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Cybertherapy: Advantages, Limitations, and Ethical Issues

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ABSTRACT

Information and Communication Technologies (ICT) are becoming more and more common in Clinical Psychology. Two of the technologies that are more consolidated in this field are virtual reality (VR) and telepsychology. There are other technological innovations that are beginning to be used in clinical and health psychology such as ambient intelligence, ubiquitous computing or persuasive computing. In the last fifteen years there has been a proliferation of studies testing the efficacy of immersive virtual reality in the delivery of cognitive behavioral therapy (CBT) for several mental disorders and health conditions. The essence of VR is that it can simulate reality and add a new possibility: the user has the illusion of "being" in the computer-generated environment while interacting with the VR objects. This unique feature of VR is very relevant for its use in Clinical Psychology. At the same time, it can raise several ethical issues. It is important to investigate the possible effects of blurring the distinction between real and virtual worlds in vulnerable populations. Some other concerns regarding the use of VR in therapy have already been investigated, such as cybersickness. After ten years of experience treating patients with VR, this has not been a problem in the published efficacy studies.

Telepsychology has also been used to improve the delivery of CBT. A number of Internet-delivered programs have already become important tools in the health system. The main advantage is that online therapy can reach people who might not otherwise seek therapy, such as disabled people or those who live in remote areas. However, several concerns have been raised about self-help procedures, like the issue of self-diagnosis. and the fact that patients usually have all of the necessary self-help information at their disposal. It is important to establish criteria to protect people from the possible negative effects of this.

Other innovations such as ambient intelligence and pervasive computing bring up other ethical issues. For example, is privacy being compromised too much when people are located using GPS or physiologically monitored 24 hours a day? Criteria for considering these issues must be established.

Our research group has been working with new technologies and therapies for the last fifteen years. This paper addresses the ethical issues we have encountered in our research and clinical practice; it also explores ethical issues that will become increasingly important.

Keywords: *cybertherapy, virtual reality, telepsychology, e-therapy, pervasive computing, ethics*

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1. Advances in psychological treatments

The field of psychological treatment grew tremendously during the twentieth century. The pioneering work by J.B. Watson and his assistant Rosalie Rayner demonstrated, contrary to the dominant Freudian theories of psychology, that it was possible to stimulate phobias in a laboratory environment (Watson & Rayner, 1920). The *Little Albert* experiment provided empirical evidence of classical conditioning in humans. A few years later, Mary Cover Jones conducted her study of a patient named Peter (Jones, 1924). She treated his fear of a white rabbit with a variety of fear-reducing procedures, the most successful of which employed *direct conditioning*: a pleasant stimulus (food) was presented simultaneously with the rabbit. This case illustrated how fear may be eliminated under laboratory conditions. Recognizing her success, Joseph Wolpe christened Jones "the mother of behavior therapy".

Wolpe continued this path of systematic experimentation. He introduced evidence-based psychological procedures to the field of psychological treatment through the application of "systematic desensitization". This was the basis of a psychological technique that would enjoy success and empirical support: exposure therapy. Since then, numerous studies have been conducted demonstrating the efficacy of psychological procedures for the treatment of several mental disorders. Wolpe, Kelly, Lazarus, Skinner, Rachman, Marks, Beck, Seligman, Mahoney, Barlow, Salkovskis, Clark, etc. are important figures who contributed to the consolidation of Cognitive-Behavior Therapy (CBT).

> *Cognitive-Behavior Therapy is devoted to the relief of human suffering using methods that work. The latest in scientific advances are used to design treatments. Cognitive and Behavioral Therapies (CBT) use techniques that are based on scientific evidence to understand and treat psychological symptoms* (Association for Behavioral and Cognitive Therapies).

CBT comprises a significant number of well-established therapeutic techniques and programs for the treatment of several human mental disorders: exposure, cognitive restructuring, relaxation, modeling, and others. One of the main features of CBT is its emphasis on empirical study, namely the study of mental health problems in the lab wherein one can control variables to assure internal validity while also considering ethical issues concerning the study's participants.

