Exploring the Collective Unconscious in the Age of Digital Media

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Chapter 3
Breaking the Frame of Digital, Dream, and Waking Realities

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ABSTRACT

Just as our dreaming reality is constructed, our waking reality may also be constructed. While our waking reality influences our lives the most, other constructed realities also have impact. Yet, never before has such a large part of the population been so widely affected by another constructed reality beyond dreaming; specifically, our technologically constructed digital reality through video game play. One potential consequence of video game play is breaking the illusion or 'frame' of our dreams as reality through various dream experiences. Many of the world's wisdom traditions believe that waking reality is an illusion, and now this idea is supported by modern digital physics. While being aware of the illusory nature of waking reality is difficult, it may be easier to break the framework of perception or 'wake up' to the true nature of reality in alternative realities, such as digital and dreaming. This chapter will review the evidence collected in the video game and dream laboratory to explore how video game play is breaking the frame within dreaming realities.

INTRODUCTION

Once upon a time, Zhuang Zhou dreamed he was a butterfly, a butterfly flitting about happily enjoying himself. He did not know that he was Zhou. Suddenly he awoke, and was palpably Zhou. He did not know whether he was Zhou, who had dreamed of being a butterfly, or a butterfly dreaming that he was Zhou. (Zhuangzi, as cited in Mair, 1998)

Our experience of life is subjective and may be a constructed reality (Blackmore, 2012). Within this experience, there exist various other constructed realities or states of consciousness. One such state is experienced by everyone while we sleep: our constructed dreaming reality. Dreams may have been

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one of the first realizations of an alternative reality by our early ancestors. Zhuang Zhou's parable is over 2,000 years old, and it is one of the earliest instances in recorded history where we question the boundaries of reality through dreams. These boundaries can be broken or transcended through various techniques, which can result in altered, and perhaps even higher states of consciousness. In traditional, indigenous societies, psychoactive plants and fungi, as well as drumming, vision quests, and sweat lodges were used by our early ancestors to alter their consciousness and access states of non-physical reality (Schultes, Hofmann, & Rätsch, 2001). In modern, industrialized societies, digital technology is used to access various constructions of reality. These digital technologies are not only interacting with people and societies but are also influencing ideas and philosophies. As a result, our theories of mind and reality are being informed by these technologies and evolving into various theories on mind/machine relationships, digital philosophy, digital physics, and simulated reality.

Our intention in this chapter is to explore the relationship between various constructions of reality, focusing on our biologically constructed dreaming reality and our technologically constructed digital reality. These realities exist within a framework of perception and this frame can be broken in various ways, which may result in a phenomenon often called "waking up" in the transpersonal literature. For instance, in a lucid dream the dreamer is aware that they are in a dream. This awareness breaks the frame of the dreaming reality by allowing the dreamer to become simultaneously aware of the true nature of their dreamt reality as well as their waking reality. Thus, the dreamer is "waking up" in their dream while still remaining asleep. In this chapter, we investigate ways in which the frame can be broken in dreaming realities, but also in digital realities, and perhaps even in waking reality. Some of the newest theories in physics, while long espoused in the wisdom traditions, have philosophical implications on the nature of our waking reality as perhaps a simulated construction within a framework of perception. Ultimately, we are exploring how breaking the frame, within these constructions of reality, affects the nature of consciousness itself.

MEDIATED COMMUNICATION AND COGNITION

We have been creating, interacting with, and influencing technology since the beginning of our existence. In turn, these technologies have been influencing us biologically, psychologically, culturally, socially, and even philosophically, by informing our ontological theories of mind and reality. Theories of mind that consider the relationship between the human mind and machines have a long history. Sternberg and Preiss (2005) argue that mediated communication, whether it is through modern electronic technologies or through simple lines on a cave wall, has long affected how we think. They broadly conceptualize the development of technology as "the building of artifacts or procedures—tools—to help people accomplish their goals" (p. xvii) and thus note technology's longstanding influence on human development.

Sternberg and Preiss (2005) present two dimensions of technological influence: frequency of use and degree of dissemination. High and low classification along each of these two dimensions yields a four–part taxonomy. The degree of influence on the human mind by mediated communication ranges from the rarely used, but nonetheless widely influential (e.g. aptitude tests), to the widely used and widely influential (e.g. alphabets). In this taxonomy, digital worlds in computers, the Internet, and video gaming are moving from the very rare, if influential (e.g. early computer use by mainframe computers), to the widely used and widely disseminated (e.g. today's use of the Internet as a mass medium or the wide

use of video games). The growth curve of technologies and their subsequent absorption into society is nicely articulated by Preiss and Sternberg (2005):

Cultural tools are invented historically and transmitted from one generation to the next and acquired ontogenetically. Some tools that are commonplace to one generation were created only through a great intellectual struggle by the previous generation. As these tools become commonplace and shared by a larger group of people, cognition becomes increasingly technological. (p. 203)

Similarly, Cole and Derry (2005) view "tool use as both amplifier of human action and transformative of human mind" (p. 221). Specifically, they note that:

Writing relates progressively less to the cultivation of expression on paper and more to effective computer use . . . this change restructures the writing process as planning and reviewing with word processors involves more cognitive effort than does working in longhand. (p. xiii)

Likewise, in mathematics, the use of calculators and computers allows more time for complex problem–solving, since computation is performed by the machine. A related development has been observed in people who play video games as they demonstrate higher levels of nonverbal problem–solving in the specialized cognitive ability of visuo–spatial information processing because of their game–playing experience (Greenfield, 1996). An important issue in evaluating the effects of such experiences is the increasing ability to couple our internal representational systems with technological systems that augment input data. There are many examples of such couplings, such as absorption in a movie, chatting on a cell phone, or playing a video game. It is becoming increasingly likely that we are not only immersing ourselves in and enjoying these augmented realities but also that our mental functions are being altered as we experience them (Sternberg & Preiss, 2005).

Certain types of media exposure provide a largely passive observer experience. Television, videos, and radio, for example, are organized for one–way communication. Although users can change channels, the content of each experience is fixed. This is not the case with video game play, where the player is an active participant, and sometimes creator, of the emerging experience. Video game play is arguably the most absorbing, and thus, immersive experience of technological mediation. It appears that mental functions are affected, and perhaps even consciousness may also be affected. As noted by Greenfield (1996), "video games make it possible for the first time to actively navigate through representational space" (p. 91).

NATURE OF REALITY

We are suggesting that perhaps reality itself is representational, literally; in other words, a simulation. Many philosophies on the nature of reality have posited the existence of a fundamental substance or essence that pervades the universe, such as monads, matter, mind, or God. Pre-Socratic philosophers postulated that elemental forces, such as water or air, compose the essence of the universe (Abernethy & Langford, 1970). Post-Socratic philosophers, such as the Pythagoreans, believed the first thing to come into existence was the monad, the Divine totality of all beings (Fairbanks, 1898). Various beliefs of the

pervasiveness of mind or soul were prevalent throughout the ancient world, from indigenous religions such as paganism and shamanism to Eastern religions of Taoism, Shintoism, Buddhism and Hinduism (Clarke, 2004). In Western philosophy, Leibniz borrowed the term "monad" to describe the substance that builds the universe, or perhaps more specifically, the "perpetual living mirror of the universe" (Rescher, 1991).

