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Rodriguez Ortega, A.; Rey, B.; Alcañiz Raya, ML.; Baños, R.; Guixeres Provinciale, J.; Wrzesien, M.; Gómez Martínez, M.... (2012). GameTeen: new tools for evaluating and training emotional regulation strategies. En Annual Review of Cybertherapy and Telemedicine 2012. IOS Press. 334-338. doi:10.3233/978-1-61499-121-2-334.



The final publication is available at

<http://dx.doi.org/10.3233/978-1-61499-121-2-334>

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GameTeen: New Tools for Evaluating and Training Emotional Regulation Strategies

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Abstract. The aim of this paper is to describe GameTeen, a novel instrument for the assessment and training of Emotional Regulation (ER) strategies in adolescent population. These new tools are based on the use of 3D serious games that can be played under different settings. The evolution of ER strategies will be monitored in two ways depending on the setting where the tool is presented. Firstly, in the laboratory, physiological signals and facial expressions of participants will be recorded. Secondly, in real life settings, ecological momentary assessment tools will be used to obtain answers from the subjects using their mobile phone. The goal is to obtain more attractive and reliable tools to evaluate and train ER strategies.

Keywords. Serious Games, Virtual Reality, Emotional Regulation, Physiological signals, Face Tracking.

Introduction

Emotional Regulation (ER) strategies determine the way in which we feel, express and regulate our emotions [1]. ER strategies influence and control the way of feeling and expressing the emotions that a person is experiencing in any situation. This could be automatic or controlled; conscious or unconscious [2-3]. Deficiencies or deficits in ER are considered to be relevant factors in the origin of numerous behavioral disorders such as depression, anxiety, addiction, aggressiveness, etc.

These deficits are becoming evident in the adolescent population in which they are the origin of many psychosocial problems. The increase of bullying at school, the bad behavior in the classroom and school failure may be due to a deficient ER. Thus, correcting these deficits will help in the prevention of different psychological disorders.

Currently, used ER training and evaluation instruments are based on traditional tools such as oral presentations or subjective questionnaires [4-5] that ask the subjects

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about the way in which they manage their emotions. Another evaluation method is the use of laboratory tests in which the subjects are asked to carry out tasks that generate emotions and thus evaluate the ER strategy that has been used.

Although these types of tools have proven very useful, they are less suitable for the evaluation of ER strategies in adolescents, since this population is particularly reluctant to be assessed. Indeed, motivating the learner continues to be one of the most difficult aspects of teaching.

With the development of new technologies, we hope to overcome these limitations. For this reason, we present, in this work, new tools to evaluate and train ER strategies using virtual reality (VR) based on serious games and new Information and Communications Technologies (ICTs), like smart phones. The use of VR will be very useful also for our purpose. VR is a technology that is very attractive to adolescents, who are accustomed to the simulated environments of videogames.

The evaluation of these tools has been divided in two studies which are described in great detail in the following sections. The first study will be conducted in a laboratory setting and the second study in real world setting (i.e., ecological ER evaluation and training).

In the first study we pretend to carry out the experiment in laboratory controlled conditions. The goal is to evaluate if these tools developed really help to evaluate and train different ER strategies in the participants, and if we can detect significant differences in physiological responses and in gesture responses when a mood has been induced through a game, which has been designed for this propose. The other goal we pursue in this laboratory study is to analyze the influence of different game interfaces in ER strategies. In order to achieve this goal we will compare the traditional game interface (mouse and keyboard) with other more technological and natural interfaces (TOF cameras).

The aim of the second study is to evaluate a friendly platform that allows the therapist to monitor the emotional status of adolescents every day in any moment. This system would be our social sensor.

1. Methods

ER strategies will be trained and evaluated in the context of a VR environment. Two mood induction games, i.e. joy (figure 1a) and frustration (figure 1b) will be developed during this work. Unity3D will be the software used for programming these games.



Figure 1. Games developed for this work. a) Joy game b) Frustration game

For the first game, a joy game, an attraction park has been developed. In this game, the subject will have to exploit as many balloons as possible. The subjects will also have to answer questions about their emotional states while they play. The game has been developed for joy induction, for this reason, the colors and music, the encouragement messages, arms, etc. will be chosen consciously for this purpose.