CBT's emphasis on experimentation and empirical studies allows us to understand another important advance in the field which happened at the end of the twentieth century. In 1993, division 12 of the *American Psychological Association* (Clinical Psychology Division) created a panel of Experts (*Task Force*) with the aim of promoting the application of empirically validated treatments as well as the development and dissemination of evidence-supported psychological procedures. Since then, there has been an increase in the development of evidence-based treatments, most of them being CBT programs (Chambless et al., 1996, Chambless & Hollon, 1998). Additionally, a clinical guide (*Template for Developing Guidelines: Interventions for Mental Disorders and Psychological Aspects for Physical Disorders*) also by the American Psychological Association (*APA Task Force on Psychological Intervention Guideline,* 1995) established a distinction between the efficacy of an intervention (*efficacy*) and its clinical utility (*effectiveness)*. The guideline proposed evaluating interventions using two axes: Axis 1, efficacy or internal validity, is a rigorous analysis of the empirical evidence in order to investigate the efficacy of the intervention. Axis 2, effectiveness or clinical utility, is an analysis of the feasibility of the intervention in its natural context; it includes therapist expertise, availability of trained therapists, acceptability of the treatment by patients, and the possibility of applying the intervention in natural contexts.

From this perspective, ethical considerations have to be made. First, it is important to build on the work of Watson, Jones and Wolpe to develop efficacious treatments, or to progress in axis 1 (internal validity). Additionally, we must progress in axis 2 (effectiveness or clinical utility). For example, if we have two procedures equally efficacious (axis 1), which one would we use to treat a patient? We would have to rely on axis 2 criteria. For example, we could choose the one with fewer negative side effects, more feasible application, more patient acceptance, less attrition, lower financial costs, or with lower cost and effort required for training therapists. Information and Communication Technologies (ICTs) can have an important role in improving axis 2 aspects in the field of psychological treatments.

2. Efficacious psychological treatments and Information and Communication Technologies (ICTs)

In recent years, there have been spectacular advances in ICTs that could help improve psychological interventions, mainly regarding the effectiveness or clinical utility axis. Therapeutic applications of ICTs include e-therapy, virtual therapy, VR treatments, and others, all of which fall under the umbrella of "cybertherapy". This term gives its name to one of the more prestigious conferences in the field of computer-aided Psychotherapy, another concept coined by a prestigious figure in CBT, Isaac Marks (Marks, Cavanagh & Gega, 2007). Cybertherapy involves using the computer to provide, enhance or facilitate therapy. As a therapeutic tool, the computer can be both a communication device that enables and promotes distance interaction, as well as a simulation device for creating virtual realities. From our point of view, cybertherapy includes the use of any new device based on ITCs that could contribute to improvements in clinical psychology (in addition to computers).

2.1. Virtual Reality and Augmented Reality

ICTs' first contribution to Clinical Psychology was in Immersive Virtual Reality (VR). The pioneering work by Barbara Rothbaum and colleagues (Rothbaum, et al., 1995), explored the utility of virtual reality for the delivery of exposure therapy for acrophobia. Since then, a significant number of virtual reality programs have demonstrated its efficacy in the treatment of several mental disorders, mainly in anxiety disorders. Ten years ago, in their work *"Basic issues in the use of virtual environments for mental health applications",* Rizzo, Wiederhold and Buckwalter (1998) highlighted that "After an early period of inflated expectations and limited delivery, Virtual Reality Technology is now beginning to emerge as a viable tool for mental health applications. Virtual environments (VE) have been developed which are now demonstrating effectiveness in the areas of clinical psychology and neuropsychology" (p. 21).

In the past fifteen years numerous studies have tested the efficacy of virtual reality in the delivery of CBT. The first works addressed less severe disorders, such as specific phobias. However, more recently, virtual reality programs have been developed for the treatment of more severe problems such as panic disorder, posttraumatic stress disorder, eating disorders and pathological bereavement. A significant number of controlled studies, reviews and meta- analysis reveal the scientific advancement in the field. (see, for a review, Anderson, Jacobs & Rothbaum, 2004; Emmelkamp, 2005;

Krijn, Emmelkamp, Olafsson & Biemond, 2004; Garcia-Palacios et al., 2006; Marks, Cavanagh & Lega, 2007; Powers & Emmelkamp, 2008).

A recent application of ICTs that could help improve efficacy and effectiveness of psychological interventions is Augmented Reality (AR). AR is a modification of VR which includes a combination of both real and virtual elements. Current AR applications for psychological treatment are scarce and address two specific phobias: acrophobia and small animal phobia. Following the guidelines of Öst, Salkovskis & Hellstroöm (1991), our research group has obtained positive preliminary results (through a case study, a case series and a multiple base-line single case design study) on the use of AR for the delivery of one-session exposure for the treatment of specific phobias (Botella et al., 2005; Botella, Bretón-López, Quero, Baños & García-Palacios, submitted; Juan et al., 2005).