In our recent history, we believe that the fundamental substance of reality is matter, composed of atoms, but we later discovered sub-atomic particles in the form of protons, neutrons, and electrons. As atomic theory continued to evolve, Schrödinger (1926) published a paper that described the electron as a wave-function, instead of a point particle, returning to deterministic classical physics. Born (1926), however, disagreed and published an interpretation of Schrödinger's wave-function by proposing that it does not to describe the electron itself but rather all of its possible states. This suggests that Schrödinger's wave-function can be used to calculate the probability of finding an electron around its nucleus. Born's interpretation reconciled the duality of the electron refracting like a wave but having the mass of a particle and thus, introduced the theory of wave-particle duality. This modern model of the atom and Heisenberg's uncertainty principle (Heisenberg, 1927) describes the position of electrons in terms of probabilities because it is mathematically impossible to derive the position and momentum of an electron. In the decades that followed, additional particles were proposed and subsequently detected inside of sub-atomic particles, such as matter and anti-matter particles, called fermions, as well as force particles, called bosons. Collectively, these were called elementary particles; "The atoms or the elementary particles themselves are not as real; they form a world of potentialities or possibilities rather than one of things or facts" (Heisenberg, 1958).

These new theories of physics, collectively called quantum physics, have significant philosophical implications with regards to the nature of reality. The universe no longer seems deterministic, as described by Newton's classical physics, but instead appears to be probabilistic, composed of elementary particles that exist in a wave of potentialities. This new physics provides a probability distribution for the outcome, calculated as a wave function, and the ultimate form of this distribution is determined by the quantum state and a measurable operator or observable describing the system. When one of these elementary particles switches from one quantum state to another, it is comparable to a binary digit changing from one value (e.g. 0) to another (e.g. 1). Since the universe is composed of elementary particles, it follows that the universe can be described as binary digits, changing from one quantum state to another, and existing in a field or wave of quantum probabilities. These changes in quantum states are changes in information, such as binary changes from one to zero. Consequently, the fundamental substance of the universe is ultimately information. This idea is further supported by loop quantum gravity (Rovelli, 1997), which proposes that space-time itself is quantized. If space-time is quantized, it may be computable. Furthermore, since information can be computable, perhaps the universe itself is being computed as a simulation. This hypothesis is at the core of various theories on digital physics and digital philosophy. Specifically,

Every it — every particle, every field of force, even the space-time continuum itself — derives its function, its meaning, its very existence entirely… from… binary choices, bits… What we call reality arises in the last analysis from the posing of yes-no questions. (Wheeler, 1989)

VIRTUAL REALITY

If the essence of our physical, material reality is information, this is analogous to our constructions of digital reality, which is also composed of binary digits of information. As we continue to develop interesting and exotic technologies, we are not only developing and influencing society and ourselves but also glimpsing into the very nature of reality. Our interaction with technology is also evolving. We are no longer content to simply observe and participate with technology on a screen in front of us. As a result, we are inventing ways to *enter* technology by creating a virtually simulated environment or a virtual reality. One of the most recent manifestations of our desire to *enter* technology is the highly anticipated Oculus Rift virtual reality head-mounted display.

Virtual reality (VR) is a digitally simulated environment that replicates the experience of being present in another location, a phenomenon known as presence. The developers of VR claim that users will perceive objects found in the virtual world as being equally present to those found in the "real" world. The extent to which one feels present in another location depends on how well the perceptual systems of the user are submerged in the computer-generated stimuli. The more the system captivates the senses and blocks out stimuli from the "real" world, the more the system is considered immersive, which in turn allows the user to experience presence. The easiest way to capture these experiences is by wearing a high quality VR head-mounted display. Until recently, high quality VR head-mounted displays have been too expensive for the average user. This changed, however, with the introduction of the Oculus Rift. Industry experts have been claiming for over a decade that in the near future, VR will reach a greater number of consumers and subsequently revolutionize the online world as we know it (Biocca, Kim, & Levy, 1995).

One of the key elements for presence in VR is engagement of the vestibular system. More specifically, the vestibular system contributes to our sense of spatial orientation by relying on visual and auditory feedback. Various systems have been and are currently being developed, which include haptic vests, VR gloves, and body placement recognition through feedback loops, such as Microsoft's Kinect for Xbox One. Following Facebook's acquisition of Oculus Rift in March of 2014, various other large corporations have announced that they are also entering the consumer retail market for VR interface. Some of the most anticipated new entrants into this market are creating holographic technology to augment our physical, material reality, such as Microsoft's HoloLens and Google's investment in the start-up Magic Leap. Other companies are competing directly with Oculus, such as Sony's Project Morpheus, which is a VR head-mounted display that is also geared for gaming and argued to be equally sophisticated. Other competing systems include Samsung's Gear VR, which is a head-mounted display made by Oculus, but powered by their phone-tablet, the Galaxy Note. The most recent addition to this market is a partnership between HTC, the smartphone manufacturer, and Valve, who run the social gaming platform Steam. The two have partnered to create the HTC Vivé VR, which is another competitor in this emerging new market. Mark Zuckerberg, the founder and CEO of Facebook, anticipates a huge shift occurring in society with the emergence of these new VR technologies. He believes that "one day… this kind of immersive, augmented reality will become a part of daily life for billions of people" (Zuckerberg, 2014).

Although VR has successfully captured the public's imagination, to truly capture the user's sense of presence, additional improvements still need to be made. For instance, Wlassoff (2015) argues that the brain is not actually fully convinced of the visual/auditory VR stimulus. He has pointed out that some of the newest research on place cells, neurons that create and control cognitive maps by taking input from the environment, claims that the brain can tell the difference between virtual reality and waking reality. Wlassoff explains that the relatively minor senses actually play a role in presence. While the soon to be

released gamer-focused VR technologies do not include these minor senses, recent research has finally found a way to digitally reproduce them (Strickland, 2015). Thus, we believe that as VR becomes more widely dispersed, and the technology improves, the user will become completely immersed and perhaps the brain will be fully convinced.

Although, the capabilities and limitations of VR are a constant point of contention, immersion into virtual worlds is already happening without head-mounted displays as a result of the explosion of the Internet. The objective of VR is to create a mediated experience that appears to be non-mediated or "real", in order to create a sense of presence. However, a recent and reverse phenomenon, known as inverse presence, has emerged in which a real experience appears to be mediated:

Drawing on news reports and an online survey, we identify 3 categories of this "illusion of mediation": positive (when people perceive natural beauty as mediated), negative (when people perceive a disaster, crime, or other tragedy such as the events of September 11, 2001, as mediated), and unusual (when close connections between people's "real life" activities and mediated experiences lead them to confuse the former with the latter). (Timmins & Lombard, 2005, p. 492)

The exchange of real and virtual realities, consequently, seems to have come full cycle. Some industry experts have suggested that this VR transformation is comparable to the way that the Internet revolutionized the distribution of information in the 1990s (Zuckerberg, 2014). In fact, beyond the obvious application of VR to entertainment, Kaplan (2015) suggests that "as virtual reality headsets and the necessary enabling technologies improve and catch on, huge opportunities in journalism, business, education, medicine, mental health, and more, will start to appear." We are suggesting that it is not only the entertainment industry that are about to change but also education, healthcare, and even society-at-large. Furthermore, we posit that these industries are about to be radically transformed by emerging VR technologies, which will fundamentally shift human consciousness.

