at one end of the scale (which we term *absence*), whereas a compelling virtual world would evoke high presence. Some recent experimental evidence for this view is provided by Waterworth and Waterworth (2003b). The other two dimensions are locus – that is, whether attention is directed towards the virtual or the physical world – and sensus – which is the level of attentional arousal, on a continuum from completely unconscious to fully alert. The combination of these three dimensions provides a conceptual space in which various types of virtual experience, and virtual reality applications, can be placed. This has implications for designing and evaluating virtual worlds of various types and with varying aims.

The EMMA project

The EMMA project is a 30 month EU funded project within the fifth framework and the FET programme. EMMA is an acronym for Engaging Media for Mental Health Applications. The goal of the project is to study the relationship between presence and emotions and to develop “mood devices” that are able to induce different forms of mood changes. The project aims to understand better the development of some psychopathological phenomena in terms of presence and emotional experience, and to develop of new correcting experiences and knowledge. The partners in the project are Universidad Politécnica de Valencia (Spain), Universitat Jaume I (Spain), Istituto Auxologico Italiano (Italy), Goldsmiths College of the University of London (United Kingdom), Università di Padova (Italy), and the Interactive Institute Tools for Creativity Studio in Sweden. . Different environments are being designed and developed for several different purposes and target groups, such as for example people with different kinds of phobias, anxiety and stress. Relaxation Island is one of the environments developed within the project, with the goal of augmenting standard relaxation techniques by using new technology

A body of earlier work had shown that immersive virtual reality can be effective in dealing with a range of psychological problems, from body image disorders, to various phobias and sexual dys-functionalities (see, for example, Riva et al., 1999). An important aspect of these environments, and apparently the key factor in their effectiveness in addressing psychological mal-adaptations, is their ability to arouse controllable emotional responses in combination with a strong sense of presence, where presence refers to the feeling of actually being located in the world portrayed by the virtual environment, so that the world can be directly perceived, not merely imagined (see Waterworth and Waterworth, 2003a). Using information technology to address psychological problems has several advantages, including an increased sense of empowerment and autonomy of those directly affected, and reduced financial and other demands on employers and society in general

The Relaxation Island environment

The environment is designed as a tropical island. The user sits in a chair in front of a large back projected screen (Figure 1). It is important that the screen is large and covers most of the visual field in order to achieve a strong experience of immersion. The application starts with setting up the story of the user arriving on the island by boat. On the beach is a hut that contains a film screen where the user can watch a film about how to use the navigation tool and about the island. The island is an archetypical tropical island with lush vegetation, a waterfall and a long beach and surrounded by mountains. It is possible for the user to explore the island freely at his or her convenience.



Figure 1, Set up of Relaxation Island

On the island the user can choose among four different zones to learn different relaxation techniques, beach zone 1, beach zone 2, the waterfall and the cloud zone (Figure 2). There is heard a calm voice that leads the user through the different exercises at each zone. Beach zone 1 and 2 are located on the beach. Both zones are aimed at teaching the user relaxed breathing. The waterfall zone asks the user to type in words describing problems that worry her. After typing the words the user navigates to the waterfall and sits down on a rock looking down on a little creek that runs past the rock. In the water floats some leaves, and on some of the leaves there are the worry words the user has entered. The user is encouraged to let her worries float away with the leaves. In the cloud zone the user navigates across the sand dunes of the island and lies down on a towel in order to look at the clouds in the sky. The idea behind the exercises in this zone is to teach the user muscle relaxation. The clouds are formed into a human form and the different parts of the body that are in focus for relaxation are highlighted.



Figure 2, Beach zone 1, beach zone 2, the cloud and the waterfall zone.

The user navigates around the island with a wireless interaction device designed as a seashell, with a pearl inside (Figure 3). The pearl works as a mini-joystick and when pressed down the user sees a menu to select the different zones, leave the island or to get the introduction sequence. The user navigates around the island by pushing the pearl up, down, left or right.



Figure 3, The Seashell

After practising with the main environment described above the user is given a PDA which can be used later to get reminders of the actual immersive environment. Because of its portability, it can be used in an emotional situation in real life; in other words, for anytime, anyplace relaxation. For example, if one has a panic attack on a bus, one could use the PDA

to recapture the memory and mood of the calming environment and one of the exercises in the Relaxation Island. The main goal of the PDA application is to enable the user of the more comprehensive VR-application to re-experience feelings from the 3D environment independent of time and place. The idea is to bring to mind the feelings that the user experienced in the 3D environment in order to handle the emotional situation at hand.

The pocket-pc application uses a combination of pictures, sound effects and small movies to achieve these goals. The pictures consist of screen shots from the 3D environment, and the sound effects are selected pieces from the VR application, including the relaxation exercises. The user is able to choose audio-only presentation, and in this way can recapture the relaxing experience in an unobtrusive way while looking at other things (while walking around town, for example). At such times, the user will simply appear to others as if listening to music on a Walkman.

