Sex in the Machine: The Ultimate Contraceptive

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Introduction

VIRTUAL SEX is akin to narcissism as in effect, such sex, without direct physical contact with another being or with an artificial intelligence, is equivalent to masturbation. In Greek mythology, Narcissus was cold in nature and was cursed by being made to fall in love with his own reflection in a woodland pool "until he died from exhaustion and unsatisfied desire" (Hard 217).

Ennui in the face of the real world and lack of mating opportunities may ensue because of the spread of virtual reality environments which, to the individual, are more predictable, controllable, compliant, and hence more entertaining and satisfying than real life.

This paper will trace the development of sex toys from dolls to cyberspace, and compare this development with sex with robots leading on to sex in virtual environments (VR) within the science-fiction (SF) genre. An interdisciplinary flavour will inevitably intrude as the author is a medical doctor, and hence, real-life medical conditions will be mentioned in relation to this theme, where appropriate.

Non-fiction

In real life, the simulation of sex has been achieved through sex dolls and other aids. A sex doll may be defined as a sex aid for the purposes of masturbation and may consist of a complete replica or only part/s of the (male or female) human. These dolls may be remarkable simulacra of the human body, to the extent that at first glance they may appear almost indistinguishable from real persons, and can even be positioned, with an endoskeleton that includes moveable joints, and even motorised parts such as a moving pelvis. Such dolls are customisable and may cost up to $10,000 (Ferguson 45).

Sex dolls are as old as mythology, as seen in the story of Pygmalion who fashioned a sex doll from ivory which was so real, that he became besotted with her, to the extent that he fed, bathed and slept with her, until Aphrodite eventually brought the statue to life, allowing him to marry his Galatea (Hard 574). In the contemporary setting, a sex doll "represents woman in her most objectified form […] man's ultimate sexually idealized woman […] rendered harmless […] immobile, compliant, and perhaps most importantly silent" (Ferguson 5).

The first recorded life-size dolls originate in the seventeenth century as *dames de voyage* or *damas de viaje* composed of sewn cloth or old clothes and used by French and Spanish sailors during long sea voyages (Ferguson 16). More sophisticated dolls were created in the early 20th century by "true Vaucansons in this province of pornographic technology, clever mechanics who […] prepare entire male or female bodies, which [...] subserve fornicatory purposes," to the extent of being able to simulate ejaculation (Bloch 660). The first sex dolls to be marketed as such appeared in 1955, a figurine named "Bild Lilli" which was the precursor of the modern Barbie doll (Ferguson 27-28), and more details on the history, connotations and repercussions of the sex doll may be found in Ferguson's "The Sex Doll: A History."

Henrik Christensen of the European Robotics Research Network Experts predicts that "people are going to be having sex with robots within five years" (Habershon). Even more contentiously, Levy reasoned that ongoing progress in robotics and artificial intelligence will soon result in the production of robots that will be indistinguishable from humanity in appearance and functionality, hence humans will inevitably fall in love with robots, have sex and even marry them.

Science-fiction

Lester del Rey's "Helen O'Loy" (1938) was one of the first stories to depict sex with robots or androids. Androids derive from the marriage of two concepts: simulacra, devices that exhibit human likeness and automata, devices that exhibit independence. The term was first used by Mathias Villiers de l'Isle-Adam in his work "Tomorrow's Eve" (1886), featuring a mechanical robot. In "Helen O'Loy," two men, a mechanic and a medical student, modify an ordinary household robot so as to allow the extremely realistic and highly attractive female robot to have emotions. The robot, Helen, promptly falls in love with the mechanic, who, in Frankensteinian fashion, initially rebuffed his creation. He later relented and married the robot, gradually artificially ageing her potentially immortal face and body. When he dies, the robot asks to be deactivated, destroyed with acid and buried with her husband.

The issues of automatic contraception, robotics and offspring are elegantly depicted in "The Joy of Living (1954)." Women are tempted by the makers of robots

to care for mechanical babies, with the argument that this does not spoil one's figure and one does not waste time changing nappies and giving feeds. Men are also targeted to buy a perfect mechanical woman (Nolan). Indeed, robot sex, and hence, automatic contraception, is frequently depicted in SF, for example, as an illicit activity, in Asimov's "The Caves of Steel" (1954) and "Robots of Dawn" (1983).

