Affective Realism of Animated Films in the Development of Simulation-Based Tutoring Systems

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ABSTRACT

This paper presents a study focused on comparing real actors based scenarios and animated characters based scenarios with respect to their similarity in evoking psychophysiological activity for certain events by measuring galvanic skin response (GSR). In the experiment, one group (n=11) watched the real actors’ film whereas another group (n=7) watched the animated film, which had the same story and dialogue as the real actors’ film. The results have shown that there is no significant difference in the skin conductance response (SCR) scores between the two groups; however, responses significantly differ when SCR amplitudes are taken into account. Moreover, Pearson’s correlation reported as high as over 80% correlation between the two groups’ SCRs for certain time intervals. The authors believe that this finding is of general importance for the domain of simulation-based tutoring systems in development of and decisions regarding use of animated characters based scenarios.

Keywords: Affective Realism, Animated Scenarios, Emotion, Game Simulator, Psychophysiology, Skin Conductance Response

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INTRODUCTION

Simulation-based training brings many advantages over conventional training, such as highly relevant and experiential training contexts (Bell, Kanar, & Kozlowski, 2008). One of the potential applications of simulation-based systems is in treatment/rehabilitation of mentally disordered offenders (MDOs). Currently, most risk analysis and treatment/rehabilitation of MDOs typically takes place within clinical settings and risk estimation is based on verbal descriptions. These methods are weak in identification of social and cultural factors and different kinds of triggers for provoking violence. Moreover, MDOs often have reduced ability to understand and react to verbal descriptions of situations (Murphy, 2006; Rogers, Dziobek, Hassenstab, Wolf, & Convit, 2007). To overcome these limitations simulation systems with video-based scenarios that patients can interact with have been developed (Wijk, Edelbring, Svensson, Karlgren, Kristiansson, & Fors, 2009). Similar systems have been applied for rehabilitation of men sentenced for domestic violence, where the clients can train to understand their own and their spouse’s emotional and physical reactions in certain situations in order to re-learn how to avoid violent reactions (Sygel Jakobsson, Fors, & Kristiansson, 2010; Sygel Jakobsson, Kristiansson, & Fors, 2011). Although, these systems are able to engage the users to a satisfactory degree, they have limitations too: they are expensive when real actors are employed; the scenarios are neither open for changes nor flexible enough to adapt to the patient; and they are unable to engage patients towards expected emotional reactions. The aim of our research is to address these issues using state of the art technologies for game development and psychophysiological measurements available today.

The utilization of games and game technologies for purposes beyond entertainment is referred to as serious games (Ritterfeld, Cody, & Vorderer, 2009; Brennecke, 2009; Backlund, Engström, Johannesson, & Lebram, 2010; Mitchell & Savill-Smith, 2004). In particular, much attention has been paid to visualization technologies and several studies have been conducted to examine the physical realism and pedagogical value of game simulators (Backlund et al., 2010; Backlund, Engstrom, Hammar, Johannesson, & Lebram, 2007) and the difference between simulators and their corresponding real world contexts (Nählinder, 2009). However, Hudlika (2009) identifies a lack of affective realism in games, i.e. games’ capability of generating affectively realistic social interactions between game characters and players. Some key requirements for game engines to achieve this are: capability to recognize players’ emotions and, capability to adapt gameplay and game character behaviors to emotions. Affective feedback games and biofeedback games are examples of approaches aiming for affective realism by using invisible physiological responses (e.g. heartbeat rate variations) and behavioral responses (e.g. gestures, facial expressions, postures) of the players (Gilleade, Dix, & Allanson, 2005; Bersak, McDarby, Augenblick, McDarby, McDonnell, McDonald, & Karkun, 2001; Kim, Bee, Wagner, & André, 2004; Fairclough, 2007; Yannakakis & Hallam, 2008).

The psychophysiological indices are considered to offer several advantages over other methods in recognition of emotions, as their changes are continuous and can also be used to determine psychological variables beyond the emotional domain, such as cognition and motivation (Fairclough, 2007; Ekanayake, Karunarathna, & Hewagamage, 2009). Our current study basically relies on galvanic skin response (GSR), also known as the electrodermal activity (EDA), of subjects. EDA is a widely used response system in psychophysiological research and its applications can be found in basic research examining attention, emotion, and information processing to more applied clinical research. The tonic level of skin conductance or resistance in the absence of phasic response is known as the skin conductance level (SCL) or skin resistance level (SRL), whereas phasic increases in conductance or decreases in resistance on top of tonic level are known as skin conductance responses (SCRs) or skin...
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