DREAMS AND TECHNOLOGY

In our research, we investigate the relationship between our technologically constructed digital realities and our biologically constructed dreaming realities, which exist within our consciousness. Dreams have been studied and interpreted since before our recorded history. Perhaps dreams are simply our mental experiences of the brain's activity while we are sleeping. Yet while asleep, the cognitive experience of dreaming is separated from most external stimuli and the dreamer experiences a biologically constructed virtual reality. The dreaming reality is composed of imagined perceptions that often feel very real, thus, it is a true virtual reality:

The dream world is thus 'virtual' for precisely the same reason as a computer-generated synthetic environment is: in both cases I feel physically present (i.e., I am phenomenologically present!) in an unreal place where my physical body is not really present at all. (Revonsuo, 2006, p. 114)

In our research laboratory, we have been investigating the relationship between digitally constructed online reality, such as social media or video game play, and another construction of reality, dreams. Dream research has progressed over the last century following Freud's (1900) classic opus publica-

tion, *The Interpretation of Dreams*. This research has clearly demonstrated that we regularly function in this biologically constructed realm, which is seemingly not as "real" as our waking reality appears to be. Our dreaming reality exists in a realm between our conscious awareness and our unconscious mind. For as long as we have dreamt, we have been postulating the purpose of those dreams, a realm rich in mythologies, archetypes, and narratives, which, according to Jung (1933), exist in our collective unconscious. This realm has been a source of inspiration for our visions of insight, elaborate storytelling, and expressions of art for thousands of years. Our forms of storytelling and artistic expression have evolved as well, based on the mediums available for expression. One such medium used today is digital media, such as television, cinema, video games, and the Internet. Thus, it follows that our dreams are a source of inspiration for this digital media as a result of the high levels of interactivity in today's media environment. This digital media, in turn, is also influencing our dreams, almost as a positive feedback loop. We propose that we have a push/pull relationship between digital media and night-time dreams.

Our early ancestors lived in tribal societies and experienced archetypes through shared rituals, dreams, and altered states of consciousness. These shared experiences are what held these societies together in terms of their collectivity of consciousness (Durkheim, 1961). Our modern Western society values autonomy and extreme individualism. We lack the collective societal nature traditionally seen in societies that value higher states of consciousness and absorptive states. Interestingly, we have unwittingly recreated this shared or collective social reality through our digital media, particularly interactive media, such as the Internet and video games. Interacting with others online and in video games serves some of the same societal functions as explicit mythological systems have served in indigenous cultures. Both offer fully available and explicit mythological imagery and narrative as part of a daily engaged virtual life. The sense of being part of the VR world and influencing it, such as in video games, achieves a level of immersion that cannot be attained with traditional storytelling. Furthermore, this experience ultimately evokes an emotional response, which may be unobtainable by any other means.

This immersion in a constructed reality, be it digitally or biologically created, occurs because the boundaries of these realities are permeable. In other words, it is difficult, arguably impossible, to know where one reality ends and another reality begins. Perhaps there are no boundaries at all; no lines of demarcation that clearly separate one construction of reality as being wholly distinct from another. Various physiological parallels of digital and dreaming reality have been observed along with their associated psychological importance. Practice in one alternative reality, VR, informs another alternative reality, dreams. But such practice can also change the very structure and function of these biologically constructed dreams (Gackenbach, 2012). Might this phenomenon also occur in waking reality, especially if waking reality is also constructed? That is, if our waking reality is constructed, might our digitally constructed reality (i.e. life online) also change the structure and function of our waking reality, as it seems to do so for our dreaming reality?

The boundaries of reality are often blurred because our constructions of them are fragile. Our susceptibility to illusion is well documented in the perception literature and makes for fun activities online. Beyond this susceptibility, however, is the phenomena of change blindness or inattentional blindness. That is, we may miss information in our visual field that is not necessarily subtle. One famous example of this is the gorilla in our midst experiment. In this experiment, a few people dressed in white or black are shown passing a basketball back and forth. The viewer is instructed to focus on the players dressed in white and count the number of passes. In the midst of passing the ball, a person dressed in a black gorilla costume walks directly through the visual field of the observer. Many people miss seeing the gorilla completely. Change blindness is a version of inattentional blindness where something in a pic-

ture changes and is not subsequently noticed by observers (Mack & Rock, 2000). These changes can be large or obvious, such as a person in a gorilla costume. The easily distracted nature of our attention is the stock and trade of the magician. Mack and Rock claim that these phenomena are a function of attention. Various techniques have been argued to focus attention, including meditation (Weinstein & Smith, 1992; Holzel & Ott, 2006). We have found that gamers are less susceptible to change blindness effects than either a control group or a group that claims high levels of prayer or meditation (Gackenbach, Swanston, & Stark, 2015). In either VR or prayer/meditation, one can argue that breaking the fragile frame of reality, in this case, not seeing all that is there, is a rather common occurrence that can be improved with various practices.

This fragility of reality is also spoken of by Jung (1933). He speaks extensively of the archaic man relative to the modern man and points out that each has a set of assumptions upon which his reality is based. The former intones sorcery while the latter relies on natural consequences to explain the world around him. Jung stresses that both have an explanatory system, which satisfies their need to understand and be in the world safely. The absolute truth of the matter either does not exist or does not matter, suggesting there is no objective reality. He goes on to argue that the supernatural explanatory system of the archaic man helps him embrace the clustering of apparently coincidental events as omens rather than events which occur together by chance. Thus, the archaic man's explanatory system allows for a wider range of "natural" events than the modern man's. Jung (1933) explains:

It is a rational presupposition of ours that everything has a natural and perceptible cause. We are convinced of this right from the start. Causality is one of our most sacred dogmas. There is no legitimate place in our world for invisible, arbitrary, and so-called supernatural powers – unless, indeed, we descend with the modern physicist into the obscure, microcosmic world inside the atom, where it appears, some very curious things happen. But that lies far from the beaten track. We distinctly resent the idea of invisible and arbitrary forces, for it is not so long ago that we made our escape from that frightening world of dreams and superstitions, and constructed for ourselves a picture of the cosmos worthy of our rational consciousness – that latest and greatest achievement of man. (p. 113)

Empirical evidence supporting these distinct ways of viewing the world comes from Drinkwater (1976). Specifically, Drinkwater reported a superiority for natural object placement among moderately integrated Australian aboriginal children relative to their European ancestry peers. The children of European ancestry, conversely, were superior in the placement of household objects found in traditional Western society. Staying within this tone of relative reality, Jung argued that the aboriginal framing of reality, which included causal attributions of witchcraft when anomalous but "natural" events occurred, gave way to modern views of the range of "normal".

Similarly, our mass immersion in technologically created realms is again changing our views of causal mechanisms for reality. Is the digital physics theory of reality as a simulation mentioned earlier, simply speculative new science or is it an idea whose time has come? At the 2011 New York Science Festival, various physicists discussed whether the universe is the ultimate computer simulation. One digital physics philosopher, Nick Bostrom (2011), pointed out that the time is right as simulations are now sophisticated enough that the scientist can imagine an alternative reality hypothesis. Bostrom went on to suggest that in 30 years technology will be sophisticated enough that we will not be able to tell the difference between our virtual and "real" world realms. Certainly, we have seen enough progress in the last two decades, with the advent and mass dissemination of the Internet, that this implication is plausible.

MERGING WAKING REALITIES

Computer-based systems for entertainment, communication, and productivity are so deeply enmeshed in human lives that it is difficult to imagine modern society without them. However, with the incorporation of these technologically constructed alternative realities into daily routines, our perceptions of our waking reality are also changing. Sometimes these changes are quite distinct, as immersing oneself in a video game, but sometimes they merge seamlessly with our behavior, like texting as one walks. These technological integrations also overlap in a more perceptually profound way, as in the work on the Game Transfer Phenomenon (GTP). GTP examines how video game play experiences are transferred to the real world, resulting in automatic mental processes, altered perceptions, and changes in behaviours influenced by video games (Ortiz de Gortari & Griffiths, 2012). Some of the experiences may blur the boundaries of reality to such an extent that they may be misinterpreted as hallucinations. The incidence of these experiences are self-reported by 92% of the participants observed, with 20% of those reporting distress and the remainder feeling the urge to do something (Ortiz de Gortari & Griffiths, 2014). Although the concept of playing video games may seem trivial to some to others they:

become a matter of emotional touch, evoking not just sensations, but lasting emotive imprints, which hold for the gamer many of the same characteristics as memorable real life experiences. (Ortiz de Gortari, 2007)

In a parallel and confirming series of studies, Poels and colleagues (Poels, Ijsselsteijn, & de Kort, 2010; 2014) explain that the:

phenomenon of game-biased perceptions and associations, or how, through intensive game play, elements from the game world can trigger thoughts and imagery outside the game world, influencing the perception and interpretation of stimuli in everyday life. (p. 1)

They further posit that these game transfer experiences increase with more play time and narrative involvement. It is reasonable to assume, accordingly, that with the imminent release of a variety of affordable VR head-mounted displays, that presence, and thus game transfer to reality, may increase. Supporting this assumption is early data collection where we found that presence, but not enjoyment, was higher after playing a video game with the Oculus Rift VR head-mounted display than after playing the same game on a computer screen (Gackenbach, Sinyard, Hakopdjanian, in press).

