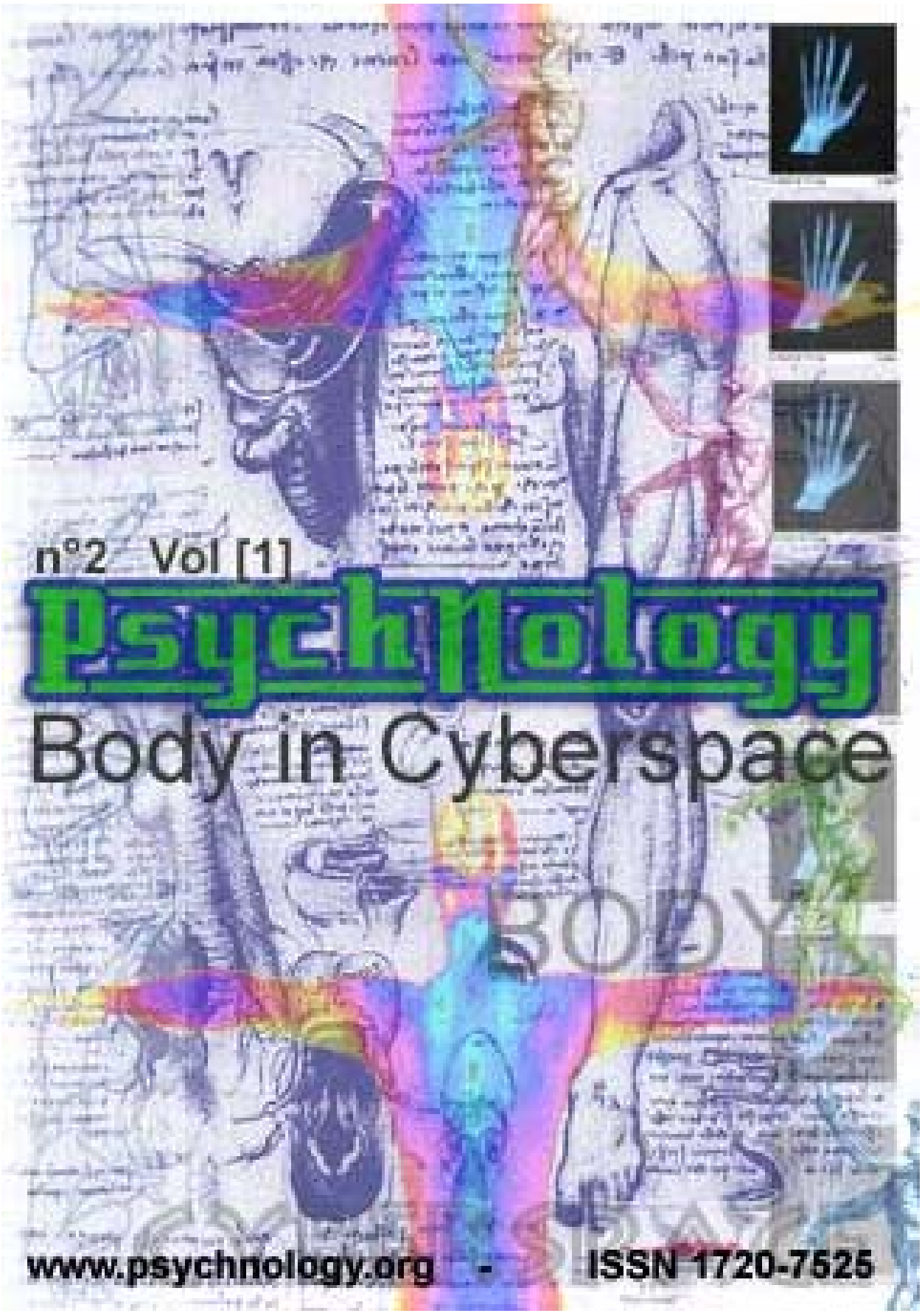
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Editorial Preface

The target theme for the present issue of the PsychNology Journal is 'body in cyberspace'. The goal is to avoid simplistic depictions of cyberspace as a purely symbolic realm and to problematize taken for granted separations between real and physical, corporeal and symbolic. Narratives of a disembodied life in cyberspace imbue the literature without adding any cue to the understanding of our daily, mundane experience in technologically mediated environments. Interfaces are developed today that provide stimuli to the perceptual, motor and physiological human system, so that it is hard to say where the physical ends and the virtual begins. In other words, bodily coordinates and functionalities are ready for researchers to be investigated, putting aside utopias and obsolete presuppositions. In addition to the papers addressing the target theme, this issue also contains papers on ergonomics, emotional presence, clinical treatments with virtual reality.

The opening paper, '*From Cyborgs to Cyberbodies: The Evolution of the Concept of Techno-Body in Modern Medicine'* by Gaggioli, Vettorello and Riva tries to retrieve the different concepts that have been invoked to describe the digitally-reframed body thereby reminding us that bodies are not natural objects, but historical cultural products. The authors distinguish among three concepts, namely 'cyborgs', 'cyberbodies' and 'transparent bodies' that have informed the medical applications of computer technology so far.

Alzola Romero's paper '/WHOIS? *Identity: Collectivity and the Self in IRC*' illustrates an ethnographic study of a virtual community, *rudos, and the nature of its members' identity. The text has an incremental progression, each step redefining the conclusion of the previous one, abandoning individual identities in favour of collective ones, dominance of one reality over another in favour of interdependence and exchange. Some common refrains are challenged, such as the postmodernist claim that the relaxation of some physical limits through digital technologies allows an unrestricted re-invention of identity.

Spagnolli and Gamberini address some issues in the current research on human-computer interaction. They focus especially on interaction with virtual environments, where the corporeal movement acquires more relevance than in other mediated environments and needs to be fully monitored. For this reason, data tend to be necessarily 'cross-medial', as the authors say, not only in the sense that they include pictures, text and sound, but in the sense that they distribute across many sources of data on the same phenomenon. *'Display Techniques and methods for cross-medial data analysis'* describes three solutions to collect and display cross-medial data.

The target theme section of the journal being exhausted, we are left with the other contributions. '*The EMMA Project: Emotions as a Determinant of Presence*' by Alcañiz, Baños, Botella and Rey deals with the challenging topic of emotions; it summarizes a ne borne research project, EMMA, aimed at the manipulation of the emotional presence experienced in a mediated environment. The central idea is to endow the interface with controlled 'mode devices' and deploy them to support certain psychological treatments.

The next couple of contributions belong to the area of ergonomics. Sik Lányi's article, '*Optimization of computer presented information left-handed observer'*, compares people with different hand preferences, right-handed versus left-handed. The hypothesis is that such preference be correlated with a better performance in processing information presented in the right versus left portion of a computer screen. The hypothesis is disconfirmed, suggesting that personalization of the information arrangement on the screen according to hand preferences may not be worthwhile. Pretto's paper '*Testing driver's comfort in virtual environments'* shows a possible application of virtual reality to prototype simulation and testing in automotive industry. An evaluation test is described where different features of a car's tool are varied that can influence the drivers' comfort. An immersive virtual setting such as the one described in this paper makes the evaluation more ecological by placing the stimulus into realistic surroundings and allows to test several versions of a prototype with no need to build them physically.

The final contribution, Roy's '*State of the art of virtual reality therapy (VRT) in phobic disorders'* ,offers another view on virtual reality, in the shape of a brief review of virtual simulations in the treatment of phobias. The guiding principles are sketched and the results reported on the tradeoffs of this clinical strategy vis-a-vis more traditional ones.

We would be happy to receive feedbacks on the papers published.

The Editors in Chief

PsychNology Journal, 2003
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From Cyborgs to Cyberbodies: The Evolution of the Concept of Techno-Body in Modern Medicine

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ABSTRACT

This paper focuses on the ways in which the introduction of technologies in modern medicine is changing collective notions of the body. In particular, it describes two popular and imaginative conceptualizations of the body that have been inspired by progresses made by medical technologies during last century: the *cyborg*, and the *cyberbody*.
Although these two models stem from the same post-modern philosophical "post-body", "post-biological," or "post-human" visions, they are characterized by a fundamental distinction. While the *cyborg*, at least in its original conception, is linked to the “wild wired world”, the world of cells, neurons, blood and biological processes, the *cyberbody* can be defined as a wireless, inorganic entity, made of pure bits of information. However, both definitions assume that people no longer has a *direct* "sense of body", but a mediated sense of body. Further steps in this direction may be determined by the emerging technological paradigm of Ambient Intelligence. In this vision, people will be surrounded by intelligent and intuitive interfaces embedded in everyday objects around us and an environment recognizing and responding to the presence of individuals in an invisible way by year 2010. Although the Ambient Intelligence scenario is still in an early phase of development, it is somehow predictable that technological innovations that this paradigm will bring into medicine are likely to foster the production of a new collective notion of the body based on the “digital me”: a virtual reality representation of the patient as a virtual person, integrating all the diagnostic and clinical information of the patient into a single record continuous across time. In addition to explore this perspective from a theoretical viewpoint, implications for medical practice are discussed.

Keywords: *medicine, human body, sense of body, cyberbody, VEPSY UPDATED*

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1. Introduction

In the last century, biology and medicine were transformed through a new collection of biophysics instruments, such as electron microscopes, mass spectrometers and new agents such as radioactive isotopes. Advances in computing, semiconductors and microelectronics enabled the development of new fields of biomedical imaging such as ultrasound, computerized tomography (CT and PET scanners), nuclear magnetic resonance imaging (MRI), and endoscopic surgery. These massive changes in biomedicine, together with developments in immunology and pharmacology, enabled radical new ways of intervening in the body, including transplantation of kidneys, hearts, lungs and livers.

These dramatic new ways of remaking and altering the body through genome mapping, genetic engineering, aesthetic surgery and mechanical, electronic and biological prosthetics, have contributed to reshape the notion of the body in the cultural imaginary and to foster a transformation of the collective representation of the embodiment experience. As a consequence, the question of technology and the body has become relevant theoretical topic for anthropological, psychological and sociological studies.

According to theorists such as Arthur and Marilouise Kroker, the notion of the body is already obsolete (Kroker, 1997). Consistent with this assertion is the widespread belief that we are on the verge of the "post-body," "post-biological," or "post-human". This view is also shared by the and science historian J. David Bolter, who refers to the late-20th-century human as "Turing's Man" (Bolter, 1984).

Post humanists argue for a model of identity that is dramatically altered within technological cultures. In this perspective, western industrialised societies are experiencing a new phase of humanity “wherein no essential differences between bodily existence and computer simulation, cybernetic mechanism and biological organism, robot teleology and human goals, exist [...]. Embodiment is seen as an accident of history and consciousness is an evolutionary newcomer”(Hayles, 1999b).

In the following paragraphs, we describe two popular and imaginative conceptualizations of the techno-body that have been inspired by progresses of medical technologies during 20th century: the *cyborg*, and the *cyberbody*. We argue that although these two models stem from the same post-modern philosophical "post-body", "post-biological," or "post-human" visions, they are characterized by a

fundamental distinction. While the *cyborg*, at least in its original conception, is linked to the "wild wired world", the world of cells, neurons, blood and biological processes, the *cyberbody* is a wireless, inorganic entity, which is made of pure bits of information. However, both definitions assume that people no longer will have a direct sense of body, but a mediated sense of body. Further steps in this direction may be determined by the emerging technological paradigm of Ambient Intelligence. According to this vision, people will be surrounded by intelligent and intuitive interfaces embedded in everyday objects around us and an environment recognizing and responding to the presence of individuals in an invisible way by year 2010 (ISTAG, Feb 2001). Although Ambient Intelligence scenarios and applications are still in an early phase of development, it is likely that technological innovations introduced by this paradigm into medical practice will foster a new collective conceptualization of the body. To characterize this notion, we propose the definition of *transparent body*.

2. From the Cyborg to the Cyberbody

Manfred E. Clynes, a designer of physiological instrumentation and electronic data-processing systems, and Nathan S. Kline coined in 1960 the term *cyborg*, short for cybernetic organism. In their paper, presented at the Psycho-physiological Aspects of Space Flight Symposium in San Antonio, Texas, they presented the idea to develop a machine system, which would continually monitor and regulate physical-chemical functions and other external conditions while the human participant concentrates on space exploration and doing other vital experiments. In their study, a 220-gram rat was implanted with a Rose-Osmotic pump to permit continuous injection of chemicals at a slow and controlled rate so as to modify and regulate homeostatic states (Clynes, 1995).

The concept of cyborgs is linked with the concept of cybernetics. Cybernetics is a field that recognizes random events where a simple change in a complex system would have far reaching implications leading to an unpredictable and radical change in the entire system. It was Norbert Weiner who in 1948 introduced this concept and coined the word cybernetics. He derived the word from the Greek word *kubernetes*, which means "steersman". Since the sea is always in motion, steersman needs to adjust the wheel all the time. This causes changes in the ship's course, which in turn changes the motion of the water, which again impacts the ship and causes steersman to respond (Weiner, 1948).

According to Hailes (Hayles, 1999a), central to the construction of the cyborg are informational pathways connecting the organic body to its prosthetic extensions. In this sense, the beginning of the evolution of cyborg can be situated between 1950s and 1960s, as artificial hip joints and artificial heart were developed (Blanchard, 1995). Such a progress in bionics engineering, along with the discovery of electrical signals in nerve impulses, made it possible to use motor controlled body parts that served as prosthetics and initiated the era of implants. Since then, researchers throughout the world have looked for ways to improve these bionic devices to foster quality of life of disabled individuals. Their efforts have produced pacemakers, cochlear implants, implantable pumps, and neuroimplants so precise that they can even detect the firing of a single nerve. This is allowed by using a small piece of silicon to be attached to a neuron as a transmitter. Current research is using this technology to develop retinal and cortical stimulation where light is converted to electrical signals, which are directly connected to nerve cells and sent to the brain. For example, the USA Department of Energy national labs, partnering with the University of Southern California and North Carolina State University, are developing a micro-electronic device that will be implanted in the eye on the surface of the retina. A small video camera in the eyeglasses of the blind person captures visual signals, which are further processed through a microcomputer worn on a belt. The signals are transmitted to the electrode array in the eye. The array stimulates optical nerves, which then carry a signal to the brain. The prototype implants contain 16 electrodes, allowing patients to detect the presence or absence of light. The artificial retina project's "next generation" device would have 1,000 electrodes and hopes to allow the user to see images (http://www.icat.ncsu.edu/projects/retina/).

Further step in bionics would be the creation of artificial muscles and nerves, making it possible for progressive technological integration into the body, eventually replacing or augmenting the structures that mediate the various physical and mental attributes that we normally consider "natural" to human beings, including emotion, natural sensory modes, rational thought and properties of imagination. However, the progressive integration between human and machine, although motivated by the need to foster quality of life of impaired people, generates anxiety. As noted by Katherine Hayles, “fusing cybernetic device and biological organism, the cyborg violates the human/machine distinction; replacing cognition with neural feedback, it challenges the human-animal difference; explaining the behavior of thermostats and people through theories of feedback, hierarchical structure, and control, it erases the animate/inanimate distinction”. Other exponents of the post-human debate share this view. Donna Haraway, in “A Manifesto for Cyborgs,” writes about the potential of the

cyborg to disrupt traditional categories: “The cyborg is a creature in a post-gender world; it has no truck with bisexuality, pre-oedipal symbiosis, unalienated labor, or other seductions to organic wholeness through a final appropriation of all the powers of the parts into a higher unity. In a sense, the cyborg has no origin story in the Western sense - a 'final' irony since the cyborg is also the awful apocalyptic telos of the 'West's' escalating dominations of abstract individuation, an ultimate self untied at last from all dependency, a man in space” (Haraway, 1985). The collective anxiety generated by the cyborg is also reflected by the work of several artists. Indeed, from the monster in Mary Shelley's 1831 novel Frankenstein, to nowadays, artists continue to be impressed and fascinated by this “bionic blasphemy”. Perhaps one of the most known contemporary interpret of this fear is Stelarc, an Australian visual artist whose work explores and extends the concept of the body and its relationship with technology through human-machine interfaces incorporating medical imaging, prosthetics, robotics, virtual reality systems and the Internet (http://www.stelarc.va.com.au/).

The emergence of the cyborg as process of progressive technological integration into the body coexists with the collective notion of progressive *virtualization* of the patient’s body. The virtualization of the body is the endpoint of the effort to realize the *cyberbody*, a digitalization of all body tissues and structures of interest, regardless of dimensional size and/or separation, that is sufficiently accurate and faithful so as to render the virtual representations indistinguishable from the real objects. This goal is accomplished by exploiting the capabilities of current 3-D and 4-D medical imaging modalities (Magnetic Resonance Imaging, Computed Tomography, Positron Emission Tomography etc.) along with computer reconstruction and rendering of volume image data. The use of these imaging technologies obviates the need for physical dissection or abstract assembly of anatomy, and provides powerful new opportunities for medical diagnosis. One significant example of the virtualization of the body in medicine is the National Library of Medicine's (NLM) *Visible Human Project* (www.nlm.nih.gov/research/visible/visible_human.html). Authors of this project have successfully recorded real human bodies in three-dimensional, living color, capturing these bodies in digital images through the technology of MRI (Magnetic Resonance Imaging) and CT (Computed Tomography) scans, as well as cadaverous dissection and high-resolution digital color photography.

As more and more of the medical technologies become information based, it will possible to represent a patient with higher fidelity to a point that the image may become a surrogate for the patient – the *medical avatar*: a virtual reality representation of the patient as a virtual person (Satava & Jones, 2002). The power of the “medical avatar” scenario (also called “the digital me”) is that it integrates all the diagnostic and clinical

information of the patient into a single record continuous across time. It can be updated as needed, and made available to the patient on a personal credit card sized record, like the military's Personal Information Card (PIC), or perhaps contained on a secure webserver on the Internet and available for global consultation through telemedicine.

Apart from biomedical visualization, the use of virtual bodies in medicine was stimulated by the need of medical staff for medical education and surgery training. Virtual reality for surgery involves applications of interactive immersive computer technologies to help perform, plan and simulate surgical procedures. In particular, virtual simulation of the body is used to give the surgeon 3D interactive views of areas within the patient. Planning is carried out preoperatively, to find the best approach to surgery, involving minimum damage (Silverstein et al., 2002; Simpson, 2002; Wilhelm, Ogan, Roehrborn, Cadeddu, & Pearle, 2002). These applications of virtual bodies have naturally extended to include telemedicine and collaboration, involving sharing information across individual medical staff and across geographical locations.

Another medical field where the process of virtualization of the body is taking place is psychological therapy. Virtual reality is proving surprisingly powerful as a therapeutic tool for both mental and physical disabilities. In most of the existing applications, virtual reality is used to simulate the real world, including the patient's body, and to assure the researcher full control of all the parameters implied. Virtual reality constitutes a highly flexible tool that makes it possible to program a variety of procedures of intervention on psychological dysfunctions. In this sense, virtual reality provides a new human-computer interaction paradigm in which users are no longer simply external observers of images on a computer screen but are active participants within a computer-generated three-dimensional virtual world. The key characteristics of virtual environments for clinical professionals are both the high level of control of the interaction with the tool without the constraints usually found in computer systems, and the enriched experience provided to the patient (MT, 2001).

The initial accomplishments will be at the macro level for the whole body, organ and tissue systems; then further levels of glandular structure, molecular, biochemical and genetic information can be added.

3. Emerging conceptions of the body: the transparent body

In the previous paragraph we have described how the introduction of medical technologies such as prosthetic extensions and virtual reality has contributed to further two popular conceptualizations of the body, the *cyborg* and the *cyberbody*. How will further medical innovations reinvent or affect these notions? Although answering this question is not easy, it is at least predictable that in the next decade the emerging technological scenario of Ambient Intelligence (AmI) will most likely be the most active field in fostering new conceptions of the body. Ambient intelligence is a way of making interfaces between humans and computers disappear. This paradigm builds on three recent key technologies: Ubiquitous Computing, Ubiquitous Communication and Intelligent User Interfaces.

Ubiquitous Computing means integration of microprocessors into everyday objects like furniture, clothes, vehicles, roads and smart materials even particles of decorative substances like paint. Ubiquitous Communication enables these objects to communicate with each other and the user by means of ad-hoc and wireless networking. An Intelligent User Interface enables the inhabitants of the AmI environment to control and interact with the environment in a natural (voice, gestures) and personalised way (preferences, context). Medical applications of this new paradigm may be represented, for example, by the BAN (Body Area Network), PAN (Personal Area Network), smart clothes and other body integrated devices that will be able to detect patients' vital signs and retransmit them to sorting nodes, in real time. Body Area Network means wireless communication between various components attached to the body, such as data spectacles, earphones, microphones and sensors. Through its wireless connections between the individual components Body Area Network will allow a variety of different medical applications, such as transmission of the body parameters (blood pressure, pulse rate, body temperature) and transmission of parameters of body implants.

A Personal Area Network (PAN) is a technology that could enable wearable computer devices to communicate with other nearby computers and exchange digital information using the electrical conductivity of the human body as a data network. Smart clothes, or intelligent textiles, can be described as textile materials that incorporate electronic devices such biosensors and multi-function processors (see figure 1). While still in an embryonic stage, biomedical clothing and textiles have the potential to change the provision of health care services for patients suffering chronic diseases (such as

cardiovascular, diabetes, respiratory and neurological disorders) and the elderly with specific needs.

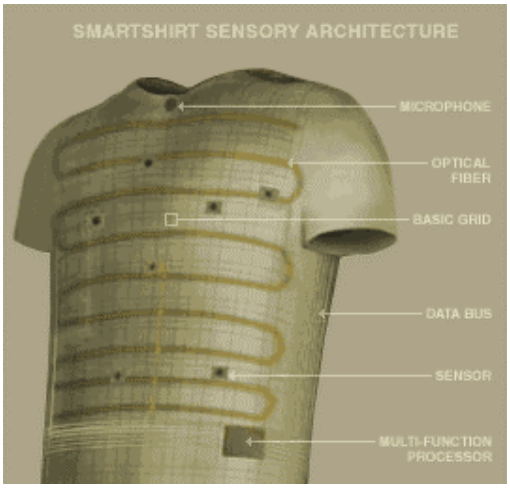

Figure 1. A prototype of smart shirt for medical applications

Currently, these Ambient Intelligence devices are under development to provide the right balance between the need of non-invasiveness, real time vital sign monitoring and telediagnosis. Such embedded devices will be part of the human body as implanted prosthesis, but instead of being “passive” extensions of the body, these intelligent biomedical instruments will be used as an active interface that makes physiological signals transparent to the outside world. As a result, the patient’s body may be reduced to a mere collection of anatomical and physiological data that will be accessed directly or remotely by the physician.

In this perspective, the definition of *transparent body* seems appropriate to label this progressive “digital disembodiment” of the patient. How these innovations will affect medical practice in the next years is somehow predictable. In fact, the concept of ‘transparent body’ will make the physician facing a new paradigm. Nowadays, the physician is supposed to take decisions on which clinical tests to prescribe to his patients, according to his clinical experience but also taking into account economical considerations. Therefore, since time and financial resources are limited, the physician needs some fixed standards to make a preliminary choice among the wide range of available tests.

This criterion is still based on the Hippocratic vision of medicine inherited from ancient ages, which teaches to interview the patient before anything else. In the Ambient Intelligence future scenario, the whole set of tests may be integrated in the patient’s

body or at least in his clothes, and may be visible from the outside by embodied imaging (with video-clothes) as well as by showing the end-user vital parameters in a digital or graphical form. Accordingly, physicians' decision process may no longer focus on the most suitable clinical test, but rather on the interpretation on clinical outcomes.

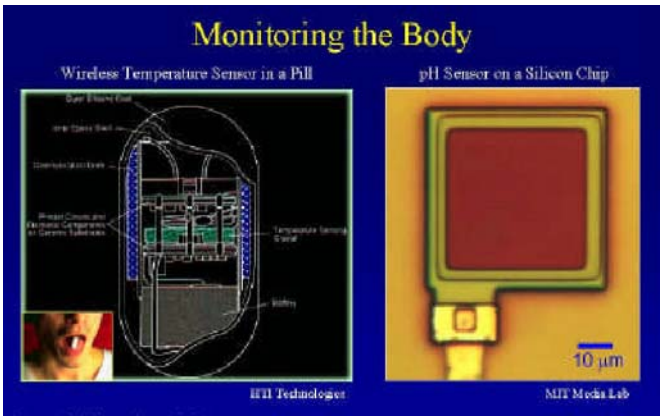

Figure 2. New generation of wearable sensors enable real-time wireless readout of internal bodily signals such as temperature or pH.