Even more intriguingly, Asimov's "Satisfaction Guaranteed" (1951) depicts a handsome male robot who realises that his married female owner has poor self-esteem, and in order to raise her standing among her friends and neighbors, he simulates illicitly making love to her by kissing her, thus demonstrating to the voyeurs (who do not know that he is a robot) that she is capable of attracting a handsome man and consummating an adulterous relationship.

The android lover is graphically depicted in Piercy's "He, She, and It" (1991), where an android is a re-creation of the equivalent of a golem by two Jewish scientists, a being who "transgresses not only the conventional boundary between human and machine, but between male and female as well" (Booker 347). He is the perfect lover, hygienic, obedient, indefatigable and considerate, a trope repeated in feminist novels. His programming is such that he "derives his pleasure primarily from pleasing his partner" (347), a being whose "marvellous organ is scrupulously clean" (347). His "entire body is free of the kind of physical imperfections that characterize human men" (347). However, this android "differs substantially from Haraway's notion that the problematic gender of the cyborg is considerably more "dangerous" than that of the sensitive male, whose very androgyny may in fact involve an attempt subtly to appropriate power," (348) and also imbricates the trope of the sanitisation of sex, a common element in cyberpunk with its technological appropriation and misappropriation, "a phenomenon embodied, for example, in the distaste for "meat things" shown by many of Gibson's male characters" (348).

In the *Star Trek* universe, the android Data's sexuality is explored in several episodes. For example, in Lynch's "The Naked Now" (1987), Data has sex with the *Enterprise's* inebriated security officer, who precedes the intimate encounter by coyly but pointedly asking him: "you are fully functional, aren't you?" to which Data replies "of course, [...] in every way, [...] I am programmed in multiple techniques, a broad variety of pleasuring."

The issue is further confused when androids believe that they are ordinary biological humans and have no inkling whatsoever that they are artificial constructs. The wife of Data's creator is such an individual, constructed by Data's creator in Pygmalion fashion, complete with real memories as a replacement when his original wife died (Sheerer "Inheritance"). This is prefigured by the *Star Trek: The Original Series* episode *Requiem for Methuselah* (1969) wherein an immortal human creates an immortal android woman companion who does not know that she is an artificial construct (Golden "Requiem"). Such androids have also been depicted in more mainstream narratives, such as "The Stepford Wives" (Levin).

Ridley Scott's *Blade Runner* (1982) takes this one step further, portraying the "Tyrell Corporation" which manufactures organic androids, proudly declaiming in its motto that it's products are "more human than human." The company's ultimate product is a female android, Rachel, "the product of a cynical psycho-technological experiment" (Fitting 348), with complete artificial memories of her nonexistent past, memories taken from Eldon Tyrell's own niece, memories which lead her to believe that she is human, such that "the replicant Rachel [...] stands as the image of a cyborg culture's fear, love, and confusion" (Haraway "Simians" 178). Because for the Tyrell Corporation,

> [p]erfect simulation is thus its goal [...]. With Rachel the system has reached perfection. She is the most perfect replicant because she does not know whether she is one or not. To say that she simulates her symptoms, her sexuality, her memory, is to say that she realizes, experiences them (Bruno 68).

Thus, Rachel functions as the ultimate sex doll and "fulfils the common male fantasy of the completely pliant woman who serves all a man's needs" (Kellner 7).

In SF, simulation has also been depicted in the *Star Trek* universe in the "holodeck," a holographic and interactive theatre, wherein holograms possess not only form and appearance but also tangible physical bodies. The first hint of the possibilities that such environments may supply in the sexual realm is in the Lynch's episode "11001001" (1988) where a perfect woman is recreated by the computer on the starship *Enterprise*. Unsurprisingly, an alien entrepreneur uses the holodeck to create licentious programs for hire (Landau "The Forsaken"). The holodeck is also used to relieve potentially biologically fatal sexual frustration in an alien Vulcan (McNeill "Body and Soul").

Conversely, holographic characters have occasionally been shown to achieve independent sentience and a de-

sire to consummate sexual relationships. The starship *Voyager* sports a holographic doctor who experiences true family life with a wife and two children (Williams "Real Life"), and in an alternate future, is revealed to have married a human female (Croeker "Endgame"). Intriguingly, he also claims to have somehow fathered a child while on an away mission on an extrasolar planet (Beaumont "Blink of an Eye").