2.2. Telepsychology

Another contribution of ICTs to Clinical Psychology is "telepsychology" or online therapy, in which electronic equipment and therapeutic communication converge. Telepsychology can be defined as using ICTs to put patients and mental health professionals in contact to conduct diagnosis or treatment, to disseminate information, or to conduct research studies or any other activity related to mental health care (Brown, 1998). "E-therapy" refers to the delivery of mental health services online. Typically the online services include emails, discussion lists, chats, or audiovisual conferencing. This kind of therapy is proliferating rapidly, and its applications have the potential to advance the field of psychology in a multitude of ways since they are used when face-to-face contact with licensed psychologists is impossible.

Telepsychology has been employed to improve the delivery of CBT. A number of Internet-delivered programs have already become important tools in the health system. The main advantage of online therapy is that it can reach people who might not otherwise seek therapy, such as disabled people or those who live in remote areas; it also reduces the contact time between therapist and patient. Several recent studies have demonstrated the efficacy of Internet-based programs for a variety of mental disorders and health problems such as eating disorders, posttraumatic stress disorder and pathological grief, panic disorder, depression, and chronic pain, among others (see Andersson, 2009; Carlbring & Andersson, 2006; Ritterband et al., 2003, for a review).

2.3. Ubiquitous Computing and Persuasive Computing

We are witnessing the development of ITCs that combine ubiquitous and persuasive computing to improve psychological treatments. The term ”ubiquitous computing” was coined by Weiser in 1991 as a human-computer interaction paradigm in which the computer is integrated into the user’s environment; various small, inconspicuous devices enable the interaction. It employs the use of miniature technology, small systems that communicate among themselves and can be easily integrated into different objects. Examples of these technologies can be found in mobile phones and PDAs with Internet capabilities. One key benefit is that they allow free access to information anywhere at any time. This advancement will likely lead to the fusion of the computer with the objects of daily life (Mattern, Ortega & Lores, 2001).

“Persuasive Computing”, coined by Fogg in 1999, can be defined as the use of technology with the explicit purpose of changing human attitudes and behaviors. Of course, humans have a great capacity for persuasion. However, the persuasive abilities of computers (Fogg, 1999) have made Persuasive Computing one of the technological concepts that have rapidly obtained the attention of the human-computer interaction community. Computers can be more persistent than humans in some ways, by employing many methods to create a convincing experience (text, audios, images, videos, virtual environments, sounds and animations, and more). Additionally, this convincing experience can be easily replicated and distributed to large numbers of people simultaneously. In the field of health, it has been focused on the promotion of healthy habits and the prevention and treatment of unhealthy habits (e.g. smoking). Persuasive computing includes the following main features: a) Timeliness: e.g. messages can be sent to promote healthy food choices in context (Intille, Kukla Farzanfar & Baku, 2003); b) Simulation of experiences: simulations of useful experiences for making appropriate decisions; and, c) Customization: use of customized information in order to ensure that the user follows the instructions.

The most common device in the field of ubiquitous and persuasive computing is the mobile phone. Its fast integration into daily life has benefitted the field of health. For example, it has facilitated the delivery of counseling to HIV patients (i.e. Skinner, Rivette & Bloomberg, 2007), assisted with providing strategies for coping with stress (i.e. Riva, Preziosa, Grassi & Villani, 2006); and aided in the treatment of combat-related stress (Riva, Grassi, Villani & Preziosa, 2007). Because of such benefits, Bang, Timpka, Eriksson, Holm and Nordin (2007) have proposed integrating CBT strategies into mobile phones. Our research team is pursuing this approach, combining phones

with games to prevent obesity in children (E-TIOBE project) and for providing support in the treatment of phobias.

User-centered technologies appear to be the future of the use of ITCs. The rapid development of ITCs and the increasing research on their usefulness will result in a growing number of therapeutic tools with the potential of improving treatments for various mental disorders.

3. Advantages, limitations and ethical issues of using ITCs in psychological treatments.

As previously stated, ICTs are providing new methods for delivering therapy. Yet, it is important to consider their ethical implications and to explore the advantages and limitations of their use in therapy. This reflection is relevant in any research or practice with human subjects.

3.1. Advantages

We began considering these issues when we began our line of research with ICTs and psychological treatments (Baños, Botella & Perpiñá, 1999; Botella, Baños, Perpiñà & Ballester, 1998; Botella et al., 2004). Currently, our dominant perspective is that ICTs can be understood as *new senses* that are incorporated into our *structure to know the world* (using Konrad Lorenz terminology, 1974). While they enhance our abilities to function as living creatures, they are also useful in optimizing therapy.