Just as it has often been pointed out that dreams are a constructed reality, it can also be argued that waking reality is constructed. While our waking reality influences our lives the most, other constructed realities, whether they occur during drug use, illness, hypnosis or meditation (Blackmore, 2012), also impact our lives. Yet, never before has such a large part of the population been so widely affected by another constructed reality beyond dreaming, specifically, our technologically constructed digital reality. We are able to break the frame of our dreaming reality through various dream experiences and these dreams affect our overall consciousness development. Relative to nighttime dreams, however, it is rather easy to break the frame of VR as we remain continuously awake upon entering and leaving it. Although as shown with game transfer effects, VR also seems to be affecting our consciousness. Thus, is it possible that we may also be able to break the frame of our physical, material reality, especially if this is a simulation as well? If this is the case, what will we find outside of the frame?

Alexander, Boyer, and Alexander (1987) have argued that the first signs of enlightenment (i.e. the growth or evolution of consciousness) first appear in sleep, and especially in dreams. Their argument is based upon the teachings of Maharishi Mahesh Yogi and their formidable research program (Alexander et al., 1990; Chalmers, 2015), which examines physiological, sociological and psychological parallels to the transcendent experience. Alexander et al. (1987) suggest that these signs of enlightenment take the form of lucid dreams initially while the ego is still "caught" by the excitement and fun of the experience. Eventually, as one's consciousness continues to develop, one can experience a state of transcendental consciousness or "witnessing", a silent state of pure awareness devoid of mental content (Mason, Alexander, Travis, Gackenbach & Orm-Johnson, 1995). "Witnessing" first appears and spreads throughout the dream, then progresses into 'dreamless' sleep and, finally, into waking as a state of restful alertness. As this state becomes more prevalent and stable it becomes a silent witness or observer, which is considered the first classical state of enlightenment in many Eastern ideologies. The practice of transcendence is the mechanism that this meditation research group has empirically shown is needed in order to attain this awakening in dreams, as lucidity, then eventually to the illusion of our waking reality.

Breaking the frame, or waking up to the true nature of "reality", initially happens in dreams because dreams are less driven, if at all, by external stimuli. Yet dreams are a regular experience of an altered reality that occurs for about two hours out of every 24 nearly universally, with the exception of brain damage (Solms, 2011). Our physical, material reality or "real" world has quite a stranglehold on our senses because we use our senses to process input data (sights, sounds, tastes, etc.). Thus, noticing the illusory nature of waking reality becomes quite difficult. When one moves to alternative realities, in this case digital and dream, or even drug-, hypnotic-, or fever-based, then it is much easier to break the frame or "wake up" to the reality of the frame whether induced by a video game, dream, or so forth.

While transcendence of dreams, then sleep, then waking is arguably the best way to "break the frame", it is not the only way. Although there is a long list of practices that may or may not create transcendence, many do seem to push consciousness to a more awake and present state. These are, increasingly, mindfulness practices. Gackenbach (2008; & Bown, 2011) has been arguing for years that exposure to digital realms of an alternative reality in general, especially in video game play, parallels a meditative state. Gackenbach suggests that the deep absorption of meditation is comparable to the same deep absorption in virtual realms that gamers experience. This absorption is associated with improvements in attention that also parallel meditative states. In some instances, they are better. Gackenbach, Swanston, and Stark (in press) found gamers outperformed those who pray/meditate on change blindness tasks. Following this logic, then gaming, and especially VR gaming with a head-mounted display, can be considered practice or training for waking up to the true nature of reality, or breaking the frame.

DREAMS AND VIDEO GAME PLAY

Our prior research efforts have focused primarily on the merging of digital and dreaming realities. More specifically, the relationship between video game play and dreams (reviewed in Gackenbach, 2012) and more recently non-gaming digital life, especially social media use, and its relationship to night time dreams (Gackenbach & Boyes, 2014a). We have examined the dreams of 'expert' video game players who have played approximately 10,000 hours since childhood to determine if there is an overlap of realities, convergence of realities, or a change in realities. Our research has shown that at the very least we dream about gaming, but that the more important impact is potentially on the structure and function of

dreaming affected by gaming. Several lines of inquiry will be reviewed to make this case. Namely, higher lucidity/control in dreams, more nightmare protection, and more bizarreness/creativity in gamers. Each of these advantages in gamers' dreams extends the reach of dreaming in terms of negative emotional regulation and potentially into expanded states of consciousness.

Video gamers' dreams show incorporation of game content, which is consistent with the continuity hypothesis and suggests that there is a continuum between waking activities and dreamt activities (Shredl, 2003). Here is an example of simple incorporation of gaming into a dream consistent with the continuity hypothesis:

I had played a game called Bomber Man where you just run around and put bombs down and explode areas so that you can leap past…. There's, like, monsters running around that can kill you or you have to blow them up, and I remember in the dream I was down like in 3D, I was the bomber man type guy, and there were these monsters on these blocks, and I was running around, and my whole family was there actually, and we were running away from them as fast as we could. (Gackenbach et al., 2009)

While the game is not in the dream most of the time, when the game is the dream the content is not only a game being represented but rather the entire dreamt sequence is thought to be a game (Gackenbach, Sample, & Mandel, 2011). Thus, the dreamer's choices are affected by the attribution of "this is a game". In one gamer's dream, for instance, he wondered what it would be like to burn to death and, subsequently, chose to stay in a burning car to find out (Gackenbach & Hunt, 2014). Dying as a personal choice is a common occurrence in video games but in dreaming it is quite rare. In addition to incorporating game content in a dream or misattributing the state of the dream, such as believing the dream is a game, there are certain dream types that suggest breaking the frame of the dreaming reality.

LUCID/CONTROL DREAMING

Our dreaming reality is composed of imagined perceptions that often feel very real. Accordingly, it can be argued that our dreaming reality represents a true virtual reality (Revonsuo, 2006). Even if the dreamer realizes that they are within a dream, the felt experience remains, and this is called a lucid dream. While virtual gaming dreams are sometimes lucid, in that the gamer knows they are in a dream, what is more consistent in our research is the felt sense by the gamer that they can control the events and outcomes of the dreamt scenario (Gackenbach, 2012). This is often referred to as a "control dream". Unlike a lucid dream, in a control dream, the metacognitive component of awareness is somewhat missing but the dreamer can still exert some control over the dream. Deliberate decision making is present and is even allowed to violate the physics of waking reality. The degree of control a dreamer has can be measured on a continuum and varies between aspects of the dream.

