Routledge
Taylor & Francis Group

LIMES: Borderland Studies
ISSN 2029-7475 print / ISSN 2029-7483 online

2012 Volume 5(1): 1–10
doi:10.3846/20297475.2012.659680

I. VISUALITY IN MEDIA: TEXTS AND IMAGES

PICTURES OF ME: POSSIBILITIES OF SHAPING OUR BODY IMAGE THROUGH VIRTUAL REALITY

Mateusz Woźniak

Jagiellonian University, Institute of Psychology,
Al. Mickiewicza 3, 31-120 Kraków, Poland
E-mail: mgwozniak@gmail.com

Brain system responsible for visual perception has been extensively studied. Visual system analyses a wide variety of stimuli in order to let us create adaptive representation of surrounding world. But among vast amounts of processed information come visual cues describing our own bodies. These cues constitute our so-called body-image. We tend to perceive it as a relatively stable structure but recent research, especially within the domain of virtual reality, introduces doubts to this assumption. New problems appear concerning perceiving others' and our own bodies in virtual space and how does it influence our experience of ourselves and true reality. Recent studies show that how we see our avatars influence how we behave in artificial worlds. It introduces a brand new way of thinking about human embodiment. Virtual reality allows us to transcend beyond the casual visual-sensory-motor integration and create new ways to experience embodiment, temporarily replacing permanent body image with almost any imaginable digital one.

Keywords: avatar, body image, body representation, creativity, embodied cognition, virtual body, virtual reality.

Introduction

Virtual reality allows us to inhabit almost any body imaginable and technological progress makes it more and more realistic. Recent neuroscientific and psychological studies begin to uncover the mechanisms of virtual embodiment and its influence on our everyday lives. Understanding these mechanisms can lead us to think about our bodies and ourselves from a totally different point of view and it can bring brand new ideas on how to use this situation to improve our lives. Moreover, it shows that the borders of our physical identity, contrary to our everyday experience, are not as clear as it seems to be. We are living in the corporeal containers that may have blurred rather than sharp edges and modern technology allows us to see it more clearly.

My body in the brain

Ownership of the body is a prerequisite for the existence of life. Even the most basic living creatures, Procariota, actually "equal their bodies". Humans as well, accenting it contrary to many purely spiritual beliefs and theories, require a physical, organic base to live. There was not a single case in the course of human history of a person not possessing one. The body is so fundamental in our relation between ourselves and reality that recent theories start to emphasise the embodied character of cognition (Gallagher 2005; Merleau-Ponty 2001). The so-called "embodied cognition theories" explain mental processes, such as language (Lakoff, Johnson 1980), as fundamentally rooted in the spatiotemporal structure of bodily experienced physical reality.

Our bodies consist of millions of cells which build organs and biological systems. What makes them work together and coordinates their functions is the central nervous system. There are at least two brain / mental representations of a body (for discussion see Vignemont 2010). These are the body schema and body image. The body schema represents sensorimotor representation of a body. Its neural localization seems to be strongly affiliated with somatosensory and motor cortex, but also with lower brain structures (thalamus, cerebellum) (Sadowski 2001; Kalat 2006). In *dyadic* conceptions the body image groups all the remaining aspects (visual, emotional, semantic) (Gallagher 2005). *Triadic* conceptions (Schwoebel, Coslett 2005) split the second structure into visuospatial body map and the semantic representation. In further analysis the term body image will be used mostly in the context of visual representation. On the neural level the body schema and body image information seems to be somehow fused in the inferior posterior parietal cortex (IPPC which is also associated with self-agency attribution: Haggard 2009), with the body image possibly strictly associated with temporoparietal junction (TPJ: Arzy *et al.* 2006; Tsakiris 2010; Blanke *et al.* 2004). Another theoretical distinction among body representations is based on the long-term (off-line) and short-term (on-line) distinction (Vignemont 2010).