1. Immersive VR and AR are technologies that allow the creation of 3D computer-generated objects, avatars, environments or situations. Significantly, they simulate reality while providing a new possibility: the user has the illusion of "being" in the computer-generated environment interacting with the VR objects. This is a unique feature that is very relevant for applications in Clinical Psychology. It involves creating *safe* virtual worlds where the patient can explore and experience "new realities"; this feeling of safety is essential in therapy, so that the patient can act without feeling threatened. The "as if" of Kelly (1955) is a good example. This perspective is also included in the "need for safety and protection" of Bowlby's (1973) attachment theory.

The virtual context allows patients to approach situations that they perceive as threatening in a gradual way, at their own pace, with complete safety and protection.

2. Confronting and overcoming fears in therapy is essential, and VR allows total control in this area. Information can be presented gradually, in such a way that the patient can progress from easier tasks to more difficult ones. This work in the virtual world helps patients master the strategies needed to overcome their fears in the real world.

3. Bandura (1977) stated in his theory that of all possible sources of personal efficacy, performance achievements are especially useful. VR is an excellent source of information on performance achievements, since numerous methods can be designed to assure the patients' success in each of their virtual experiences; patients can also practice potential difficulties or occasional failures. According to Bandura, once strong expectations of efficacy have been established through repeated successes, the potential negative impact of occasional failures will be reduced. Failures that are overcome with the patients' effort will strengthen the patients' persistence and involvement. It is of great importance that the patients view themselves as competent, and efficacious. Likewise, is essential for the patient to associate personal competence with factors such as consistency and effort in the environment, which give rise to a larger sense of strength and mastery.

4. Another important advantage of VR is that it and other ICTs can help build a new conceptual framework for understanding how the human mind works. If normal mental processes are better understood, disturbances in mental processes which are involved in the development of mental disorders can be more easily studied (Baños, Botella & Perpiñá, 1999).

5. Virtual worlds provide additional advantages. As they are "virtual", it is not necessary for them to adhere to the rules of space and time; indeed, they can be said to exist "beyond reality". As a result, researchers do not have to wait for specific events to occur. Rather, they can simulate them whenever appropriate for the patient and the therapy process. Also, the possibilities for self-training are enhanced. A patient can work on a concrete issue for any duration at any time and in any place (through the use

of mobile devices). Virtual worlds can also help to generalize the progress achieved in therapy, because the patient can practice in different virtual contexts.

Additionally, VR makes it possible to alter the feared environment at the patient's and therapist's convenience. It is flexible enough to allow the existence of a series of contexts where patients can confront not only their concrete fears, but also elements and situations beyond those concrete fears. For example, an individual with a fear of public speaking is afraid of making mistakes and being negatively judged by an audience. In a virtual world, the patient can experience different reactions from the audience, from an attentive and supportive reaction to a very negative reaction which would only rarely occur in the real world (insults, throwing objects, and so forth). As another example, an individual suffering claustrophobia fears staying in a locked room and not being able to open the door. This situation can be simulated virtually, with the additional experience of having the walls and the ceiling move until the individual is confined in a square meter space. These examples illustrate how the patients' interaction with the virtual environment can be managed at different levels and in different ways. This promotes overlearning and enhances mastery of one's fears. Thus, the purpose of virtual worlds is not merely to recreate reality, but to create therapeutic contexts containing elements that are relevant to the patients and their problems, some of which might not otherwise be available (Wann, Rushton, Smyth & Jones, 1997).

Because patients can work on concrete interactions with the world repeatedly and at their own pace means that they can experience the consequences of those interactions many times. This is demonstrated by one of the first well-known VR applications, flight simulation. Users can practice multiple situations, difficulties, mistakes, dramatic consequences and so forth, while gaining knowledge and skills for dealing with these experiences in the real world. Progress achieved in the virtual world regarding a feared situation will help the patient to "live reality" in a different way and to generate new internal models of the world and ways to interact with it (Korzybski, 1958). These internal models will allow users to view themselves and the world from a new perspective. In summary, VR can promote operational thinking (Piaget, 1926) and improve one's capacity to perceive the world, while enhancing one's fundamental capacity to imagine "what would happen if…" (Tart, 1991). Virtual experiences not only have an impact on patients, but can also leave imprints as patients incorporate experiences to memory, to cognitive structures and to life in general.