4. Conclusion

With the incoming new technologies in the biomedical field, particularly those dedicated to prosthesis and bioimaging, Hippocrate and Galeno's conceptualization of human body as 'sacred inviolable temple' is progressively abandoned and replaced by new coexisting posthuman notions of the body, as the cyborg and the cyberbody. Within twenty years, applications of Ambient Intelligence devices in health care will probably further a new notion of the body, the "transparent body". According to this vision, first-level diagnostic and therapeutic procedures may be mainly performed at home or during activities of everyday life, with the remote support of clinicians (i.e. teleassistance).

The next step will probably be a 3-D computer generated representation of a specific person (a "digital me") or medical avatar that will act as a surrogate for optimizing (and possibly predicting) individual patient care (Satava & Jones, 2002). The more devices which are developed that can acquire information about a person the richer the medical avatar and the more accurate the results from modeling and simulation, pre-operative planning or intra-operative assistance. Not only is this relevant to patient care for medical conditions, but also to be used at all levels, including school age.

A possible use of this “digital me” is described by Satava & Jones (Satava & Jones, 2002): “Imagine the power of each child having a medical avatar which “grows up” with them, which they carry on a credit card device and use in class. By inserting their avatar into the virtual environment, they can learn health and nutrition by observing the consequences to their avatar. For example, by implementing the “smoking” module, the child’s avatar could grow a cancer, get bronchitis and emphysema and decrease the ability of the avatar - as a prediction of what would happen with long term smoking.” (p. 234).

Theoretically, if a “generic” or standardized medical avatar could be created, the early phases of clinical trials (on drugs or devices) or virtual “crash dummies” could replace some of the extremely expensive and high-risk testing-and-evaluation occurring today. As a consequence, hospitals and health care facilities may progressively become highly specialized structures for medical research, or emergency-oriented facilities. Then, traditional, face-to-face clinical examinations would take place in these facilities only if the patients’ conditions are critical or unstable; in the other cases, the physician would be expected to deal only with “transparent bodies” or their 3D representations. In fact, through digital processing, data dispersed over many different sites may be combined into virtual patient records, specifically tailored to the health care professional’s needs, and affording unprecedented potential for the coordination and accumulation of health care data (Dick, 1997). Clearly, this scenario is not safe from risks. If on one hand the application of the Ambient Intelligence vision may lead to a dramatic lowering of costs (reduction of time to diagnosis and time to treatment, outpatient diagnosis and treatment, etc.), on the other hand the risk of de-humanization and de-personalization of the patient should be carefully considered. This dehumanization may consist in a progressive identification of the patient with the collection of his vital parameters. In other words, the risk is that the patient will be progressively disembodied, reduced to the sum of his biological and physiological functions. There is, of course, the obvious physical separateness of patient from the patient’s medical data, but this is of small importance when one considers the overwhelming significance of the unity of the patient and the recorded information that describes exclusively the health care of that patient. A second risk may arise from the possibility for the patient to monitor directly data detected and stored by wearable biometric devices. This capability may contribute to increase awareness of patient’s body, but it may also increase the likelihood of self-diagnosis, with potential serious implications for patient’s health.

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/WHOIS?
Identity: Collectivity and the Self in IRC

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ABSTRACT

Cyberspace challenges our traditional cultural understandings of notions as basic as time, space, and—more importantly—identity. With the advent and growth of electronic communication, it is becoming increasingly necessary to ask ourselves who we actually are and who we are interacting with when we are on-line. This article focuses on a case-study from the IRC chat room #rudos (Undernet), and poses the question of whether cyberspace is quite simply a powerful means of reaffirming pre-established Physical-Reality identities, or, on the contrary, a medium that allows for the creation of Virtual-Reality personae. Drawing on examples from casual conversations extracted from our emic ethnographic approach, the project soon revealed that the traditional dichotomous separation between reality and virtuality is not quite as clear-cut as many would have originally assumed.

Keywords: *identity, IRC, chat room, computer mediated communication, cyberspace*

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1. Introduction

[Neo looks at his hand; fingers distended into mirrored icicles that begin to melt rapidly, dripping, running like wax down his fingers, spreading across his palms where he sees his face reflected.]

Neo: Did you...!?
Morpheus: Have you ever had a dream, Neo, that you were so sure was real. What if you were unable to wake from that dream? How would you know the difference between the dream world and the real world?
Neo: This can't be...
Morpheus: Be what? Be real?

The Matrix.

Throughout the last ten or fifteen years, the more industrialised regions of the world have experienced the overwhelming spread of a revolutionary mass medium. Internet, or *the* Net, originated during the 1970s in the USA as ARPANet—a fail-safe military

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communication system in the event of a nuclear war (Pickard 1998). Its main strength lied on its multiplicity of nodes and unlimited capacity of growth. In little time, the Net's advantages and potential as a mass medium grew evident, and, today, Internet has become an effective, relatively affordable and simple tool to which more than 60% of households in the USA and 250 million people worldwide have access (Looksmart Ltd. 2001).

The fast spread of Internet has occasioned an ever-increasing amount of different types of interaction on-line among users at an international scale. The Net has transformed the way we work, the way we get in contact with others, our access to information, our levels of privacy and indeed notions as basic and rooted in our culture as those of time and space.

The popular perception of time today is still based on the 18th century notions, which conceived of time quite simply as "that which is set by a clock" (Benedikt 1991: 60), as a linear, monolithic, unique and unstoppable phenomenon[1]. In cyberspace, however, this is hardly ever the case. People connected to a virtual community from different parts of the world find that they share one single virtual space and time while physically being in different geographical locations, different time zones and even different seasons of the year depending on the hemisphere! "The computer has an infinity of times in potential, ready to be actualised. It is a time that has a crowd of moments" (ibid.).

One of the most common questions asked by those who are unfamiliar with the nature of the technology is 'Where is cyberspace?' For those people who are accustomed to dealing with material, bounded objects, locations and resources, this seems a logical question to ask. Cyberspace, however, does not exist at any specific physical location. Instead, it exists in an eternal state of construction or invention, brought about through continuous interaction between the nodes. Cyberspace exists in the action of networking, in much the same way as conversation is constructed through the linking of individual words (Pickard 1998).

This redefinition of our senses of time and space renders our previous solid and irreplaceable conceptions completely relative. In cyberspace, time and space do exist, but embracing their own particular set of rules. Attempting to understand these phenomena the way we traditionally have done outside of cyberspace is fruitless.

More importantly, time and space are not the only games that cyberspace plays with our senses. Philosophers have long understood that time and space are bound up with

[1] Although we do affirm that these perceptions of time exist in the traditional popular view, in no way do we sustain that the complex phenomenon of time can be reduced in academic study to the oversimplified "monolithic, unique and unstoppable" indication that is set by the clock. As expressed by Munn (1992: 93), "time is infinite complexity." The different perceptions of time in relation to action, actors and space, can (and indeed should) be subject to deep theoretical study. Nonetheless, a close analysis of these topics would transcend the limits of our discussion here.

one's experience of the self and others (Campbell 1994, cited in Jenkins 1996: 27). Space makes no sense outside of time, and time is important in processes of identification because of the continuity which is established in a claim to, or an attribution of identity (Jenkins 1996: 27). The distortion of space and time in Internet is thus linked to another crucial redefinition—that of our notions of identity.

Internet is, undeniably, a powerful tool of communication, but to what extent is it simply a tool used to transmit a message? To what extent is cyberspace a world in its own right? In this context of increasing social interaction on-line and constant redefinition of essential notions such as time, space and identity, it becomes crucial to ask ourselves *who* we actually are in Internet and who we are interacting *with*.

Throughout this text, we will aim to consider the ways in which cyberspace affects our notions of identity and the ways in which we conceive of others on-line. Is Internet a means of reaffirming the identity of our Physical Reality[2] (hereon PR), or is it a way of evading the physical and social constraints of PR by adopting new *cyber-identities* and creating virtual personae? Are virtual identities the caricature of something we wish to imitate for experimentation or entertainment, or do we actually reflect through these caricatures what we unconsciously want to be in PR by giving free will to our desire in Virtual Reality (hereon VR)?

Certainly, Internet and a PC have no meaning per se—after all, it is the human factor behind them what creates the communication, the interaction and their significance. In Computer-Mediated Communication (hereon CMC), there is always (or nearly always) a physical, 'real' person producing and sending a message from his/her side of the computer, and another physical, 'real' person receiving the message through his/her PC and replying in a similar way. Schefield (1998: 180) considers thus the interaction in virtual communities to be an accurate reflection of PR social relations. In the words of Warner (1992, cited in Poster 1998: 190), "technical forms are never 'independent variables', but always already inscribed in social and cultural processes." What takes place through these new technologies, therefore, reflects, according to Warner, a social *reality*, the reality of the physical world that has given rise to these new media.

McLuhan, on the other hand, affirms that "by putting our physical bodies inside our extended nervous systems, by means of electric media, we set up a dynamic by which all previous technologies that are mere extensions of our hands and feet and teeth, will be translated into information systems" (McLuhan 1964: 31). *The medium is the*

[2] Throughout this text we will employ Velmans's term—Physical Reality—instead of what has traditionally been referred to in previous literature as 'Real Life', for, as we will later explain, we consider the latter term to be inaccurate and rather misleading as a concept. In his article of 1998, Velmans distinguishes between three types of reality—the physical reality, the virtual reality and the psychological reality. Physical reality exists independently of the observer, extended in space—in the world. It has tangible properties such as mass and solidity. Virtual reality appears to be in the world as well, but is actually in the mind. It appears to have extension in space but has

message; the technology of communication (not the content itself) governs the nature of human communication and thereby human affairs and interaction. According to McLuhan, when new media are introduced into societies, it is the form of those new media that most deeply impacts us.

In cyberspace, there seems to be an evident aspiration to leave the bodies behind—to free ourselves from the fixed situated identities of gender, race, ethnicity and sexualities, and enter a free space of imagination in which we are allowed to choose 'who' to be and 'how' to be (Jeleniewski 1998: 20). In the words of Meg Pickard (1998), "in cyberspace, the playing adult can step sideways into another reality." It is this apparent contradiction in cyberspace that leads to the question: "are identities and social interaction in VR *virtual*, or *real*?"

2. Cyber-ethnography

> In virtual ethnography there are no exotic locations, no mosquito nets or peanut butter cravings.
>
> Meg Pickard 1998

The term 'cyberspace' was originally coined by Gibson (1984) in his science-fiction novel Neuromancer several years before Internet became the revolutionary mass medium that it is today. In Neuromancer, cyberspace is a consensual hallucination, a virtual space of powerful desire and even self-submission, where things attain a super vivid hyper-reality (Gibson 1984: 35).

The concept was later adopted by Internet users to describe the virtual environment produced by the Net. Today, cyberspace is "the world in which the global traffic of knowledge, secrets, measurements, indicators, entertainments and after-human agency takes on form" (Benedikt 1991: 1).

The study of humans in virtual communities and networked environments is referred to as cyberanthropology. Carrying out ethnographic fieldwork in cyberspace implies a series of outstanding advantages for the anthropologist. In cyber-ethnography there are no flights to take, no passports, no vaccines or extreme weather conditions. We become, in the most literal sense of the word, armchair anthropologists.

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no actual extension. Its existence depends on the interaction of the user with the Virtual Reality equipment. Psychological reality exists only on the mind, depending exclusively on the observer. It is relatively intangible and unsubstantial (Velmans 1998: 46).

Moreover, cyberspace as a medium is readily accessible from a great variety of places. The physical and temporal constraints of anthropological fieldwork are thus eliminated. Whether at home, at university, in Barcelona or in Moscow, as long as there is a PC with an Internet connection, we can always go back to the virtual community and carry out some more research. “Virtual reality is just around the corner from commonplace” (Jones 1998: vii).

On the other hand, there are indeed a number of important disadvantages to bear in mind when studying interaction in virtual media. Kitchin (1998, cited in Hine 2000: 5) divides into three categories the effects of cyberspace: changes to the role of time and space, changes to communication and the role of mass communication, and a questioning of dualism such as the virtual and the real, truth and fiction, technology and nature. In cyberspace we deal with large numbers of people who come and go, who conceal PR identities or have multiple cyber-identities. There is very frequently a carnivalesque, irreverent atmosphere and attitude in virtual communities. Rejecting common sense and playing with concepts such as reality, presence, gender or logic are favourites among cyberspace users.

Cyberspace is subversive and carnivalesque in its nature (Danet 1998: 130). Like cyberspace, Carnival has many faces, many voices—it has riotous upside-downings and playful inversions (Gilmore 1998: 213). Carnival is a metaphor for the temporary licensed suppression and reversal of order, the time when the low shall be high and the high low, the moment of rupturing, of “the world turned upside down” (White 1993: 1). In Europe, argues Lommel (1972: 7), masks as a part of everyday life belong to the distant past. “Masks have become simply a disguise, whereas in other areas the mask still personifies something or somebody” (ibid.). In Internet, however, we find that the typed text is this mask (Danet 1998: 129). It is a mask of letters and symbols in a Carnival of electric impulses and fibre optics. More than the reversal of status and social roles, the Carnival of cyberspace is concerned with the more intimate aspect of ourselves—gender, age, ethnicity—identity. If we do not understand this particular carnivalesque nature of CMC, cyber-ethnography can result confusing and misleading. The key, affirms Derrick de Kerckhove (Muy Interesante 1999: 132), lies in breaking with classical mental habits and substituting them by new ones.

One of the main problems that Meg Pickard (1998) found in her work as a cyberanthropologist was trying to convince her ‘real life’ community members (both academic and social) that what she was doing was actually worthwhile research. To what extent is cyberanthropology actual anthropological fieldwork? “The Internet and

its various functions and guises are generally considered to be a mere leisure pursuit, and a fairly fruitless one at that" (ibid.).

Many anthropologists will argue that, in cyberspace, the academic wanders in places that do not exist, cohered by ties which, in PR, would not hold a group of people together for more than half an hour. In these terms, the study of social worlds built by people on computer networks challenges the classical dimensions of anthropological research (Paccagnella 1997).

Anthropology is concerned with the identification, study and understanding of other cultures—this itself is difficult to deny. If we take Tylor's classical definition of culture as "that complex whole that includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by man [sic] as a member of society" (Tylor 1871, cited in Pickard 1998), it immediately becomes clear to us that cyberspace is indeed a scenario full of profound cultural processes. In virtual communities, new users learn from older users behaviours, ideas, concepts, skills and rules specific to the context in which they interact. "Virtual communities have evolved rules, rituals and communication styles that qualify them as real culture" (Shaw 1997: 135).

Many ethnographic studies of on-line settings have made a major contribution to the establishment of the view of Internet as a culture based on the uses that people make of the technology available to them (Hine 2000: 9). Thus, terms like 'cyberculture' (Benedikt 1991) or 'cybersociety' (Jones 1998) have emerged among anthropologists within the last two decades to describe the culture and social organisations that exist in cyberspace.

Whether cyberculture is a homogeneous, monolithic culture shared among all cyberspace users or a phenomenon that emerges at a more context-specific level within cyberspace as a medium, is an issue that we will consider later on. What leaves no place for doubt is the fact that any situation that involves the interaction of humans in symbolic and social ways, and in which participants skilfully juggle issues of identity, culture and community, surely merits an anthropological approach (Pickard 1998). "As with artificial cultures, [cybercultures] may be subjected to the same disciplinary operations as natural cultures—ethnography and archaeology" (Encyclopaedia of Cultural Anthropology 1997: 308).

Due to its versatility and increasing acceptance among Internet users, we have opted to focus our study of identity in cyberspace on IRC communication. IRC (Internet Relay Chat) is a real-time conversation program based on a network of IRC-

specialised servers throughout the world[3]. In IRC, users[4] have the chance to carry out perhaps the closest and most socially active of the interactions on-line by engaging in real-time, face-to-face (or nick-to-nick, rather) conversation with others.

Nicks are quite simply the usernames or pseudonyms that we choose as aliases for ourselves in IRC. They are our physical appearance—the equivalent of our face in PR interaction. In IRC, names are local labels, and participants seem to have no difficulty addressing, befriending and developing fairly complex relations with the aliases—or 'delegated puppets' of other participants.

Most of the examples in our study will be drawn from a chat room called #rudos, in the server Undernet. In #rudos, there is no single nationality, religion, general interest or topic of discussion cohering the members of the community. Its only particularity with respect to other chat rooms is that what would otherwise be considered intolerable, insulting behaviour or language, in #rudos is tolerated and even celebrated. Members of #rudos log on from a variety of nations and cultural backgrounds—mainly South American, Central American and Spanish. Communication generally takes place in Spanish, although conversations in English or Portuguese are not unusual.

Despite this heterogeneity, #rudos is an active community with a strong sense of identity. Its members keep a web page with the history and origins of the chat room, OP details, general information on events and gatherings, and several manifestations of the chat room's philosophy and attitude.

#rudos originated in 1995 as the result of a division between the OPs of the chat room #insultos, in Undernet. Several OPs in #insultos eventually decided to abandon the community and open their own chat room. #rudos was thus created, and #insultos immediately established as its rival.

The approach adopted throughout our fieldwork in #rudos has been an emic, participant one as an active member of the community with intermittent access to OP status. Natural, spontaneous conversations were encouraged. In fact, most of the material that we will use to illustrate our discussion has been extracted from casual conversations in the chat room and private windows (with the consent of all parties involved).

[3] See Appendix 2 for *An Introduction to IRC*.

[4] We prefer to employ the term 'users' as opposed to 'players' to refer to those who get connected to and interact in IRC, for it seems clear to us that IRC, more than a game, is a medium for social interaction, independently from the transcendence one might wish to grant to this interaction.

Jones (1998: 4) warns us about the dangers of being lulled into a false sense of certainty when considering CMC interaction by "freezing" electric discourse, capturing text and the information it may contain and putting it under a microscope regardless of the interpretive moment in the electric discourse from which it emerges. Throughout this text, fragments of 'frozen' electronic conversations will be used only as relevant examples of our ethnographic fieldwork to illustrate our analysis, not as self-explanatory pieces of text to analyse in their own right.

Finding and recording cases of casual, spontaneous conversations in IRC about the topics we will discuss in our work has not been difficult, as the notions of identity and concepts of reality-virtuality tend to be topics that IRC users in general are most often concerned and confronted with.

3. Method

> In no way do I maintain that there has ever been a tribe, a language in which the term 'I', 'me' (*je*, *moi*) has never existed, or that it has not expressed something clearly represented.
>
> Mauss 1985: 3

The study of identity is a complex and problematic one. Who decides who belongs to what? The observer? Us by contrasting ourselves to an 'other', the 'other' by noticing that we are differentiating him/her, or perhaps all at the same time? Identity encompasses a wide range of aspects of ourselves. We can thus distinguish our religious identity, gender identity, social identity, political identity, personal identity and many more which academics have categorised in different ways.

"Much sociological and everyday discourse draws a distinction of type between social identity (or identities) and individual identity" (Jenkins 1996: 19). Beels (1978, cited in Antaki & Widdicombe 1998: 11) makes a distinction between cultural, social and self identity, whereas Moll, in his Identity and Religion (1978) opted for the categories of the personal, the group and the social identity in the frame of a linear evolution from the personal to the social.

In Internet, the creation of different categories of identity is a difficult exercise. Identities in cyberspace are blurry and redefined at a very high rate. Many of the previously solid and well-established categories of identity are inexistent in the virtual medium, others are redefined to the point they are hardly recognisable.

For the sake of a more convenient analytical approach, we have opted in this work for a distinction between the self and the collective identity in cyberspace. Self-identity will be held to mean in this context the diversity of fundaments used to construct our own sense of individuality with respect to that of others (i.e. the *moi*). By collective identity we will understand the varied aspects of ourselves such as nationality, ethnicity, beliefs, social background or sense of belonging to a chat room that might be used to shape the shared identity of a group of people in a virtual community.

We shall start by considering the notion of self-identity in cyberspace, its role in the construction of a virtual identity and in the reaffirmation of PR identities. We shall then move on to an examination of the collective identity in cyberspace, its virtual and PR exponents, and finish by reconsidering our question of whether cyberspace should be defined as a medium that reaffirms PR identities, or rather as an alienated, virtual world from which cyber-identities and virtual personae arise.

4. VR Self Identity

Agent Smith: "Do you hear that, Mr. Anderson?"
[Agent Smith grabs Mr. Anderson in a chokehold, forcing him to look down the tracks, the train's headlight burning a hole in the darkness.]
Agent Smith: "That is the sound of inevitability. It is the sound of your death.
[There is another metal screech, much louder]
Agent Smith: "Goodbye, Mr. Anderson."
[The veins bulge in Mr. Anderson's head, as he grits through the pain. He is not ready to die.]
Mr Anderson: "My name is *Neo*."
[Impossibly, he hurls himself straight up, smashing Smith against the concrete ceiling of the tunnel. They fall as the sound and fury of the train explodes into the station.]

The Matrix

In the words of Víctor Domingo, from the Spanish Association of Cybernauts, "cyberspace makes us different" (El País Semanal 2000: 46). For some, cyberspace offers the possibility of entering a party with a redefinition of their entire body, flesh and bones, that can be stored on a floppy disk (Stenger 1991: 50). In the TV program "The New Edge" (Discovery Communications Inc., 1999), a paralytic cyberspace user described how Internet has changed his life and the ways he interacts with and shows himself to others. "In cyberspace I am another integrated member of society, I feel free. Nobody sees my spasms or my wheelchair. Cyberspace represents for me what the fall of the Berlin Wall meant to many Germans."

"For Descartes, it is crucial that as rational selves we have an inner relationship to reason, mind and consciousness, and an external relationship with our bodies" (Jeleniewski 1998: 25). In VR, this Cartesian distinction between the physical and the non-physical is taken to extremes in a shift away from the basic Newtonian conceptions that helped organise the 17th century scientific revolutions. "Being a body constitutes the principle behind our individuality" (Heim 1991: 71). Today, CMC simply brackets the physical presence of the participants, either by simulating or by omitting corporeal immediacy. "This frees us from the restrictions imposed by our physical identity" (ibid.).

According to Jeleniewski (1998 20), the disdain for the body runs deep within Western culture, and the wish to escape from it is given new forms within visions of cyberspace. In IRC, the user experiences a phenomenon that we could describe as the *distortion of the self*. One looks at the screen of the PC and sees him/herself interacting in the chat room among other users as if s/he looked at him/herself through a mirror. Our physical presence is embodied by our nick in IRC, our words become lines of text and our identity is projected on the screen. The presence of the body is eliminated in CMC interaction, bodily language is substituted by the use of emoticons and physical contact is inexistent.

When designing virtual worlds, computer programmers face a series of reality questions. How, for instance, should users appear to themselves in cyberspace? "Should they appear to themselves as one set of objects among others, as third person bodies that users can inspect with detachment, or should they perceive the virtual world as if they were looking through their own eyes?" (Heim 1991: 59). Cyberspace distorts how we see ourselves, and how we see ourselves affects the way we perceive our self-identity.

For MacKinnon, interaction and social roles in cyberspace are moulded through the persona (1997:217). Social interaction via Internet technology allows users to experiment with identities, ideas and situations. It is this playful experimentation that develops our cyber-identity. "If our culture no longer offers an adolescent moratorium, virtual communities do. They offer permission to play, to try things out—this is part of what makes them attractive" (Pickard 1998).

In #rudos, creating virtual identities is a common practice among most users. Atenea, for instance, has adopted the identity of the Greek goddess of wisdom, not only through the use of her nick, but also in her interaction within the community.

[Chat room #rudos, 15 July 1999]

*Atenea is preparing a sociological study about the rabble in this chat room. Are they inferior to the rest of the *mortals*? lol

*Rook produces abundant information to sustain that thesis.

*Atenea welcomes any statistics, data, notes or photos. I have to forward them to God Zeus!

[Chat room #rudos, 22 September 2000]

*Atenea is feeling very pessimistic today

*Rook prescribes chess and wine!

<Atenea> I shall immediately start the treatment. Any brand of wine in particular, Rook?

<Rook> No cheap wines!

<Atenea> Obviously, Rook! I am a goddess! Only refined brands for me…

(italics mine).

Several members of #rudos find in their virtual identity the perfect excuse to play with ambiguity and experiment with aspects such as gender, nationality or age. Canovas21, whose DNS is from Mexico, when asked about his nationality, constantly gives as a response:

<Canovas21> I am a native of Sri Lanka, but I grew up in the arid lands of Mauritania.

Car- has been a member of #rudos for several years now. Throughout all this time, s/he has developed an androgynous gender that makes it impossible for other user to distinguish whether s/he is 'in reality' a male or a female. The nick Car- is the abbreviation for the Spanish names Carlos (male) or Carla (female). In some occasions, s/he joins the chat room with the nick Carlos:

[Chat room #rudos 23 May 1999]
<Carlos> *Hoy vengo de hombre.* (Today I come as a man).