In several studies, we discovered that high frequency gamers have more lucid dreams than those who rarely game (Gackenbach 2006; 2009; Gackenbach & Kuruvilla, 2008). This association between video game play and lucid dreaming is not unexpected. Video games are a technologically constructed alternative reality, while dreams are a biologically constructed alternative reality and thus, there may be a carryover learning effect. If you are in an artificial reality for hours a day, it follows that you might recognize something similar when you are in another one at night. As Revonsuo (2006) pointed out, in both the dream world and the virtual world, there is a sense of presence. In order to examine this

perceived presence, Gackenbach and Rosie (2011) compared ratings of presence after playing a video game to presence after having a dream about that video game. Their results indicated that there were few differences between dreaming and gaming with regards to participants' felt sense of "being there". This supports the idea that there are similarities between virtual and dream states and thus the potential for a learning transfer.

Additionally, lucid dreaming has been characterized as presenting with a heightened meta-cognitive capacity (Kahan & LaBerge 1994). Koriat (2007) defines meta-cognition as the

process by which people self-reflect on their own cognitive and memory processes (monitoring) and how they put their meta-knowledge to use in regulating their information processing and behaviour (control). (p.289)

This meta-cognitive capacity can also be viewed as a type of self-reflective awareness (Kahan, 1994). LaBerge and DeGracia (2000) point out that while non-lucid dreams can have a meta-cognitive element,

meta-cognition during lucid dreams is not confined to events occurring in the dream, but references, either explicitly or implicitly, waking experience as well . . . hence, lucidity in the context of dreaming, implies meta-cognition framed by consciously accessible memories of waking experience. (p.275)

Another reason we might expect to find an association between lucidity and gaming is that both video game play and lucid dreaming have been associated with improved spatial skills (Gackenbach, Heilman, Boyt, & LaBerge, 1985; Sims & Mayer 2002; Subrahmanyam & Greenfield 1994). Furthermore, some resistance to motion sickness is needed to play video games for extensive periods of time (Preston, 1998) and, correspondingly, lucid dreamers have better vestibular systems (Gackenbach et al., 1986), which render them insusceptible to motion sickness. Additionally, the high attention and absorption reported by gamers (Glicksohn & Avnon 1997-98) and research on gaming (Gackenbach 2007) is reminiscent of the same qualities associated with meditation (Holzel & Ott, 2006; Weinstein & Smith, 1992). To this end, meditators have been found to have very high levels of lucidity in sleep (Gackenbach & Bosveld 1989; Hunt 1989; Mason et al., 1995).

A natural question that follows from this comparison is: are there self-selection factors in gaming that account for lucidity? The answer is yes and no. Yes, because to be a serious player you need to not suffer motion sickness. For serious game play, spatial skills are an advantage. The games most serious gamers play cater to boys and those who are able to get absorbed should do better. No, because today almost all children through to young adults play some form of video game. In the last decade, developers have been creating video games to capture a wider market, which has increased the number of girls playing as well as adults of all ages. The average gamer is now 35 years old and people of all ages and cultural backgrounds are playing games on various platforms, from computers and consoles, to phones and tablets.

Gackenbach (2008) has also argued that video game play specifically, and perhaps all electronically mediated interactions, can become a sort of meditative experience. Her argument is based on the similarities she has identified between video game play and meditation. These similarities include improved attentional skills, deep absorption, flow experiences, improved spatial skills, and increased lucid dreaming all of which are characteristic of both meditation and video game play (for a review of each of these areas see Gackenbach, 2012). Gackenbach posits that gaming allows an entry into states

of consciousness typically accessed by meditators while not claiming that the effects of gaming are as profound or far reaching as meditation.

In addition to its heightened meta-cognitive self-monitoring, lucid dreaming bears a direct phenomenological and cognitive resemblance to the states sought in traditional meditation, and has been further developed within both Transcendental Meditation and Tibetan Buddhist practices. In both dream lucidity and meditation, participants experience an enhanced self-awareness. The full emergence of this awareness is marked by feelings of a vivid kinesthetically enhanced presence and feelings of awe, fascination, and at times, bliss. These feelings are similar to that in Maslow's peak experience and Otto's descriptive phenomenology of a numinous feeling of the felt sense of the sacred (Gackenbach & Bosveld, 1989; Hunt, 1989).

Hunt (1989) points out that when combined with enhanced mythic-archetypal content, lucid dreams have similarities to accounts of shamanistic vision-trance or sacred dreams of tribal societies. These sacred dreams were also of interest to Jung and were themselves crucial in confirming a directly felt sense of a shared or collective social reality. This sense of collective social reality explains the clans and other groups that emerge in long-term, committed gaming experiences, specifically in online role-playing games.

Gackenbach et al. (in press) examined lucidity and control dreams in two groups, a gaming group versus meditation/prayer group. Their research also considered a high activity versus low activity manipulation. That is, participants were asked to report a dream after a day of high activity (i.e. gaming or meditation/prayer) and after a day of low activity (i.e. little/no gaming or meditation/prayer). While the meditating/prayer group self-reported more lucid dreams overall, the gaming group reported the most control dreams across conditions. Internal commentary item on the metacognition scale was highest in the gamer group after a high activity day and lowest in the meditation/prayer group after high meditation/prayer activity. The opposite was the case after a low activity day. In terms of thwarted intention, the gamer group reported less thwarted intention in their dreams after a high activity day, while the meditation/prayer group reported more thwarted intention after a day of high activity and less thwarted intention in their dreams after a day of low activity.

Gackenbach et al.'s (in press) study also compared attention performance in the laboratory. Performance on the waking attention task was superior for gamers, while self-reports of positive effects of their chosen activity were highest for the meditation/prayer group. These findings imply that while gaming and meditation/prayer have unique differences, the absorbing qualities of both may share a similar role in their effects on consciousness. This combination of practicing control in the altered reality of gaming explains the transfer of skills of dream control for gamers into dreams. The lower lucidity, relative to meditation/prayer among gamers (although higher than the control group), however, points to an orthogonal relationship between lucidity and control, as has been noted in previous research (Levitan & LaBerge, 1993). Furthermore, it seems to be consistent with the nightmare protection hypothesis of gaming effects on dreams (Gackenbach, Ellerman, & Hall, 2011).

We make the argument that lucidity, and to some extent dream control, break the frame of the dreaming mind. Breaking the frame occurs when one is aware that they are no longer contained by the dream but are able to move within and between dreams at will. It is these moments that can also result in attributions of the dream as an out-of-body experience. Other states of consciousness confusion attributions include false awakenings, the belief that the dreamer has woken up while still asleep, and various pre-lucid experiences.

NIGHTMARE PROTECTION HYPOTHESIS

We have found that one result of personal dream control is nightmare protection. Our early ancestors evolved from primitive times where daily threats to survival were abundant. Those that were able to rehearse the perception and avoidance of threatening elements safely in the virtual reality of dreams had an evolutionary advantage for survival (Revonsuo & Valli, 2000). Thus, from an evolutionary perspective, one function of nighttime dreams may be threat simulation (Revonsuo & Valli, 2000). It therefore follows that playing combat-centric video games might serve that same function in an altered reality. Less threat should appear in dreams because that function has been served in combat-centric game play while awake. This effect is what we have found in several studies with male gamers. This adaptive response to threats in dreams is developed when a gamer fights threats for many hours over many years in a video game. Early in our work, we found some indications of how nightmares were differentially responded to by high end gamers, with comments like 'they were fun' or they reported fewer of them (reviewed in Gackenbach, et al, 2009). In our first content analysis of high versus low end gamers[1], we found a smaller number of dreams with aggression, yet more intense aggression (namely physical aggression), in those dreams that did contain violence (Gackenbach, et al, 2009) for the high end gamers relative to the lows. Here is an example of the intensity of violence:

so I went outside with my cat and shot these criminals that were trying to eat my dad and they were on top of my dad trying to eat his arms and he was fighting them off, and they were trying to hold him down and bite his shoulders and there was blood and stuff. (Gackenbach et al., 2009)

The respondent commented about this dream, "and it was a very graphic shootout for a dream; it was very blood and guts ya know?" Thus, it's important to keep in mind that while this can happen in gamers' dreams it is uncommon, not only statistically but also in the eyes of the dreamer. Further, it has been replicated in other such content analyses of gamers' dreams (Gackenbach & Boyes, 2014b; Boyes & Gackenbach, 2015; Gahr, 2015).