The pilot test

A pilot test is being conducted in order to investigate the emotional impact and the sense of presence the relaxation island elicits in the user. The aim of this pilot test is to prepare for a larger-scale test which includes the practice of all zones and usage of the Relaxation Island over a longer period. The participants in the pilot study are volunteers from Umeå, in northern Sweden, with varied professional backgrounds. They were instructed to follow two of the exercises on the island, in beach zone 1 and the waterfall, and they each only experienced the zones once. To capture their experiences of relaxation, we used the following specially-constructed interview manual (translated here from the Swedish used in the test). Questions were answered orally, and responses were recorded and then transcribed.

Interview manual for pilot test

Part 1 - Immersive tendencies

Are you easily distracted when trying to work on a task?

When you are involved in something, how well can you block out external distraction?

How well can you focus on less pleasant tasks?

How easily can you shift your attention from one task to another?

Are you ever so involved in a book/TV show/movie that others have trouble getting your attention, or that you become unaware of your surroundings?

Have you ever been so involved in something that you lost track of time?

How often are you emotionally involved in media content, such as movies/TV shows/newspapers and so on?

Part 2 - The experience of Relaxation Island

How was your experience of moving around in the environment? Did you get better at it during the study?

Did you become involved (captivated) by the visual aspects of the environment?

What did you think of the quality of the graphics?

Did you become involved (captivated) by the sounds in the environment?

What did you think of the presentation of the environment on a big screen?

To what extent were you aware of your external surroundings?

Was this disturbing to you?

How did you feel about using the seashell?

How was it to experience Relaxation Island as compared to experience in the real world – do you feel this comparison can be made?

When you were in the environment, did you ever have the feeling you were actually there for real?

To what extent did Relaxation Island become more present to you than the real world surrounding you?

To what extent do you think you will remember Relaxation Island as a place you have visited rather than as a set of images you have seen?

Part 3 - Emotional experience

Please take a stand on the following statements:

I felt relaxed in my body.

Why/why not?

More or less than usual?

I felt relaxed emotionally and in my mind.

Why/why not?

More or less than usual?

It was an unpleasant experience.

Why/why not?

In which sense?

If it was not unpleasant, what was it and how would you describe it?

Can you describe how you felt, emotionally and mentally, during the time you were in the environment?

Part 4 - Other points

What do you think of this as a form of treatment?

What do you think of the theme, a tropical island?

What do you think of the design of the island?

What do you think of the exercises?

What is your general judgement?

Do you have any suggestions for changes?

The results showed that most of the participants connected the experience of the Relaxation Island with their own earlier experiences of beaches, holidays and relaxing situations. This shows that the environment is able to induce the expected feelings in the user. Users that regularly play computer games compared the environment with a computer game and were enthusiastic to explore the island more thoroughly before taking the exercises than the users who do not play computer games. The gaming users considered that the environment lacked some features of computer games and was a bit limited. Participants with little experience of computer games indicated a higher degree of engagement and were more affected by the experience than the participants who compared it with a computer game, who were expecting more of a challenge from the environment. It seems from this that it is important to explain to users at the outset that this is an environment for learning different kind of relaxation techniques in order not to build up the wrong expectations in the user.

Most of the participants thought that they had to concentrate because it was a new kind of experience and they had to follow the instructions in the exercises. However all of the participants were convinced that this would change if they were able to repeat the exercises several times, which in fact is the idea behind the planned therapeutic interventions.

Several of the participants showed bodily reactions when navigating around the island, for example if they “walked through” a tree or the walls of the beach hut. They indicated that it

almost hurt to go into a tree or through the walls. One of the participants stated that she felt slightly travel sick on the boat ride into the island in the introductory scene, pointing to the high realism of the VR and sense of presence invoked.

Some of the participants stated that the beach zone breathing techniques made them very relaxed and that if it had continued longer they would have fallen asleep. All participants claimed that the experience of the island itself made them relaxed and that the fantasy of the experience strengthened the experience and increased their experience of relaxation.

Some of the participants noted that it is important that the setting is right, for example that the chair is comfortable in order to be able to relax. It is also important that the participant is secluded from the outside world in order not to be disturbed by surrounding sounds. One of the participants said that it would have been convenient to have a table next to the chair in order to put the seashell down while doing the exercises. One participant noted that it would increase the experience if the user had a warm carpet under the feet in order to simulate warm sand, or to increase the heating in the room and/or a fan that creates a calm breeze in the room. All of the participants liked to navigate with the wireless seashell and found it very natural.

To summarise, all participants found the relaxation island very relaxing and enjoyable. None of them complained about the graphics, on the contrary they liked the environment in general and the waterfall and the creek in particular. They noted also that the sounds of the environment were in harmony with the visuals.

Conclusion

The results of our initial pilot test showed that the Relaxation Island evokes a high degree of engagement. First results from the pilot study suggest that the Relaxation Island effectively induces relaxed mood states and also produces a high degree of presence at times. It also elicits periods of relative absence, when the user starts daydreaming and thinks about other relaxing situations, as would be the case on a real island. In trials to follow, a direct comparison will be made between the designed virtual island and a purely imagined one. According to our theoretical model, the latter would not evoke much presence, and certainly

less than through exposure to the virtual model. However, the results of our planned trials will provide answers to the question in the title of this paper.

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