Other times s/he adopts the female nick of Carla or Zulema:

[Chat room #rudos 12 October 1999]
<zulema> *Hola, Gilbert, me encuentras guapa*[5] *hoy?.* (Hi, Gilbert, do I look pretty today?).

But, in most cases, s/he uses the neuter nick of Car-, which conceals his/her gender and allows for ambiguity and playful experimentation.

[Chat room #rudos 23 May 1999]
<Carlos> Pero y si realmente soy mujer? (But what if I really was a woman?)

These changes in the nick imply as well a change in Car-'s gender roles and identity. Thus, when s/he joins the chat room as a female, his/her attitude is completely that of a female throughout his/her stay.

[Chat room #rudos 12 October 1999]
<Car-> *Jijiji* (Giggles).
<Car-> *Eres muy inteligente, Napito*[6]*.* (You are very intelligent, Napito).

[*S/he receives a digitalised photo*]
<Car-> Ay, que lindo, Napo! (Aw… How cute, Napo!)

In cyberspace, people who have never before been interested in cross-dressing become members of the opposite gender (Danet 1998: 129). Brenda Danet describes the categorisation of genders in the Western world as "the tyranny of genders" (ibid. 131). Not only do we tend to polarise our society into the male and female spheres, but we also expect each person to act according to his/her gender role in the way s/he behaves, perceives him/herself and talks to others.

Cyberspace revolutionises these traditional gender categories and allows us to take advantage of the gender roles of each other. Females can become dominant and active in dealing with public affairs, and males can experiment what it feels like to receive the gentlemanly attention of other users (Danet 1998: 129).

[5] Car- uses g*uapa* (pretty) in this case as a feminine adjective (*guapo*- [male] handsome; *guapa*- [female] pretty).
[6] Napito- affectionate form of the masculine nick Napo.

In cybersex relations, some people occasionally discover that their partner is not of the gender they had originally expected. Many users decide to adopt an attitude of resignation in this circumstance.

> [Chat room #rudos 15 July 1998]
> <Rook> In cybersex, the *real* identity of the other person is the least important after all.
>
> (Italics mine).

Certain user conceal their PR self-identity and real intentions behind elaborate personae with the aim of obtaining information or services from another party. This is particularly the case among hackers and members of the counter-hacking world, such as programmers or network security professionals, who refer to this practice as *social engineering*. In The Presentation of Self in Everyday Life (1969: 141), Goffman defines this position or role as the "strategic secret." In adopting strategic secrets, a party conceals from the audience its intentions and capacities in order to prevent them from adapting effectively to the state of affairs that the party is planning to bring about (ibid.). In #rudos, for example, the user Amoeba, who is lesbian, occasionally adopts a male nick and identity with the aim of attracting unaware females into flirty, private conversations.

Another role identified by Goffman in everyday social interaction is that of the 'non-person'. The non-person is that who is present during the interaction but in some respects does not take the role of either of a performer or of the audience, nor does s/he pretend to be what s/he is not (Goffman 1969: 151).

Finding non-person cyber-identities in IRC is not unusual. Certain users adopt nicks such as Silencio (Silence) or Nemo (Latin for *nobody*) and join a community (sometimes for long periods of time) without any participation or signal that they are following the interaction of others. The adoption of a non-person cyber-identity, however, does not imply that the user will adhere to it eternally. Identity is a fluid and mutable phenomenon (Widdicombe 1998). In cyberspace, identity is as fluid and versatile as it is in PR (if not more). In #rudos, for instance, the original non-person

cyber-identity of Nul0 (Nil) gradually evolved into an active, participant role. Through casual conversations with other members of the community, Nul0 gradually passed from being a mere, passive observer, to acquiring an OP status and being partially responsible for the management of the channel.

According to Goffman, we must not underestimate the degree to which the person who takes a non-person role can use it as a defence. (Goffman 1969: 152). Particularly in the hectic, rebellious atmosphere of #rudos, a non-person role can be an effective way of avoiding unkind comments and verbal quarrels.

Non-person roles, on the other hand, can also be imposed on others as a sanction. “A team can treat an individual as if he [sic] were not present, doing this not because it is the natural thing or the only feasible thing to do, but as a pointed way of expressing hostility to an individual who has conducted himself improperly” (ibid.). In IRC, this sanction can be carried out through the use of the command /ignore [nick], which will cause our IRC client to ignore the presence and participation of another user in all of IRC, independently from the chat room or server we are using.

Moreover, chat room operators have the possibility of imposing the non-person self-identity on another user by preventing him/her from sending any messages or participating in any way in the community (even whilst being in it). This is done by denying a user his/her right to the *voice* as a sanction or an expression of hostility.

The imposition of a non-person self-identity in cyberspace, whether through the use of the command /ignore [nick] or through the denial of the right to voice is considered to be a severe punishment. For certain users, their cyber-identity and social roles within a virtual community are not a mere game, but an issue of great importance—a crucial element of their self-conception.

Throughout her fieldwork in teenage chat room communities, Schefield came across several users who claimed not to attach too much importance to their virtual self-identity. “Jake: It’s pretty fun, ‘cause it’s like you don’t really care, ‘cause they don’t know who you are. It doesn’t matter, you’re just talking about all this stuff” (cited

in Schefield 1998: 179). In #rudos, however, far from being anonymous, careless individuals, most users have constructed through time an identity and a network of social relations within their virtual community. Denying them the right to interact in certain social circles or under a certain nick would be analogous to killing the virtual identity that they have constructed through many years of interaction.

In fact, the banning of a particular user from a chat room or a server is occasionally referred to as "killing the user." In the server Dalnet, the importance of the virtual self identity is reaffirmed by a system that allows users to register their nick with the server administrators. Registering a nick will grant a user the exclusive right to its use, thus strengthening his/her individuality and virtual self-identity.

5. PR Self-Identity

> Internet is not a world, it is only a tool.
>
> Abraham López (in El País Semanal 2000: 49)

"There has never existed a human being who has not been aware, not only of his [sic] body, but also at the same time of his individuality, both spiritual and physical" (Mauss 1985: 3). The notion of the self is inherent to the human condition.

In "A Category of the Human Mind: the Notion of the Person, the Notion of the Self" (1985) Mauss suggests that our understanding of the self has passed through different socio-cultural stages before developing into our modern-day perception of individuality. In its primeval, less developed form, self-identity is conceptualised through the notion of the persona (*personage*). Thus, in the totemic system of Pueblo Indians, the clans are conceived of as being made up of a certain number of persons "who are in reality characters (*personages*)" (Mauss 1985: 3). The role of all these people is to act out, and insofar as it concerns them, the prefigured totality of the life of the clan (ibid.).

From the notion of the persona, Mauss moves on to the emergence of the notion of the person[7]—the *personne* and the *moi* in the classical civilisations. All freemen in Rome were persons (*personnes*). The Roman citizen had a right to the *nomen* and the

cognomen. Only the slave was excluded from it. *Servus non habet personam.* S/he has no personality (*personalité*) (ibid. 16).

Our present-day notion of the person is based on "the Christian person" (ibid. 19), which Mauss seems to depict as the ultimate and most developed of all perceptions of the self. The Christian person is *one* that is subdivided into three parts and two natures: *unitas in tres partes, una persona in duas naturas*. It is from the notion of the *one* that the notion of the person (*personne*) was created (ibid. 19).

In cyberspace, we are, for better or worse, still irremediably bound to our physical body. "To this day, virtual bodies remain coupled to selves which depend on physical bodies for existence" (Shaw 1997: 134). For a number of scholars, this physical constraint implies as well a boundedness to our PR identity. Stones (1991: 113, cited in MacKinnon 1997: 217) illustrates this concept rather graphically by affirming that "no refigured body, no matter how beautiful, will slow the death of a cyberpunk with AIDS."

Expressing a PR identity in IRC, however, is not as easy as it might seem at a first sight. How do we approach the act of expressing who we are in a virtual medium shared by users from all around the world who see from us little more than our nick, our IP number and the text messages we send? A common mistake among new IRC users (newbies) is to enter a chat room and type a general "Hi, *who are you*?"

[Chat room #azul, 9 September 2000]

<Cici> *Hola, Lynx, quien sos?* (Hi, Lynx, who are you?)

In a monthly reunion of driving-school teachers, for example, this question might receive a number of appropriate, satisfactory answers in accordance with the context of the interaction. In the context of IRC communication, however, an answer of the sort of "I am John, how do you do" would lack any meaning. For Goffman, interaction takes place almost by definition in a situation, in a context (or *frame*) (Goffman 1997). The frame of the interaction is what renders what would otherwise be a meaningless aspect of the scene into something that is meaningful (ibid. 21).

[7] Carrithers (1985) suggests that Mauss renders as a single story here what is in fact a complex plot (1985: 235), and affirms we should disentangle and distinguish the *moi* from the *personne*, the *moi* being a conception of the physical and mental individuality of human beings, and the *personne* the conception of the individual in respect of society as a whole.

In cyberspace, however, we find people from all genders, ages, professions and social backgrounds. It is what we could call a decontextualised context. Certain chat rooms have a specific topic of discussion or an obvious aspect that coheres the members of the virtual community (e.g. #philosophers, #lesbians or #mormons). But there are also chat rooms like #rudos, where there is no set topic of discussion, no general area of interest, nationality or shared profession.

So, *who are you* in cyberspace? Many French chat rooms have established a tradition by which every user that joins a chat room for the first time will have to include immediately after his/her greetings his/her age, gender and city of origin. Failing to do so will cause other users to make him/her aware of his/her error by addressing him/her the question of "*a/s/v*?" (*Age, sexe, ville*—Age, gender, city). If the user insists in not answering the question, s/he will be infringing a netiquette rule by not giving away his/her PR identity, and might be sanctioned accordingly by the OPs.

In #rudos, users generally prefer to conceal their PR identity and use it as an excuse to play with ambiguity and reaffirm an anarchic, irreverent attitude. However, those who do wish to express their PR self-identity make use of different methods, depending many times on the aspect of their PR identity that they wish to express and to whom.

Thus, Paulina25 suggests through the use of her nick that she is 25 years old and female, which are both true aspects of her PR self-identity. However, Paulina25's /whois information does not include her real name. She has therefore chosen to express only some aspects of her PR self-identity—her gender and age, but not her real name.

Lea26, by contrast, has opted to express as much of her PR self-identity as she could. This she has done by constructing a web page in which she has included personal information such as name, gender, age, profession, favourite colour and cartoons, hobbies, as well as pictures of herself, her friends, her house and family. This representation of Lea26's PR self-identity is, nonetheless, intended only for certain members of #rudos. By giving the URL of her web page exclusively to those who she trusts and sympathizes with, Lea26 limits the number of people who enter the web page and thus have access to her PR identity.

Whether the users start circulating this information among others is probably something that she cannot control herself, though. In #rudos, it is common for a member of the community to be picked on by others who have had access to aspects of his/her PR self-identity that s/he did not want to be publicised. Thus, s/he might start

being addressed by his/her first name instead of his/her nick, or sarcastic comments might be made about his/her looks in a photo, about his/her clothes or hairstyle.

Another popular method of expressing PR self-identities in IRC is the exchange of digitalised photos through a DCC connection. In fact, #rudos' web page has a section including a rather large collection of photos of the more regular users. Some of these photos are rather suspicious, though, and much discussion goes on over whether they reflect the 'real' person or whether they have been scanned from some random source. Other photos are overtly 'non-real', among which one could find images of Drew Barrymore or Bugs Bunny.

Once again, the extent to which users have access to others' photos as representations of a PR self-identity depends to a large extent on the restrictions set by the user in his/her decision of who (or who not) to send the image. In #rudos, certain photos have become very valuable—even mystified—with time. Owning the 'real' photo of a particular user has become, in certain cases, analogous to keeping a genuine copy of the *Necronomicon* in your library.

Ocasionally, IRC users not only reaffirm their PR self-identity through cyberspace as a medium, but also base their PR identity on cyberspace itself. Thus, cyberpunks reject in general their human condition and use cyberspace both as a medium and as a topic to express their discontent with PR.

For a cyberpunk, the ideal physical state is as an irrational animal, a corpse or a machine. Many connect plugs, electronic chips or other technological devices to their bodies in the attempt to assimilate themselves to cyborgs. Others use heavy makeup to conceal the more human physical traits and enjoy listening to synthesized music composed exclusively with computers and electric, non-physical instruments.

According to Featherstone and Burrows (1995: 4), we are all cyborgs in one way or another. If plastic surgery, genetic engineering and nanotechnology allow us today to live with metallic braces in our mouth, a pacemaker in our chest or orthopaedic limbs, the form of postbiological humanity that can be achieved in fifty years will have profound implications for our self-identity.

Mateo Conde, or *Linkman*, has also chosen to base his PR self-identity on cyberspace, although not precisely as a cyberpunk. Conde's job consists on browsing the Net in search of any information or resources that his client demands. He has

developed the search engine for *El Centro Cervantes* in Spain, and has a strong reputation among journalists, semiologists and professors for being able to find any sort of information as long as it exists.

Mateo Conde spends the night in cyberspace, when the number of Internet users decreases and the speed of the communication is faster, and sleeps during the day. His profession, and indeed his entire lifestyle would not be possible without the existence of cyberspace (El País Semanal 2000: 48).

6. Reconsidering the Question

The real face and the mask get confused in a mirror's reflection.

(Séneca).

Having considered the use of IRC as a means of constructing VR personae and as a tool to reaffirm PR self identities, it would seem there is a profound contradiction between those who claim that cyberspace is a reflection of the PR social relations (e.g. Schefield 1998: 180) and those who claim that it is a revolutionary medium that allows us to free ourselves from the physical constraints of our self-identity (e.g. Heim 1991: 71).

In PR interaction, physical presence and body language are of great importance. Identity is considerably stable within each frame, or context, and categories of identity such as gender, age or nationality tend to be, not only clearly demarcated, but also elements that condition how we perceive ourselves and interact with others.

In IRC interaction, the physical presence is inexistent and bodily language is substituted by emoticons. Identity is very redifinable and potentially volatile, and categories of identity such as gender, age or ethnicity tend to be used as an excuse for playful experimentation or even to conceal PR self-identities.

For many users, this paradoxical nature of the interaction in cyberspace has given rise to existentialist worries and confusion about who one is in VR and who one interacts with. "How does an individual maintain existence in cyberspace? Who are we when we are online?" (Jones 1998: xvi).

[Chat room #rudos 25 April 1996]

<Weasel> In reality, I don't know you. I am not really talking to you. I am only talking to a nick.

Ninety nine percent of all encounters on the virtual community where Stenger carried out her fieldwork never led to an actual meeting (Stenger 1991: 36). But when an actual meeting does take place in PR between people whose relation originated in VR, how are these seemingly opposed spheres and the identities constructed in them harmonized? What are the implications of transferring a relation from VR to PR, or from VR to PR?

When asked about their own experiences in this respect, certain users affirmed not to perceive any difference whatsoever between their relations and identities in VR and in PR. For these users, cyberspace is, as claimed by Schefield (1998: 180), a reflection of their PR social interaction and a powerful tool of communication more than a world in its own right.

Interviewer: So, what is the difference, do you think, between meeting someone in the chat room and dating someone in person?

Michael: Well, when you're dating somebody and it seems like, you're more looking at them, but when you're like, chatting to them, you can't see them, but you can get that trust going on with the person, and you can really get to know them before you see them. And if you know them before you see them, you'll like, even if they don't look physically attractive to you, you'll still like them, because you know them and you have a lot in common.

(cited in Schefield 1998: 167).

In the chat room #cristianos (Undernet), Alberto_ described the gathering of members of the virtual community carried out in the Dominican Republic several months before our conversation as a wonderful experience. He had the chance to meet in person with many good friends from the virtual community whose physical appearance he could not even imagine. When asked about the implications of transferring the interaction from VR to PR and whether he felt any difference in the identity of his friends with respect to how he knew them in VR, Alberto_ answered that the concept of knowing a person, whether it is in VR or PR, is relative:

[Chat room #cristianos 28 January 2001]

<Alberto_> There is a girl I know who lives an hour away from my home. She sometimes joins the chat room, but we hardly ever talk.

<Alberto_> You see… we live so close by, but we hardly know each other.

<Alberto_> The friends I met in the Dominican Republic were just like the people I knew here, in #cristianos. They were the same.

<Alberto_> Day by day you keep talking to the same people here, making good friends and getting to know each other well.

<Alberto_> In #cristianos there are lots of *real* friends.

(Italics mine).

On the other hand, it is not infrequent to find among IRC users, people who perceive their interaction in VR as completely alien to the sphere of the PR. Some attach a great importance to concealing their PR identity, or even protecting their virtual identity from PR 'contamination'. Elizabeth, a member of a teenage chat room community, describes how she decided to terminate a relationship owing to the fact that the boy she interacted with in IRC attended a neighbouring school. "We started comparing notes about who we knew in each others' schools. But I didn't want to meet him, or someone from my own school, because then what if I know who he was in person and said something mean about me, I'd be like, hurt" (cited in Schefield 1998: 169).

In certain cases, users discover that the identity of the person they interact with in IRC does not coincide with the way they perceived him/her when the relation is transferred to the PR. Azucena24 describes how a relationship that started as a passionate affair with an Argentinean man ended up in complete failure after she met in person with him for the first time:

[Private 03 March 2001]

<Azucena24> He was an Argentinean man from #rudos

<Azucena24> I spoke with him in IRC for about six months

<Azucena24> and then we decided to meet up in Miami.

<Azucena24> We were very much in love

<Azucena24> but, when we met, all the attraction suddenly disappeared.

<Azucena24> He was… too serious.

<Azucena24> In IRC he seemed nice.

<Azucena24> He was more charismatic and sexy

<Azucena24> but when we met in real life he was too boring.

<Azucena24> After that it was too hard to keep the relationship alive.

In a similar way, transferring social relations from PR to VR might result in the feeling that the new medium distorts the original relation and the identities constructed within it, or precisely the opposite—that it enhances the interaction and allows us to inquire into the 'real' identity of the other party in a deeper way.

Pcit, in #rudos, affirms that communicating with his sister in IRC has contributed to him knowing her better as a result precisely of what other users might consider drawbacks of IRC social interaction:

[Private 07 August 1999

<Pcit> Here she doesn't see my face, I'm not really there, so it's like she's not afraid of telling me things that she wouldn't say in my face.

<Pcit> Also, I can't see her gestures, or the way she uses her hands when she talks, so she expresses things better in the way she talks to me in IRC. She's not as ambiguous here.

Tula's experience, by contrast, is more in line with McLuhan's "the medium is the message" (McLuhan 1964). For her, speaking with her boyfriend through IRC is "different." She affirms that his character and personality change in IRC. She perceives him as distant and "less of a person," and does not find IRC an appealing medium.

Sometimes, a person's online persona becomes so finely developed that it begins to take over his/her life off the net (Allucquere 1991: 82). A particularly illustrative example of the paradox between PR and VR self-identities in IRC is the case of Lambda, from the community of #rudos. Lambda interacted in #rudos for several years with an elaborate virtual self-identity that she used to conceal her PR identity. Lambda would refuse to give any PR information in the chat room such as city of origin or real name. Moreover, very few users in #rudos had access to her digitalised photo. After some time of absence from the community, Lambda returned with a new nick and the aim of expressing her PR self-identity to certain members of #rudos. This implied her having to interact with a new identity and others having to assimilate it and accept it. Thus, Lambda admitted being of a different age from the one she had previously suggested and contradicted many other elements that she had previously used to construct her cyber-identity.

For Goffman, revealing internal secrets, particularly if they contradict the presentation of the self that a party had previously used to construct its identity, is a destructive information (Goffman 1969: 143). The disclosure of different types of secrets about the self threatens the situation that its performance fosters.

In #rudos, after so many years interacting with Lambda's virtual identity, certain users found it difficult to assimilate her new PR identity. In fact, some kept addressing her by her previous nick. In a way, Lambda found herself in the frustrating situation of being trapped by her virtual identity when what she really wanted to express was her PR self-identity. She could not find an effective way of disentangling herself from her previous self and interacting in the chat room as the person she wanted to be.

"How much of one's day does someone have to spend 'playing a game' before it is fair to call it a 'life'? How deep does a relationship with another 'player' have to be before s/he can be called a spouse?" (MacKinnon 1964: 232). More than with well-defined, unambiguous categories of identity, in cyberspace we are dealing with multiple levels of identity that might eventually give rise to representations of the representation of a representation. PR and VR identities do get confused sometimes, and the barrier (if we can talk about such a barrier) between reality and virtuality is often blurry. It would seem to us as we delve deeper into ethnographic fieldwork in virtual communities, that the distinction between the roles of cyberspace in the construction of VR or PR self-identities is not as clear-cut as many academics have suggested.

7. VR Collective Identity

<CoCoBoNgO> *que pex, la raza de rudos!* (Whazzup, race of rudos!)

[Chat room #rudos 23 July 1997]

The processes of identity formation in IRC seem at a first sight to be moulded exclusively by each user's nontransferable decision at a very personal level. "In cyberspace you can be whoever you want to be. You can completely redefine yourself if you want" (Danet 1998 136). Indeed, it is the user who decides the nick, the attitude and identity that s/he wants to adopt in cyberspace. However, it is only within the community or interaction with other people that this identity is validated and given meaning. For Jenkins, what people think about us as individuals is no less important than what we think about ourselves. It is not enough to assert an identity. That identity must also be validated (or not) by those with whom we have dealings. Social identity is never unilateral (Jenkins 1996: 21).

The individual identity, whether in a virtual medium or in PR, is created in a social context, not in a vacuum. Thus, Lambda's attempt to redefine her identity deeply affected, not only her interaction with others, but also the collective identity of the entire community in #rudos, to the point that some users refused to address her by her new nick. When an individual appears before others, s/he knowingly or unwittingly projects a definition of the situation, of which a conception of him/herself is an important part. When an event occurs which is incompatible with this fostered impression, significant consequences are simultaneously felt at several levels of social reality. Social interaction between two parties or between an individual and his/her community, for instance, may come to an embarrassed end. The interaction may cease to be defined and previous positions may become no longer tenable. Moreover, the reputation or role

of the collectivity might be affected by the incompatibility in the identity of one of its members. Audiences tend to accept the self projected by an individual performer during any interaction as a responsible representation of his/her colleague-grouping, of his/her team and social establishment (Goffman 1969: 235).

Self-identity and collective identity are thus intricately interconnected. The collective identity validates the self-identity, and the self-identity contributes to moulding the collective identity. This symbiosis between the individual and the collective in #rudos is such that the members of the community have even personified the bot of the channel (W) as an old, ugly lady, and refer to her as "la gorda" (the fat lady), with 'her' own place and social role in the community.

A community is, in the words of Fernback (1997: 38), "a bounded territory of sorts (whether physical or ideological) as well as a sense of common character, identity or interests." The first virtual communities emerged in the 1970s as Bulletin Board Systems, or BBSs. These systems depended on individual computer terminals connected to a closed network. It was the Community Tree Group, regulated by John James and Dean Gengle that developed the idea of BBSs as potential electronic communities that could eventually transform social life and give rise to new social forms (Finquelievich 2000). With the spread of Internet, community formation in virtual media has flourished at a vertiginous rate and the Community Tree Group's prediction of virtual communities giving rise to new social forms has been proven not to be misled. Today, certain anthropologists and sociologists consider the collectivity of cyberspace users as a community in its own right, and refer to its members as cybernauts or netizens (Pickard 1998). Jones defines cybersociety as "the new social form originated by the rise of CMC technology" (1998). For Benedikt, Internet has given rise to its own distinct culture, which he refers to as cyberculture. "Cyberculture is the culture of and in cyberspace" (Encyclopaedia of Cultural Anthropology 1997: 306). But, is there such a thing as the culture *of* cyberspace? Some scholars not only do not doubt that there is a homogeneous, monolithic culture embraced by all cyberspace users, but also affirm that this cyberculture is a possible threat of dissolution of cultures, of homogenisation, a great syncretism of many cultures into one that has no nation or territory but exists in a virtual environment (Poster 1998: 185). In the words of Fernback, "there is a *collectivity* of CMC users. This collectivity is driven by the principles of democracy and egalitarianism in its use of CMC. […] There is a virtual ideology in cyberspace which is collectivist in orientation" (1997: 46, italics in original).

On the contrary, following Liebniz, we could describe the social organisation of cyberspace based on the model defined as *monadology* (from the Greek monas—unit).

For a network to exist, more than one unit (in this case, independent virtual communities within the broader world of cyberspace) must exist. Otherwise, there is nothing to be networked (cited in Stenger 1991: 71).