Our first focused look at the threat simulation hypothesis was in a 2008 study by Gackenbach and Kurvilla. In that study, we examined Revonsuo and Valli's (2000) threat simulation evolutionary theory of dream function, and hypothesized that high end gamers would report less threat in their nighttime dreams. While support of the hypothesis was correlational, the strength of this study was the selection of dreams as "all occurring last night", "after a full night's sleep", "feeling rested", and "having had played a video game the day before." Our inquiries continued with two subsequent studies (Gackenbach, Ellerman, & Hall, 2011; Gackenbach, & Flockhart, 2013) that examined populations more likely to experience threat in waking life compared to student samples, namely military and first responders.

In the first study, Gackenbach, Ellerman, and Hall (2011) solicited responses from soldiers who played at least some video games. They also prescreened out soldiers reporting symptoms of current post traumatic stress. Thus, their results apply to relatively healthy military personnel. In addition to collecting dreams that were from the soldier's military experience, Gackenbach et al. (2011) collected a recent dream. In a review of the nightmare literature, Levin and Nielsen (2009) reported that two predictors of susceptibly to nightmares are emotional reactivity and previous history of trauma. Thus, in the military study we inquired about these predictors, and held them constant in our threat simulation content analysis of the soldiers' dreams. We then examined two groups of almost entirely male soldiers

who differed in video game play frequency. Soldiers reporting more play, as hypothesized, were found to have less threat in their dreams and more personal control. The following dreams illustrate the difference. The first is the military themed dream of a low frequency player:

I couldn't find my rifle and something was chasing me. I searched the entire forest until I did find my weapon. As I turned around to shoot what was hunting me - the trigger felt like it was a 1,000 lbs trigger pull. The rounds I was shooting were delayed and where not hitting where I was aiming (Subject #21). (Gackenbach et al., 2011)

This dream was coded as high in threat. In contrast, from a high frequency player, here is the second military themed dream:

I was told by my old Sargent to load up on the humvv in my gunners spot. he said we were going to roll out to fight some were in Baghdad. we drove down to the combat area where there was a brutal fight me and quite a few men against the insergants. i remember shooting and seeing men fall on both sides. i saw the faces of the dead eyes wide and staring at the sky soulless faces of friends. i walked dazed back to the humvv and woke up (Subject #115).

While both dreams contained high threat levels, the second dreamer is clearly able to fight back and thus is less victimized by his dreamt circumstances. Relatedly, in coding for war motifs in these dreams, the lower frequency gamers were found to report significantly more such content than the high gamers. This is noteworthy because there were no differences in such motifs in their recent dreams and there were no gamer group differences in deployment history.

In a subsequent study on first responders with the same design, we found that males who play video games frequently had fewer objective threats in their dreams (Gackenbach & Flockhart, 2013). In this study, we had enough women to identify a sex difference among high end gamers and nightmare protection. Specifically, high end female gamers did not appear to get the same advantage as their male counterparts in being protected from their nightmares by frequent game play. We went on to replicate these findings using the same study design on a student sample (Gackenbach, Darlington, Ferguson, & Boyes, 2013). We concluded that male high end gamers seem to be less troubled by nightmares than female high end gamers. We suggested three reasons for this: game genre, game sociability, and sex-role conflict. This is illustrated in another follow-up study from our laboratory examining nightmare protection. We found that chases and attacks in male gamers' dreams are more likely to result in a fight rather than a flight response (Boyes & Gackenbach, 2014). In addition, although the dreamt chases and attacks may remain frightening and threatening, male gamers also report that they are fun and empowering.

In two subsequent studies (Boyes & Gackenbach, 2014; Ditner, 2015), we examined these differences in responses to nightmares among high end male and female gamers. Our results, which are consistent with previous research (Gackenbach, Darlington, Ferguson, & Boyes, 2013), indicate that male and female gamers are playing different types of video games. Males played more combat centric games, which may be nightmare inoculating. Females, conversely, play primarily casual games, which may not be providing the nightmare protection found in males. No support was found for the stereotype threat hypothesis, which is that gaming women may not be fighting back in their dreams because it contradicted traditional sex roles. Early support was found for differences in coping styles in both waking and in dreaming. In

our most recent inquiry into this gender disparity (Ditner, 2015), we examined high frequency and low frequency female gamers who favored either the combat centric or noncombat centric genres. Ditner (2015) reported that female high end gamers who favored combat centric games reported less fear in terms of fear experienced in the nightmare and immediately thereafter. In addition, she found that the sex role identity of masculinity was more associated with women who prefer combat centric games. Thus, we are beginning to better understand the apparent reversal of the nightmare protection hypothesis in women and see that it is a function of genre history and preference as well as gender role identity.

Under the right circumstances, both genders can break the frame of nightmares with video game play. From a clinical perspective, this may or may not be healthy as Jung has indicated that the nightmare is the psyche's invitation. From the perspective of the potential evolution of consciousness, however, such effects of gaming may be functional.

BIZARRENESS AND CREATIVITY

One of the most often assumed characteristics of dreams is that they can be so bizarre. Even when to an outside judge a dream may not appear bizarre (Domhoff, 2007), the dreamer may perceive it as bizarre. For instance, if a car is colored yellow in a dream, the dreamer may consider that very element to be bizarre. They may hate the color yellow, which is why they thought it was so bizarre to see the yellow car in their dream. Early in our work, we found bizarre elements in gamers' dreams (Gackenbachet al., 2009). In this study, the male norms for content analysis of low end gamers' dreams reported no inclusion of dead and imaginary characters, while among these high end gamers' dreams, in this sample, 22% had such characters. Here is an example of an imaginary dream character from that study:

I dreamt I was a character in Underworld 2; it was a werewolf character, and then I became a third person. It was the two main characters; it was the vampire girl and a hybrid werewolf character.

This was taken up as the focus of a study examining video game play history and dream bizarreness by Gackenbach, Kuruvilla, and Dopko in 2009. Consistent with Domhoff's (2007) findings, they found that gamers, both high and low end, had more non-bizarre elements than bizarre ones. However, of the bizarre elements, high frequency gamers' dreams were coded as containing more incongruent and vague elements than low end gamers. High end gamers report a greater amount of some types of dream bizarreness. Why does this occur? The first and most likely reason is because gamers are immersed in digitally constructed unusual worlds, often filled with fantasy and mythology, during their game play. Thus, what we may be observing is the direct incorporation of daytime activities into dreams. However, the participants in the Gackenbach, Kuruvilla and Dopko study, rated themselves as to whether there was any reference to digital media in their dreams. There were no gamer group differences. This finding is especially interesting in the context of the significantly higher digital media exposure that the high end gamers reported from the day prior to the dream. One might conclude that despite high end gamers being exposed to more bizarre media elements while awake, there were no group differences in morning after reports of media content in their dreams. This weakens the argument that bizarre dream content is purely a function of waking exposure to bizarre media (Gackenbach, Kuruvilla, & Dopko, 2009).

An alternative explanation for the higher bizarreness in gamers' dreams may be due to the nature of their semantic networks. Specifically, Revonsuo and Salmivalli (1995) state that:

One possible way to understand the underlying mechanisms of dream incongruity is to think of them in terms of connectionist networks . . . During dreaming there is no sensory input to constrain the possible combinations of activation patterns, which may result in an atypical configuration of activation in the network. Such activation could be reflected in subjective experience as incongruous dream imagery. (p. 183-184)

They argue that more diverse networks allow for more incongruous dream bizarreness. This interpretation is consistent with other research on high end video game players who have demonstrated a variety of cognitive and attentional type skills, which in turn may implicate more diverse neural networks (Green & Bavelier, 2003).

