SHIFTING WORLDVIEW USING VIDEO GAME TECHNOLOGIES

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ABSTRACT

Interactive video games have become one of the most engaging forms of media today. Although video games are predominantly used as a form of entertainment, they are finding other application areas including education and training (*serious games*). The interactive and engaging nature of video games also makes them an ideal platform for creating experiences that facilitate personal transformation and psychological well-being (*meaningful games*). Conditioned behaviors and beliefs have a physiological basis and are related to and accessible through emotional stimulation and awareness. A video game situation engages the player's awareness and mind, while their real-time response, including the decisions they make within the game as well as their physiological reaction to the situation, reveals their conditioned behaviors and beliefs (*worldview)*. By stimulating reflexivity in the player at critical moments, games can illuminate the relationship between thoughts, feelings, sensations in the body, and behavior. As players become increasingly aware of the nature of their underlying beliefs, change occurs. This chapter presents a conceptual overview and framework for developing meaningful games as well as several approaches for designers to use in creating positive psychological change and transformation, including: transformation through narrative, cultivating somatic awareness, medication through gameplay, directly inducing experiences through non-traditional video game technologies, and facilitating introspection.

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INTRODUCTION

Interactive video games have become one of the most engaging forms of media today. In 2010, 67% of American households played video games with the average gamer playing for eight hours a week (Weinstein, 2010). Although video games are predominantly used as a form of entertainment, they are finding other application areas including education and training (*serious games*) (Alvarez and Rampnoux, 2007; de Freitas and Jarvis, 2007; Michael and Chen, 2005). We suggest that the interactive and engaging nature of video games also makes them an ideal platform for creating experiences that facilitate personal transformation and psychological well-being. To differentiate these forms of games from other types of serious games we call them *meaningful games*.

Generally speaking, serious games are designed for an explicit purpose other than entertainment. Many categories of serious games exist including: Advergaming, Edutainment, Edumarket, Simulation games and so forth (Alvarez and Rampnoux, 2007; Michael and Chen, 2005). Unlike serious games that create experiences to entrain new knowledge, thus adding complexity to the mind meaningful games alter previously conditioned knowledge in an attempt to reduce mental interference. We argue that this can be achieved by creating experiences that bring greater awareness to players' psychological beliefs and behavioral patterns. As players become aware of how their conditioning influences their emotional state they are more likely to seek to resolve the underlying stories and feelings that perpetuate it. Understanding acquired through gameplay may be applied to real-world situations and stimuli to affect behavior because the underlying physiological mechanisms are highly similar (Ivory and Magee, 2009; Rosser Jr., Lynch, Cuddihy, Gentile, Klonsky and Merrell, 2007).

The premise for meaningful games is that conditioned behaviors and beliefs have a physiological basis and are related to and accessible through emotional stimulation and awareness. A video game situation engages the player's awareness and mind, while their real-time response, including the decisions they make within the game as well as their physiological reaction to the situation, reveals their conditioned behaviors and beliefs (Rao, Asha, Rao, and Vasudevaraju, 2009). We refer to the latter as a player's *worldview*. By stimulating reflexivity in the player at critical moments, games can illuminate the relationship between mental thoughts (*mental awareness*), feelings and their sensations in the body (*somatic awareness*), and behaviors (*behavioral awareness*). As players become increasingly aware of the nature of their underlying beliefs, positive transformation occurs. This chapter presents a conceptual overview and framework for developing such games as well as several approaches for designers to use in creating meaningful games.

A PHYSIOLOGICAL BASIS FOR VIDEO GAME ENGAGEMENT

How the mind arises from the body's physiological processes is not yet known (Block, 2007; Grossberg, 2010). Evidence from neuroscience (Amassian and Maccabee, 2008; Schlaug, Marchina and Wan, 2011) and psychoactive drugs effects (Griffiths, 2011) suggests that there is a physiological basis for mind (Clark, 2008). External stimuli engage physiological processes in the body through perception, the brain and nervous system, and so forth. Through a series of mostly unknown, highly dynamical unconscious processes (Cortha

and Liotti, 2007), awareness of some stimuli eventually rise to conscious perception but in a highly filtered way that is heavily affected by previous conditioning (Broogard, 2010; van Gaal and Lamme, 2011; van Gaal, Lamme, Fahrenfort and Ridderinkorf, 2011). We refer to these unconscious and conscious processes as the *mind*.