These effects of VR therapy entail advancements of psychological treatments from an ethical point of view. Virtual worlds support and protect the patient along the therapeutic process; this is evident in one of the best applications of VR to therapy, exposure. Therefore, it is not surprising that that some studies have found that patients show a preference for VR exposure over exposure in the real world. For example, Rothbaum, Hodges, Smith and Lee (2000) gave flight phobia patients a choice between VR exposure and in vivo exposure; most of them chose VR exposure. Similar data have been reported by García-Palacios, Botella, Hoffman and Fabregat (2007) in a study wherein patients were asked about their preferences regarding VR exposure and in vivo exposure. Again, most of them chose VR.

6. As previously mentioned, other ICTs related to ubiquitous and persuasive computing (the Internet, mobile phones, PDAs, GPS, several types of sensors and others), offer the important benefit of making information available at any time (e.g. information about the treatment rationale, instructions for applying treatment strategies, and more) in any context (at the patient's home, on the street, at the workplace, and so forth), with the possibility of immediate feedback. These strengths can help improve the provision of mental health care. Benefits from the perspective of axis 2 (the clinical utility axis) are enormous given that the technologies can help reduce costs and facilitate the dissemination of information that, until now, was impossible.

However, the use of ICTs in clinical psychology has disadvantages. It is important to pay careful attention to the limitations and ethical issues related to the progress of this field.

3.2. Limitations and ethical issues

The use of ICTs in clinical psychology is a recent development that is gaining momentum and offers significant benefits; therefore, researchers must be aware of the issues and ethical considerations that can arise in applications of ICTs.

1. Ten years ago, susceptibility to cybersickness and aftereffects of treatment were particularly of interest. It was an ethical requirement to analyze the potential for adverse side effects of treatment. Cybersickness is a form of motion sickness that includes symptoms such as nausea, vomiting, eyestrain, disorientation, ataxia, and vertigo (Riva, Bacchetta, Baruffi, Rinaldi, & Molinari, 1999). Aftereffect symptoms

include disturbed locomotion, perceptual-motor disturbances, flashbacks, drowsiness, fatigue, and lowered arousal. Rizzo et al., (1998) considered of the possible relationship between various side effects and the features of different clinical groups. They also analyzed various issues relevant to the application of VR in clinical populations. Researchers were concerned about the duration of exposure sessions and whether patients would be unable to complete VR sessions due to cybersickness. However, after ten years of experience treating VR patients suffering mental health problems this has not proven to be a problem in efficacy studies. Only a minority of patients cannot benefit from VR therapy for such reasons. In these cases, it is important to find alternative treatments or ways to minimize the effects of cybersickness or other aftereffects.

2. Another historically important consideration was whether a patient's age was a key factor in appropriateness of VR treatment. At the time, it was recommended to be very cautious when treating children and elderly patients with emotional problems. After many years of VR application, it is clear that children with phobias can benefit from VR treatment (e.g. Botella et al., 2007), as can the elderly. For example, patients 60 years old and older have overcome phobias (claustrophobia and storm phobias) over many years of VR treatments (Botella et al., 1998; Botella et al., 2006). However, it is necessary to provide more empirical data on the benefits of ICTs in clinical psychology for these populations who suffer various mental problems.

3. Another early concern was whether VR ought to be applied to more severe anxiety disorders, such as posttraumatic stress disorder (PTSD) or panic disorder with agoraphobia. The concern was that VR exposure might not benefit these patients, and could even have negative effects (such as causing sensitization instead of desensitization). Because of this, it was considered important to analyze possible negative effects and to be cautious about the application of ICTs. Researchers have taken these recommendations into consideration, and the preliminary data indicate that VR could benefit PTSD patients without causing negative side effects. (Rothbaum, Hodges, Ready, Graap, & Alarcon, 2001; Difede & Hoffman, 2002). In addition, our research group has conducted a controlled clinical trial showing efficacy and effectiveness at short- and long-term after VR exposure for the treatment of panic disorder (Botella et al., 2007).

4. Another original belief was that VR therapy should not be used with populations suffering from certain types of psychopathology or having features of various psychotic, bipolar, paranoid, substance abuse, and other disorders where reality testing and identity problems were present. Because VR simulates reality with a high degree of fidelity, this was believed to present issues for populations with difficulties in distinguishing between reality and imagination (such as those with high vulnerability to psychosis). However, there are currently a number of VR applications for psychosis that show that VR can in fact be applied to these populations. Freeman and his colleagues at the Institute of Psychiatry in London have demonstrated that VR is a safe and acceptable method for studying paranoia in the laboratory. Indeed, in a recent work by Freeman (2008), "Studying and Treating Schizophrenia Using Virtual Reality: A New Paradigm", the author states: "The use of virtual reality (VR) interactive immersive computer environments allows one of the key variables in understanding psychosis, social environments, to be controlled, providing exciting applications to research and treatment… VR, suitably applied, holds great promise in furthering the understanding and treatment of psychosis" (p. 605).