The body schema appears to be innate and basically a stable structure, but it also possesses some more variable characteristics. For example, research on monkeys (Maravita, Iriki 2004) suggests that the usage of tools temporarily changes our body schema (or at least its changeable part). On the other hand, visual body image is not fundamentally in-born. Children develop the ability to recognize themselves in the mirror around the age of two (Amsterdam 1972). What is in-born, however, is the possibility to develop it. Body image is based on the experience with self-perception and requires an adequately mature brain system. What is important is the fact that the body image is being created and updated by the continuous stream of external information concerning our physical appearance. It has a clear processual character. This way, the changes in our look through the course of our lives do not usually surprise us and do not cause strong feelings of strangeness of our appearance. Body image seems to be also a relatively stable structure, but much more prone to change than the body schema. For example, the phenomenon of phantom limbs, which is present among 95–100% of amputees (Melzack 1990, but which is less frequent, about 20%, among infants aged less than 2: Ramachandran, Hirstein 1998) shows that even after the loss

of a part of the body (usually an arm or a leg) the intrinsic brain system keeps the original information about the sensorimotor map of the body. It results in persistent sensations from the non-existing body-part, frequently accompanied by strong pain or other unpleasant feelings such as itching. These sensations can last for years and in many cases do not disappear at all. In comparison, the body image seems to be a much more flexible representation. Changes such as a new hairstyle or a tattoo usually take only a few days or weeks to become fully integrated within the main structure.

Disorders associated with body representations

Clinical cases are good examples of functions and dysfunctions of the body-representation mechanisms and structures. In a classical case study conducted by Hans Ehrenwald (Ehrenwald 1930) a 59-year-old man with a posterior left hemisphere infarction "*identified himself with a motionless giant double on which many additional but tiny doubles are climbing around*" (citation in English from Brugger *et al.* 2006: 667). This study shows that reality can sometimes greatly exceed imagination. In this case all forms of representations seemed to be invalid. The most distinctive symptoms concerned the body schema. The patient could actually feel being a "motionless giant" and feel "tiny doubles climbing around". Such a disorder is called heautoscopy. It represents a group of clinical conditions in which the patient is confronted with his double, but this double (*doppelganger*) is **felt** to be him. It can also be seen, but it does not change the diagnosis. Another example comes from the article by Wolfgang Klages (Klages 1959): a 54-year-old male with a lesion in the left parietal lobe after a gunshot wound reported "*feeling split into three persons. The actual self observes two other selves represented by the left and right body halves, respectively*" (citation in English from Brugger *et al.* 2006: 667). These sensations show distortions of both visual and sensorimotor representations. Autoscopic hallucinations are the clinical term describing strictly **seeing** oneself double. For example, Giovanna Zamboni, Carla Budriesi and Paolo Nichelli (Zamboni *et al.* 2005) presents the case of patient B. F., a 30-year-old woman who suffered a serious brain damage (occipital cortex, right occipital-parietal junction and several lower structures). Three months after the event she started reporting seeing her exact mirror image in front of her. It had the same clothes and was performing exactly the same actions she did, but using the opposing side of the body, just like a mirror reflection. She said that she noticed a permanent blurred figure just after she recovered and gradually it started to look more and more like herself. After three months it took the form of exact visual representation of herself. She could see it approximately 1 meter in front of her when looking straight into the distance and see it on the floor or ceiling when looking at these respectively. The image started to gradually disappear and after six months of convalescence it disappeared completely. What is important at this point is the fact that the image was the exact visual representation of patient B. F.'s physical appearance (or rather imagined appearance). Moreover, this representation had direct connection with the information about the state and position of all body-parts, so it could become an online projection of the patients' image of herself.

The third psychological state strictly associated with body image is the depersonalization disorder. It is defined as a particular form of dissociation "involving a disrupted integration of self-perceptions with the sense of self, so that individuals experiencing it are in subjective state of feeling estranged, detached or disconnected from their own being" (Simeon 2004: 344) where dissociation is meant as "<…> a disruption in the usually integrated functions of consciousness, memory, identity and perception, leading to a fragmentation of the coherence, unity and continuity of the sense of self". The most common sensations include feelings of being somewhere outside of the body, feelings that "my body is not exactly a part of me" or body strangeness. It is frequently accompanied by de-realization disorder, what is a clinical term used to describe feelings of strangeness, dream-likeness of and the impression of living in an estranged, unreal world.