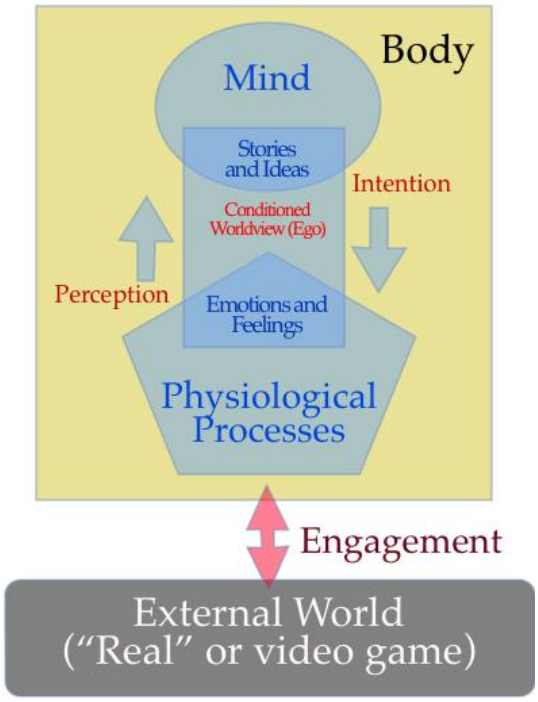

Figure 1.

Figure 1 presents a framework that models how a person may engage external stimuli, including video games. The mind activates other physiological processes (i.e., motor activity) based on external stimuli to affect both internal psychological and physiological processes as well as the external world (Forgas, 2008). A key bridge between physiological processes and the mental world are emotions, each of which has unique physiological characteristics. These, in turn, serve a primary role in supporting our beliefs (love, hate, or fear of certain circumstances, political policies, and so forth) (Barrett and Bliss-Moreau, 2009).

Bindings between the physiological processes in the body and the narrative of the mind develop over time as one experiences and engages the material world (Forgas, 2008). The mind develops as a consequence of a lived experience and through the process of conditioning (Bunge, 2010). Emotions expressed as feelings become bound to objects, ideas, and symbols to form beliefs within the mind and motivate conscious behavior. A mentally constructed sense of self emerges from which conscious decisions appear to be made. The stories and beliefs we create from these experiences shape our reality and ultimately determine who we are and the lives we lead (Shiri, Wexler, Schwartz, Kadari, and Kreitler, 2010). These stories serve to inspire and give deeper meaning to our lives and keep us acting from the emotions they engender such as hope and fear.

In a video game the sound and images combine to influence the player's perception and create a reality within their mind. By manipulating input device(s), the player can affect those

images and sounds. While the mechanics of a game are codified in software running on a computer, the experience of it is entirely within the mind of the player. The decisions that are made during gameplay are primarily based upon the relationship between the presentation of the game and the interpretation of and reactions to the experience occurring within the mind of the player (Kiili and Lainema, 2010; Nacke and Lindley, 2008). The experiential interpretation is constructed based upon the player's worldview, conditioning, and behaviors, all of which are driven by conscious and unconscious mental processes (Kultima and Stenros, 2010).

During the course of gameplay, emotions such as hope, love, inspiration, fear, desire, and anxiety may become stimulated (Chu, Wong and Khong, 2011; Levillain, Orero, Rifqi, and Bouchon-Meunier, 2010). As previously stated, all emotions, including those arising from video game play, are driven by and impact a range of physiological responses, from low-level hardwired nervous system functions such as the "fight or flight" response (Gerson, 2009), to the player's higher-level interpretation of the reality portrayed in the game (worldview). To a significant degree, from a physiological perspective the mind and body are agnostic regarding whether an external stimulus is from the "real world" or a video game. However, ultimately these emotions are measurable because they have physiological consequences such as stimulating the autonomic nervous system and triggering the release of neurotransmitters that influence mood, attention, motivation, the feeling of well-being, and so forth. These measurements can be constructively used in a wide variety of ways within the game to psychologically beneficial ends.

TRANSFORMATION

From an evolutionary psychology perspective, both simple (i.e., fear) and complex emotions (i.e., disgust) are manifest in the physiology to keep the body sustained and physically safe (Haidt, 1997). In psychological terms, feelings are emotions bound to mental constructs (Hansen, 2005; Izard, 2010). Mental activities such as "thinking" and "imagining" can trigger feelings and emotional responses.