Ten years ago, Baños, Botella and Perpiñá (1999) supported the application of VR in the field of psychopathology. They demonstrated that VR could aid in generating useful models for studying basic processes and their disturbances. For example, VR can assist in studying the processes involved in reality testing, which is one of the most intriguing challenges for psychopathologists. Results of this line of inquiry might reveal some of the most important aspects of the distinction between psychosis and neurosis. Researching how VR can influence reality judgments might shed some light on how we attribute reality to our perceptions, or other cognitive information. It is also important to study and understand the same metacognitive processes in psychotic individuals. The field is continuing to progress, and there are recommendations for further studies. Perhaps VR can provide answers to questions underlying mental disorders, and can spur further advances (as happened with the pioneering studies by Watson and Jones).

5. Another consideration is the limitation of the continuing high cost of some of the necessary devices and systems. Although costs have decreased significantly in recent years, it remains expensive to develop technological tools and equipment required for program implementation; many therapists and mental health care institutions find them unaffordable. Decreasing these costs is an ethical imperative. Another challenge is that

psychologists and patients unfamiliar with ICTs may resist their use in therapy if they lack the confidence and skills required for the programs' application. It is important to work on increasing the acceptability of ITCs by patients and therapists.

6. Several concerns have been raised about self-help procedures in telepsychology and online therapy. One is the issue of self-diagnosis. For example, a patient could begin an Internet-based program for social phobia because he thinks he has this issue; yet, this might not be an accurate diagnosis. A true diagnosis must be conducted by an expert; therefore, online treatment programs must consider the risks involved in offering treatment with only self-diagnosis. Another issue is that patients usually have access to all the self-help information simultaneously, as opposed to a program wherein each step must be suitably completed before advancing to the next step; this could lead to negative effects. It is important to establish criteria to protect people from the possible negative effects of these kinds of treatments.

Online mental health services present several important legal and ethical issues, most of which remain unresolved: determining the identity of the recipient of services, maintaining confidentiality, legal jurisdiction, and technical competence of the therapist (Gingerich, 2002). To remedy this, various associations of online professionals and health care organizations have developed codes of conduct for online services in recent years. The following links are examples of some guidelines that have been published by various professional organizations: American Psychological Association (1997) Services by Telephone, Teleconferencing, and Internet; American Counseling Association (1999) Ethical Standards for Internet Online Counseling; International Society for Mental Health Online & Psychiatric Society for Informatics (2000) Suggested Principles for the Online Provision of Mental Health Services; Internet Health Coalition (2000) e-Health Code of Ethics (draft); National Board of Certified Counselors (1997) Standards for the Ethical Practice of Web Counseling; Health on the Net Foundation (1997) HON Code of Conduct for Medical and Health Websites; American Medical Informatics Association (1998) Guidelines for the Clinical Use of Electronic Mail with Patients.

In summary, although many of the anticipated limitations of the application of ICTs in therapy appear to have been overcome, it is important to remain cautious. VR and other ICTs offer many potential benefits and can be integrated into established psychological and psychiatric theory and practice. However, ICT researchers must

follow the ethical guidelines for the standard practice of conventional psychological and psychiatric research and therapy.

3.3. Ethical considerations for the future

Technology offers enormous potential for change; it changes us as well as the world at large. For example, a multitude of human advances are due to the use of tools. Likewise, innumerable global changes have resulted from the development and use of increasingly sophisticated devices (carts, boats, trains, cars, planes, rockets, computers, and others). These extraordinary advances have contributed to the development of various cultures and civilizations and the conquest of new frontiers on Earth and beyond.

Despite the dominance of certain countries or cultures at each moment in history, the culture of a plethora of populations has persisted. The abundance of cultures in the world has contributed to the rich cultural legacy of humans. However, current powerful technological advances like the Internet, VR or other ICTs have the potential to provoke significant changes in the path of human progress.

Internet

This technology allows us to quickly access any person or place. This offers enormous advantages, but also limitations. Clear advantages include ease and fluency of communication and the potential for great advances in knowledge. Possible limitations of the Internet include the risk of transforming the world into a “global village” characterized by increased cultural uniformity and loss of diversity. Additionally, the Internet has spurred a phenomenon of social isolation which leads to reduced communication and intimacy with friends and family. Many people no longer need to venture from their homes in order to work or enjoy themselves. The Internet’s growing entertainment function includes new interfaces and increasingly sophisticated stimuli. “Generation C” has been described by Peter Marsh as the generation of the Internet. Its main features are creativity, connectivity, collaboration and communication. Marsh notes that this generation has developed with the ideology of the Internet, including free access to information, cooperation and information sharing. While this may be a benign characterization, descendants of Generation C may be have the misfortune of having access primarily to “connected experiences” in which each individual is isolated from others. Thus, they would be “connected human beings” with more personal space but increased isolation.