Denying the existence of cyberspace as a distinct sphere with its own particularities or even its own logic, would be difficult. What is more difficult to sustain, however, is the idea that cyberculture is a homogeneous cultural body. There is no such thing as a typical cyberspace user today as reflected by Gibson in Neuromancer (1984). There are no blue neon lights, no consensual hallucination, no unique ideology or aesthetic criterion embracing the totality of cyberspace users. Among CMC users, there are several distinct cultural groups. Within these groups it is possible to recognise even further identity divisions. Far from being a monolithic culture, cyberspace is shaped by a series of overlapping circles of identities and collectivities.

Patt and Black, and GusTaf and Pop, for instance, are all members of the community of #rudos. They all share this collective identity and would join forces against an 'enemy' chat room such as #insultos. However, in a different context, Patt and Black (Mexican) would stand against Pop and GusTaf (who are Peruvian) and pick on them because of their difference in their collective national identity. Any one collective identity does not preclude another one. To further illustrate our point, a member of #insultos might eventually sympathize with a member of #rudos when put together against a user of the server Dalnet, instead of Undernet, despite the fact that #rudos and #insultos are traditionally enemy chat rooms.

Certain academics take the argument to extremes, and affirm, not only that there is no such thing as a homogeneous cyberculture, but that there is no such thing even as a 'real' sense of collective identity within virtual communities at all. Jenkins (1996: 27), argues that "social continuity needs the positing of a meaningful past or history. Social identities are in themselves one foundation upon which order and predictability in the social world are based." The usual absence of a recorded history or of any order and predictability has been used by some scholars to deny the existence of cyber-*communities* as such and of a virtual collective identity that distinguishes the members of a virtual community from others. Widdicombe, for instance, affirms that "there are shallow reasons for affiliating with a virtual group—the related identity may thus be regarded as inauthentic" (Widdicombe 1998: 65). For Schefield, the teenage chat room of her research was merely "a gathering of unconnected individuals, seeking others (or usually one another) for the establishment of individualistic relationships with a lack of any communal sense of identity" (Shefield 1998 181).

#rudos does have a web page with a section that describes the history and origins of the chat room, but most virtual communities lack this sort of historical record. However,

this does not seem a legitimate reason to affirm that collective identity within cyberspace is inexistent. It would be perhaps more suitable to describe the situation as a different sort of collective identity, more in accordance with the new set of rules that the virtual medium implies than with our traditional notions of community and collectivity.

Indeed, certain users in cyberspace will occasionally deny that they feel any sense of belonging to the chat room in which they interact. However, as expressed by Zimmerman (1998: 87), analysis shows that, in resisting subcultural identity, speakers acknowledge and undermine normative cultural assumptions, by rejecting the category-boundedness of particular attributes and transferring their meanings so that they become expressions and a reaffirmation of a personal identity. This does not imply that the categories or collectivities that these users deny do not really exist. The assertion that there is no such thing as a collective identity exhibited by the users of cyberspace communities is perhaps too precipitated.

During our ethnographic fieldwork in #rudos, an important event occurred in the server Undernet. In December 2000, the official Undernet bots, X and W, in charge of maintaining the social hierarchy and order of all chat rooms in the server, were put out of order by a severe DoS attack[8]. The entire hierarchical system of all the chat rooms in Undernet was eliminated. There were no more legitimate OPs, no more differences in status, no bot mediation in the creation of official ban and ignore lists or the prevention of abuses such as flood. At the time of writing this text, unofficial bots have been introduced in #rudos by the members of the community to reconstruct the social order, but the official X and W Undernet bots have not been yet restored.

In #rudos, the fall of X and W was received with excitement, particularly by the members of the chat room who did not have an OP status, as we would expect. Virtually all users seemed to enjoy the atmosphere of anarchy and lack of control.

[Chat room #rudos 13 January 2001

<Gnomo> Down with the OPs and W! *Viva la anarquia!*

<ana300> *Libertad, Libertad, libertad*…!

When the unofficial bots were introduced in the chat room and the social structure was reconstructed, some users complained about the restoration of the previous order and control, but operators were quite happy to obtain their status back. An important aspect of this unusual event is that, throughout the entire process, no abuses were attempted. None of the members of #rudos seemed to take advantage of the vacuum of power to

[8] Refer to Appendix 4 for a copy of the official letter sent by the administrators of Undernet to all the users.

cause harm or to destabilize the community. Moreover, none of the regular members of the chat room have abandoned the community as a result of the lack of social control. This suggests that, in #rudos, there is indeed a feeling of belonging to the community and a sense of collective identity that are sustained by stronger bonds than those of a computer-based social stratification or the mediation of bots

The sense of belonging to the virtual community in #rudos is sustained by a series of perceived characteristics in common. For instance, in #rudos, most users are native Spanish speakers. Other shared characteristics that promote the cohesion among the members of the community are constructed within the virtual medium itself. According to Goffman, inside secrets are those whose possession marks an individual as being a member of a group and helps the group feel separate and different from those individuals who are not 'in the know' (Goffman 1969: 142). The use of the symbol "+," which in other Undernet chat rooms is used to identify the users who have the right to voice when the channel is set to moderated mode, is known to be among #rudos's regular users a denigrating or insulting mark imposed by OPs to those who they perceive as alien or intruders. Thus, when a new user joins #rudos and s/he is happy to receive a + sign, unaware of its derivative meaning, jokes and excitation immediately arise among the more regular users who do know what the internal meaning of + is in #rudos.

More importantly, collective identity is constructed, not only by what one is, but by what one is *not*. "Members of a community must believe in themselves, their personality, by downgrading their enemies and asserting who 'they' are" (Fernback 1997: 42). By setting themselves in opposition to the chat room #insultos, the members in #rudos strengthen their own collective identity and the links that bond them together as a group. The rules and perceived set of particularities of #rudos are constructed in opposition to the characteristics of other chat rooms:

[Chat room #rudos 23 May 1997]

<Juancho> *Ya dejen de utilizar el ban!* (Stop using the command /ban!)

<Juancho> *Se estan empezando a parecer a los [idiotas] de #mexico, que banean por repetir hola tres veces…* (You are starting to look like the [fools] of #mexico, who ban users just for repeating "hi" three times).

The sense of belonging to a virtual community, however, does not imply that a user will have to adhere to exclusively one community. In fact, the user Bse is accepted as a member of the community of #rudos, but, at the same time, interacts in and is part of the chat room #insultos. Each context, or frame, allows for different sorts of interaction and different feelings of belonging and collective identity. What cannot be denied is

that, in each virtual community, most regular users are much more than “unconnected individuals with a lack of any communal sense of identity” (Schefield 1998: 181). In the words of Paccagnella (1997), “many of the most interesting virtual communities are very proud of their exclusive culture.”

8. PR Collective Identity

> The perfect virtual community is that in which you feel like in your living room.
>
> Idoia López (in El País Semanal 2000: 47)

For Idoia López, director of the virtual community commm.com, the ideal virtual community is that which reflects the sort of interaction and socialisation that would take place in a PR environment. “The perfect virtual community is the one in which you feel like in your own living room” (El País Semanal 2000: 47). “The Net can be a space in which people can reach out beyond their own culture and circle of acquaintances to gather new information and insight that is unavailable to them in their everyday lives” (Velmans 1998: 23), but it can also be an effective medium to strengthen these original social circles and reaffirm the sense of PR collective identity in them.

Poster (1998: 205) perceives elements such as “the smell of food, the intonation of voice, bodily gestures and ways of thinking” as the everyday main building blocks of his Jewish ethnic identity. For Bourdieu, people and their relations are conditioned by their physical and social medium—the habitus. A habitus is a matrix of perception, appreciation and action common to all the members of the same group or class and constituting the precondition for all objectification and appreciation (Bourdieu 1977: 83). The way people act and perceive themselves is linked to a whole system of techniques involving the body and the surrounding material world, charged with a host of social meaning and values (ibid. 87).

In Internet elements of PR such as smells, geographical space, bodily presence and physical traits are inexistent. Does this mean, however, that it is not possible to act collectively in VR in accordance with the ways we perceive and appreciate things in PR? “Anti-semitic writings in Europe referred to Jews as the deracinated people, those without a homeland, without roots in the soil” (Poster 1998: 205). For Poster, “Internet, far from dissolving ethnicity, enables all Jews, wherever they are on the planet, to connect with one another and reaffirm a pre-established ethnic identity” (ibid.). Thus, cyberspace as a medium can allow us to materialize our perceptions and appreciations in PR into actions in the virtual medium. In Poster’s virtual community, Jewish people

found VR as a place to express and reaffirm their PR collective ethnic identity and the way they perceive and appreciate things in their habitus as Jews.

In contemporary America, Frazer asserts that coexisting, public spheres of counterpublics—such as gays, feminists, anarchists and so on—tend to form in response to their exclusion from the dominant sphere of public debate (cited in Fernback 1997: 38) This multiplicity of public spheres is represented in cyberspace, where dissonance is welcome and a plurality of constituent voices is exhibited:

[Chat room #punk 03 February 2001]

<Zionite> *Arriba el punk!* (Hurray the punk movement!)

<Zionite> *Arriba el punk!* (Hurray the punk movement!)

<Zionite> *Arriba el punk!* (Hurray the punk movement!)

In the chat room #cristianos (Undernet), users have found in cyberspace a powerful medium to cohere Christians from different parts of the world and propagate their religious message to others:

[Chat room #cristianos 28 January 2001]

<Alberto_> *#cristianos es un canal dedicado a reunir a creyentes de todas partes del mundo.* (#cristianos is a chat room dedicated to joining believers from different parts of the world).

[Question: What is it that coheres all the users of #cristianos, being from so many different places and social backgrounds?]

<Alberto_> *Se trata del amor a Dios.* (It is about loving God).

<Alberto_> *El amor a Dios es lo que nos une a todos en este canal.* (Loving God is what brings us together in this chat room).

[…]

<Alberto_>*Reunirse en un canal para alabar a Dios tiene muchas ventajas* (Joining in a chat room to praise God has a lot of advantages)

<Alberto_> *porque se comparten cosas hermosas* (because we share beautiful things)

<Alberto_> *y haces buenos amigos.* (and you make good friends).

[…]

<Alberto_> *Aqui todos somos sinceros* (We are all sincere here).

<Alberto_> *porque, si te acuerdas, de los diez mandamientos, dice NO MENTIRAS.* (because, if you remember the Ten Commandments, it says THOU SHALT NOT LIE).

<Alberto_> *Entonces hay una confianza y una union tremenda.* (Therefore, there is a great deal of trust and unity).

Far from the "homogenising tool that threats with the creation of a great syncretism of many cultures into one that has no nation or territory but exists in a virtual environment" (Poster 1998 185) feared by some, cyberspace can be an effective medium for the reaffirmation of a pre-established collective identity by providing a virtual space in which users join a chat room to share their perceptions and appreciations and *inter-act* accordingly.

9. Conclusions

> In modern everyday life, it is difficult (and becoming impossible) to definitely classify experiences as 'real' or 'not real'; it is more helpful to determine the degree or 'accent' of reality in an event. The frames we once used, conceptually, to set the real apart from the unreal are not as useful as they once were; they are not as sturdy; they betray us. As they become even more fragile, we require new concepts and understandings.
>
> Mary Chayko 1993: 172

William James, in his famous chapter 'The Perception of Reality', first published as an article in *Mind* in 1869, instead of asking what reality is, gave the matter a subversive phenomenological twist, italicising the following question: '*Under what circumstances do we think things are real?*' (cited in Goffman 1997: 2). Within the reflexive model of the perception of reality, the physical world as-experienced is part of the contents of consciousness (Velmans 1998: 56). That is to say, the truth is *not* out there, but in our mental processes, in the ways we, as individuals, perceive the reality. Once we perceive and interpret this reality, it makes no further sense to split the physical reality from the psychological reality.

To what degree is it appropriate to ask ourselves whether interaction and identities in cyberspace are virtual or real? In our predominantly materialist culture we take it for granted that the physical world is 'real'. Often, we are presented with black and white arguments indicating that a choice has to be made between the virtual and the real, however, it would seem obvious that "the most common of the commonalities in both real life and virtual life is that they are peopled by people" (Pickard 2000). It is thus people who give true meaning and 'reality' to their interaction. "It should not be taken that people passively or latently have this or that identity which then causes feelings and actions, but that they work up and work to this or that identity, for themselves and others" (Antaki & Widdicombe 1998: 2).

In practice, CMC interaction is not so much a process of defining clear-cut categories, or delineating unambiguous distinctions between the virtual and the real. Hollis reminds

us that the notion of the role (or the persona) is not so clearly divorced from that of the self as the image of the mask suggests in our secular age. “The relation of actors to the characters they play does not yield an easy distinction of men [sic] from masks” (Hollis 1985: 218). Not only can we not take the development of the self as the result of a linear evolution from the notion of the role to the notion of the person and the *moi*, as expressed by Mauss (1985), but we cannot either affirm that, today, the distinction between the person and the persona is crystal clear. “Do not expect to keep your old identity: one name, one country, one clock. […] In cyberspace, multiplied versions of yourself are going to blossom up everywhere” (Stenger 1991: 50).

Realms of being are the proper objects for study. ‘Real life’ or ‘everyday life’ are not special domains to be placed in contrast to others, but merely other realms. “Each subworld has its own special and separate style of existence, and each world, *whilst it is attended to* is real after its own fashion (Goffman 1997: 564, italics in original). As we delved deeper into our ethnographic fieldwork in cyberspace, it became increasingly evident that the original question—of whether the Net is a means of reaffirming the identity of our PR or, by contrast, a world in its own right that allows for the creation of virtual identities—was misled.

Social identity is nothing else than our understanding of who we are and who other people are, and reciprocally, other people’s understanding of themselves and others (which includes us). Social identity is no more essential than meaning; it too is the product of agreement and disagreement, it too is negotiable (Jenkins 1996: 5).

This reasoning, although providing a satisfactory answer to the apparent contradiction between PR and VR identities in cyberspace, leads us to another problematic issue. If we take identity to be completely negotiable and reality nothing else than a mental process, how do we succeed in interacting efficiently with others? The individual could be easily ‘wrong’ in his/her interpretations, that is, misguided, out of touch, inappropriate, and so forth (Goffman 1997: 26). Instead of ‘*Who* are we when we are online?’ (Jones 1998: xvi), the question thus transforms into ‘*How* can we be when we are online?’

For Antaki and Widdicombe, “discourse identities are integral to the moment-by-moment organisation of the interaction” (1998: 90). Participants assume discourse identities as they engage in the various sequentially organised activities: speaker, listener, story teller, story recipient, questioner, answerer, and so on and so forth. In initiating an action, one party assumes a particular identity and projects a reciprocal identity for co-participants (ibid.). Discourse identities emerge as a feature of the sequential organisation of talk-in-interaction, orienting participants to the type of activity underway and their respective roles within it. An example of this fluid re-adaptation of

roles and identities can be found in what Goffman refers to as the transfer of a presentation of the self to the 'backstage', (Goffman 1969: 168). In a backstage, the person represents a different face of his/her self, more in accordance with the new context of the interaction:

[Private 09 July 1999]

<Lea24> *Iba a decirte algo, pero no… mejor olvidalo* (I was going to say something, but no… never mind, just forget it).

<Lea24> *Se me habia olvidado que estabamos en privado. El privado es el privado y el canal es el canal.* (I had forgotten we are in a private window. The private is the private and the channel is the channel).

Goffman asserts concerned that this fluid re-adaptation of roles confronts us with the "embarrassing methodological fact that the announcement of constitutive rules seems an open-ended game that any number can play forever" (1997: 6). Indeed, this is the case—discourse identities are constantly shaped by the moment-by-moment organisation of the interaction," as described by Antaki and Widdicombe (1998: 90). However, far from posing embarrassing methodological problems, this view throws light on the processes of identity formation and makes clear that it is fruitless and vain to attempt to create a typology of frames, or contexts, because, when one engages in social interaction, the number of frames or contexts that we can construct are only limited by our willingness to accept them and validate them (or not).

The key to interacting and communicating effectively, whether in PR or in VR, lies in considering the context that we construct with others to host our interaction—in arriving to a consensus over what frame of interaction we are using, the identity that each party wants to adopt, and the identities that each one is willing to validate, whether it is a VR identity in PR, a PR identity in VR, a PR identity in PR, or a VR identity in VR.

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APPENDIX 1

Glossary

Bot: Short for "robot". A bot is an interactive script or program that runs inside an IRC client or another program connected to an IRC server. X and W are the official bots for the server Undernet.

Chat Room: a.k.a. channel—the virtual space in IRC in which communication and social interaction take place between several users and virtual communities are established. (See *query*).

Client: A software package designed to provide a method of connecting to an IRC server.

Clone: One of two or more nicks in the same IRC server under the control of one user. Clones are created quite simply by opening several IRC connections through one server.

CMC: Computer Mediated Communication—any form of human communication that takes place through the use of computers.

Cyber-anthropology: The study of humans in virtual communities and networked environments.

Cyborg: A self-regulating human-machine hybrid in which the machine parts become replacements which are integrated or act as supplements to the organism to enhance the body's power potential.

Cyberpunk: The social category and body of fiction built around the work of William Gibson and other writers, who have constructed various visions of the future worlds of cyberspaces, with all their vast range of technological developments and power struggles.

Cybersex: The sharing of sexual fantasies between two parties through CMC. In certain communities, cybersex has similar social implications to engaging in sexual relations in PR.

Cyberspace: a.k.a. Matrix. The on-line virtual world of computer networks.

DoS Attack: Denial of Service Attack—a technique used to attack a system and crash it. When a system is hit by a successful Denial of Service attack, the machine is usually rendered inoperable for a period of time and the user is denied the service the machine was either offering or using.

DCC: Direct Client to Client—a type of connection in IRC between two users that bypasses the use of channels, providing a direct link for the exchange of any sort of data or communication.

DNS: Domain Name Server—the alphabetical equivalent of the numerical IP. For example, the DNS for *129.234.122.58* is *aidan-08@dur.ac.uk*.

Emoticons: a.k.a. smileys—the expression of emotional feelings through the use of characters, numbers and symbols from the keyboard.

Flood: Any large amount of data purposely or unintentionally sent to other users that might eventually cause a disconnection from their IRC server.

Hacker: One who is proficient at using or programming a computer or who illegally gains access to or enters another's electronic system to obtain secret information or steal money. Anthropologists and sociologists often refer to the Hacker culture, or sub-culture.

IP: Internet Protocol—the protocol running Internet and other computer networks. It is the most widely used computer interconnection protocol. Internet addressing is based on the IP, which is expressed through a numerical value.

IRC: Internet Relay Chat—a multi-user, real-time communication software based on a client-server model.

IRCop: An IRC user with an OP status that has validity throughout the entire IRC server, not only in a specific chat room. IRCops are in charge of listening to all users' concerns and preventing any illegal activities or abuses in IRC.

Netiquette: The etiquette governing communication on the Internet.

Nuke: A malicious application that sends OOB (out of Band) data to a particular port in another user's Windows OS, causing his/her computer to hang. Nukes include many forms of DoS attacks.

OP: Operator—any user who has a status in a chat room with a numerical value ranging from 1 to 500 that grants him/her the possibility of performing special commands and managing the virtual community.

PC: Personal Computer—a general-purpose computer equipped with a microprocessor and designed to run especially commercial software for an individual user.

PR: Physical Reality—according to Velmans (1998), the reality that exists independently of the observer, extended in space—in the world. It has tangible properties such as mass and solidity. Physical Reality replaces what has traditionally been referred to as RL (Real Life). (See *VR*).

Query: a.k.a. private window—the virtual space in IRC in which communication ad social interaction take place on a private, one-to-one basis. (See *chat room*).

Script: A program code designed to complement and enhance the possibilities offered by an IRC client. Certain scripts focus on illicit applications used as bellicose IRC tools to illegitimately get control of a chat room or to disrupt the connection of other users. Other scripts focus on defensive tools, on user-locating mechanisms, or games and pastimes.

Server: A computer in a network that is used to provide services to other computers in a network. The IRC *server* for channel #rudos is Undernet.

Social Engineering: Among hackers, the interaction with others adopting a particular pose, or role, with the aim of obtaining information or services. This role is defined by Goffman as the development of a strategic secret (1969: 141).

Voice: The capacity of a user to send text to a particular chat room and participate in it. This right can be denied to a specific user by channels OPs as a sanction or an expression of hostility.

VR: Virtual Reality—an artificial, interactive environment which is experienced through sensory stimuli provided by a computer.

Wingate: A multi-protocol proxy server and general purpose Internet connectivity tool. An Internet connection through Wingate will conceal our DNS and IP address to other users.

APPENDIX 2

An Introduction to IRC

The format of IRC is similar in many aspects to a playwright's script. Each line of text begins with the user's nickname (nick, or alias) and is followed by the text the user wishes to broadcast to other users. As the conversation progresses, each line of text rolls off the top of the computer screen to make room for the new lines of text being transmitted through the bottom of the screen (Shaw 1997: 134).

In IRC, most people are 'regulars' of a chat room and adopt a defined nick, although this can be changed at any time by performing the command */nick [new nick]*. In addition, one can belong to more than one chat room, speak simultaneously in more than one chat room and engage at the same time in private conversations and open chat room conversations.

Chat rooms, or channels, are virtual communities formed by several IRC users. These communities can be registered with the administrators of their corresponding IRC server (and therefore considered official, recognised chat rooms), or simply improvised, non-registered chat rooms. It is not possible for two chat rooms to coexist in one server under the same name, though. Registering a chat room will therefore consolidate its identity and presence, and prevent other users from establishing homonymous communities.

In private windows (or queries), conversation takes place in a private, one-to-one basis. Chat rooms, however, are potentially open to any user that wishes to join in. The social organisation of these communities is complex. A number of users in the chat room are assigned a status with a numerical value that grants them a series of rights within the community. These users are known as operators (or OPs). Thus, the founder of the chat room has the highest OP status—God status (500). S/he has the possibility to manage his/her chat room as s/he wishes and to grant other users lower OP statuses (ranging from 499 to 1).

OPs in IRC have a wide range of possibilities—they can, for instance, kick a user out of the chat room, ban him/her from the chat room for a certain period of time, set the topic of the conversation, limit the number of users that can enter the chat room at once, invite users from other chat rooms and even prevent a user from sending any message to the chat room whilst being in it.

These actions and others are carried out through the use of commands.[9] Two commands of particular relevance to us are */dns [nick]* and */whois [nick]*, both of which can be performed by any user regardless of his/her status. */whois [nick]* will display on

our screens broader information on the individual identity of a user. In theory, this includes the server the user is connected through, the chat rooms s/he is participating in, the user's real name, and his/her IP number:

sara1 is ~sin@194.204.248.83 * Mon nom
sara1 on #beauce #quebec #montréal #paris #maroc
sara1 using Flanders.Be.Eu.Undernet.org Planet Internet, Vlaanderen
sara1 End of /WHOIS list.

In practice, however, users decide which information they want to make available, and whether they wish to make it appear as part of a PR identity, or a VR identity. Thus, sara1, on the example above, has chosen not to include his/her real name in the */whois* information, and has substituted this information by the phrase *Mon nom*.
The command */dns [nick]* will display on our screen the DNS (Domain Name Server) and the IP Number (Internet Protocol Number) of a particular user. The DNS and the IP can be used as fix, standard tools to locate and identify a user throughout the Net regardless of his/her nick, chat room, server, or any other volatile information. In practice, however, it is the user once again who decides whether s/he wishes others to have access to this information or not. Logging on to IRC through a Wingate connection, for instance, will conceal our real DNS and IP Number and substitute them by new, unrecognisable ones.
In IRC, commands like */whois*, */dns*, and many others can be combined with the use of a script. A script is a program designed to complement and enhance the possibilities offered by an IRC client. Certain scripts focus on illicit applications such as nukers and flooders, used as bellicose IRC tools to illegitimately get control of a chat room or to disrupt the connection of other users. Other scripts focus on defensive tools, on user-locating mechanisms, or games and pastimes.
The intermingling of IRC and script commands with traditional day-to-day speech has given rise to a very particular use of the language in IRC. Thus, whether we are speaking in English, Spanish, Russian or any other language, TIA will always mean "Thank You in Advance." BFN will stand for "Bye For Now," LOL for "Laughing Out Loud" and ROTFL for "Rolling On The Floor Laughing." Moreover, the absence of physical contact and bodily presence in IRC is counteracted by the use of emoticons (from *emotions* and *icons*). Emoticons are the expression of emotional feelings through the use of characters, numbers and symbols from the keyboard. The emoticon **=)** for

[9] See Appendix 3 for *A List of Commands*.

instance, represents a smiley face, **=(** a frown, **=o)** a clown, **=”(** tears, **=*** a kiss, and so on and so forth.
Lázaro Carreter (2000) affirms in rather hyperbolic terms that:

[t]his new, succinct and pseudo-universal language that is still in its gestation process, has already threatened our traditional, normal speech. […] As soon as the Internet Language acquires three or four other expressions, it will take over from the idea of Esperanto and be valid to communicate no matter which language we use.