The ultimate VR environments are explored in Moore and Kuttner's "Two-Handed Engine" (1955), Knight's "Semper Fi" (1966), Gunn's "The Joy Makers" (1976), and "If I Forget Thee" (1977), and in Bear's "Moving Mars" (1993). In these stories, humans increasingly turn to virtual reality environments and cannot be bothered to procreate, since in their fantasy worlds, sexual urges are easily satisfied and families can be created at will. Gunn, above, logically extends the search for happiness by having all of humanity forced permanently into a real-life comatose existence, with minds roaming at will in virtual reality, prefiguring "The Matrix" (1999).

More recently, in Brambilla's "Demolition Man," (1993) depicts an amalgamation of Los Angeles, San Diego, and Santa Barbara into pacifist utopia called "San Angeles," where sex leading to "The rampant exchange of bodily fluids was one of the major reasons for the downfall of society. After AIDS, there was NRS, after NRS, there was UBT." For this reason, even kissing is outlawed and procreation is laboratory accomplished after "[f]luids are purified, screened, and transferred by authorized medical personnel only […] the only legal way." Sex only occurs in a virtual world when two consenting adults don special helmets that allow the fantasization of a virtual sexual encounter.

Discussion

The rapid and insidious extension and marketing of all aspects of technoculture into contemporary society allows this essay to progress from sex with gadgets, to machines, to virtual sex. Indeed, "even more striking is how quickly we adapt to and take for granted the technologies in our daily lives that were science fiction just an eyeblink ago" (Cooper 1).

The contemporary intersection of VR and sexuality is arguably that of online multiplayer gaming. This may be a compulsion, or even an obsession, as in the cyberuniverse, through the aid of computers one may raise virtual pets, families, communities or even entire universes, with seemingly omnipotent power.

"The trance state experienced by many computer users has become a staple of science-fiction film and cultural jokes," (Haraway, "Simians" p. 178) and the trend in this direction may be seen in individuals who compulsively play multiplayer online games in virtual worlds and who experience significant loss of time in the real world (Wood), even to the extent of inflicting unusual, computer games related injuries (Cowley). Such games have even been shown to increase rates of aggression, abnormal sexual behaviour, substance abuse, disordered eating, obesity and academic difficulties (Strasburger).

The Internet has also been used to express and exploit sexuality, "whether cybersex or use of the internet to make sexual contacts" (Ross 342). Disturbingly, "the evidence suggest that there are those who would prefer a simulacrum to living flesh." (Ferguson 5) since like the sex doll, VR environments "offer verisimilitude, the appearance of truth. The aim of the image is to displace reality" (Ferguson 5).

> Experiments and observations on consenting human subjects have shown that Cybersex itself was experienced by some cybersex-initiates as 'liberating'. It allowed participants to explore new behaviours in terms of verbal/sexual self-expression, and was particularly constructed as inhibition-freeing by some women (and men) whose social roles would 'normally' preclude them from uninhibited sex talk and/or the writing of erotica. (Green 181)

To the extent that to such subjects "there is the sense of almost unlimited scope—nothing is impossible in cyberspace. The cyber-romance is restricted only by the limits of expression and imagination, not by the corporeality of physical presence" (Green 182).

With further development of technology "as well as being a two-way exchange, cybersex offers an increasingly multi-sensory experience. Leaving aside the (rare and expensive) 'pleasure suit,' webcams can communicate images of cybersexual partner(s) who have a particularly exhibitionist disposition" (Green 182).

This technology has been espoused by some members of the social and medical professions as having the potential to reduce the risk of infection with sexually transmitted diseases (Miller). On the other hand, compulsion is a pathological extension of such desires and indeed, it has been noted that "[c]ompulsive cybersex has become a significant problem for many men and women who have fallen prey to the accessibility, affordability, and anonymity of online sexual behaviours" (Southern 697), and such individuals may pres-

ent with "underlying trauma, depression, or addiction" (697). This is mostly attributed to "maladaptive coping, conditioned behavior, dissociative reenactment of life trauma, courtship disorder, intimacy dysfunction, and addictive behaviour" (697). Treatment of such disorders includes "relapse prevention, intimacy enhancement, lovemap reconstruction, dissociative states therapy, arousal reconditioning, and coping skills training" (697). With obsession and imagination, like the replicants in "Blade Runner," characters engaged online are hyperreal, since "[n]o original is […] invoked as point of comparison, […] no distinction between real and copy remains" (Bruno 68).