Homeostasis is the physiology's natural tendency to maintain a stable, constant state (Cannon, 1932) and is regulated by the autonomic nervous system (Shields, 1993). The autonomic nervous system consists of the parasympathetic and sympathetic nervous systems. The parasympathetic nervous system is responsible for regulating the body's organs during the "rest and digest" state, while the sympathetic nervous system activates the body's "flight or fight" response experienced during stress (Jansen, Nguyen, Karpitskiy, Mettenleiter, and Loewy, 1995).

Theoretically, a body that is not facing physical danger or a severe lack of something critical to biological survival should be at rest, with the physiology largely being regulated by the parasympathetic nervous system. For a person focused on the experience of the present moment, assuming that there are no immediate physical dangers, the mental experience of this "at rest" state can be a sense of contentment (Martin, 2010, McCormick, 2009). However, for most people, mental activity that is based on their worldview occurs during these moments and prevents the experience of contentment. In other words, even though no physical threat is present, their mind continues to dwell on a wide range of past and potential

"threats" to physical safety, worldview, sense of self, and so forth (Killingsworth and Gilbert, 2010; Mrazek, Chin, Schamader, Hartson, Smallwood, and Schooler, 2011).

Based upon the physiological model outlined above, one way transformation may occur is by decoupling the bindings between conditioned, emotionally linked thoughts (i.e., ideas, beliefs, stories, etc,) and their underlying physiological basis and expression (Glomb, Duffy, Bono, and Yang, 2011). This is especially relevant for the bindings that result in behaviors motivated by less desirable emotions such as fear. The bindings between thoughts and physiology are uniquely personal, though their underlying physiological processes are thought to be similar across individuals. Imagining an action, for example, may activate processes in the body that are biometrically measurable through breath, heart rate, heart rate variability, galvanic skin response, pupil dilation, and so forth (Mullineaux, Underwood, Shapiro, and Hall, 2012). It will also activate many of the same brain regions that are involved in completing the task in the real world (Rossini and Rossi, 2007).

As a simple experiment, if a person is asked to vividly remember the specific details and deeply re-experience a time when they were very angry, the individual often experiences sensations in his or her body that are associated with anger. A related experiment is to ask subjects to breathe slowly and deeply from the belly, versus from the chest, while feeling angry. Few report that anger can co-exist with the physiological state produced by deep belly breathing (Philippot, Gaetane and Blairy, 2002).

VIDEO GAMES AND TRANSFORMATION

Video game designers create situations that manipulate players' emotions to elicit engagement. Games achieve this by creating a *symbolic reality* consisting of symbolic elements (game objects) and actions that obey fixed rules (game mechanics). By measuring the way an individual responds to a situation within a game, we argue that a model of their worldview can be constructed and used to modulate their game experience in a way that facilitates transformation through introspection and the cultivation of mental, somatic, and behavioral awareness. We have identified five related approaches for utilizing video game technology to facilitate positive psychological change and transformation: transformation through narrative, cultivating somatic awareness, medication through gameplay, directly inducing experiences through non-traditional video game technologies, and facilitating introspection. Each of these is covered more in its respective section below.

Transformation through Narrative

Since the beginning of spoken language, stories have shaped culture and how we perceive the world. Narrative stories allow us to witness the world from a different perspective. Engaging narrative stimulates emotions, and has the potential to shift worldview and facilitate transformation (Klimmt, Hefner, Voderer, Roth, and Blake, 2010; Roth, Vorderer, and Klimmt, 2009). Traditional forms of narrative work because the reader or viewer identifies with the protagonist of the story (Hefner, Klimmt and Vorderer, 2007). Although stories differ in details, many of the best are believed to follow a common structure; the *monomyth*

also referred to as the *hero's journey* (Hefner, Klimmt, and Vorderer, 2007). Characters within these types of stories represent feelings and emotions symbolically expressed as archetypes (Campbell, 1972).

Hero's journey stories follow a common developmental arc with the protagonist journeying from the "known" to the "unknown" and returning to the "known" with new knowledge. Prometheus (Aeschylus, 1983) and Star Wars (Kurtz and Lucas, 1977) are examples that follow this development structure. The structure itself is inherently a template for the transformative process of self-discovery (Howard, 2011).