IRC is one of the most versatile and social of the CMCs. The vast amount of commands and options available can be enhanced by the use of specialised scripts. IRC allows the identification and location of other users in various ways, it provides a flexible medium for users to engage in real-time, nick-to-nick conversation in private windows or open chat rooms, as well as the possibility of participating in active social interaction of different types—from the establishment and leadership of a virtual community to the commencement of an IRC war with nukes and flood. These characteristics make of IRC an excellent medium to study processes of identity formation in a virtual environment.

APPENDIX 3

List of Commands

/ Recalls the previous line entered in the current window.
/! Recalls the last command typed in any window.
/action {action text} Sends the specifed action to the active channel or query window.
/add [-apuce] {filename.ini} Loads aliases, popups, users, commands, and events.
/ame {action text} Sends the specifed action to all channels which you are currently on.
/amsg {text} Sends the specifed message to all channels which you are currently on.
/auser {level} {nick|address} Adds a user with the specified access level to the remote users list.
/auto [on|off|nickname|address] Toggles auto-opping of a nick or address or sets it on or off totally.
/away {away message} Sets you away leave a message explaining that you are not currently paying attention to IRC.
/away Sets you being back.
/ban [#channel] {nickname} [type] Bans the specified nick from the curent or given channel.
/beep {number} {delay} Locally beeps 'number' times with 'delay' inbetween the beeps.
/channel Pops up the
channel central window (only works in a channel).
/clear Clears the entire scrollback buffer of the current window.
/clearall Clears all text in all open windows.
/ctcp {nickname} {ping|finger|version|time|userinfo|clientinfo} Does the given ctcp request on nickname.

/closemsg {nickname} Closes the query window you have open to the specified nick.
/commands [on|off] Sets the Tools/Remote/Commands setion on or off or checks its status.
/creq [ask | auto | ignore] Sets your DCC 'On Chat request' settings in DCC/Options.
/dcc send {nickname} {file1} {file2} {file3} ... {fileN} Sends the specified files to nick.
/dcc chat {nickname} Opens a dcc window and sends a dcc chat request to nickname.
/dde [-r] {service} {topic} {item} [data] Allows DDE control between mIRC and other applications.
/ddeserver [[on [service name] | off] To turn on the DDE server mode, eventually with a givem service name.
/describe {#channel} {action text} Sends the specifed action to the specified channel window.
/disable {#groupname} De-activates a group of commands or events.
/disconnect Forces a hard and immediate disconnect from your IRC server. Use it with care.
/dlevel {level} Changes the default user level in the remote section.
/dns {nickname | IP address | IP name} Uses your providers DNS to resolve an IP address.
/echo [nickname|#channel|status] {text} Displays the given text only to YOU on the given place in color N.
/enable {#groupname} Activates a group of commands or events.
/events [on|off] Shows the remote events status or sets it to listening or not.
/exit Forces mIRC to closedown and exit.
/finger Does a finger on a users address.
/flood [{numberoflines} {seconds} {pausetime}] Sets a crude flood control method.
/flush [levels] Clears all nicknames from the Remote/users list that are currently not on your channels.
/font Activates the font selection dialog.
/fsend [on|off] Shows fsends status and allows you to turn dcc fast send on or off.
/fserve {nickname} {maxgets} {homedirectory} [welcome text file] Opens a fileserver.
/groups [-e|d] Shows all (enabled or disabled) groups defined in the remote sections.
/guser {level} {nick} [type] Adds the user to the user list with the specified level and address type.
/help {keyword} Brings up the Basic IRC Commands section in the mIRC help file.
/ignore [on|off|nickname|address] Toggles ignoring of a nick or address or sets it on or off totally.
/invite {nickname} {#channel} Invites another user to a channel.
/join {#channel} Makes you join the specified channel.
/kick {#channel} {nickname} Kicks nickname off a given channel.
/list [#string] [-min #] [-max #] Lists all currently available channels, evt. filtering for parameters.
/load {-apuce} {filename.ini} Loads Aliases, Popups or Remote items into mIRC.
/log [on|off] Shows the logging status or sets it on or off for the current window.
/me {action text} Sends the specifed action to the active channel or query window.
/mode {#channel|nickname} [[+|-]modechars [parameters]] Sets channel or user modes.
/msg {nickname} {message} Send a private message to this user without opening a query window.
/names {#channel} Shows the nicks of all people on the given channel.
/nick {new nickname} Changes your nickname to whatever you like.
/notice {nick} {message} Send the specified notice message to the nick.
/notify [on|off|nickname] Toggles notifying you of a nick on IRC or sets it on or off totally.
/onotice [#channel] {message} Send the specified notice message to all channel ops.
/omsg [#channel] {message} Send the specified message to all ops on a channel.
/part {#channel} Makes you leave the specified channel.

/partall Makes you leave all channels you are on.
/ping {server address} Pings the given server. NOT a nickname.
/play [-cpqmrlt] [channel/nick] {filename} [delay/linenumber] Allows you to play text files.
/pop {delay} [#channel] {nickname} Performs a randomly delayed +o on a not already opped nick.
/protect [on|off|nickname|address] Toggles protection of a nick or address or sets it on or off totally.
/query {nickname} {message} Open a query window to this user and send them the private message.
/quit [reason] Disconnect you from IRC with the optional byebye message.
/raw {raw command} Sends any raw command you supply directly to the server. Use it with care !
/remote [on|off] Shows the remote commands status or sets it to listening or not.
/rlevel {access level} Removes all users from the remote users list with the specified access level.
/run {c:\path\program.exe} [parameters] Runs the specified program, evt. with parameters.
/ruser {nick[!]|address} [type] Removes the user from the remote users list.
/save [-apuce] {filename.ini} Saves remote sections into a specified INI file.
/say {text} Says whatever you want to the active window.
/server [server address [port] [password]] Reconnects to the previous server or a newly specified one.
/sound [nickname|#channel] {filename.wav} {action text} Sends an action and a fitting sound request.
/speak {text} Uses the external text to speech program Monologue to speak up the text.
/sreq [ask | auto | ignore] Sets your DCC 'On Send request' settings in DCC/Options.
/time Tells you the time on the server you use.
/timer[N] {repetitions} {interval in seconds} {command} [| {more commands}] Activates a timer.
/timestamp [on | off] Sets timestamping on or off for all your conversations.
/topic {#channel} {newtopic} Changes the topic for the specified channel.
/ulist {level} Lists all users in the remote list with the specified access levels.
/url [-d] Opens the URL windows that allows you to surf the www parallel to IRC.
/uwho [nick] Pops up the user central with information about the specified user.
/wavplay {c:\path\sound.wav} Locally plays the specified wave file.
/who {#channel} Shows the nicks of all people on the given channel.
/who {*address.string*} Shows all people on IRC with a matching address.
/whois {nickname} Shows information about someone in the status window.
/whowas {nickname} Shows information about someone who -just- left IRC.
/write [-cidl] {filename} [text] To write the specified text to a .txt file.

APPENDIX 4

Official Message from Undernet Administrators
With Reference to the DoS Attacks

11 January 2001

Notice to our users (updated)

This is an update on the current status of the Undernet IRC network. It is intended to help clarify any confusion surrounding full service disruptions.

This is an official statement from the administration of the Undernet. Any and all communications or information that have been provided prior to this release should be considered personal opinion and not a representation by the administration of the Undernet.org IRC Network. All communications will be made publicly available via this medium.

The X and W service bots continue to be offline. Currently, there is no projected date for their return. In recent days, network resources of U.S. and European Internet service providers (ISP's) who host Undernet IRC servers have been subjected to continued DoS (denial of service) attacks. The sources of these attacks are systems within large bandwidth networks, which have been unwittingly compromised for destructive purposes.

Unfortunately, when an IRC server is attacked, it impacts the provider's ability to carry on normal day-to-day network operations. DoS attacks have been an inherent problem with IRC servers. However, these recent attacks have been so severe, that some providers have terminated their agreements to host IRC servers on the Undernet network. However, this has not stopped the attacks. Some providers continue to be the subject of extensive DoS attacks, even after disconnecting their IRC servers. It appears that the intent of the subject(s) orchestrating these DoS attacks is not only to destroy an IRC network, but also to adversely impact the business enterprise of individual ISP's that have hosted Undernet IRC servers.

These recent attacks on individual Undernet IRC servers have been intense, often in excess of 100 mbps.To demonstrate a frame of reference, an OC-3 line is a 155 mbps data pipe with an average monthly cost of $45,000.00 - $60,000.00. Many of the ISP's hosting IRC servers are utilizing resources of at least a multi-homed DS3 data pipe (45 mbps), costing $18,000.00 - $35,000.00 per month. Most dial-up modems are 56 kbps. 1024 kbps equals 1 mbps.

The Undernet is one of the largest IRC networks, providing real time text based communications world-wide, to over 2.2 million users per week. All Undernet IRC servers are privately owned and operated. The server administrators, who provide IRC network resources without charge to users, have made the Undernet the success that it is.

There are numerous issues that complicate a swift resolution to the current dilemma. To effectively back trace and terminate DoS attacks of this magnitude, the cooperation and assistance of Internet backbone providers is required. To date, providers hosting Undernet IRC servers are working with upstream providers to obtain the needed resources to effectively address this problem. Another difficulty is dealing with the complex laws of many different countries. We are continuing to cooperate with U.S. Federal law enforcement authorities in their criminal investigation.

So what does this mean? At this point, the future of the Undernet and IRC remains uncertain. While providers are currently paying for the resources to provide a free IRC environment, they cannot continue to do so if they suffer substantial losses of business revenue. The destructive actions of a few irresponsible people can effectively remove forever an Internet communication medium that millions of people worldwide have come to enjoy and love.

We are working diligently in attempt to resolve this current dilemma. Your patience and understanding is appreciated during these trying times. We will continue to keep you informed of ongoing developments.

The Undernet IRC network (http://www.cservice.undernet.org/)

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Display Techniques and Methods for Cross-medial Data Analysis

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ABSTRACT

Various kinds of resources (physical, digital, local, far), settings (real and mediated, single or multiuser) and mediating tools are simultaneously active during the interaction with digital environments. In conducting research on human-computer interaction is then vital to work with cross-medial data collections, namely with data which derive from different collection procedures addressing various aspects of the interaction and which are combined according to an overarching methodological rationale. The present paper intends to describe some techniques for the collection and displaying of cross-media data, integrating them with some methodological considerations. Three procedures will be illustrated, namely the split-screen technique, that allows the synchronized visualization of different environments on the same screen; the action indicator augmented display, that allows to enrich the visual recording with signals notifying the occurrence of a particular event; the pentagram, which allows to transcribe multiple sequences of events in their reciprocal temporal relationship. The basic characteristic of these techniques are described and illustratively applied to the interaction with virtual environments.

Keywords: *virtual environments, data collection, interaction analysis*

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1 The need for cross-medial data collections

Over the last couple of decades, the recourse to multiple devices to collect data on a same phenomenon has spread for technical and theoretical reasons. First, technological and ergonomic improvements have produced versatile, affordable devices with friendlier interfaces, so that high skills in computer science or engineering

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are no longer needed in order to operate them. Second, a conceptual preference has developed for studying a phenomenon in the context of its actual occurrence and in its natural appearance, so that different levels (from the detailed operations on a device to the norms regulating an activity type), modalities (from gestures to speech) and components (different resources that actor is working with simultaneously) of such a phenomenon need to be recorded This is particularly true for studies on media usage and human-computer interaction, where participants' action draws on various kinds of resources (physical, digital, local, far), is distributed across different settings (real and mediated, single or multiuser) and operates with different mediating tools. It is then vital to combine multiple means of data gathering and create *cross-medial collections.*.

A research using 'cross-medial data collections' requires a good design strategy in order to be reliable. It is for this reason that qualitative methods are looked at with renewed interest; here, the concern with preserving the structure of the phenomenon under study has made customary the combination of different recording techniques, from videorecordings to field notes, from journals to drawings and pictures. In the same vain, qualitative and quantitative data are often combined in order to obtain a more comprehensive analysis (see for example Gamberini et al, 2003), in a mixed quantitative and qualitative research design, which Creswell has distinguished into sequential ('the researcher tries to expand the findings of one method with another method'), concurrent (the researcher converges qualitative and quantitative data in order to provide a comprehensive analysis of the research problem') and transformative ones ('the researcher uses a theoretical lens as an overarching perspective within a design that contains both quantitative and qualitative data') (2003, p.16). Under appropriate methodological conditions, the use of cross-medial collections sets a new standard of accuracy in research. The possibility of inspecting the original patterns of data repeatedly and of sharing them with other scholars increases the transparency and accountability of the analytic process; the access to several aspects of an event helps highlighting phenomena that may otherwise escape our perception.

The present paper intends to describe some techniques for the collection and display of video-data in the field of human-computer interaction, illustratively applied to the interaction with virtual environments. The approach we suggest for the interpretative analysis of video-recorded events is discourse/interaction analysis, centred on the qualitative examination of action sequences (Heath and Hindmarsch, 2002; Goodwin, 2000; Jordan, Henderson, 1995), which has sensibly influenced the solutions we elaborated. Quantitative analysis, not addressed in this paper, starts from the sequences of human-interface events, namely from the users'operations on the computer interface that can be collected automatically (Fisher, Sanderson, 1996).

2. Some preliminary considerations

Let's demystify two commonsensical believes that may plague a cross-medial procedure, namely fidelity and triangulation.

Still or moving images are taken as objective renditions of the events portrayed. This is easily disconfirmed in the experience of people using images in their own research, well aware that each and every shot requires -at least- a perspective, a framing and the exclusion of some features from the picture (Suchman, 1995). Instead of putting this down to the limitations of the recording system, semiologists (Barthes, 1964), media scholars (Evans, Hall, 1999; Berger, 1995) and visual culture researchers (Walker and Chaplin, 1997; Mitchell, 1994) underline that choices are intrinsic to any image; visual representations, even direct visual perceptions, always need cultural practices and pragmatic resources to be made sense of and are therefore 'interpretations'. Consequently, video images do not provide direct glances on bare events, but are necessarily shaped by specific situation and cultural practices that make them meaningful (Latour, Woolgar, 1986). This may be extended to any other kind of rendition that seems to neutralize the intervention of an arbitrary observer, such as the automatic recording of outputs from a computer system or any analogical representation of a phenomenon, acoustical, psychophysical or similar. Collecting data on a phenomenon does not amount to reproduce it objectively, no matter how many sides of it we try to cover or how 'un-mediated' it looks to us.

Another misleading assumption is that *triangulation* among different sources of data, namely the adoption of several methods for data collection (or several sources of data on the same phenomenon or several researcher in the same project), may erase subjectivity and partiality from the data. To be sure, any scientific endeavor needs to come to terms with the issue of subjectivity and try to handle it in some way. However, sociology and philosophy of science reminds us that we cannot defeat subjectivity, but rather increase intersubjectivity and transparency. Right from the start, when the material is prepared for a subsequent analysis, the natural occurrences are 'domesticated' according to methodological conventions: the transcription of a videorecorded interaction, notwithstanding its emphasis on fidelity and accuracy, is actually the first step of an analytical treatment (Ochs, 1979). Endowed with critical awareness, we can go on to the description of three techniques for collecting and displaying cross-medial data.

3. Split-screen technique

A rich array of modalities of human-computer interactions are available today: 'real' environments augmented with digital information or reachable via telecommunications;

artificial environments overlapped with physical ones or embedded within them; mediated environments for social or individual navigation. A common characteristic of all these settings, authors start to recognize, is that they are partly digital and partly physical, partly artificial and partly real (for example, Hayles, 1999; Kellerman, 2002; Gamberini and Spagnolli, 2002; Spagnolli and Gamberini 2002). In addition, the action they host may intersect the action on other settings, which the person is simultaneously engaged in (Heath, Luff, 2000).

In particular, immersive virtual environments while placing the user in a three-dimensional virtual scenario depend on real, physical aspects as well. On the one hand we have the "real" body, its movements and the events taking place in the physical room hosting the virtual equipment; on the other hand, we have the "virtual" body, its movements and the events taking place in the virtual media. The simultaneous involvement of the user in both mediated and 'natural' environments produces a double source of data for the researcher.

The *split-screen technique* allows to consider the situation in its complexity. In the simplest case, when one user is immersed in a virtual environment, the screen is split into two portions. One half of the screen shows the real environment (figure 1, on the left) with the action performed on the interactive devices (e.g. head mounted display and joystick), gesticulation, talk with other people and so on. The other half of the screen shows what the avatar (or, more generally, the virtual body of the user) is doing in the virtual environment, the feedback received and other events in the simulation.

Fig.1 The split screen technique applied to a single user during navigation in a VE.

The sense-making process (Rosson & Carrol, 2002; Norman, 1986) in which the user exploits the affordances of the environment to structure his/her action is highlighted by the data offered by this synchronized double videorecording of the events. In fact, we encourage not to treat the events in the real and virtual environments as necessarily separate, but to consider them as components of a hybrid setting hosting a unitary course of action. Users' posture and movements, such as head rotation or joystick manipulation, can be directly analysed in conjunction with the events occurring in the virtual environment to understand the reason why they are produced.

We have referred so far to a single user in an immersive virtual environment, but this technique can obviously be "multiplied" to support the analysis of multi-user environments as illustrated in figure 2 where the split-screen technique is applied to a collaborative virtual environment with two participants (Gamberini et al, 2003).

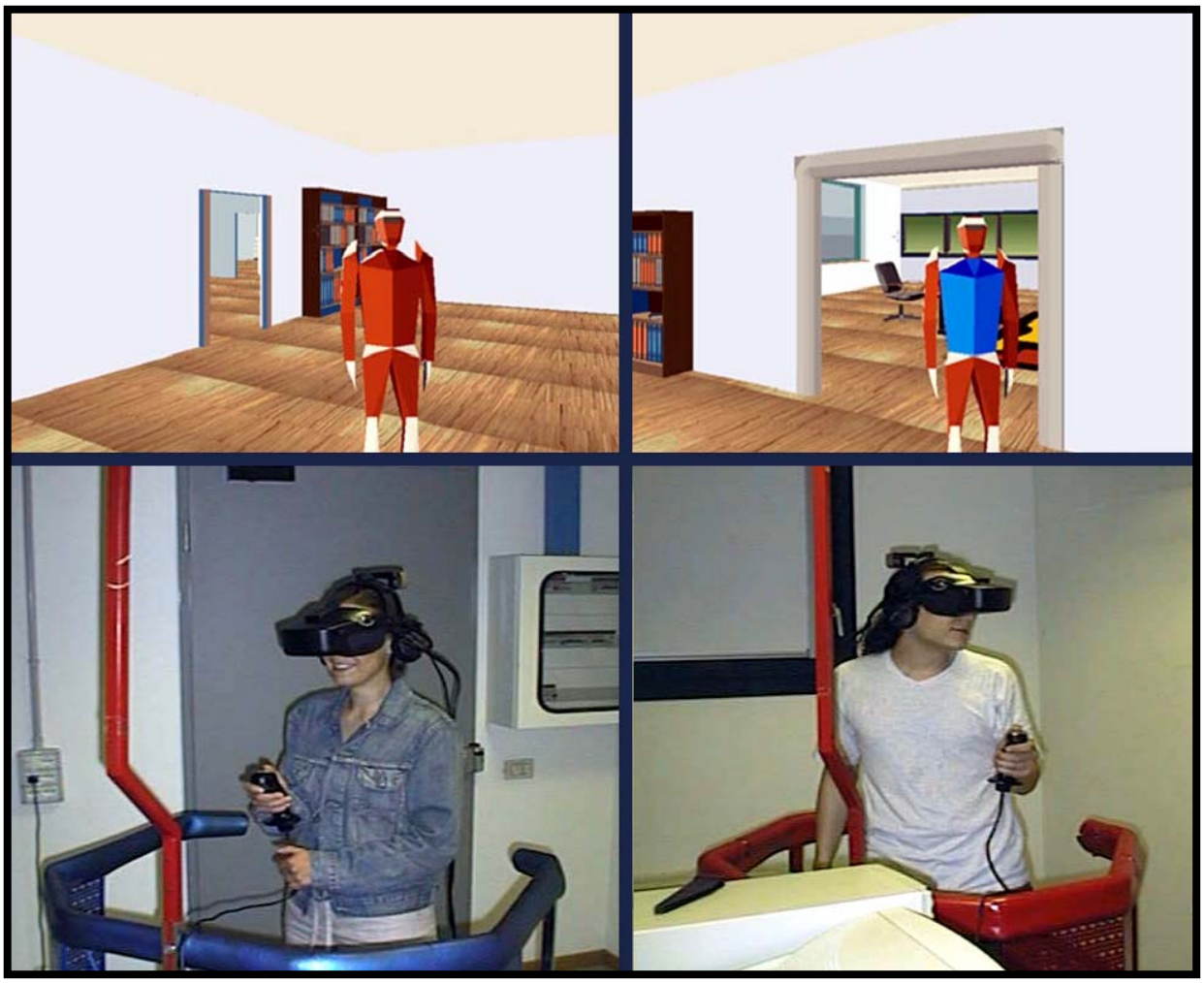

Fig. 2 A split-screen with four synchronized images showing two participants in the virtual and the real environment

Obviously, all video sequences come with related, synchronized audio tracks. The digital recording permits to collect some information on the acoustic events, such as their start, length, source and pattern. We suggest to set separate audio channels for different acoustic sources (for example the talk recorded by the microphones in the physical room and the sound effects in the simulation), so as to facilitate their discrimination during the analysis.

4. Action Indicator Augmented Display (AIAD)

The observation of the events during human-computer interaction may be particularly difficult when participants' actions are too fast and overlapped to be detected by watching them. For example, a rapid sequence of actions on the button of a joystick can be difficult to be captured by observing the hand: quick movements may be irremediably lost, and with them the possibility of a fine analysis at this micro level.
With the purpose of facilitating the analyst's work and eliminating gross misinterpretations on what goes on, we used (Spagnolli et al, 2002) a symbolic graphic indicator, called "Action Indicator Augmented Display" (AIAD). This graphical monitoring system is visualized in a corner of the monitor and is activated by a pre-defined set of participants' actions on the interface. A simple version of it is shown in figure 3, where the movement forward, backward, pause and action on virtual objects are indicated.

Figure 3: An AIAD, at the bottom of the screen, shows an arrow indicating that the button for the movement forward is pressed .

An AIAD can be easily realized by programming a graphical output of any event of interest, such as any avatar's collision against the virtual objects, a head movements, the appearance of particular object in the visual field, etc.: they can be automatically recognized by the program and translated into graphical symbols on the screen. During the interaction each symbol blinks when appropriate, like the arrow in the figure 3 and "augments" the information provided by the images. AIAD output must be synchronized with the flow of events, matched with other automatically recorded data and the overall timeline of the session. Researchers can organize their appropriate AIAD by selecting the events that are most relevant to their study.

5. Pentagrams: representing multiple sequences of events

To analyse simultaneous sequences of events interrelated to each other we adopt a representation rationale called 'pentagram'.

Preliminary, different *kinds* of events are defined, most likely non-verbal events, verbal events, actions on various settings (computer mediated and natural, for example), commentary from the analyst (the commentary is needed because more than one action can be shown in the videoframe). Then the events are are put on a dedicated line in the pentagram, positioning them with reference to a timeline on the top of the pentagram. The beginning and completion of each event is measured in seconds and/or frames, obtained from the video-recorder or the digital viewer; the granularity of the timeline can be changed according to the desired level of details.