Baudrillard intriguingly subdivides SF into three stages: the classical or 'counterfeit' with the creation of utopian or dystopian worlds. Secondly, 'production' or genre SF which appropriates science and technology to produce credible futures, and thirdly, that of simulation itself in which the hyper-real become facsimiles without originals, an area that Baudrillard does not name as he declaims that "[t]he most likely answer is that the good old imaginary of science fiction is dead and that something else is in the process of emerging" ("The Transparency" 119). In this postmodern milieu, Baudrillard's statement, referring originally to prostheses, is arguably equally applicable to the replacement of a human being with a virtual partner as

> When prostheses are introduced at a deeper level, when they are so completely internalized […] when they impose themselves […] as the body's "original" model […] this point means the end of the body […] the individual is now nothing but a cancerous metastasis of his basic formula. ("The Transparency" 119)

The fascination with the verisimilitude of such technology may carry away individuals as ever novel and practically limitless situations and characters may be created in a virtual environment, as we are cautioned by Baudrillard who contends that "the real is not what can be reproduced, but that which is always already reproduced […] the hyperreal […] which is entirely in simulation" ("Simulations" 146).

Baudrillard further warns against our deception by such artificial beings, since "[t]he unreal is no longer that of dream or of fantasy or a beyond or a within, it is that of hallucinatory resemblance of the real with itself" ("Simulations"142). He also counsels against our beguilement by "an operational double, a metastable, programmatic, perfect descriptive machine which provides all the signs of the real and short-circuits all its

vicissitudes" (4). This is because

> [t]o simulate, in fact, is a more complex act than to imitate or to feign. To simulate implies actually producing in oneself some of the characteristics of what one wants to simulate. It is a matter of internalizing the signs or the symptoms to the point where there is no difference between "false" and "true," "real" and "imaginary." (Bruno 68)

This possibility may potentially irrupt from SF into the real world. Indeed, the cultural theorist Paul Virilio warns that mankind risks metamorphosing into "terminal citizens," immobilizing the individual into a sort of "valid invalid." A similar view is shared by Jean Baudrillard, that "simulation […] is the generation by models without origin or reality: a hyperreal" ("Simulacra" 1) sometimes to the extent that "present-day simulators attempt to make the real, coincide with their models of simulation" (2).

> One final warning that SF enjoins us is to heed Frankenstein's plight, as such beingsoffer a glimpse of a liberated and empowered humanity, which could be realized thanks to the wonderful possibilities of technology; but so too, they indicate the terrible price of that seductive empowerment in the substitution for our humanity of the qualities and characteristics of the machine. (Fitting "Futurecop" 345)

One cannot help but wonder whether sentient beings operating at computer speeds would tolerate or even countenance the possibility of having sex with mankind. For example, in Bole's "The Ensigns of Command" (1989), an alien humanoid female develops romantic feelings for Data but soon realises that Data is incapable of any reciprocation. This may be because such beings are unable to experience the pleasure and experience, the qualia associated with sex that humanity takes for granted. Qualia

> are recognizable qualitative characters of the given, which may be repeated in different experiences, and are thus a sort of universals; […] The quale is directly intuited, given, and is not the subject of any possible error because it is purely subjective. (Lewis 121)

It is doubtful whether artificial intelligences could be programmed to experience sex-related qualia, and if this possibility existed, whether they would wish to have such possibilities.

Only two examples will be given, of the temporal dissociation of experience that is inevitable in a human-

computer interaction. The android Data tells the Captain: "zero point six eight seconds, sir. For an android ...that is nearly an eternity" (Frakes, "Star Trek: First Contact").