Virtual self and virtual others

Virtual reality environments allow us to immerse into a digital world and inhabit an artificial body. A virtual body controlled by a living agent is called an avatar. The origins of this word come from the Hindu mythology (Bailenson, Blascovich 2004), according to which one of the three main gods, Vishnu, in the times of trouble on Earth, takes the physical form of a human or an animal and saves mankind from inevitable tragedy. Analogously, a computer game player becomes embodied into a digital avatar and, in many cases, saves the virtual realm from danger. The situation in a computer game is, theoretically, purely fictional. So it may seem a little odd to hear that it may not be as simple as it appears.

Byron Reeves and Clifford Nass (Reeves, Nass 2000) have done an extensive research in the field of media perception. They have conducted 36 experiments approaching human – media interaction from many different perspectives. Results of their work show that people tend to naturally perceive media (and virtual) reality as if it was real. Acceptance of the fact that media representations are only derivates of the physical world seems to be a secondary reaction, which requires higher cognitive processes. Immersion in realistic fiction seems to be more natural than critical understanding of the differences between these worlds. Reeves and Nass explain this phenomenon with the evolutionary perspective – the archaic brains of modern humans have been shaped by the world in which the ability to distinguish between media and reality was not useful at all. Firstly, because there were no media / virtual environments and secondly, because it was always safer to overreact in case of a potential danger than to suffer the consequences, sometimes grave, of not reacting at all. That is the reason why a person reacts with symptoms of physiological fear when watching a horror movie. This mechanism is, actually, a very adaptive one. It is responsible for the fact that we use the same resources and experience the same emotions both when playing a computer game and when living a real life. Moreover, it makes virtual environments more useful in practical applications like teaching, training, desensitization or PTSD treatment (Rothbaum *et al.* 2010; Smith 2006).

There has been a number of research investigations conducted in the last twenty years concerning social perception of artificial agents (including some of the experiments done by Reeves and Nass). People tend to engage in interactions with virtual characters and treat these interactions analogously to the "real" ones. Moreover, they tend to feel compassion towards digital people (Slater *et al.* 2006; Woźniak 2010), emotionally engage during contact with them (Żelichowska 2009) and even unconsciously mimic them (Bailenson, Yee 2005). It complements the everyday experience of gamers, who sometimes experience real emotional and existential dilemmas within the realm of computer games.

All the situations above mirror the real physical life. Digital communication strictly corresponds to human-human interactions and virtual environments are usually quite similar to the ones that we live in or at least possibly could (like space stations, other planets or fantasy worlds). But it seems very unusual for a modern human to inhabit a number of bodies and be free to move from one to another simply at will. That is the case with avatars. People find it surprisingly easy to wander from being one creature to another. A classical *self-perception theory* by Derryl Bem (Bem 1972) says that the way we perceive ourselves influences our beliefs (and among them our self concept) and behavior. Research conducted by Mark G. Frank and Thomas Gilovich (Frank, Gilovich 1988) is a great illustration of this thesis. Participants were asked to perform an experimental task. They were randomly assigned to one of two groups. First group wore white uniforms and the second – black ones. People dressed in black were more aggressive and tough in their behavior than the rest. Semantic affiliations of these colors had an impact on the actions performed by the people wearing them. According to the *self-perception theory*, the participants imagined themselves in black or white uniforms, deduced information about them from this fact and finally started acting according to values and forms of behavior associated with the color of their clothing. Is it possible that the same process occurs when a subject experiences himself / herself in a different body? Recent research in the field of virtual reality suggests that it can be true.