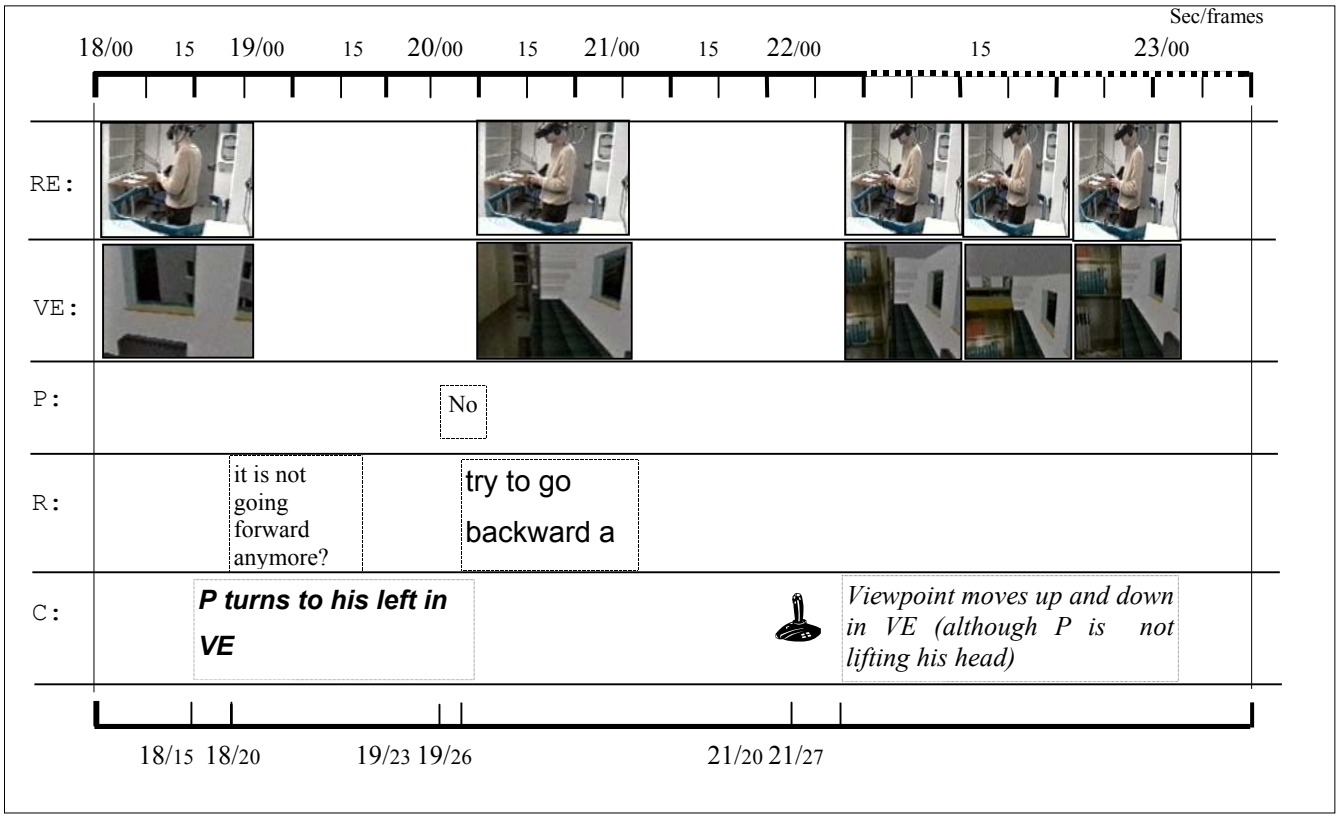

Fig. 4. An example of pentagram for the transcription of cross-medial data; from frame 22 through 23 the granularity of the timelines changes to allow the display of events occurring at a short pace

The novelty of this representation rationale with respect to more conventional transcriptions resides basically in the following aspects:

1. the use of a timeline;
2. the attribution of one line to each kind of events;
3. the equal status attributed to the different kinds of events.

Placing each action on the pentagram with respect to a timeline has many advantages: first, it makes the length and overlap of any event appreciable at a glance; second the space occupied by each action horizontally depends on its actual duration instead of on the verbosity of the description.

When the non verbal events represent the majority of the data, as it is common in human-computer interaction, the use of descriptions, conversation and pictures provides a more fitting representation. The natural organization of the different lines of events is preserved, without privileging the verbal one and inserting any other events

into its architecture, as it is customary in classic transcription techniques. The result is a polyphony of events interplaying with each other.

Measuring each and every action and building the pentagram is however extremely time consuming. The timeline pentagram can be the solution adopted since the very beginning of the transcription or it can be used on selected fragments after a rough transcription of the events has already been outlined, their temporal unfolding and interplay been indicated without precise temporal measures.

Conclusions

In the previous paragraphs we presented the characteristics of three techniques for gathering and displaying cross-medial data. The peculiarity of these techniques is to combine several methods of data collection to address the complex nature of the phenomena under study. The basic structure of each technique can be adapted to specific research goals, provided that a good balance be found between conflicting needs: on the one hand, to develop customary solutions tour particular research project; on the other, to take into account conventions already in use so that other researchers can understand and adopt the solutions we propose.

We purportedly chose to coin the expression *cross-medial collection* instead of using similar ones, such as 'multi-medial or 'multi-modal'. As to the first one, we intended to underline the necessity not only to adopt several devices (as in 'multi-medial') but also to seek a methodological rationale to connect them to each other. As to the second ('multi-modal'), it distinguishes the different data on the basis of their sensorial and semiotic properties (for example visual versus numerical, gestural versus verbal, etc) (Nigay, Coutaz, 1993), while we wanted to distinguish them on the basis of the capturing procedure.

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The EMMA Project: Emotions as a Determinant of Presence

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ABSTRACT

So far, scientific literature has paid attention to the cognitive and environmental determinants of presence, trying to offer a definition and assessment measures that could seize such an elusive concept. However, the emotional determinants of presence have received less attention. Emotional responses could play a key role in generating and enhancing presence, specially for some Virtual Reality (VR) applications, such as mental health field (both for promotion and treatment goals). The main goal of EMMA project –an European Community funded research project (IST-2001-39192)- is to study the relationships between presence and emotions. In particular, after analyzing the possible emotional impact of high compelling synthetic experiences characterized by a high level of presence, the EMMA project wants to develop "mood devices" able to induce different forms of mood enhancement.

Keywords: *emotions, virtual reality, emotional response, presence, EMMA Project*

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1 Introduction

Presence, the sense of "being there", is a complex experience. There is consensus that it is formed through an interplay of raw sensory data and various cognitive processes. However, there are still a number of unresolved issues such as the

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structure of presence, an accepted explanatory model of presence, measuring presence, contributions of determinants of presence, effects of presence, impact of individual differences and social consequences of presence technologies (Ijsselsteijn et al., 2001).

So far, scientific literature has paid attention to the cognitive and environmental determinants of presence, trying to offer a definition and assessment measures that could seize such an elusive concept. However, the emotional determinants of presence have received less attention. Not too much effort has been dedicated to study the relationships between emotions and presence. However, emotional responses could play a key role in generating and enhancing presence.

Emotions affect behaviours and cognitions, and they have an important impact on presence. Users “feel” presence. And as presence is unstable, emotions are also continuously changing. If we are able to understand better presence and emotional reactions to VE, we will be able to design more effective “virtual” experiences. Especially in clinical psychology field, but not only, we need to know how to generate and optimise the emotional impact that the virtual experiences have from a therapeutic point of view.

Over the last 100 years clinical psychology and psychopathology have advanced notably and different useful metaphors have been stated for the understanding of human being. These metaphors had an important heuristic value. At this moment, VR permits us to state a new metaphor. This one starts from the classic notion of “living organism that uses tools”, that is, the use of tools modifies the environment, and in turn, such a modification has an effect on the human being. From this perspective, the psychological subject can be considered as a very complex open system in which not only the cognitive components are central, but also the “wise emotions” (Campbell,1978). This open system is intimately interacting with the “participative universe” (Prigogine & Stengers, 1979), and it is in a continuous process of change. This open system contributes actively to the construction of its own experience. In fact, the observer’s participation produces what is called “tangible reality”, the Universe (Wheeler, 1979). Tart (1990) already pointed out that our “reality” is virtual. We live inside machines which simulate the world, “our machine to know the world”, using the Konrad Lorenz’s terminology (Lorenz, 1977). Our perceptions are constructions, “simulations of the world processes” that allow us to do things. Moreover, VR allows a new way of interaction with the information. As it occurred with the microscope and the telescope, more information is available with this “new sense” for both researchers and users. In short, VR has a notable potential to stimulate the scientific knowledge since it

serves as a model of understanding the human mind; it may provide important keys to understand its anomalies and, from those keys, we can establish solving strategies.

At present, there are some assumptions that have a notable heuristic value, but they are quite elusive, like the conceptualization of *self* established by William James (1890). This author distinguished between *I* and *ME* as two central components of the self. *I* represents the self as "expert/knowledgeable" (the part that organizes and interprets continuously the experience) and *Me* represents the self as "known". James also pointed out the gradual transition between *Me* and *Mine* (everything the individual can consider of one's own: his/her body and ideas, his/her family, house, friends, political party,, …). This aspect allows the consideration of a basic trait of the self, its *extension*. Therefore, the *self* is not an entity blocked and closed to the world, but it is part of the environment and the environment is part of the *self* (Hermans, 1996). The aspect of *process* has to do with the historical nature of the human experience and implies to take into account space and time. The individual lives in a concrete time and space, and from them he/she can be orientated towards the past and future and towards the surrounding world. *Organizational* means that the person is not only orientated towards different parts of his/her temporal and space location, but also he/she connects or organizes those parts into a story or self-narrative. *Valuation* has to do with any unit of meaning in which the events of a self-narrative are organized.

Up to now, the different VR applications have insisted on the convenience of "simulating the reality in the most accurate way possible", but it is the moment to take a step forward and to start the design of "other realities" that represent our deepest fears, illusions, fantasies, ... New realities that user consider very "real" and they feel present in them. New realities that lead us to new processes/stages of evolutionary development. In those realities both users and "the others" could be present (or a part, sketch or trace of them). It is possible to imagine multiple dynamic positions of the *self*, along the development process. The self may move from each of those different positions and also may establish communication and interaction among them. They can be contemplated as characters that adopt an own life inside a story, the self of any position can correspond to other real or imaginary self (protecting father, imaginary friend, loving mother, etc.). From this perspective, the self is understood as a social self in the sense of Bruner (1990), that is, it is a *distributed* self. What is stated is that "I" am not only "here", but also "there" and may act as if "I" were the other.

The FET Proactive Initiative 2002 call on Presence Research Activities, which includes EMMA (Engaging Media for Mental Health Applications, IST-2001-39192) as one of its

projects, pretends to develop novel media that convey the sense of “being there” and expects to obtain a theory of presence thanks to interdisciplinary research.

2 Project objectives

There are two strategic objectives in the EMMA project.

The first one will be to investigate how **presence** mediates or generates **affective and emotional responses**, how emotional responses can be manipulated to control the extent and nature of presence, and how to use presence and emotions effectively in clinical settings. Emotions affect behaviors and cognitions, and they have an important impact on presence. Users “feel” presence.

The second objective will be to design, develop and test different mediated environments, from more traditional to more emerging, and new technologies that generate and enhance presence and emotions.

Regarding well-being issues, EMMA project’s main goal is the investigation of the use of engaging media for the development of non-addictive, mood-stabilizing experiences. In particular, after analyzing the possible emotional impact of high compelling synthetic experiences characterized by an high level of presence, EMMA pretends to develop “mood devices” able to induce mood enhancement on both clinical and non clinical samples. The “mood devices” will provide innovative ways of coping with distressful emotions, that will be better than existing approaches, for different users:

(i) Users who suffer from psychological problems (affective disorders, anxiety disorder, adjustment disorders).

(ii) Users with acute restricted mobility (the emotional mediated experiences that bedridden patients could have by means of mood devices may help relieving their anxieties, reducing their pain, and encouraging them in their fight against diseases).

(iii) General population (relaxation environments through TV or VR; presence-enhanced synthetic environments for entertainment, etc.).

3 Focus on presence

EMMA pretends to achieve a more complete understanding of presence and reactions to mediated experiences. This will help us in creating more effective experiences for emotional learning, that could be useful in many different contexts.

Three distinct types of presence will be studied: You are there, the world is here, and we are together. Regarding subjective presence, some applications could need users BEING there, and BEING NOT here (in the "real" world), but in other ones users could be there and here. Equally, some applications need the virtual world being there, or it may be a mixed in between real and virtual or holographic worlds. The purpose is to create "significant life experiences" that ARE there and thus users can test that reality, and change it. It is like Alice in Wonderland: you can go through the mirror and see the other side of reality, and after that, you can come back. Specifically, EMMA will focus on narratives of abandon, loses, reject, acceptation, collaboration, minusvaloration, fear, and so on. These mediated experiences will be able to induce emotions such as sadness, anxiety, anger, joy, hope, etc., and users will learn to cope with these emotions and feelings. A goal is to create a VR laboratory where "emotionally loaded" scenarios will be designed. Related to that, one purpose is to create a "LIVING BOOK" that would constitute digital shared environments, accessible across a range of media (from fully immersive rooms or environments to textual diary entries), allowing users to build a history of their emotional experiences, but also to live present emotional experiences and even generate new future experiences. Finally, EMMA will also focus on the therapist presence. Users could be always accompanied by a person who trust on, under therapist protection. So it is easier for them to venture to change the world (and change themselves). And not only when users are "in" the virtual environment, but also when they are in the real world, even generating therapist presence using some aspects of therapist (voice, instructions, etc.).

The project is focused not only on generating and enhancing presence, but also on measuring it. The purpose is to measure the "arrival" experience (being in the VE) and the "departure" experience (not being in the physical environment). As the sense of presence is unstable (a moment-by-moment feeling), it would be necessary to design and develop new instruments to measure sense of presence.

4 Design of experiments

Presence is determined by different factors: the medium, the user and the context. Before developing the final applications for different types of users, EMMA pretends to study the potential role of each variable and to identify the factors that affect emotions

in mediated experiences. Specially, it should be determined if it is possible to maximize presence via modification of emotions, or if it is possible to maximize emotions via modification of presence.

4.1 Emotional aspects.

The role that different emotions have on presence is going to be analyzed. At least, three basic emotions are going to be compared with the neutral: joy, sadness and anxiety.

In order to generate emotions in the user, it is required to design emotionally significant environments. The environment that we are going to use is a park with different parts (summer cinema, band stand,…).

The aspect of the park will change depending on the emotion. From the technical point of view, changes in the textures will be made, but also some specific objects or avatars will appear at the park in function of the emotion.

Several mood induction procedures will be used inside the park. They will appear in different parts of the environment. For example, in the band stand, the user will have the possibility of reading and interacting with Velten sentences and images related to the content in the sentences. In the summer cinema, the user will be able to visualize fragments of films related to the emotion. Also music can have an important role.

When the user finishes his/her exposure to the environment, in the case of sad or anxious experiences, some elements of a joy experience will appear in order to recover the user from the negative experiences.

Figure 1. Band stand in the sad park.

Figure 2. Swings in the sad park

Figure 3. Band stand and summer cinema in the sad park.

4.2 Technical aspects.

The role of technical aspects on presence is also going to be analyzed: configurations with different levels of immersion, different devices for interaction and navigation…

Several configurations for visualization will be studied. A stereo projection system will be tried, projecting the environment in a frontal projection screen of big dimensions. This immersive configuration will be compared with other configurations such as a computer with a head mounted display, or a computer with a monitor of at least 17''.

The goal is to analyse the role that immersion has over the level of presence achieved in a virtual environment.

We also pretend to compare the levels of presence achieved in the different immersive technological systems with those achieved in the real world. We will use procedures such as Velten sentences, movies, images in the real world, without the mediation of the virtual environment.

Regarding navigation/interaction we are going to analyse the role of different devices and different paradigms, from more traditional ones (such as mouse or joystick) to more innovative, such as gestual interfaces or wireless devices.

Finally, there are some technological tools that will be addressed due to their possibilities for generating emotional responses. For example, we will use virtual agents, preparing the software developments required to allow the incorporation, in a simple and fast way, of virtual agents in software applications for different hardware platforms. Those virtual agents will be able to talk and gesticulate according to the user's interaction with them in order to generate several emotional responses.

Other tools that will be analyzed will be handheld devices. We pretend to develop software solutions on new mobile computing platforms with wireless capabilities in order to facilitate access for everyone in everywhere situation. The hardware platforms will be centered in PDA, 3G cellular phones and tablet PC using new outstanding natural interfaces like handwriting capabilities, `digital ink`, speech recognition and calligraphic interfaces.

5 Innovation

The result of the EMMA project will allow innovative advances in central aspects for mental health field: new theoretical developments, new research paradigms, and new treatment strategies.

a) Theoretical advances: Although the effectiveness and the utility of the VR (Virtual Reality) applications for the health field have been demonstrated, it is still needed an appropriate theoretical framework that guides the research and allows a larger progress in the future. EMMA project will help us to undertake that framework.

EMMA also will allow to seize the process of extension of the self, and the "narrative" and "dialogal" conception of the self, defined by Hermans as an *organized process of valuation*.

b) A new research framework: EMMA aims at carrying out basic scientific research on presence and reality judgments. Researching on presence and reality judgments may shed some light to discover how we attach reality to our perceptions, cognitions, interactions etc., and especially what go astray in the same metacognitive processes of psychotic individuals. This may allow us to distinguish between psychosis and neurosis, or in a more traditional way, between "craziness" and "normality". Being able to count in psychopathology with a normative theory about reality judgment would help us identify which are the specific execution deficits that have those who suffer from certain problems. For example, it could help us understand basic psychopathological processes as delusions and hallucinations: How does a person with a delusion collect and interpret the information and how does he or she use the evidence to support or disregard his or her believes? How are irrational believes created in sane human beings? On the other hand, from a practical point of view, the understanding of what aspects are altered, and in which way they are altered, could suggest innovative interventions to be used in therapy.

Another innovation is to use VR as a "new realistic laboratory" (Baños, Botella & Perpiña, 1999) where to study behaviors, emotions, thoughts, basic psychopathological processes, individual differences etc.. and emotions. This "realistic lab" will allow to do research with a high degree of validity. It is classic the dilemma between the different types of validity. It seems that we usually sacrifice something regarding the internal or external validity: As a greater control is needed, it seems necessary to turn to the "artificiality" and/or "simplicity" of the lab. The "virtual laboratory" could help overcoming this dilemma creating significant contexts, with high external and ecologic validity, in which certain questions can be tested with a high degree of control and accuracy.

c) New treatment strategies: The purpose of EMMA project is to design and test VR strategies that structure effectively the treatment procedures stated by these theoretical approaches. If the narratives are the essential processes of the construction of meaning, it is possible to make hypothesis about the different idiosyncratic ways to construct the meaning corresponding to different prototypic narratives. In other words, as EMMA project proposes, by means of "mood devices" it will be possible to construct "new vital narratives" with high emotional impact which provide concrete central meanings. This prototypic experiences can be used to activate, correct, structure, and restructure previous life experiences that serve as structural frameworks from which it could be possible the categorization of cognitive processes for future experiences. It is

not only to change the observable behavior, nor change the central cognitive contents that influence the individual functioning, but going beyond, trying to open the door that allows to modify cognitive processes and structures, and activate and modify basic emotional patterns.

6 Conclusions

With the EMMA project, it is expected to achieve a better understanding of presence construct, paying special attention to the study of the relationships between emotions and presence, by means of an interdisciplinary approach.

At the end of the project, it will be possible to understand better the development of some psychopathological phenomena and to develop “new correcting experiences and learning” to cope those psychopathological experiences, with tools that offer richer sense of presence. Since mood disorders are the most common psychological problem in the general population, it will be possible to reach a higher number of persons suffering from psychological problems.

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Optimization of Computer presented Information for left-handed Observer

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ABSTRACT

An experiment was conducted to test the hypothesis that left- and right-handed people – due to differences in the cortical processing of the perceived information — will respond differently if a signal is presented in the left or right peripheral visual zone. Experiments showed small differences between left- and right-handed people that could be partially traced back to differences between their motoric skills.
Differences could be observed depending on the task (identification of letters, numbers, seeing pictograms).
For the lay-out of a display window, however, the differences seem to be too small to justify developing separate screen lay-outs designed for the use of left-handed or right-handed people.

Keywords: *right and left handed, stimuli presentation, software design*

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1. Introduction

It is well known that the two halves of the human brain are differentiating among the tasks they have: in an oversimplified form one might state that the processing of verbal information is done in the left side of our brain. This half-brain leads the right-hand in writing the information. On the other hand the right hemisphere of our brain is normally responsible for perceiving pictorial information. It is usually better in processing images and is responsible for the left hand motoric skills. [1, 5]

Most people are right-handed. About 10 per cent of us are, however, left handed, but we are living in a right-handed world. For this reason some utensils are

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less suited for the left-handed people. Now-a-days, one can get e.g. a pair of scissors designed specially for left-handed users. But what is the situation if cognitive effects play a role, as well? Is the ergonomic design of a computer screen, optimised for the general population, also optimal for the left-handed user, or not. Should the design of a computer display reflect the differences between users, or can we live with a single – right-handed design of the computer screen.

This question might be even more important in educational multimedia applications, as modern pedagogic theory favours to permit left-handed children to stay left-handed and tries to provide them with utensils optimised for their use.

2. Description of the experiments

The fundamental idea we wanted to test was the following: is there any difference in cognitive reactions between left- and right-handed observers if, after working with a normal visual task in the middle of the computer screen, a special task pops up on the left side or the right side of the screen. Is there any difference in experiencing this special task by right- and by left-handed people? We tried to differentiate between tasks

- where the meaning of a sign had to be recognised (identification of letters, such identification work should be performed by the left hemisphere of the brain), and
- where pictorial information was used (perhaps processed primarily by the right hemisphere of the brain).

The experiments were conducted using a PC, with a 19” screen diameter monitor. The angular distance between the task seen in the middle of the screen and on the right or left side was approximately 18°.

Three independent experiments were performed. In all three experiments the observer had first a search task to keep him occupied. Two of these were designed to show different mental loads, one was a letter search task. In the other task, the observer had to make a mental decision. The third experiment was designed to test the image perception of the observer.

The first task was a search task: A printed text was displayed in the middle of the screen and the observer had to search for a particular character in this text, and had to hit the space bar when he/she found the character (see Figure 1.).

After a random time-lapse (this has been recorded together with the number of hitting the space bar) the text disappeared in the middle of the screen and reappeared either on the left or the right side of the screen. The observer had to continue to search for the particular letter from the third paragraph on, and signalled every finding of the letter by hitting the space bar.

The idea behind this experiment was that if there is any difference in processing printed text information by the two halves of the brain, [2] this would manifest itself in the speed of finding the particular letter in the reappeared text. One could speculate that depending on the handedness some differences might occur if a right- or left-handed person performed the experiment.

In the second experiment the primary task was a mental task: In the middle of the screen three digit numbers appeared randomly and the observer had to respond whether the number was even or odd. [3, 4] At the same time, on the two sides of the screen the same picture (photorealistic image) was displayed, as seen in Figure 2. After the elapse of a random amount of time a small part of the image either on the left or on the right side of the picture changed and the observer had to respond when he/she realised the change and on which side he/she realised it. (see e.g. Figure 3.).

The third experiment was quite similar to experiment No. 2, but here the same picture was used on both sides of the screen as the mirror image of one another. In this experiment, the task in the middle of the screen was the realisation of a simple geometric shape. Thus the question was, comparing experiments 2 and 3: is there any difference in the reaction time if the task is a mathematical one (processed primarily by the left side of the brain), or a pictorial one (where the primary processing might be done by the right side of the brain. Figures 4 and 5 show the computer screen image before and after the change occurring on the screen.

3. Subjects

Results of 18 subjects will be analysed in this paper. We selected six absolutely left-handed and six absolutely right-handed subjects and six who can be termed as ambidexter (two-handed). All subjects were young university students. [6]

4. Results of the experiments

In case of all three programmes we collected 20 individual results for each subject, see Tables 1. to 3.

Comparing the averages of all the left-handed subjects with the averages of all the right-handed subjects first a t test was performed (see Table 4. line 4.), followed by a multiple analysis of variance (see Table 5.). The averages were regarded not to be different if, for a significance level of $\alpha = 0.05$, the two averages could not be regarded as different. We found that differences between the responses given by left- and right-handed subjects could be found only if the answer had to be given with the right hand and the task was finding numbers (see t-test, Table 4). In both groups, differences

could be found depending on what had to be searched for (text, numbers or figure, see multiple analysis of variance, Table 5.).

Analysing 1,000 individual results, there seems to be indication that right-handed subjects signal earlier for the text search task if it appears on the right side than the left-handed subjects (see Table 2.). Left-handed subjects signal in average earlier if the change appears on the left-side (see Table 1.). A possible explanation could be that the right-handed person is not so quick using his left-hand than the left-handed person using his right-hand (the programme lay-out was such that if the change appeared on the left side of the screen, one had to signal with the left hand).

The experiment, where odd and even numbers had to be distinguished, contradicts this assumption: for realising that a change occurred in the pictures, right-handed subjects signalled earlier if the change occurred on the left side than when it occurred on the right side (see Table 2.).

According to Table 1, left-handed subjects realise the change on the right side of the screen faster than the change on the left side of the screen if the task is number checking. A possible explanation could be that left-handed people are apt to mix up numbers. It is well known that they easily mix signs being mirror images for each other. Thus it might be necessary for them to take more attention to the number-task, a task occurring in the left side of the brain. Differences could be found only when the task was number identification and answer was given by the right-hand, see t-test, Table 4.