Video games are often based on stories and share many of the characteristics of traditional story driven media forms such as film, theater, and literature (Swing, Gentile, Anderson, and Walsh, 2010). An emotional connection is established between the player and the protagonist. This emotional connection is even stronger in video games because of the player's sense of agency over the character within the game world (Hefner, Klimmt, and Vorderer, 2007, Klimmt, Hefner, Voderer, Roth, and Blake, 2010).

The interactive nature of video games also allows them to better personalize the narrative to the player's worldview. The "transformation through narrative" approach builds upon traditional narrative models to help players transcend psychologically created barriers by role-playing alternative behaviors. New behaviors may become entrained through gameplay (Baranowski, Buday, Thompson, and Baranowski, 2008).

Cultivating Somatic Awareness

In this approach video games are designed to induce specific emotional reactions, at which point the player's attention is brought to their physiological state. These emotions may be desirable (i.e., elation, happiness, contentment, and so forth) or undesirable (i.e., fear, anger, anxiety, and so forth) As players become aware of the effects of emotion on their physiology (i.e., heart rate, breathing, tension or relaxation in muscles, and so forth), they become able to readily identify these physiological characteristics as they arise in real-world situations.

From the perspective of the cells in the body there is little difference between whether the stimuli triggering an emotional response are from the "real world" or from a virtual experience. An individual's fear of certain stimuli can simulated through gameplay, eliciting a response similar to the one that occurs when the stimuli are physically present. The role of biofeedback in this process is to monitor the physiology during gameplay and detect strong emotional reactions. Real-time biometric measurements such as electroencephalogram (EEG), heart rate variability (HRV), and galvanic skin response (GSR) are correlated to physiological processes and can indicate degrees of stress, arousal, and attention (Fairclough, 2007; Kim and André, 2008; Kivikangas et al, 2010; Kuikkaniemi et al, 2010; Ravaja, Saari, Salminen, Laarni, and Kallinen, 2006; Ravaja, Turpeinen, Saari, Puttonen, and Keltikangas-Järvinen, 2008; Segal and Dietz, 1991). Increased awareness allows users to better adapt their mindset (and consequently, their physiology) when situations reoccur (Parasuraman, Sheridan, and Wickens, 2008).

Games can also facilitate the deconstruction of beliefs that constitute an individual's worldview by exposing the rationale behind their thinking and the resulting emotions. Thus, players can better understand how their attachment to certain beliefs triggers desirable or

undesirable experiences. By becoming more aware of the link between emotions and their physiology, players may be able to better recognize psychological patterns as they emerge and entrain desirable behavior patterns while overcoming undesirable ones.

Medication through Gameplay

In this approach interactive games are designed to stimulate the natural production of biological chemicals related to the central nervous system. A number of studies have shown that video games can trigger the body's release of dopamine, adrenaline, and endorphins (e.g., Koepp et al, 1998). We believe that it is possible to engineer gaming experiences that stimulate chemicals the body is deficient in, thus eliminating the need for pharmaceuticals.

There has been a lot of attention recently related to video games and the state of "flow." Video games vary the degree of difficulty to keep players in the flow state, attempting to match the level of difficulty to the player's ability (Crowley, Charles, Black, and Hickey, 2008; Csikszentmihalyi, 1990; Holt, 2000; Kiili and Lainema, 2010; Nacke and Lindley, 2008). Players in the flow state lose track of time and forget all external pressures. Video games have long served as an "escape from reality" for those suffering from depression.

By occupying a player's full attention and inducing experiences that activate the body's reward mechanisms and stress mechanisms like the "fight or flight" mechanism, we can naturally medicate an individual. Recent studies have shown success in the use of casual games to treat depression and anxiety (Kato, 2010). Ideally, it would be better to cultivate somatic awareness so that players' do not become overly dependent upon any forms of medication. However, the medication through gameplay is more immediate and direct.

Directly Inducing Experiences through Non-Traditional Video Game Technologies

The versatile nature of video games means that many technologies can be incorporated into gameplay. This can be used to our advantage in creating experiences during gameplay sequences that benefit from the presence of certain physiological characteristics. By inducing precise physiological reactions through specific techniques and technology, it is possible to alter the perception of a given in-game situation.