Self-perception of an avatar

In 2007 Nick Yee (Yee 2007; also see Yee, Bailenson 2007) successfully defended a dissertation introducing a concept of Proteus effect. Proteus was a Greek lesser god (the son of Poseidon) who had an extraordinary ability to take any form imaginable. Similarly, in a virtual reality an avatar can take on any shape, substance and color. The Proteus effect describes an interesting fact that the characteristics of an avatar controlled by a user influence the behavior of this user. In his research, Yee asked participants to wear a virtual reality helmet and immerse into the realm of digital experimental room. First, they were asked to turn around and look at their virtual bodies reflected in a mirror. They had to perform several actions in order to fully acknowledge that the person they see in front of them is themselves, or at least their temporary body. After a while they were asked to turn around once more. Now, they could see

another avatar standing in front of them. Their task was to get as physically close and to say as much about themselves as they felt comfortable with. One of the groups controlled a virtual body with an attractive face, the other – with unattractive one. The results showed that participants from the first group were more eager to cut the distance and speak more about themselves than the opposing group. Similarly, research by Mateusz Woźniak (Woźniak 2010) has shown that people controlling avatars looking either like soldiers or like civilians behave differently in the same situation. The effect of the avatar's model interacted with the sex of the participants. The dependent variable was the readiness to inflict electric shocks to a digital character. Analysis of the results showed that women controlling a military avatar were more likely to follow the orders at the cost of suffering of a virtual person than other groups. These experiments suggest that taking control over the virtual agent may be more like a form of dressing, but instead of wearing clothes, user or gamer wears the whole body.

Self concept is a cognitive structure representing our knowledge and convictions about ourselves (Shavelson *et al.* 1976; Markus 1977). According to cognitive theories, knowledge is represented in the mind in special coding systems (Nęcka *et al.* 2006; Sternberg 2001). These are typically: symbolic-linguistic representations and mental images (for discussion see Sternberg 2001, for *dual coding theory* see Paivio 1986). The body image, as described by the triadic conceptions presented at the beginning, can be split into visuospatial and semantic representations. The former is coded by mental images and the latter by the semantic system. In a usual situation of a lifelong development of the self image, a person creates a visual representation of his or her appearance basing mostly on reflections. The body image is being constantly constructed based upon external information. Within the realm of virtual worlds, the situation is similar and, actually, often even simpler. Similarly to everyday life, the player needs to find a way to look at his / her character from an external point of view. This is often possible to achieve using graphic engine functions. Locating camera view in almost any point is possible in most three-dimensional engines. This way, a player can discover how he / she looks like and create a mental representation of his / her virtual body. As a result, he / she can, when playing a game, act more accordingly to this virtual self than to the real one.

Creativity and the body

Information technology has dramatically changed the world during the last several decades. Analysis of the impact of computer revolution goes far beyond the scope of this study. What is important to notice here is the fact that virtual reality has become, among others, a tool to taste living in a different realm, time or place. Especially computer games industry exploits any possible ideas of worlds to create, making them more and more weird and intriguing. But at the same time exactly the same process occurs with agents inhabiting them. The possibility to suspend physical rules paves the way for a multitude of potentially creative actions. The results of these actions are extremely interesting from both business and scientific perspectives.

First of all, in a virtual reality the body ceases to be a rigid and solid substance underlying any possibility of existence. It loses its strict borders and merges with the environment. Digital body can become almost anything, from a steel armor to a cloud of gas. A human agent can embody into an amoeba, a flower or God. What is worth noting is that these possibilities have already found a way into the mainstream computer culture. For example, in a fighting game *Tekken 6* (*Tekken 6* 2009) the player can take control over a wooden training doll Mokujin. In another game *Planescape: Torment* (*Planescape...* 1999) among the cast of main characters one may find, for example, Morte, the flying skull, or Ignus, the burning sorcerer. Morte is absolutely nothing more than a flying skull devoid of any other elements of a body except for eyes. It does not stop him from having a nasty and sarcastic sense of humor. On the other hand, Ignus is an endlessly burning, yet not dying human being suffering for his past sins. The main character controlled by the player in this game is "The Nameless One" – a hero desperately trying to regain mortality. The flexibility of imagination seems to be the only limit for character creators, but curiously even the weirdest avatars usually do not cause any problems in identifying with them. Human representations of bodies can accept almost every form of being. Imagine being an octopus with a golden, Titanic-like antenna sticking from your head, receiving thoughts of an alien race. And then imagine becoming such a thing in an immersive virtual reality.