The results for ambidexter (two-handed) subjects resembled sometime that of the left-handed, and some time that of the right-handed subjects (see Table 3.).

Comparing the real left- and right-handed subjects' results (see Table 4.), we can state that at the significance level of $\alpha = 0.05$ the results of the two groups are not different (with one exception). The multiple analysis of variance has shown differences depending on the task (see Table 5 line 4)

The statistical analysis was performed using the SPSS statistics program.

Table 4. shows that the left-handed subjects are slightly faster than the right-handed ones. For all three groups it is common that the longest time is required to search the text task. Identification of the change in the picture needs the shortest time. Thus, as a subsidiary result, we can state that, the use of a pictogram is the best choice to direct the attention of an observer to something on the computer screen. It should be placed on the left side of the screen and should not be mixed with other tasks (texts, numbers, etc.).

5. Conclusions

Experiments conducted up to now show that there is difference between observing different types of information. Both right- and left-handed observers have the shortest reaction time for pictogram observation and the longest for text identification.

Differences between processing of information presented on the left or on the rightside of a screen seems to be smaller than other motoric skill differences. If one is accustomed to observe at a given location one type of information, it is more important to keep that location constant then to adjust it to different observers.

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Table 1 Average results of left-handed subjects in sec/60

left-handed	1	2	3	4	5	6	average
lh-l-text	97,5	63,5	45,6	47,9	64,2	57,88	62,763
lh-r-text	100,8	59,2	48,1	39,1	56,4	60	60,6
lh-l-numb	47	33,11	39,22	42	55	50	44,388
lh-r-numb	42,7	37,5	41	38	47,5	43,75	41,742
lh-l-figure	38,25	34,4	40,88	35,5	41	40	38,338
lh-r-figure	40,77	32,3	39	34,6	41,75	41,1	38,253

Designations:

lh-l-text: lefthanded observer with his/her lefthand answers to the text changing,

lh-r-text: lefthanded observer with his/her righthand answers to the text changing,

lh-l-numb: lefthanded observer with his/her lefthand answers to the number changing,

lh-r-numb: lefthanded observer with his/her righthand answers to the number changing,

lh-l-figure: lefthanded observer with his/her lefthand answers to the figure changing,

lh-r-figure: lefthanded observer with his/her righthand answers to the figure changing,

Table 2 Average results of right-handed subjects in sec/60

right-handed	1	2	3	4	5	6	average
rh-l-text	105,7	56,4	53,8	83,11	48,1	69,9	69,502
rh-r-text	101,5	53	48,1	76,77	57,5	59,9	66,128
rh-l-numb	45,3	37,66	49,33	44,625	50,83	39,8	44,591
rh-r-numb	50,1	43,75	50,25	45,55	61,857	41,25	48,793
rh-l-figure	38,25	32,55	43,125	41	46,77	34,4	39,349
rh-r-figure	41,7	34	49,33	48,33	47,8	37,11	43,045

Designations:

rh-l-text: righthanded observer with his/her lefthand answers to the text changing,

rh-r-text: righthanded observer with his/her righthand answers to the text changing,

rh-l-numb: righthanded observer with his/her lefthand answers to the number changing,

rh-r-numb righthanded observer with his/her righthand answers to the number changing,

rh-l-figure: righthanded observer with his/her lefthand answers to the figure changing,

rh-r-figure: righthanded observer with his/her righthand answers to the figure changing.

Table 3 Average results of two-handed subjects in sec/60

ambidexter	1	2	3	4	5	6	average
a-l-text	95,6	46,8	82,2	58,7	65,6	53	66,983
a-r-text	95,5	46,4	80,3	52,2	63,4	49,7	64,583
a-l-numb	47	39,75	39,4	43,2	41,88	39,5	41,788
a-r-numb	44,62	40,5	37,77	45,33	42,42	42,55	42,198
a-l-figure	34,3	36,11	35,2	40,375	37	37	36,664
a-r-figure	40,2	38,77	37,9	43,77	41	40,1	40,29

Designations:

a-l-text: ambidexter observer with his/her lefthand answers to the text changing,

a-r-text: ambidexter observer with his/her righthand answers to the text changing,

a-l-numb: ambidexter observer with his/her lefthand answers to the number changing,

a-r-numb: ambidexter observer with his/her righthand answers to the number changing,

a-l-figure: ambidexter observer with his/her lefthand answers to the figure changing,

a-r-figure: ambidexter observer with his/her righthand answers to the figure changing.

Table 4 Comparison of results (t-test)

left-handed	average	right-handed	average	significance level
lh-l-text	62,763	rh-l-text	69,501	0,392
lh-r-text	60,6	rh-r-text	66,128	0,435
lh-l-numb	44,388	rh-l-numb	44,591	0,947
lh-r-numb	41,742	rh-r-numb	48,793	0,025
lh-l-figure	38,338	rh-l-figure	39,349	0,599
lh-r-figure	38,253	rh-r-figure	43,045	0,133

Designations:

lh-l-text: lefthanded observer with his/her lefthand answers to the text changing,

rh-l-text: righthanded observer with his/her lefthand answers to the text changing,

lh-r-text: lefthanded observer with his/her righthand answers to the text changing,

rh-r-text: righthanded observer with his/her righthand answers to the text changing,

lh-l-numb: lefthanded observer with his/her lefthand answers to the number changing,

rh-l-numb: righthanded observer with his/her lefthand answers to the number changing,

lh-r-numb: lefthanded observer with his/her righthand answers to the number changing,

rh-r-numb righthanded observer with his/her righthand answers to the number changing,

lh-l-figure: lefthanded observer with his/her lefthand answers to the figure changing,

rh-l-figure: righthanded observer with his/her lefthand answers to the figure changing,

lh-r-figure: lefthanded observer with his/her righthand answers to the figure changing,

rh-r-figure: righthanded observer with his/her righthand answers to the figure changing.

Table 5 Results of the multiple analysis of variance

Dependent Variable: time

Source	df	Mean Square	F	significance level
HANDED*WHAT	2	17.255	0.115	0.892
HANDED (left, right)	1	320.623	2.135	0.149
HAND OF ANSWER	1	0.864E-02	0.000	0.983
WHAT IS FINDING (text, number, figure)	2	4184.977	27.862	0.000
Error	65	150.204		

Captions to illustrations

Figure 1: Experiment No. 1. before the change.

Figure 2: Experiment No. 2. before the change.

Figure 3: Experiment No. 2. after the change.

Figure 4: Experiment No. 3. before the change.

Figure 5: Experiment No. 3. after the change.

Figure 1

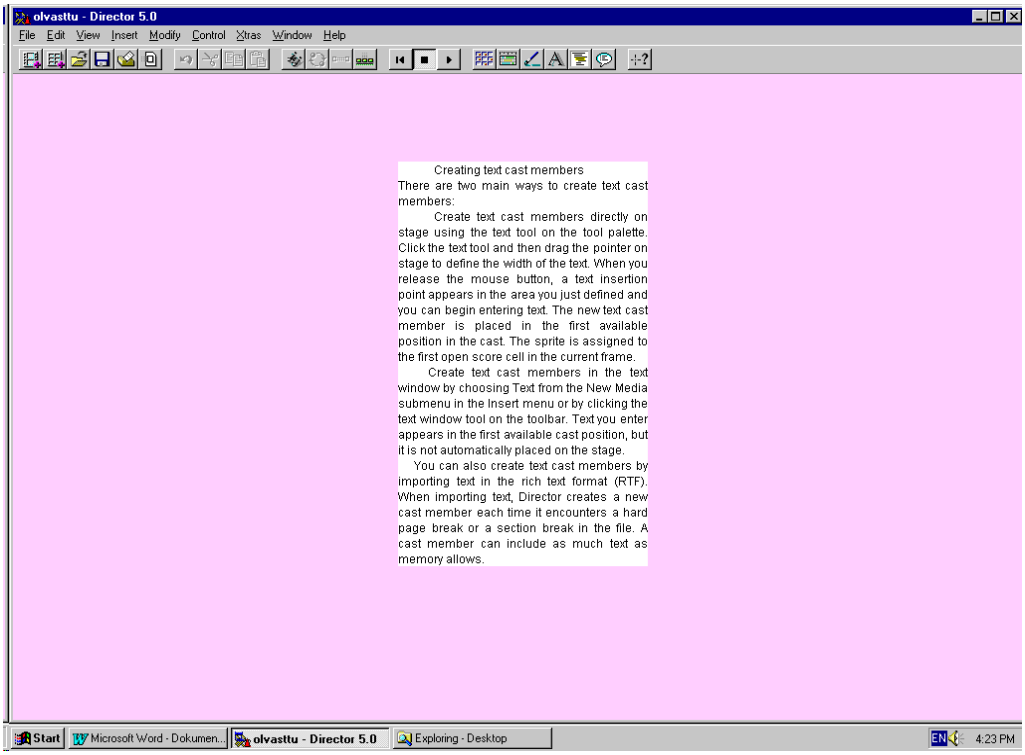


Figure 2

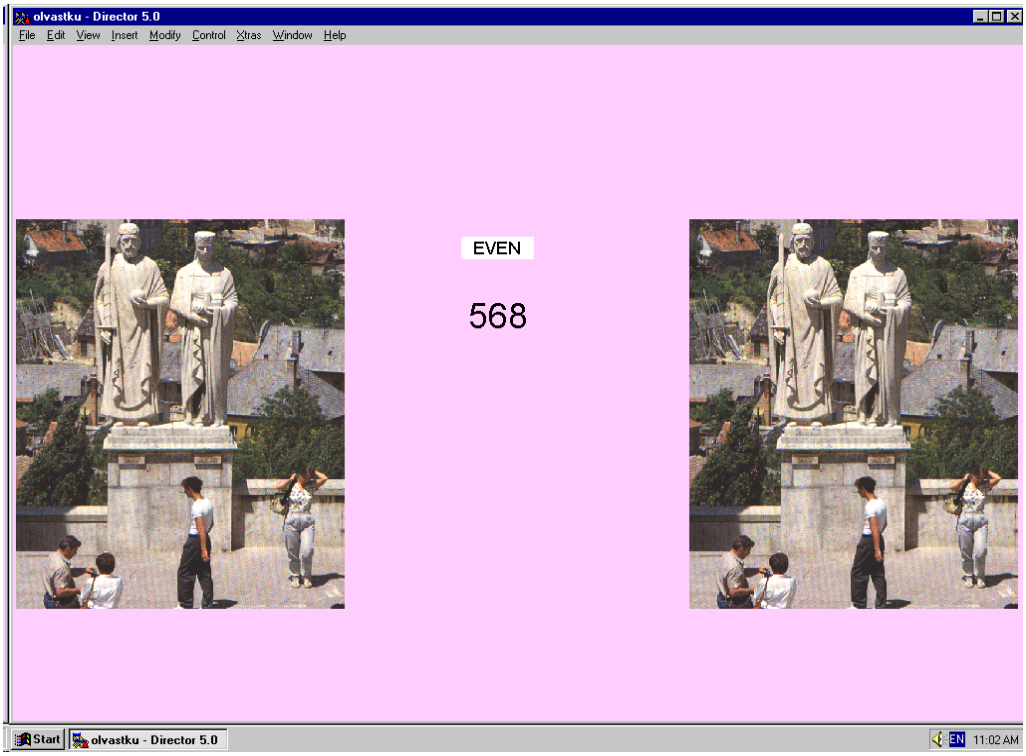


Figure 3

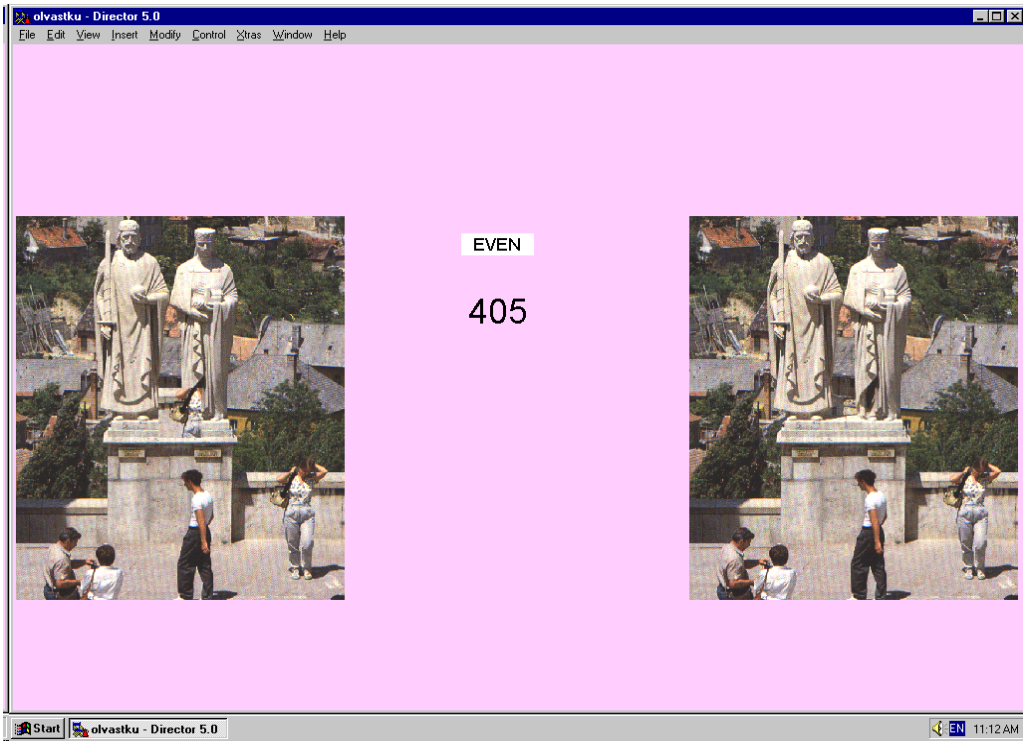


Figure 4

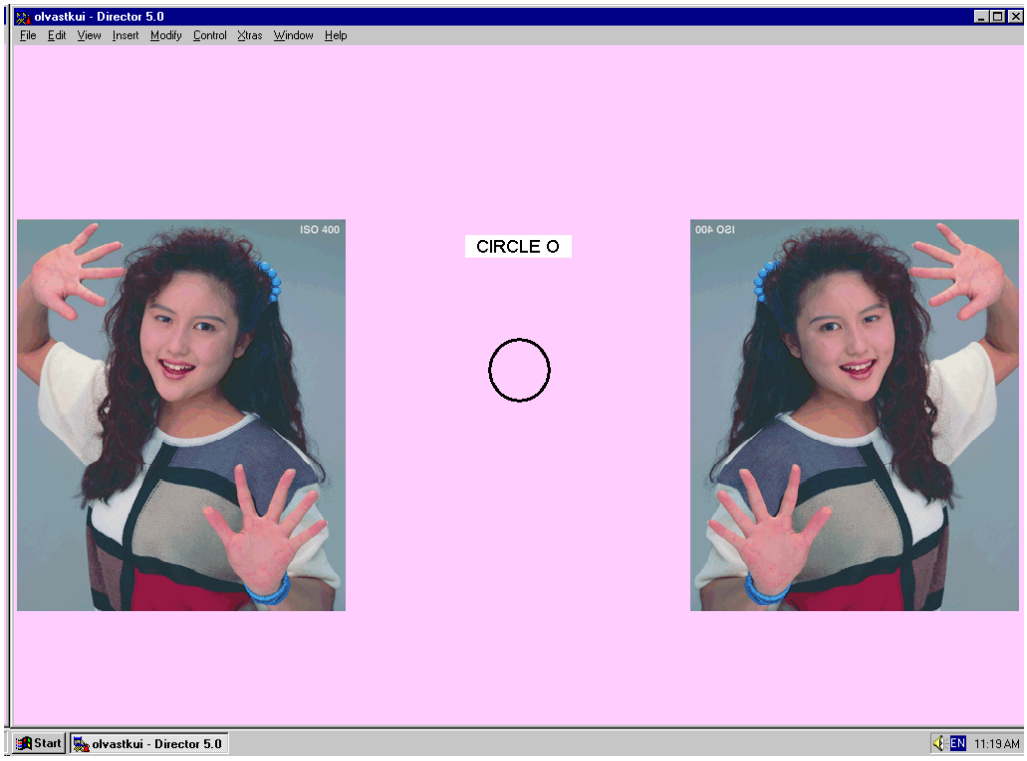
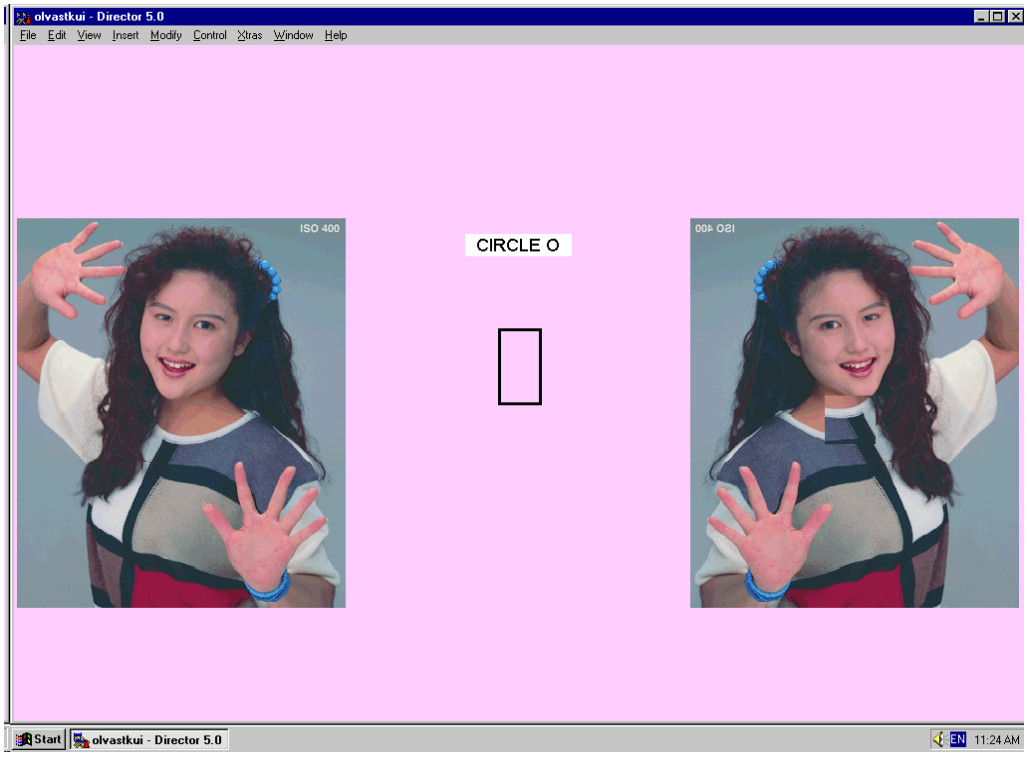


Figure 5



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Testing Driver's Comfort in Virtual Environments

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ABSTRACT

In this study, the comfort of the tools available to the driver are evaluated through the virtual simulation of a car interior on a Tanorama™ Powerwall. In a series of couple comparisons, 20 participants have been asked to judge both the visibility and the aesthetic pleasantness of a set of hazard buttons, differing in their coloration parameters. The results show that "visibility' has a direct influence on the perceived comfort, while aesthetic pleasantness has none. The easiness with which different prototypes can be produced and evaluated in an immersive simulation adds another argument to the application of virtual environments to vehicle engineering.

Keywords: *car prototyping, vehicle evaluation, driver comfort*

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1. Introduction

The technological equipment of a car tries to meet the customers' needs in terms of communication, safety and on-board comfort, aiming at a multi-sensory harmony between the driver and its environment [Gilardi, 2002]. To achieve this goal, ergonomics represent a powerful aid with its focus on efficiency and comfort and with 'user-centeredness' [Norman, 1986] as the fundamental design principle [Buxton, 1998].

In particular, in order to evaluate different car interiors a parametric "vehicle system" has been devised, consisting of a mechanical frame (i.e. *seating-buck*) which varies the position of seating and commands, and of a virtual rendition of the car interior,

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integrated with specific software for the ergonomic analysis [Monacelli, 2001]. This simulator creates an environment for the manipulation and evaluation of physical (posture, visibility, approachability), cognitive (attentional demands [Lamble, 1999]) and perceptual aspects (directional motion, graphic patterns) of the driver's experience [Falkmer, 2000]. It provides an interactive, multi-modal environment in which researchers can study *in situ* the user's behaviour ("sensory labs", Gilardi, 2002).

In this paper we will describe a research carried out with a virtual simulator to evaluate the impact of different factors on the driver's perceived comfort.

2. Methodological guidelines

For the evaluative setting to be created, the following aspects have to be defined.

- *the object of study;*
- *the human factors of concern;*
- *the type of user (*Zhang, 1999*) (to be identified via market research);*
- *the experimental task;*

Figure 1 details these four aspects, highlighting in red those considered in the present study.

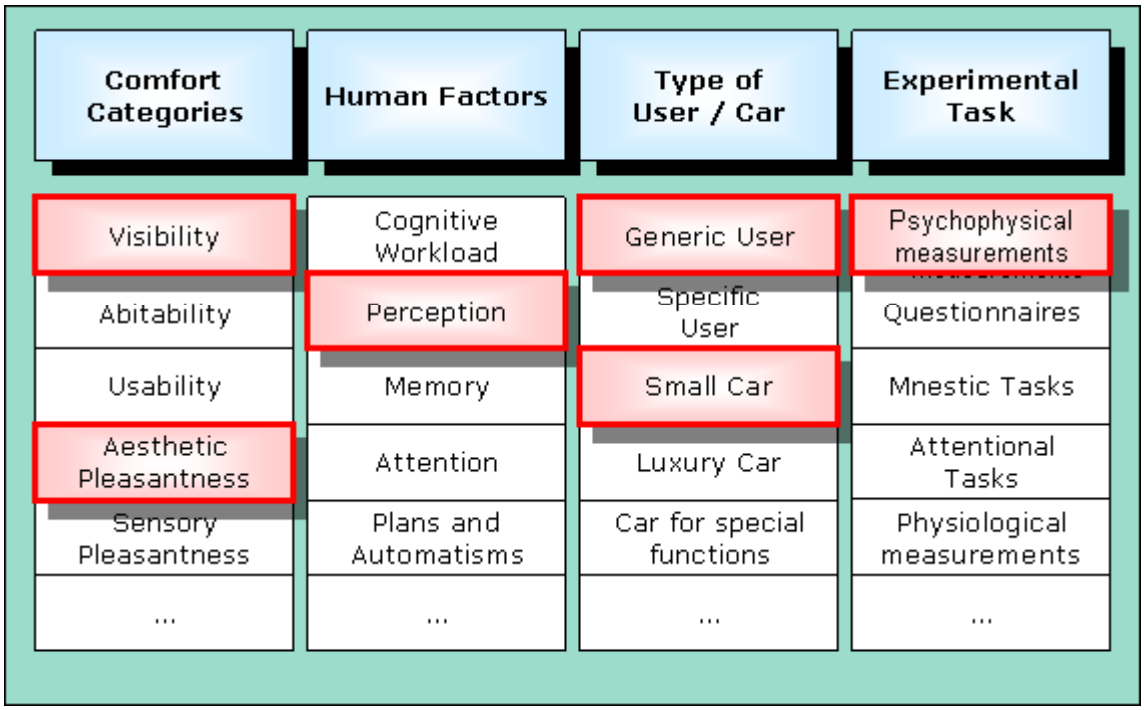

Figure1

Other aspects include:

- *the type of multi-modal environment;*
- *the impact of the technology with which the task is realized* (a training session before the actual evaluation task is highly recommended to allow participants' familiarization with the experimental setting and equipment);
- *comparison between real and virtual environments;* even though not strictly aimed at measuring the driver's comfort, it can be considered as a method for increasing the validity of the evaluation with the simulator;
- *use of anthropometrical data:* software specialized on calibrating posture, motion and access space of the occupants of the car is currently adopted in vehicle engineering and has been integrated in the virtual simulator.

3. Experiment

The object of the experiment presented here is to study the *immediate visibility* and *aesthetic pleasantness* conveyed by the color of the 'hazard buttons' of a car (namely the button to be pushed in case of emergency to activate the four external blinking lights of the car). As it is shown in figure 1, those aspects represent two components of the driver's perceived comfort. In a previous study (Pretto, 2002) a significant difference in the relative importance of these aspects was found, the former being more directly correlated to safety and comfort. Quite surprisingly, it is quite overlooked in the guidelines adopted by the major Italian car manufacturer.