Diverse neural networks may be due to differences in creativity, which is "the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints)" (Sternberg & Lubart, 1999, p. 3). Several studies link the degree of bizarreness in dreams to creativity. Specifically, Adelson (1974) found that college girls who had more creative dreams were also advanced students in creative writing classes. Schecter, Schmeidler, and Staal (1965) found that university students in an arts program recalled more imaginative dreams compared to students enrolled in science or engineering.

In a further study on dream bizarreness and creativity, Gackenbach and Dopko (2012) investigated this finding and also observed that the bizarreness occurrence associated with gaming was somewhat replicated by their study. This time, the number of hours playing a video game the day before was controlled. They also found that video game play history was related to figural creativity. The positive bizarreness, gaming, and creativity association was partially confirmed for males, while video game play was associated negatively with bizarreness for females, with no creativity link. In separate and joint factor analyses of the major variable clusters (i.e., media use, including gaming, bizarreness, and creativity), it was clear that any associations were to gaming and not to other media use the day before the dream.

Revonsuo and Salmivalli (1995) studied the frequency of three types of dream bizarreness. They found that incongruity is a more common form of bizarreness than vagueness or discontinuity. More specifically, they found that language and cognition were the most incongruent content and that the self was the least incongruent content. This indicates that the self is well preserved in dreams and rarely affected by features incongruous with waking reality. Early in our work, we found changes to the self, already noted, as related to gaming characters (Gackenbach et al., 2009), or to activities the self is not normally engaged in, such as choosing to burn to death (Gackenbach & Hunt, 2014). These deeper transformations in gamers' dream selves that occur due to the transfer of self into the avatar in gaming, can be interpreted as a form of breaking the frame in dreams. In other words, since the gamer is entering an avatar in the game, there is a separation between their actual self and their perceived self through the eyes of their avatar. This separation makes it more likely to undergo a metamorphosis of self, which has been observed in gamers' dreams.

We have explored three types of dreams that are affected by video game play and result in the frame of the dreamt reality being broken. Next, we explore two situational constraints and how they may also break the frame of the dream reality, due to exposure to digital reality.

SOCIAL MEDIA, CULTURE, AND DREAMS

Being present in digitally constructed realities is not limited to video game play and includes life online. The number of people using the Internet has grown exponentially, with over three billion users, transferring up to eight zettabytes of information in the digital universe in 2015. A zettabyte is one trillion gigabytes! The majority of Internet users reside in China, which has become the dominant population online. While North America has deep penetration of the Internet into its population (78 percent) and China has only 42 percent penetration, because of China's huge population, it has 15 times more users. Comparatively, India has five times the number of users in North America but its penetration is significantly lower than China's at only 11 percent of its population. Thus, it seems that the future direction of Internet growth will occur in the East (ITU, 2011; World Bank, 2012).

The move to mobile devices to reach the Internet is especially prevalent in developing countries. It is cheaper to buy or use a cell phone online at villages along a coastline than to buy a computer when trying to get the best market price for fish. While the trend internationally is towards more mobile Internet access, this trend is strongest in North America. North Americans, however, are using their mobile phones to get online information and the most common use internationally is to text others, followed by taking pictures and video.

Another new component of life online is the prevalence of social media networks. Although Facebook remains the undisputed market leader, in terms of total number of users with over 1.39 billion monthly users as of December 2014 (Facebook, 2014), other social media websites are also growing quickly. In 2013, 71 percent of adults in the United States used Facebook, while only 22 percent used LinkedIn, 21 percent used Pinterest, 18 percent used Twitter, and 17 percent used Instagram. Among the Chinese, there are also a high number of users of social media but not of the same websites. They have their own versions of each of these types of social media networks. Demographics of Facebook users in 2013 were largely even across gender, income, and education, but age evidenced a big drop in usage among those 65 and over (Duggan & Smith, 2014).

Given the prevalence of social media and our increasing time spent online it is prudent to ask whether these non-gaming digital reality experiences can also lead to breaking the frame? In our laboratory, we have begun an exploration of social media and culture effects on dreams. We propose that both of these have a potential effect of also breaking the frame, if not as strong as video game play.

In a preliminary study on the association between non-gaming digital life and dreams, Gackenbach and Boyes (2014a) asked students to indicate if they had played computer games or used their computer for non-gaming purposes during the day prior to a recent dream they reported. They then answered questions regarding their confidence about the type of dream they reported and their emotions during said dream. There was some indication that the high end non-gaming computer-use group had more lucid dreams (females only) and control dreams, but less bizarre dreams. All three of these dream types had previously been found to occur in gamers and can be seen as examples of breaking the frame (Gackenbach, 2012). However, in that data collection effort, the varieties of non-gaming computer-use were not inquired about.

In a second study (Gackenbach & Boyes, 2014b), this group compared the self-perceptions of typical dreams and reports of a recent dream from non-gaming and gaming electronic media users. They focused particularly on social media use, both on computers and on computer-like devices, such as smart phones. Gackenbach and Boyes found many similarities between high end gamers and high end social media users[2] in their nighttime dreams. Furthermore, the high end gamers and high end social media users had the thinnest psychological boundaries. That is, they were more susceptible to fantasy, hallucinations,

were more creative (Hartmann & Kunzendorf, 2006-2007) and thus, were perhaps most susceptible to media effects. Will these be the first candidates to break the frame of dreaming into higher consciousness, due to their thin psychological boundaries?

In their 2015 study, Gackenbach and Gahr, had Canadian students of varying cultural backgrounds take an online survey to examine their dream experiences (Dream Intensity Scale, DIS; Yu, 2010) and history of media use, i.e., social media and video game play. Regression analyses found that the role of gender and culture, relative to history of media use, was the strongest in predicting total DIS scores as well as dream recall and nightmare information, which is often reported in the literature for females. Media use was also a component of these two dimensions, but its role in predicting self-reported dream experiences was stronger for the other types of DIS information. In general, the findings with media use predicting dream types seem to fall around the age the subject began using social media or gaming as well as their use of MySpace, one of the first social media sites and thus, presumably the longest one used.

Gahr (2015) has gone on to further explore ethnic differences within a Canadian sample and its relationship to video game play both in terms of a recent dream and scores on the DIS. She found that ethnic self-identification, collectivist versus individualistic, was associated with bad dreams sub-scale on the DIS as a function of gaming history. Specifically, bad dream history and fear associated with a recent dream report were higher for female individualistic high end gamers than their male contemporaries. The low end gamers of individualistic ethnic identity had little differences in these dream concepts. This largely replicates the findings from our laboratory on the same participant pool. The effect of culture was demonstrated among those who self-identified as from a collectivist culture. In a three way interaction between gender, self-identification of ethnic identity, and gaming history, culture seemed to not make any difference for the high end gamers. Conversely, for those participants who rarely gamed, culture was a major factor. Specifically, there was no gender difference in self-reported fear in a dream among the individualistic low end gamers but there was a large difference in fear, with women reporting more than men, among the collectivists low end gamers. Thus, gaming seems to have had a differential association to gender and ethnic identity.