The limits of physicality are the core topic of an article by Yee, Jason Ellis and Nicolas Ducheneaut (Yee *et al.* 2009) entitled "The Tyranny of Embodiment". The authors name four expectations which are unconsciously assumed concerning the virtual embodiment. Those four expectations are as follows:

1) The expectation of human embodiment. Users adopt human (or humanoid) avatars in virtual worlds.
2) The expectation of matched affordances. Avatars move about and do things the way that people do things in the physical world.
3) The expectation of congruence. Users (via their avatars) have different perspectives of the virtual world, but these perspectives are perfectly congruent.
4) The expectation of single avatar control. Each user can only control one avatar at a time.
   Also, each avatar is only controlled by one user at a time.
   In practice, in specific situations it can be useful to break all of them.

Conclusions

Body image is a dynamic structure of self knowledge responsible for coding information on how a persons' body looks. It seems to be relatively stable, but recent findings in the field of psychology of virtual reality pose a threat to this classic assumption. It is possible that it is much more flexible and prone to short term changes. Modern technology brings the means to overcome casual limitations. Surprisingly, people adapt to these innovations almost immediately and intuitively. It would suggest that a representation of one's appearance is not so strictly associated with the standard parameters of a human body, bringing a new idea into the discourse of

embodiment. The borders of human identity were never clear but recent research suggest that even such intuitively stable structure as a human body may not be as unambiguous as it seems. Perhaps Zygmunt Bauman (Bauman 2004) and postmodern authors were more right than it appears to be – essentially it is rather water than stone that our identities resemble. Moreover, postmodern culture may facilitate this feat, but the potential flexibility is actually in-born. Kenneth Gergen wrote an article about multiple selves entitled "The Healthy, Happy Human Being Wears Many Masks" in 1972 (Gergen 1972). Maybe there is also a little bit of truth in a similar statement *the healthy, happy human being wears many bodies*.

References

Amsterdam, B. 1972. Mirror Self-Image Reactions Before Age Two, *Developmental Psychobiology* 5: 297–305. http://dx.doi.org/10.1002/dev.420050403

Arzy, Sh.; Thut, G.; Mohr, Ch.; Michel, Ch. M.; Blanke, O. 2006. Neural Basis of Embodiment: Distinct Contributions of Temporoparietal Junction and Extrastriate Body Area, *Journal of Neuroscience* 26(31): 8074–8081. http://dx.doi.org/10.1523/JNEUROSCI.0745-06.2006

Bailenson, J. N.; Blascovich, J. 2004. Avatars, in Bainbridge, W. S. (Ed.). *Berkshire Encyclopedia of Human-Computer Interaction*. Vol. 1. Great Barrigton, MA: Berkshire Publishing Group, 64–68.

Bailenson, J. N.; Yee, N. 2005. Digital Chameleons: Automatic Assimilation of Nonverbal Gestures in Immersive Virtual Environments, *Psychological Science* 16(10): 814–819. http://dx.doi.org/10.1111/j.1467-9280.2005.01619.x

Bauman, Z. 2004. *Identity: Conversations with Benedetto Vecchi*. Oxford: Polity Press.

Bem, D. 1972. Self-Perception Theory, in Berkovitz, L. (Ed.). *Advances in Experimental Social Psychology* 6. New York: Academic Press, 1–62. http://dx.doi.org/10.1016/S0065-2601(08)60024-6

Blanke, O.; Mohr, Ch.; Michel, Ch. M.; Pascual-Leone, A.; Brugger P.; Seeck, M.; Landis, Th.; Thut, G. 2004. Linking Out-of-Body Experience and Self-Processing to Mental Own-Body Imagery at the Temporoparietal Junction, *The Journal of Neuroscience* 25(3): 550–557. http://dx.doi.org/10.1523/JNEUROSCI.2612-04.2005

Brugger, P.; Blanke, O.; Regard, M.; Bradford, D. T.; Landis, Th. 2006. Polyopic Heautoscopy: Case Report and Review of the Literature, *Cortex* 42(5): 666–674. http://dx.doi.org/10.1016/S0010-9452(08)70403-9