Technologies such as Binaural Beats and Isochronic Tones have been shown to have conscious and unconscious effects on the human mind and body (Ehrlichman, Micic, Sousa, and Zhu, 2007; Filimon, 2010; Laeng and Teodorescu, 2002; Richardson and Spivey, 2000). Through the use of standard audio technology, perception can be altered through entrainment of specific brainwave patterns via sounds in the game and used to influence player behavior. The simple nature of this technology allows it to be easily incorporated and molded to suit the needs of virtually any game.

Inducing experiences has also been achieved with processes incorporating eye movement techniques. It has long been known that eye movements are related to the mental processes we undergo, with various movements being associated with corresponding mental states (Ahern and Schwartz, 1979; Borod, Vingiano, and Cytryn, 1998). Techniques such as eye movement desensitization and reprocessing (EMDR) utilize this relationship by using eye

movements to trigger specific neurological pathways in order to influence emotional processing. EMDR has recently been used to treat conditions such as post-traumatic stress disorder (PTSD) with significant effectiveness (Lamprechta, Köhnkea, Lempaa, Sacka, Matzkeb, and Münte, 2004; Nardoa, Högbergb, Looi, Larsson, Hällström, and Pagani, 2010; Propper, Pierce, Geisler, Christman, and Bellorado, 2009; Söndergaard and Elofsson, 2008 ; Seigler and Wagner, 2006; Strickgold, 2003).

Because the nature of video games requires users to look at a screen while engaging in gameplay, eye movement is easily influenced through this medium. Through techniques such as EMDR video games can be modified to elicit or suppress specific emotions. This control over emotional processing allows for the modification of behavior during gameplay to suit the needs of the game or act towards precise psychological goals.

More dramatic technologies such as transcranial magnetic stimulation (TMS) could also be incorporated in gameplay. TMS works as a non-invasive method of causing depolarization or hyperpolarization within neurons in the brain. This allows for increasing, decreasing, or scrambling certain types of activity in targeted areas of the brain, generally very close to the surface (Rossini and Rossi, 2007). Brain regions are often highly specific in the processes they are involved in regulating. TMS can accurately target an area of interest, thus influencing the processes that it affects (i.e., memory, vision, emotion, motor action, cognitive processing, and so forth). Recent advances in TMS and other forms of physically affective hardware have made their incorporation into games possible, adding formidable new possibilities to influencing the gameplay experience.

Overall, direct induction of experience with technologies are not currently used widely in video games is limited only by the number of techniques and technologies available. The versatility of video games allows for the incorporation and use of a broad variety of technologies into gameplay. The induction of experiences is the most direct way to get results, as it works directly to affect physiological or psychological states.

Facilitating Introspection

Video games can be used as a tool for self-analysis of the underlying emotional structures that perpetuates a person's beliefs. Players' actions are motivated and rationalized by beliefs (Aizen and Fishbein, 1980, Bandura, 2006; Montano and Kasprzyk, 2008). When beliefs are not in alignment, inner conflicts arise and a choice must be made.

Simulations in video games provide a "sand-box" environment that allows players to role-play and explore different courses of action. Gameplay provides a real-time snapshot of decisions for analysis. The military, for example, uses simulated scenarios and their review to train combat troops and pilots (Macedonia, 2002; Zyda, 2005). By reflecting on the reasons why conscious decisions are made, players can better understand how their beliefs influence behavior (Hoffman, n.d; Kato, Cole, Bradlyn, and Pollock, 2008; Robillard, Bouchard, Fournier, and Renaud, 2003, Watkins and Williams, 1998). Through the use of symbolism and archetypes, video games may also help players explore processes that are occurring in the unconscious portions of their mind in ways similar to well established methods within psychotherapy. Video games might also serve as a "mind mapping" tool to help players visualize their opinions and attitudes toward a situation.

CONCLUSION

This chapter presents a framework for using video games to facilitate transformation based upon an embodied mind. Beliefs held within in the mind correlate to physiological processes in the body expressed as emotions. Transformation is the process of unbinding the beliefs that lead to pathological behaviors and thought patterns. We have outlined five ways in which video games may help players to facilitate transformation. It is our hope that a community of game developers will build upon these concepts to create games that promote mental health and, ultimately, an enlightened society.

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