Likewise, when Ditner, Hakopdjanian and Gackenbach (2015) administered many of the same scales as were administered in Canada in collectivist China, they found that the effects of the two media types we investigated were considered separately as there are differences among the high end video game players and social media users from different cultures. In short, the surrounding culture's embrace of collectivism, China, or individualism, Canada, informs the self-perceived constraints of the individual along traditional gender roles. In China, for instance, we observed that males did not report any differences in the bad dream intensity sub-scale, regardless of the frequency of video game play. This may be attributed to males not wanting to report any threats or nightmares, which may be perceived signs of weakness and vulnerability. For females, we observed a decrease in dream threats as video game play increased, adding support to our nightmare protection hypothesis. However, females with a low frequency of video game play did report more bad dreams as there were no effects from nightmare protection or from the male self-identity bias. Since Chinese females in this sample were found to be more collectivist than Chinese males, in an already collectivist culture, it may be that this further increased their vulnerability to threats in dreams. Carrying the burden of connecting with others may result in a lot of pressure for them, which in turn, is expressed in their dreams.

In Canada, we observed that males did report a decrease in dream threats as video game play increased, again, adding support to our nightmare protection hypothesis. However, females showed an increase in dream threats associated with video game play increases, inconsistent with our findings from several

previous studies. For females, this may be from increased anxiety of an internal conflict of their self-identity as nurturers in an individualist culture, playing video games with violence.

A similar analysis can be applied to the social media use of respondents as was to the video game play history. This Chinese study from our laboratory was conducted to investigate the relationship between cultures, media use, and dreams, specifically, nightmares. We subsequently observed that males appear to be protected from our nightmare protection hypothesis in Canada, an individualist culture. Chinese females, however, seem to be more vulnerable to social pressures to conform to their expected gender role and show increased anxiety, and therefore nightmares and threats in dreams, when they do not conform. These findings allow us to better understand the effects that our technologically constructed digital world is having on our biologically constructed dream world.

We have made an argument that two immersive media experiences, video game play and social media use, have an effect on dreams such that they seem to break the frame of dreams in various ways. This is somewhat moderated by culture and gender, but at least for gender, when conditions like genre are taken into account the same frame breaking nightmare protection is possible. Culture seems to have a more nuanced effect depending in part on the degree of individualism versus collectivism.

CONCLUSION

Our research efforts have focused on the impact of our technologically constructed digital reality on our biologically constructed dreaming reality as an example of one form of naturally occurring consciousness. Specifically, we have investigated video game play and social media use and are beginning to investigate virtual reality technology as tools to break the frame of the digital reality these technologies partially construct. We have observed that these technologies are changing the structure and function of our consciousness, which we have measured by analyzing dreams, such as by affecting lucidity/dream control, nightmare protection, and bizarreness/creativity. For instance, playing video games seems to shift the gamer's consciousness into a digitally constructed virtual reality that is a more contracted state of consciousness. When the gamer emerges back to our physical, material reality, they experience a shift up into a more broad state of consciousness (Highland, 2012). This repeated shifting down into a more contracted state and then shifting up into a more broad state seems to train the gamer to break the frames of reality, thus, resulting in increased lucidity, control, nightmare protection, and bizarreness.

Never before in our human history have such a large part of the population been so widely affected by another constructed reality as the one we are currently digitally experiencing, with the exception of our dreaming reality. If we are able to break the frame of this digital reality, which seems to also have an effect in breaking the frame of our dreaming reality, does it also affect our waking reality? Our waking reality is certainly affected in a minor way with the game transfer phenomena, but we are suggesting a more profound change. Specifically, exposure to these digital realms parallels a meditative state, which has often been revered by Eastern ideologies as one of the most effective practices to transcend into a higher, transcendental consciousness. Transcending during these meditative states of consciousness facilitates an awakening in dreams, initially seen as lucidity, which will eventually lead to an awakening to the illusion of our waking reality.

Ancient Hindu and Buddhist texts describe the concept of *Maya* where the universe and our perception of reality is an illusion (Hiriyanna, 2000; Lochtefeld, 2002). The Upanishads describe the universe and the nature of reality as an interaction between the eternal consciousness, Atman, and the material world, Maya (Hiriyanna, 2000). Thus, Maya is our perception of reality and "it is not what it seems to

be, that it is something constantly being made" (O'Flaherty, 1986). In Mayahana Buddhism, Maya is a magical illusion that is experienced differently depending on the state of consciousness of the individual (Rinpoche, 2002).

Today, there are a growing number of scientific researchers and scholars that are coming to a similar conclusion about the nature of reality. Evidence from parapsychology (i.e., the presentiment work of Radin (2009)), engineering (i.e., quantum voltage fluctuations associated with large human events of Nelson (2004)), sociology (i.e., Maharishi Effect of group meditations on peace by Orhm-Johnson, Alexander, Davis, Chandler & Larimore (1988)), and psychology (i.e., near-death experience research of Van Lommel (2011)) is pointing to consciousness as not local to the brain. That is, not resulting as epiphenomena of brain processes although it is likely affected by the same processes. This sets a fertile ground for the relatively new hypothesis from digital physics that reality is simulated.

The Church-Turing Thesis proposed that every function that would be regarded as computable is computable, if it is computable by a Turing machine (Davis, 1965). A Turing machine is a device that manipulates symbols according to a rule set, an early pre-cursor to the logic of a computer algorithm (Hodges, 2012). Since space, time, and energy is quantized, it is made up of individual binary units of information, which means it is computable. So it follows that reality itself is also computable. Perhaps the universe is a digital computer that computes its own evolution and uses a universal cellular automaton (Zuse, 1967), which replicates the emergence and self-organization of life based on a predetermined rule set, or by a universal Turing machine (Schmidhuber, 1997). Wolfram (2002) believes that the universe is digital and operates on fundamental laws that can be described as programs or algorithms. The Holographic Principle postulates that the three-dimensional universe emerges from information processing on a two-dimensional surface (Susskind, 1995). The information from the three-dimensional objects is carried on a distant two-dimensional cosmological horizon that surrounds us and we are a holographic projection of that distant data. Bostrom (2003) later extrapolated these ideas to suggest the probability that reality is a simulacrum, a representation of something else, in this case, inside a computer simulation.

Many physicists propose that the existence of matter is dependent on observation, which means that this simulation is rendered by an observer. In other words, consciousness creates reality (Campbell, 2007; Radin et al, 2012; Groeblacher et al., 2007). These physicists rely on the famous double-slit experiment to provide an interpretation that consciousness is required to collapse the wave function, which means changing the nature of an elementary particle from a wave of probabilities to a deterministic particle in existence. Although this is still a controversial debate, one of the founders of early quantum physics proposed that an observer is necessary to the observation:

The interaction between observer and object causes uncontrollable and large changes in the [atomic] system being observed... (Heisenberg, 1930).

Since our brains cannot distinguish between our waking reality and our dreaming reality, if our waking reality were simulated, it would seem just as real as it does to the dreamer in a dream, except it would be to the waking person while awake. Furthermore, our perception of reality is subjective, therefore, objective reality may not exist (Campbell, 2007). We may be constructing our physical, material reality based on a pre-determined rule set or perhaps our consciousness is rendering our reality. Just as we have a set of rules for virtual reality, we also have a set of rules for our dreaming reality and another set for our waking reality. But if the totality of the cosmos, our physical material reality, is being simulated, then who is the simulator?

Reality is merely an illusion, albeit a very persistent one. Albert Einstein (Einstein, as cited in Calaprice, 2005)

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ENDNOTES

1 The idea of gamers as low versus high end means that they fall along a continuation of either frequency of play alone or more often along a variety of game play queries. These have included number of games played, age begun gaming, with younger ages being rated higher, number of hours gaming, reading about gaming, talking with others about gaming, engaging in gaming social media to name a few.

2 As with gaming, social media use identified as high or low end includes most often a summary frequency of use of about a half dozen social media website of the most popular. These include Facebook, Pinterest, Tumblr, Instagram, Myspace, to name a few. In some studies estimates of cell phone texting were also included and in the Chinese studies Chinese social media sites were asked about.