Ehrenwald, H. 1930. Veraendertes Erleben des Koerperbildes mit konsekutiver Wahnbildung bei linkseitiger Hemiplegie, *Zeitschrift fuer die gesamte Neurologie und Psychiatrie* 123: 204–223. http://dx.doi.org/10.1007/BF02865504

Frank, M. G.; Gilovich, Th. 1988. The Dark Side of Self and Social Perception: Black Uniforms and Aggression in Professional Sports, *Journal of Personality and Social Psychology* 54: 74–85. http://dx.doi.org/10.1037/0022-3514.54.1.74

Gallagher, S. 2005. *How the Body Shapes the Mind*. Oxford: Oxford University Press / Clarendon Press. http://dx.doi.org/10.1093/0199271941.001.0001

Gergen, K. J. 1972. Multiple Identity: The Healthy, Happy Human Being Wears Many Masks, *Psychology Today* 5: 31–35, 64–66.

Haggard, P. 2009. The Sources of Human Volition, *Science* 324(5928): 731–733. http://dx.doi.org/10.1126/science.1173827

Kalat, J. W. 2006. *Biologiczne podstawy psychologii*. Warszawa: Wydawnictwo Naukowe PWN.

Klages, W. 1959. Depersonalisationserscheinungen bei hirnorganisch Kranken und Schizophrenen: Vergleichendpsychopatologische Untersuchungen, *Archiv fuer Psychiatrie und Zeitschrift fuer die gesamte Neurologie* 199: 266–279.

Lakoff, G.; Johnson, M. 1980. *Metaphors We Live By*. Chicago: University of Chicago Press.

Maravita, A.; Iriki, A. 2004. Tools for the Body (Schema), *Trends in Cognitive Sciences* 8(2): 79–86. http://dx.doi.org/10.1016/j.tics.2003.12.008

Markus, H. 1977. Self-Schemata and Processing Information about the Self, *Journal of Personality and Social Psychology* 35: 63–78. http://dx.doi.org/10.1037/0022-3514.35.2.63

Melzack, R. 1990. Phantom Limbs and the Concept of a Neuromatrix, *Trends in Neuroscience* 13: 88–92. http://dx.doi.org/10.1016/0166-2236(90)90179-E

Merleau-Ponty, M. 2001. *Fenomenologia percepcji*. Warszawa: Aletheia.

Nęcka, E.; Orzechowski, J.; Szymura, B. 2006. *Psychologia poznawcza*. Warszawa: Wydawnictwo Naukowe PWN.

Paivio, A. 1986. *Mental Representations: A Dual Coding Approach*. New York: Oxford University Press.

Ramachandran, V. S.; Hirstein, W. 1998. The Perception of Phantom Limbs. The DO Hebb Lecture, *Brain* 121: 1603–1630. http://dx.doi.org/10.1093/brain/121.9.1603

Reeves, B.; Nass, C. 2000. *Media i ludzie*. Warszawa: Państwowy Instytut Wydawniczy.

Rothbaum, B. O.; Rizzo, A.; Difede, J. 2010. Virtual Reality Exposure Therapy for Combat-Related Post-Traumatic Stress Disorder, *Annals of the New York Academy of Sciences* 1208: 126–132. http://dx.doi.org/10.1111/j.1749-6632.2010.05691.x

Sadowski, B. 2001. *Biologiczne mechanizmy zachowania się ludzi i zwierząt*. Warszawa: Wydawnictwo Naukowe PWN.

Schwoebel, J.; Coslett, H. B. 2005. Evidence for Multiple, Distinct Representations of the Human Body, *Journal of Cognitive Neuroscience* 17: 543–553. http://dx.doi.org/10.1162/0898929053467587

Shavelson, R. J.; Hubner, J. J.; Stanton, G. C. 1976. Self-Concept Validation of Construct Interpretations, *Review of Educational Research* 46: 407–441.

Simeon, D. 2004. Depersonalisation Disorder: A Contemporary Overview, *CNS Drugs* 18(6): 343–354. http://dx.doi.org/10.2165/00023210-200418060-00002

Slater, M.; Antley, A.; Davison, A.; Swapp, D.; Guger, Ch.; Barker, Ch.; Pistrang, N.; Sanchez-Vives, M. V. 2006. A Virtual Reprise of Stanley Milgram Obedience Experiments, *PloS One* 1(1)e39: 1–10.