Even more extraordinarily, the sentient computer that pilots a starship in Niven's *Man-Kzin Wars* withdraws, internally recreating endless simulations of the universe. It

> dreamed. "Let there be light," it said. The monoblock exploded, and the computer sensed it across spectra of which the electromagnetic was a tiny part. The fabric of space and time flexed, constants shifting. Eons passed, […] through a universe ten light-years in diameter. Interesting, the computer thought. I will run it again, and alter the constants. Something tugged at its attention, a detached fragment of itself. The machine ignored the call for nanoseconds, while the universe it created ran through its cycle of growth and decay. After half a million subjective years, it decided to answer. Time slowed to a gelid crawl, and its consciousness returned to the perceptual universe of its creators, to reality. (Pournelle)

Inevitably, the computer wonders whether the so-called reality to which it had been recalled is also

> a simulation, a program. As it aged, the computer saw less and less difference. Partly that was a matter of experience; it had lived geological eras in terms of its own duration-sense, only a small proportion of them in this rather boring and intractable exterior cosmos. (Pournelle)

A potential way for such computers to slow themselves down would be through the use of what are contemporarily known as emulators, hardware or software that duplicate the functions of a first computer operating system while underneath, running a different operating system. These techniques are often used to run software that would otherwise fail to function, or function at far too high speeds on modern and much faster computer systems than when the software was initially created (van der Hoeven).

Interestingly, Westfahl has considered the serial immortality of our playable characters in computer games as preparation for a potential posthuman future wherein "we may be living in Mario's world, nonchalantly risking our lives to heighten our skills and knowledge, moving from body to body in a steady process of self-improvement" (Westfahl 220), but it is difficult to imagine how the simulation of sex in VR environments

can possibly provide any form of practice for the facing the future.

In conclusion, this paper has shown how SF has exposed base human desires that appropriate available mechanism and technology in order to satisfy these urges, in agreement with David Hume (1711 – 1776), a Scottish philosopher, historian, economist, and essayist who remains renowned for his philosophical empiricism and scepticism. Hume famously concluded that desire rather than reason governed human behaviour, famously stating that "[r]eason is, and ought only to be the slave of the passions." (II.iii.3/415)

It is abundantly clear, even now, that "sexuality is precariously teetering on an ambiguous electronic precipice […] access, affordability and anonymity combine to turbo-charge […] online sexual interactions" (Cooper 1-2), and it will require a determined effort for humanity not to be overwhelmed by its more sordid desires.

References

Alien. Ridley Scott. Warner Bros. Picture. 1982.

Asimov, Isaac. "Satisfaction Guaranteed." *Amazing Stories*. April 1951.

Asimov, Isaac. *The Caves of Steel*. New York: Signet, 1955.

Asimov, Isaac. *The Robots of Dawn*. New York: Double day, 1983.

Baudrillard, Jean. *Simulations*. Trans. Paul Foss, Paul Patton, and Philip Beitchman. New York: Semiotext(e), 1983.

Baudrillard, Jean. *The Transparency of Evil*. Trans. James Benedict. London: Verso, 1993.

Bear, Greg. *Moving Mars.* New York: Tor Books, 1993

Beaumont, Gabrielle. "Blink of an Eye." *Star Trek: Voyager.* January 2000.

Bloch, Iwan. *The Sexual Life of Our Time*. London: Rebman, 1908.

Bole, Cliff. Dir. "The Ensigns of Command." *Star Trek: The Next Generation* October 1989.

Booker, M. Keith. "Woman on the Edge of a Genre: The Feminist Dystopias of Marge Piercy." *Science Fiction Studies*, 21 (1994): 337-350.

Demolition Man. Marco Brambilla. Warner Bros. Picture. 1993.

Bruno, Giuliana. "Ramble City: Postmodernism and "Blade Runner."" *October* 41 (1987): 61-74.

Cooper, Al. Ed. *Cybersex: The Dark Side of the Force.* Philadelphia: Brunner-Routledge, 2000.

Cowley, A. D. and G. Minnaar. "New Generation

Computer Games: Watch Out for Wii Shoulder." *British Medical Journal* 336 (2008): 110.

David, Levy, *Love + Sex with Robots the Evolution of Human-Robot Relationship.* New York: Harper, 2007.

del Rey, Lester. "Helen O'Loy." *Astounding Science Fiction*. December 1938.

Ferguson, Anthony. *The Sex Doll: A History*. Jefferson: McFarland, 2010.

Fitting, Peter. "Futurecop: The Neutralization of Revolt in "Blade Runner."" *Science Fiction Studies.* 14 (1987): 340-354.

Golden, Murray. Dir. "Requiem for Methuselah." *Star Trek: The Original Series*. February 1969.