For the second game, frustration game, a new version of “whack a mole” has been developed. In this case, the subject will have to whack several moles as they appear. The game has three levels of difficulty which are related with the velocity and frequency of appearance.

In both games, when the emotional level of the subject, either as a positive emotion (joy game) or as a negative emotion (frustration game), exceeds a threshold, the subject will have to go to a special area of the game, where they will learn to regulate their emotions using different ER strategies designed for each case. If the subjects learn to apply the ER strategies correctly, they will win news skills or news weapons to go continue with the game.

A therapist application has been designed for this study. In this application, the therapist will be able to observe all the movements and the physiological signals of the subjects in real time. In addition, the therapist will have control of the study and positive reinforcements can be sent.

The evaluation of this work has been divided in two studies. The first study will be conducted in a laboratory setting and the second study in a real world setting.

1.1. Laboratory Study

For the Laboratory Study, two different game interfaces for the emotional induction games will be compared. The first interface will consist of a traditional mouse and keyboard. The second one will be a gestural interface based on Time of Flight (TOF) cameras. Changes in the emotions of the subjects will be monitored using questionnaires, physiological signal analysis (ECG, EEG and voice), face tracking and body gesture analysis.

1.2. Real World Study

In the Real World Study subjects will play the mood induction games using another possible game interface, mobile interface on smartphones. Changes in the emotions of the subjects will be monitored through an Ecological Momentary Assessment (EMA) tool [6] that will be developed in the project.

Our EMA will consist in two parts. The first part will be properly “our sensor”, where participants will have to answer various questions about their emotional status in the moment they receive a reminder. In this part, the questionnaire will be asked by a custom avatar (Figure 2). If subjects answer all questions every day, they will have points that could be used to buy things for their avatar. The second part of EMA consists of a web platform where the therapist will be able to monitor all the data recorded from the subjects, to program personalized news for the participants and also to draw statistical graphs, in order to facilitate the analysis of data and results.



Figure 2. Caption of the avatar used in the ecological momentary assessment tool.

2. Results

We hypothesize (H1) that the use of serious games in ER strategies learning will allow a greater enjoyment, satisfaction and motivation of adolescents than in the traditional learning context. We also hypothesize (H2) that the use of mobile EMA tools will be more efficient and more precise in terms of emotional state evaluation than traditional tools. We finally hypothesize (H3) that the use of physiological monitoring and face tracking during the exposition could yield information relevant to the early detection of ER problems [7]. Results from the two studies will allow us to evaluate these hypotheses.

3. Discussion and Conclusions

This paper presents the possible application of news technologies in VR and ICTs in ER field. The main conclusion of these tools and their implications for ER are discussed in the below paragraphs.

In our opinion, the use of VR technology based on serious games and ICTs as part of the evaluation and training of ER strategies in teenagers may provide numerous advantages in this field.

Firstly, the use of serious games improves the motivation and helps to catch the attention of subjects that can hardly be attracted by others techniques, such as teenagers. VR technology allows us to simulate any situation in a realistic way that can help us to induce any emotion. These instruments would provide us with tools for the early detection of ER patterns with a high risk of leading to health or behavioral problems. It would enable intervention before these problems worsen. On the other hand, their use as training tools would enable their integration into psychoeducational programs for prevention.

Secondly, combining VR technology with physiological measurement tools will allow us to continue studying the influence of the emotions in our physiological signals and how ER strategies can produce physiological changes that may be measured and quantified.

We think that our tools may allow the subjects become more involved in the evaluation and training process of ER strategies, which will make these strategies more effective and more motivating. In the validation of these tools, we hope to confirm our hypothesis.

Acknowledgments.

This study was funded by Ministerio de Educación y Ciencia Spain, Project Game Teen (TIN2010-20187) and partially by projects Consolider-C (SEJ2006-14301/PSIC), “CIBER of Physiopathology of Obesity and Nutrition, an initiative of ISCIII” and Excellence Research Program PROMETEO (Generalitat Valenciana. Consellería de Educación, 2008-157).

The work of A. Rodríguez was supported by the Spanish MEC under an FPI Grant BES-2011-043316.

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