Smith, R. D. 2006. The Disruptive Potential of Game Technologies: Lessons Learned from Its Impact on the Military Simulation Industry, *Research Technology Management* 50: 57–64.

Sternberg, R. J. 2001. *Psychologia poznawcza*. Warszawa: Wydawnictwa Szkolne I Pedagogiczne.

Tsakiris, M. 2010. My Body in the Brain: A Neurocognitive Model of Body-Ownership, *Neuropsychologia* 48: 703–712. http://dx.doi.org/10.1016/j.neuropsychologia.2009.09.034

Vignemont de, F. 2010. Body Schema and Body Image – Pros and Cons, *Neuropsychologia* 48(3): 669–680.

Woźniak, M. 2010. *Readiness to Inflict Pain in the World of a Computer Game: Identity and Social Role in Virtual Reality* [unpublished M.A. thesis].

Yee, N. 2007. *Proteus Effect: Behavioral Modification via Transformations of Digital Self-Representations* [unpublished Ph.D. thesis]. http://dx.doi.org/10.1111/j.1468-2958.2007.00299.x

Yee, N.; Bailenson, J. N. 2007. The Proteus Effect: The Effect of Transformed Self-Representation on Behavior, *Human Communication Research* 33: 271–290.

Yee, N.; Ellis, J.; Ducheneaut, N. 2009. The Tyranny of Embodiment, *Artifact* 2(3): 1–6.

Zamboni, G.; Budriesi, C.; Nichelli, P. 2005. "Seeing Oneself": A Case of Autoscopy, *Neurocase* 11(2): 212–215. http://dx.doi.org/10.1080/13554790590944799

Żelichowska, D. 2009. Interaktywność w sztuce elektronicznej: kwestia komunikacji interpersonalnej, *Poznańskie Forum Kognitywistyczne* 4: 370–379.

Computer games references

Planescape: Torment. 1999. Interplay.

Tekken 6. 2009.

MANO PORTRETAI: KŪNO ATVAIZDŲ APIFORMINIMO GALIMYBĖS VIRTUALIOJOJE REALYBĖJE

Mateusz Woźniak

Santrauka

Smegenų sistema, atsakinga už vizualųjį suvokimą, yra nuodugniai ištirta. Vizualioji sistema analizuoja plačią akstinų įvairovę, padedančią mums sukurti adaptuotą supančio pasaulio reprezentaciją. Tačiau tarp didelio kiekio apdorotos informacijos kyla vizualiosios užuominos, atvaizduojančios mūsų pačių kūnus. Šios užuominos steigia vadinamąjį kūną-atvaizdą. Mes linkstame jį suvokti kaip sąlygiškai stabilią struktūrą, tačiau dabartiniai tyrimai, o ypač tie, kurie vykdomi virtualiojoje realybėje, tokia prielaida verčia suabejoti. Kyla naujų problemų, suvokiant kitų ir mūsų pačių kūnus virtualiojoje erdvėje bei kokios įtakos tai turi mūsų pačių savęs ir tikrosios realybės patyrimui. Nūdieniai tyrinėjimai atskleidžia, kad tai, kaip mes suvokiame savąjį kūniškumą, turi įtakos tam, kaip elgiamės dirbtiniuose pasauliuose. Tai steigia visiškai naują žmogiškojo kūniškumo suvokimo būdą. Virtualioji realybė leidžia mums peržengti paprastą vizualinę-jutiminę-motorinę integraciją ir kurti naujus būdus patirti kūniškumą, palaipsniui pakeičiant ilgalaikį kūno atvaizdą bet kokiu įsivaizduojamu skaitmeniniu.

Reikšminiai žodžiai: įsikūnijimas, kūno atvaizdas, kūno reprezentacija, kūrybingumas, įkūnytas pažinimas, virtualusis kūnas, virtualioji realybė.

Received 24 October 2011; accepted 19 January 2012