Green, Lelia. *Technoculture from alphabet to cybersex.* Crow's Nest: Allen & Unwin, 2002.

Gunn, James. "If I Forget Thee.," *Triax.* Ed. Silverberg Robert. New York: Pinnacle, 1977.

Habershon, Ed and Richard Woods. "No sex please, robot, just clean the floor." *The Times of London Online.* 18/06/2008 <http://www.timesonline.co.uk/article/0,,2087-2230715,00.html>

Haraway, Donna J. *Simians, Cyborgs, and Women.* New York: Routledge, 1991.

Hard, Robin. *The Routledge Handbook of Greek Mythology.* London: Routledge, 2004.

Hume, David, *A Treatise of Human Nature* (1739).

Kellner, Douglas, Flo Leibowitz, and Michael Ryan. "Blade Runner: A Diagnostic Critique." *Jump Cut* 29 (1984): 6-8.

Knight, Damon "Semper Fi," *Analog Science Fact Science Fiction.* August 1964. Gunn James. *The Joy Makers.* London: Panther, 1976.

Kroeker, Allan. Dir. "Endgame." *Star Trek: Voyager*. May 2001.

Landau, Les. Dir. "The Forsaken." *Star Trek: Deep Space Nine.* May 1993.

Levin, Ira. "The Stepford Wives." New York: Random House, 1972.

Lewis, Clarence Irving *Mind and the World Order.* New York: Scriber's Sons, 1956.

Lynch, Paul. Dir. "11001001." *Star Trek: The Next Generation.* Paramount. February 1988.

Lynch, Paul. Dir. "The Naked Now." *Star Trek The Next Generation.* October 1987.

Lynn, Carol Miller and Stephen John Read. "Virtual Sex: Creating Environments for Reducing Risky Sex." Ed. Steve Cohen. *Virtual decisions: digital simulations for teaching reasoning in the social science and humanities*. New Jersey: Erlbaum Associates, 2006. 137-160

McNeill, Robert Duncan. "Body and Soul." *Star Trek: Voyager*. November 2000.

Moore, C. L. and Henry Kuttner. "Two-Handed Engine." *No Boundaries.* New York: Ballantine Books, 1955.

Nolan, William F. "The Joy of Living." *If.* August 1954.

Piercy, Marge. *He, She, and It.* New York: Fawcett Crest, 1991.

Pournelle, J.E. and S.M. Stirling. "The Asteroid Queen." *Man-Kzin Wars III.* New York: Baen, 1990.

Ross, M. W. "Typing, doing, and being: sexuality and the internet." *Journal of Sex Research* 42 2005:342-52.

Scheerer, Robert. Dir. "Inheritance." *Star Trek: Voyager.* November 1993.

Southern, S. "Treatment of compulsive cybersex behavior." *Psychiatric Clinics of North America* 31 (2008):697-712.

Star Trek: First Contact. Dir. Frakes Jonathan. Paramount Pictures, 1996.

Strasburger, V. C. and others. "Health Effects of Media on Children and Adolescents." *Pediatrics* 125 (2010): 756-67

The Matrix. Dir. Wachowski Andy and Larry Wachowski. Warner Bros., 1999.

van der Hoeven, Jeffrey, Lohman Bram, and Verdegem Remco. "Emulation for Digital Preservation in Practice: The Results." *The International Journal of Digital Curation* 2.2 (2007): 123-132.

Villiers de l'Isle-Adam, Mathias "Tomorrow's Eve." (1886). Trans. Robert M. Adams. Urbana: University of Illinois Press, 1982.

Virilio, Paul. "The Third Interval: A Critical Transition," *Rethinking Technologies*. Ed. Verena Andermatt Conley. Minneapolis: University of Minnesota Press, 1993. 3-12.

Westfahl, Gary. "Zen and the Art of Mario Maintenance: Cycles of Death and Rebirth in Video Games and Children's Subliterature." *Immortal Engines, Life Extension and Immortality in Science Fiction and Fantasy*. Ed. Slusser George and others. Athens: University of Georgia Press, 1996. 211-220.

Williams, Anson. Dir. "Real Life." *Star Trek: Voyager.* April 1997.

Wood, R. T. and others. "Experiences of Time Loss among Videogame Players: an Empirical Study." *Cyberpsychology Behavior* 10 (2007): 38-44.