While incorporating these new senses, changes in our structures for knowing the world could occur, similar to the loss of hair in primates or the loss of molars in some mammals. However, these changes could be more dramatic and dangerous and could result in the loss of valued behaviors such as non-verbal language or physical contact. The effects that this could have in the long term regarding social functioning and physical development are unknown. Perhaps the new "digital natives" (using Marc Prensky terminology) in the very distant and hypothetical future will not need legs; they will not need to go anywhere when all the information and enjoyment they need will be brought to them. In this scenario, all spheres of life would be digital.

Mobile devices and other ICTs

The benefits of using new ICT technologies (mobile phones, PDA, GPS, biosensor, etc.) have been previously explained. Their main advantage is their ability to provide information where and when it is necessary. However, it is important to consider possible limitations; one is the availability of information. An increasing amount of information is becoming available, some of which is general, but some of which is personal, which brings up privacy issues. For example, the increasing popularity of social networks like Facebook.com raises questions about ownership of and access to information. For example, could a piece of information uploaded by a user when he was 12 damage him when he is 30? Who owns the information? It is necessary to make laws about information ownership and use, privacy, and the protection of minors. Another danger related to this is the possibility of using these devices illegally, considering that it is possible to do such things as locate a person using GPS, or to monitor a person's physiological state 24 hours a day with small sensors. A "big brother" could use this technology to observe and obtain continuous information from people. This leads to ethical considerations such as whether we are putting ourselves at risk in the area of privacy.

Another danger involves the use of attractive devices that help us in numerous valuable ways, but which also entails a high price. Clear examples are the mobile phone and email. Some people have shown resistance to mobile phones; however, most have surrendered to this valuable technology. These devices are increasingly precise, small, useful and indispensable. Many people develop a dependency on these technologies (and find it very difficult to leave the mobile phone at home or not check email daily). Thus, technology "controls" us while also making it easier for others control us. For example, with email people receive information immediately, which is convenient; however, they then are obliged to answer emails daily, which consumes a large amount

of time. Therefore, it is advisable to consider limits in the use of these technologies at the workplace and also in leisure activities.

Another important reflection concerns the drive to provide a more sophisticated (and thus presumably better) education to one's children. In western society, it is considered important for children to study and understand ICTs and to have immediate access to information and knowledge in order to excel in school and beyond. It is desirable to have the fastest Internet connection in schools and homes, and to develop ways to be online anywhere at any time. Ever-smaller memory devices contain information essential to life. From this evidence it would appear to be desirable to develop devices and systems with great storage capacity that would enable continuous Internet connectivity. One might imagine that some would accept a microchip under their skin with a hard disk and capability for continuous updates, or that babies could have such devices implanted from birth. What the true cost of this be?

Virtual Reality

If the former is extraordinary, the possibilities of VR for the future are equally impressive. People might not only be able experience simulations of reality, but might also be able to *live* any "reality" that could be programmed. Theoretically, anything is possible; the human imagination and technological advances are the only limitations.

This could lead result in a significant shift in our experience of the physical world, thanks to new technologies that will enable greater control and mastery of the physical world. For example, it might no longer be necessary to physically go to New York in order to have the experience of "being" in New York. A person using a sophisticated VR system to "travel" could believe that he has been in New York when in fact he has not. How will humans adapt to these new capabilities? The possibilities can cause fear and anxiety, and might cause some people to revert to their private spaces, only to emerge when it is absolutely necessary or profitable to do so.

It is likely that the learning experiences of human beings will change. One might reconsider Albert Bandura and his vicarious learning paradigm. This author took into consideration aspects that remained outside the classic and operant conditioning paradigms (attention processes, storage processes, motivational processes, and so forth). He established an important distinction between learning and performance and emphasized the possibility of establishing new patterns of response by vicarious learning. It is likely that VR is evolving into a new learning paradigm: "virtual learning". It is incumbent upon researchers to determine its parameters and rules.