The visibility of a button may derive from:

1. *relative position*: indicates the position of a button with respect to the adjacent objects;
2. *dimensions* of the active area, i.e. of the portion of a button that, when pressed, can activate the related function;
3. *shape* (squared/ rounded, regular/ irregular);
4. *jag*: on the assumption that the minimum jag of the button from the frame containing it ('filo incasso' level) has to be of about 2.5 mm;

5. *color*: usually, hazard buttons come in red, because of the conventional meaning associated to this color; however, there is no agreement yet on the adequacy of this color.

6. *approachability limits of the 'center of selection'* (namely the central point in the active area of the button*)* depending on its function, any button should be placed in easily reachable places, such as pre-defined areas of the dashboard or the door panel.

In this study we will operationalize it as 'color'.

3.1 Participants

Twenty persons participated to the experiment, all members of the research center responsible for the project (for confidentiality reasons), aged 21 to 45, with either normal eyesight or eyeglasses. Even though participants were only presented with static images, they were asked to sign in the informed consent form alerting on all possible side-effects of a dynamic, immersive session [Gamberini, 2002].

3.2 Technical Apparatus

The experiment was conducted at the Virtual Reality Room of Elasis Research Center in Italy using the following equipment:

- *Tanorama*™ *Powerwall*: a huge multi-channel rear projection screen 7.5m wide and 2.5m high (Fig. 2). Light reflection and surface dispersion can be analyzed as good as with real finished models. Product designers in the automotive industry have a suitable capability to visualize a complete car in a 1:1 scale. The Tanorama™ Powerwall consists of 3 segments, each one projected by one or two graphic channels, which in turn are powered by 1 or 2 projectors. Therefore, in addition to 3 channels mono displays and 6 channel stereo displays, it is also possible to have a 6 channel mono display. By using double projection for each segment, strong light-intensity and high brilliance is achieved.

Figure 2 Tanorama® PowerWall in the 'Virtual Reality Room' at Elasis Research Center

- *StereoGraphics – CrystalEyes3*™: glasses with polarized LCD lenses (*Shutter-glasses*) (Fig. 3) providing stereoscopic visualization (more information available at http://www.stereographics.com/products/crystaleyes/body_crystaleyes.html);

Fig. 3 Shutter Glasses

- *SGI Onyx 3400 InfiniteReality*: a graphic server able to generate real time 1:1 scale visualizations of different vehicles (Fig. 4) (more information available at SGI products site);

Fig. 4 SGI Onyx

Division MockUp (v. 6.2) has been used in order to create and customize the presentation algorithm of the stimuli. *3D Studio Max* (v. 4.2) has been used to modify the components (the creation of single objects from the mathematics of the car).

Presentation sequence, data collection and the entire experimental progress were controlled from a console located behind the participants. The execution of the experiment required the constant presence of two people: one working with the computers and the other handling the subjects.

3.3 Stimuli

The stimuli consisted of the virtual dashboard of a car, currently on the market, projected on a PowerWall, in which the colour of the hazard button could vary among five equidistant levels: from the darkest one, in which the colour equalled the dashboard shade, to the reddest one, identical to the tint used in many car models currently on the market. Tab. 1 reports the parameter values.

Stimuli	(power = 21.160)			
	Parameter	**Red**	**Green**	**Blue**
1	ambient	0.5	0.5	0.5
	diffuse	0	0	0
	specular	0.1	0.1	0.1
	emissive	0	0	0
2	ambient	0.5	0.5	0.5
	diffuse	0.1	0	0
	specular	0.1	0.1	0.1
	emissive	0.1	0	0
3	ambient	0.5	0.5	0.5
	diffuse	0.2	0	0
	specular	0.1	0.1	0.1
	emissive	0.2	0	0
4	ambient	0.5	0.5	0.5
	diffuse	0.3	0	0
	specular	0.1	0.1	0.1
	emissive	0.3	0	0
5	ambient	0.5	0.5	0.5
	diffuse	0.4	0	0
	specular	0.1	0.1	0.1
	emissive	0.4	0	0

Tab. 1 colour variations parameters in the experimental stimuli

The ‘paired comparison indirect scaling method’ was chosen for stimuli presentation. This method considers all the *n(n-1)/2* possible couples of *n* stimuli. It provides the possibility of comparing the variation of a certain physical variable with that of the sensorial or psychological variable on the basis of the concept of *discriminal dispersion* [Torgerson, 1958] and of Thurstone’s *law of comparative judgments* [Guilford, 1954]. It is assumed that it is possible to transform the judgments, provided on an ordinal scale, in values on an intervals scale (expressed in z points) representing the distance between the stimuli.

Each couple of stimuli has been presented four times to the participant: two times in a certain order and two times with the order inverted (group scaling) Furthermore, the ten possible couples have been presented two times in a certain sequence and two

times with the sequence inverted. Overall, each participant was requested to express judgement on forty couples of stimuli. Each sequence of ten couples has been balanced according to Ross's criterions (1934) [Purghé, 1995].

3.4 Procedure

Participants sat on a chair, placed at 1.80 m in front of the projection screen and at 2.50 m from its left border. That position reflects the corresponding position of a driver seating inside a real car in accordance with the screen size. The viewpoint was customized at the height of the eyes of a virtual manikin positioned inside the digital mock-up, in conformity with the ergonomic criteria expressed by the software adopted (called 'Jack'). Fig. 5 shows a picture of the environment, as it appeared to the immersed participant. The participant wear a pair of shutter glasses (over regular eyeglasses if the participant needed them). The experiment was performed without environmental light, in order to avoid a distortions of the colour perception.

Fig. 5 Subjects' view during the experiments

The experimenter presented the first couple of stimuli, whose elements appeared in sequence for 5 seconds each. Afterwards, participants expressed their preference aloud by saying either "*primo (first)*" or "*secondo (second)*" depending on which stimuli they preferred in terms of "visibility" and "aesthetic pleasantness". The experimenter wrote both preferences and proceeded to the subsequent couple of stimuli, repeating this procedure for the 40 couples of stimuli.

Each experiment was preceded by a training phase of a few minutes, where stimuli were adopted that differed from the experimental ones in colours and objects, but not in their coloration parameters. Participants familiarized with the whole experimental procedure (including the expression of preference) so that during the experiment they would express their preference after the presentation of each couple of stimuli without any solicitation on the experimenters' part. The instructions, provided before the training phase, are reported in the Appendix.

3.4 Data analysis and results

The main purpose of the data analysis is to obtain a set of scalar values that indicates, in an interval scale, the position assumed by each stimulus along the psychological continuum representing the evaluated characteristics (Fig. 6). In this way, every scalar value will express, in *z points*, the distance of a stimulus from the others.

The mathematical transformations have been performed on data under the assumptions of *case V* of the Thurstone's *comparative judgements law*.

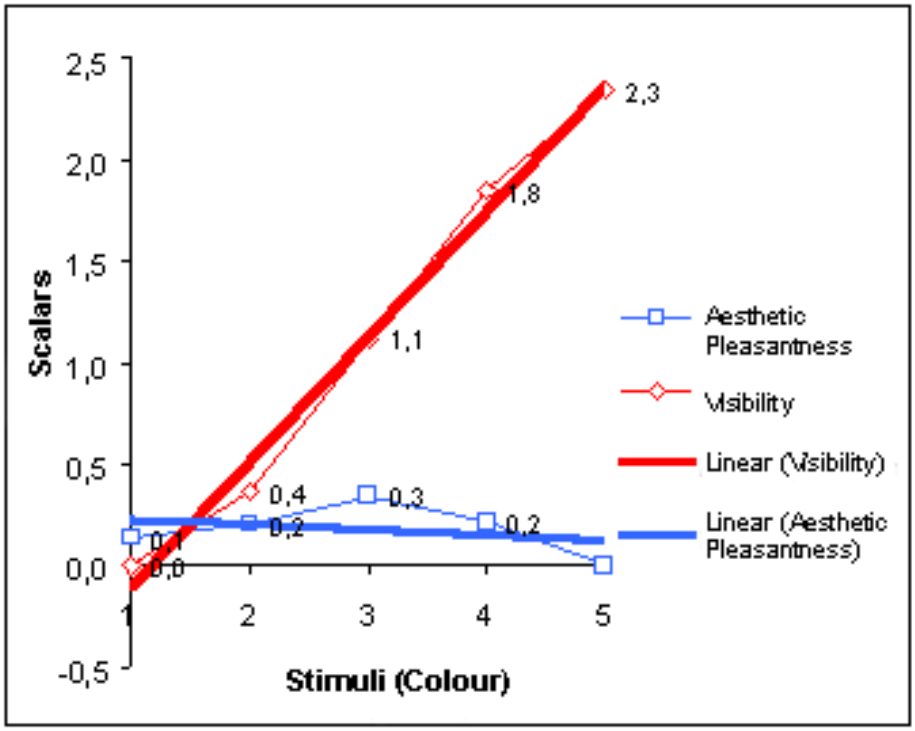

Fig. 6 trend of scalars S_j for aesthetics and visibility of stimuli

The data collected show a good adaptation to the model of mono-dimensional scale assumed by case V, because, for both characteristics, the calculated χ^2 is lower than critical χ^2, as shown in Tab. 2.

Characteristic	χ^2 **calculated**	**df**	χ^2 **critical** (α**= .05)**
Visibility	0,949	6	12,592
Aesthetics	0,023	6	12,592

Tab. 2 Data adaptation to the model of scale

The effect of colour on visibility and pleasantness preference can be statistically verified by applying the 'simple linear regression' model to the scalars, using the variations of colour as the independent variable. A regression equation assesses the average value of the dependent variable for a given value of the independent variable, i.e. the value that it would assume if it were not liable to the action of incidental factors [Camussi, 1995].

It is possible to verify whether the angular coefficient of the regression straight line significantly differs from 0. Tab. 3 reports the results of this test, along with the regression coefficient (*b)*, the significance level (*F)*, the correlation coefficient (*r)* and the determination coefficient (r^2*)*.

Characteristic	**b**	**F(*gdl*1,4)**	**Sig.**	**r**	**r^2**
Visibility	0,422	76,695	0,001	0,975	0,95
Aesthetics	0,044	3,676	0,128	0,692	0,479

Tab. 3 Significance Tests for the adaptation to the simple linear regression model

With respect to visibility, it is possible to accept the alternative hypothesis H_1: $\beta \neq 0$, according to which the angular coefficient of regression equation (regression coefficient) is significantly different from 0. This implies that the chromatic variations have an effect on the preference judgement; in particular: the more the red tint increases, the more the perceived visibility of the hazard button increases. With respect to aesthetics pleasantness, we can not reject the null hypothesis H_0: $\beta = 0$, i.e. the

chromatic variations do not have any effect on the aesthetic pleasantness of the stimulus, which remains almost constant through all stimuli.

4. Conclusion

The results of the experiment show a clear trend: the increase in the red tint of the button correlates directly with the visibility judgments. Since visibility has been assessed as the most important factor influencing the perceived comfort inside a car (Pretto, 2002), we can reasonably suppose a direct correlation of the red tint with the perceived comfort as well. The experimental results show on the other hand that the aesthetic pleasantness of the button is not significant. Therefore, we are allowed to consider that a button that is strictly associated with emergency is not appraised for its aesthetic quality as it is for the easiness with which it can be located.

These results should be always read with respect to the type of car in which the experiments have been conducted, i.e. a small car. However, even in a luxury car that cannot show unusual colours, the designer's choice must be based not only on aesthetic appearance, but on ergonomics as well; an emergency command needs special characteristics relating to visibility, approachability and perceptual salience.

Appendix

"*Tra poco le presenterò in questa plancia virtuale una serie di coppie di pulsanti di emergenza. Ogni pulsante presenterà una colore diverso dall'altro, alcune volte la differenza sarà notevole, altre volte appena percepibile. Dopo avere visto una coppia di pulsanti le chiederò di esprimere due giudizi: il primo riguarderà quale dei due pulsanti che ha visto le è sembrato il più visibile; il secondo le chiederà invece quale pulsante le è sembrato più gradevole. Risponda indicando soltanto 'primo' o 'secondo' se preferisce, rispettivamente, il primo o il secondo pulsante della coppia presentata. Tenga presente che i giudizi dovranno essere espressi in riferimento alla vettura in cui si trova e alla plancia che ha di fronte. L'esperimento durerà in tutto circa 10 minuti. Domande?*"

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Other images are available at
http://weblearn.psy.unipd.it/ergonomia/Virtual%20Reality%20for%20Car%20Prototyping.php

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State of the art of virtual reality therapy (VRT) in phobic disorders

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ABSTRACT

Virtual reality (VR) offers today a new paradigm for human-computer interaction, in which users are no longer simply external observers of images on a computer screen, but active participants within a computer-generated three-dimensional world. Most of the psychological therapies carried out with the help of virtual reality rely on the principle of exposure.
This review surveys the state of the art in the field of virtual reality therapy (VRT). After we have presented what is VR and some pilot studies, stakes and limits of the utilization of VR in psychotherapy will be discussed.

Keywords: *phobic disorders, virtual reality therapy, psychotherapy*

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1. Introduction

Virtual reality (VR) is a human-computer interaction paradigm, in which users are no longer mere external observers of images on a computer screen, but the active participants in a three-dimensional virtual world.

The interest of therapists for this new technology is very recent. Cognitive-behavioral therapies (Marks, 1992) expose that patient to feared situations, Exposure techniques are essential to improve symptoms. Traditionally, exposure therapies are carried out either *in vivo* or by imagining the situations.

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In vivo exposure is sometimes difficult to control. VR techniques enable to recreate three-dimensional worlds and reproduce realistic situations where a user can move and interact with artefacts. VR has the advantage of allowing exposures to numerous and varied situations.

In this review, we give a definition of VR and present some first studies using VR therapy. We then assess the stakes and limits of the utilization of virtual reality in psychotherapy.

2. What is Virtual Reality?

Sutherland (1965) is considered as the father of VR technology. VR can be defined as the simulation of a real or imagined environment that can be experienced visually in the three dimensions of width, height, and depth and that may additionally provide an interactive experience visually in full real-time motion with sound and possibly with tactile and other forms of feedback.

The simplest form of VR is a 3-D image that can be explored interactively with a personal computer, usually by manipulating keys or the mouse so that the content of the image moves in some direction or zooms in or out. As the images become larger and interactive controls more complex, the perception of “reality” increases. More sophisticated systems involve approaches such as wrap-around display screens, augmented reality that projects images in a real environment using wearable computers, and haptics devices that let users feel a force feedback.

VR can be divided into:

- The simulation of real environments such as the interior of a building or a spaceship often with the purpose of training or education.
- The development of an imagined environment, typically for a game or educational adventure.

According to Moline (1998), virtual environments present a unified workspace allowing a more or less complete functionality without requiring all the functions being located in the same physical space. Virtual environments can be defined as interactive, virtual image displays enhanced by special processing and by non-visual display modalities, such as auditory and haptic, to convince users that they are immersed in a synthetic space (Ellis, 1994). Less technically, a virtual world is an application that lets users navigate and interact with a three-dimensional, computer-generated environment in real time.

Satava (1993) has identified five elements that affect the realism of a virtual environment for medical applications:

- Fidelity (high-resolution graphics),

- Display of organ properties (such as deformation using morphing or the kinematics of joints),
- Display of organ reactions (such as bleeding from an artery or bile from the gall bladder),
- Interactivity (between objects such as surgical instruments and organs),
- Sensory feedback (tactile and force feedback).

In the field of VR applications in medicine, Riva (1999) and Riva & Gamberini (2000) expose three important aspects of VR systems offering new possibilities for assessment and treatment:

- *How they are controlled:* VR systems open the input channel to the full range of human gestures. The potential is there to monitor movements or actions from any body part or many body parts at the same time. All the properties of the movement can be captured, not just the contact of a body part with an effector. In consequence, in the virtual environment, these actions or signals can be processed in a number of ways. They can be translated into other actions that have more effect on the world being controlled.
- *Feedback:* Since VR systems display feedback in multiple modes, feedback and prompts can be translated into alternate senses for users with sensory impairments. The environment can be reduced in size to get a larger or overall perspective. For the individual, multimodal feedback ensures that the visual channel is not overloaded. VR presents information in alternate ways and in more than one way. Sensory redundancy promotes learning and integration of concepts.
- *Control:* Virtual environments provide the opportunity to expose patients to environments that would otherwise be dangerous or inaccessible, or would generate too much initial stress for effective therapy.

3. Virtual Reality Therapy (VRT) Studies: Example of Phobias

Applications of VR for mental health are recent, but several case studies demonstrated the effectiveness of exposure carried out through VR. It is principally in the treatment of phobias that VRT has been used and assessed.

According to the DSM-IV (American Psychiatric Association, 1994), phobia is a marked and persistent fear that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation (e.g., flying, heights, animals, receiving an injection, seeing blood). Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response, which may take the form of a situationally bound or situationally predisposed panic attack. The person recognizes that the fear is excessive or unreasonable.

The phobic situation(s) is avoided or else is endured with intense anxiety or distress. The avoidance, anxious anticipation, or distress in the feared situation(s) interferes significantly with the person's normal routine, occupational (or academic) functioning, or social activities or relationships, or there is marked distress about having the phobia.
One of the approaches to treat phobias consists in desensitizing the patient by exposure. Classically, in this mainly behavioral approach, the patient is exposed either “in vivo”, or “in imagination”. In the first case, a therapist accompanies the patient in an environment where the anxiety stimulus is met. In the second case, the patient must think of a scene confronting him/her with the stimulus. In practice, these techniques encounter a certain number of various obstacles.
The approach of VR consists in immersing the patient in a synthetic universe in which the anxious stimulus is introduced in an extremely gradual and controlled way. Various types of phobias were approached within this framework. We will give two examples: Fear of flying and acrophobia.

3.1 Fear of Flying

Two case studies were conducted to assess the effectiveness of VRT for the treatment of the fear of flying (North & North, 1994; North, North & Coble, 1996a, b, 1997).
In the first experiment, the subject was a 32-year-old married woman, who was diagnosed and treated for fear of flying. The virtual scene was a simulated city. She participated in eight sessions, each lasting about 30 minutes. She reported a high level of anxiety at the beginning of each session, gradually reported lower anxiety levels after remaining in the situation for a few minutes and eventually reported an anxiety level of zero. To investigate the transfer effect of VRT to the real world, she was flown with the therapist accompanying her on a helicopter for approximately 10 minutes at low altitude over a beach of the Gulf of Mexico. As with the VRT sessions, she reported some anxiety at the beginning, but the anxiety rapidly reduced to a reasonably comfortable level.
The second case study (North, North & Coble, 1996a, b, 1997) involved a 42-year-old married man. The subject’s anxiety and avoidance behavior were interfering with his normal activities. He was accompanied by a virtual therapist, and placed in the cockpit of a virtual helicopter and flown over a simulated city for five sessions. A modified 11-point (0 for complete calm and 10 for complete panic) Subjective Units of Discomfort Scale (SUDS) scale was used to measure the degree to which the subject was affected by VRT. In VRT the subject’s anxiety usually increased as he was exposed to more challenging situations and decreased as the time in those new situations was increased. The subject experienced a number of physical and emotional anxiety-

related symptoms during the VRT sessions. The VRT resulted in both a significant reduction of anxiety symptoms and the ability to face the phobic situation in the real world.

3.2 Acrophobia (Fear of Heights)

Two first case studies demonstrated the effectiveness of VRT in the treatment of acrophobia.

During the first one (North & North, 1996; North, North & Coble, 1996), eight sessions were conducted, which lasted between 15 and 28 minutes each. Individual VRT treatment was conducted in a standard format. The first session began with the least threatening level, which was at the ground level near a bridge crossing a river in the middle of a simulated town. The SUDS was administered periodically every two to five minutes. The progress was totally under the control of the subject, except when the subject's SUDS score was zero, the experimenter urged the subject to move up to the next level of the scene. At one month after treatment, the subject was asked to complete a ten point rating scale (including degrees for worsening symptoms) rating the degree to which his acrophobia symptoms had changed since a pre-treatment test (SUDS). The results indicated significant improvement with respect to both anxiety symptoms and the avoidance of anxiety-producing situations.

The second study (Rothbaum, Hodges, Kooper, Opdykes, Williford, & North, 1995; Rothbaum, Hodges, Opdyke, Kooper, Williford, & North, 1995) was conducted with twenty college students with acrophobia, randomly assigned to virtual reality graded exposure treatment or to a waiting-list comparison group. Sessions were conducted individually over 8 weeks. Outcomes were assessed by using measures of anxiety, avoidance, attitudes, and distress associated with exposure to heights before and after treatment. Significant improvements on all measures were found in the subjects who completed the virtual reality treatment compared to subjects on the waiting list.

More recently, Botella, Banos, Perpina, Villa, Alcaniz & Rey (1998) examined the efficacy of a treatment for claustrophobia using VR exposure only. The subject was a 43-year-old female who suffered from clinically significant distress and impairment and sought psychological therapy. Eight individual VR graded exposure sessions were conducted. In this study, all self-report measures were reduced following VR exposure and were maintained at one month follow-up.

In another study (Emmelkamp, Krijn, Hulsbosch, de Vries, Schuemie & van der Mast, 2002), the effectiveness of a low-budget VR exposure versus exposure *in vivo* in a between-group design of 33 patients suffering from acrophobia was evaluated. The virtual environments used in the treatment were the exact copy of the

real environments used in the *in vivo* exposure program. VR exposure was found to be as effective as *in vivo* exposure on anxiety and avoidance as measured with the Acrophobia Questionnaire (AQ), the Attitude Towards Heights Questionnaire (ATHQ) and the Behavioral Avoidance Test (BAT). Results were maintained up to six months follow-up. This study showed that VR exposure can be effective with relatively inexpensive hardware and software on stand-alone computers currently on the market.

A final study (Roy, Légeron, Klinger, Chemin, Lauer & Nugues, submitted) evaluated the efficacy of VR treatment for social phobia. The virtual environments used in the protocol reproduced four situations that social phobics feel the most threatening: performance, intimacy, scrutiny, and assertiveness. A first case-report was carried out. The patient is exposed to ten VR sessions. The study found that VR exposure was effective: all the self-report questionnaires showed a decrease of the symptoms following treatment and were maintained at a three-month follow-up. A future large-scale clinical trial using the same protocol will be conducted to compare a VR group therapy (36 patients) versus a comparative cognitive-behavioral group therapy (18 patients) and no-treatment group (18 patients).

4. VRT: Interest and Limits

VR offers several advantages compared to classical methods. One of the principal assets of VR treatment is the possibility for the therapist of control the intensity of the stimuli (e.g. the variations of the stress situations, the addition of new sources of stimuli: tactile, visual, etc.) in order to make progress in a continuous and soft way for the patient. In addition, the patient as well as the therapist has the possibility to suspend immediately a simulation in the event of faintness. It is not the case in the *in vivo* exposure where it is sometimes difficult to stop the exposure. Standard techniques use another type of exposure, which is the systematic desensitization. The patient has to imagine the anxious stimuli. However, some of the patients had cannot or are too phobic to imagine the situation prescribed by the therapist.

VR exposure represents a flexible tool making it possible to modify and control the stimuli to which the patient is subjected in intensity and frequency. According to Vincelli (1999) VR allows adjusting very exactly the situations, to stop instantaneously the *in vivo* exposure, to discuss the methods, and to restart the therapy. Keeping the patient in the therapist's office avoids her/him being exhibited and preserves the indispensable confidentiality.

Although the technology is mature enough to have different applications, there are key issues to be resolved for its use for practical applications (http://www.vrhealth.com):

- *Costs:* As with early computer graphics products, the entry-level costs are relatively prohibitive. A complete VR environment, including workstations, goggles, body suits, and software, is currently very expensive.
- *Lack of standard and reference parameters:* The hyperbole and sensational press coverage associated with some of these technologies have led many potential users to overestimate the actual capabilities of existing systems. Many of them must actually develop the technology significantly for their specific tasks. Unless their expertise includes knowledge of the human-machine interface requirements for their application, their resulting product will rarely get beyond a "conceptual demo" that lacks practical utility.
- *Human factors:* The premise of VE seems to be to enhance the interaction between people and their systems. It thus becomes very important to understand how people perceive and interpret events in their environments, both in and out of virtual representation of reality. We must address issues of human performance to understand how to develop and implement VE technology that people can use comfortably and effectively. Fundamental questions remain about how people interact with the systems, how they may be used to enhance and augment cognitive performance in such environments, and how they can best be employed for instruction, training, and other people oriented applications.

5. Conclusion

Possibilities offered by VR in the field of the cognitive-behavioral therapies are numerous. Immersion, guide by the therapist, leads the patient to live this experiment in a more realistic way. But this "technicization" of the psychotherapy, as attractive as it is, does not modify the theoretical and methodological bases on which VRT rests. VRT has not replaced the role played by therapist. Indeed, his/her presence near to the patient remains essential. It seems that VR reinforces the therapeutic relation between patient and therapist on a collaborative mode.

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