In the past, parents and the community (the tribe) decided what was necessary to teach, including the ideas, procedures and norms of the tribe. Later, teachers, the educational system, and books were added in order to significantly expand the limits of knowledge. However, people only had access to certain mentors and books (which were available in their immediate environment). The creation of printing expanded the availability of books. The development of revolutionary technologies such as the telephone and television resulted in greater access to various ideas, contexts and information sources. However, current advances including the combination of different ICTs like Internet, VR, mobiles devices, sensors and more result in dramatically expanded capabilities. This new learning framework offers clear advantages, including providing access to an enormous amount of information, designing and defining experiences, creating an experience or situation, organizing and structuring an experience or situation at will, adapting it to one's needs, practicing at a customized pace, recording an experienced situation, saving it, providing feedback on it, and repeating an experience as many times as needed in order to consolidate or generalize skills and strategies. The possibilities are infinite; the important question is whether all the resulting effects will be positive ones.

As previously mentioned, caution should be taken to avoid disturbing human development. Children must continue to perform certain physical functions, to develop motor skills and social skills and play with other children. The development process can be adversely affected if there is no control over the use of new technologies such as VR. These negative effects have already been observed with TV, but VR could be even more dangerous. It could cause problems in the cognitive organization of human experiences, memories, judgments, beliefs, and in the distinction between the self and the environment, leading one to question: Is this real? Is that me? Was that me? Is that happening to me? Did that happen to me? Was it a dream? Was it real? Was it a virtual experience? Having multiple virtual experiences during the years could confuse reality judgments and the perception of self and identity.

Another important advance to consider is the creation of new entities. One example is *avatars*, virtual beings that live in the memory of computers and perform in virtual worlds. Another is *robots*. The creation of these entities leads to ethical and philosophical issues about their degree of individuality or identity. One of the most intriguing questions is to what extent these entities have consciousness. In other words, will human beings be capable of creating artifacts with consciousness?

The word “robots” usually connotes machines with human appearances. However, other kinds of robots (already in existence) include autonomous minuscule structures that can be installed in human bodies; they have goals and perform actions designed to develop and maintain one’s physical and mental health, generating what some authors call “technological consciousness”. The risk is not only that robots will be integrated into human lives, but also that humans will be assimilated by them. Along this line, some authors argue that a biotechnological revolution will soon occur that will change humans’ position in the world. Ray Kurzweil, author of *The Singularity Is Near: When Humans Transcend Biology,* predicts that the fusion between human intelligence and artificial intelligence will lead to a new kind of intelligence, radically different from what can currently be imagined. This is predicted to happen soon; intelligent “nanorobots” will be integrated into human bodies and into the environment, resulting in total immersion into a virtual reality. If this does indeed transpire, humans should be prepared with deal with the possibility of losing their human identities in favor of some new entity.

4. What can humans do?

First, as in any problem-solving process, one must stop and think. The human being is the most powerful predator and also the most dangerous destructive agent on Earth. However, ICTs are also powerful, and are increasingly ubiquitous. They will intrude everywhere, becoming “liquid” technologies. Therefore, care, caution and control are highly recommended.

It is useful to recall Bertalanffy’s systems theory (1967, 1968): his vision of the human being resembles an open system and an active agent. Bertalanffy stated that people are not merely passive recipients of stimuli from an external world; rather, they “create” their realities. In the context of ICTs, his relevant belief is that any intervention or human artifact exacts a price, no matter how benign the motivation of the creator. To what universe and into what kind of being (or cybernetic organism) are humans evolving? Researchers do not want to contribute to the destruction or disturbance of central and necessary human processes; rather, they would like to promote useful patterns that could be useful in the process of human evolution, such as personal growth or empathy. Therefore, it is becoming more urgent to cautiously define the framework and contexts of intervention, to delimitate the programs of observation and

intervention accurately and to anticipate possible side effects and intervene as needed. This should be done with adequate scientific rigor. It is necessary to conduct research programs with accurate and strict methodological and ethical control. This is uncharted territory into which researchers venture blindly. To succeed, it will be important to make use of all of human accumulated knowledge. It must be remembered that ICTs are new tools and much work is yet to be done, including creating a theoretical framework that allows making predictions and organizing the findings.

ICT applications have a promising future, and the existing applications are merely the beginning of an enormous progression. As previously mentioned, it is difficult to conceive of an application that cannot be created using existing technology. The creation of future applications is only a question of talent, time and resources; technology itself is neutral. The important questions are these: In which direction should technological development proceed? Which applications will be the most useful, have the most impact or benefit the most people? Which psychological cyberspace is most effective and which cybertherapy is most appropriate to pursue? Answering these critical questions is a challenge to which all researchers can apply themselves.

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