

Survey

NEURO-TECHNOLOGY AND COUNSELLING

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1. Introduction

Neuro-technology is an emerging field that is opening up a wide range of new possibilities and devices to treat nervous system disorders. Basically, neuro-technology involves the application of electronics and engineering to the human nervous system. Neuro-technology encompasses the application of micro-fabricated devices to achieve direct contact with the electrically active cells of the nervous system (neurons). Already used for some basic research in neuroscience, the technology is also being developed for applications in neuro-prosthetics.

Counselling and neuro-technology are closely associated with each other and are aligned for better therapeutic outcome. It is believed that counselling existed since the commencement of human civilization. Human beings have sought comfort and help from their close associates, besides the kith and kin. Counselling, as a separate therapeutic science, is a product of the 1960's. Although there had been various moves from the 18th century onwards the major breakthrough in counselling came from Carl Rogers in 1942, with his famous book *Counselling and Psychotherapy*. However, research and development in different areas of neuro-technology have contributed a lot in the counselling setting today. The advances in neuro-technology give us powerful new tools to study the brain, and many of these same technologies provide new therapeutic opportunities which are central to counselling.¹

Tens of thousands have already received neural interface technologies to successfully treat symptoms of epilepsy and Parkinson's disease. While systems that sense neural signals are in early stages of development, they promise to provide a means to restore independence, communication, and, potentially, movement. Current use of technology within the actual process of conducting therapy centres around three

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¹Lawson Matt, *Entering Cyberspace at the Millennium Dome*, New York: Orion Books Ltd., 2000, 220-228.

distinct areas, such as Online Text Therapy (e-mail and Internet Relay Chat), Video/Telephone Therapy, and Stand Alone CD-ROM software. The concept of using innovative technologies for mental health has been forthcoming since it became apparent that clients are not only willing to use technology to gain therapy services but in many cases actually prefer it.² Development of sophisticated computer generated representations of the self is the work of BTEExact's Radical Multimedia Lab, and their application in therapy has been developed in conjunction with Online Counsellors. There are four distinct areas of development in progress, based on the premise that some clients find the idea of anonymous, safe, comfortable and readily available service provision empowering and preferable to traditional (usually face-to-face) therapy.

Neural interface systems have the potential to significantly modify the lives of individuals with paralysis. The multi-electrode sensor itself appears to provide a sensitive means to monitor neural functions; in this connection, it is found that it could be useful in a range of other neurological conditions as well.

The use of natural language scripts provides a mental health information service that creates a realistic question and answer session that appears to be a dialogue between two people, when, in fact, the client is interacting with a piece of software. The creation of an electronic version of the head and face of a therapist – an *avatar*³ – combines the positive “distancing” aspect of the relationship so that clients can easily access an online therapist. The representation of a human being facilitates a more open therapeutic relationship, working towards the client's mental wellbeing while bypassing the usual constraints of a face-to-face relationship (either the physical bias or having to look at someone in the eye while revealing sensitive material). Full-body *avatars*, whether actual representations of the person or not, can mean that groups can meet from anywhere in the world and hold a session in complete anonymity and genuine safety. Putting these *avatars* into specific relaxing environments, we can lose the impersonal waiting room or austere consulting room altogether.

²Anthony K., “Counselling in Cyberspace,” *Counselling Journal* 11, 10 (December 2000), 625-627.

³The word ‘*avatar*’, originally a Sanskrit term, means “a deity in visible earthly form.” In science fiction, the word has been used to mean the visible representation of a human being, appearing in a computer generated world.

2. Avatars

The word *avatar* has been applied in the IT industry with the same definition: “A graphical representation of a human being in a computer graphical environment.” *Avatars* come in many shapes and forms and in the past their appearance has been limited by the graphical processing power of computer technology.

The explosive growth of widely available PC graphics power in recent years has led to the current state of the art in *avatar* technology called photorealism.⁴ This is the ability to create *avatars* that have the same “on screen” appearance as the physical appearance of a real human being. These are usually created using 3D graphics and can be a representation of the head only, head and shoulders, upper body or full body of the human subject upon which it is based.

3. Natural Language Scripts and Knowledge Database

In order to interact effectively with the client, the therapist *avatar* will need two parts to its “virtual intelligence.”⁵ The first part is a large store of information on the issues the client is likely to discuss, how those issues relate to each other and to the client, and what are the sensible and correct responses to those issues might be. We call this a knowledge database, which is the sum of the avatar’s understanding in the required topic areas. The second part of the “virtual intelligence” is the ability of the *avatar* to communicate meaningfully with the client. Most importantly, this is the ability to understand the client’s questions and comments and, then, to structure and deliver a meaningful response.

The larger and more in-depth the information store on the required topics, the more informed the *avatar* will be and the more capable it will be in providing a useful and effective response to the client. By tightly defining the topics to be covered but providing great depth of information and linkage between the pieces of information, it is possible for the *avatar* to give very intelligent responses to the client.

4. Natural Language Engine

A natural language engine is a powerful tool. Not only does it understand the individual words being provided by the client (in spoken or text format) but it also understands the context of the words, how they relate to

⁴Anthony, “Counselling in Cyberspace,” 625-627.

⁵Anthony, “Counselling in Cyberspace,” 635-640.

each other and the implication of those words when placed in that particular order. A simple example would be as follows: The client opens the discussion with the following comment: “I feel really down about what has happened.” It is OK for a speech recognition application to detect these words and perhaps even provide their individual meanings but that is not enough information for the *avatar* to be able to help the client.⁶ For example, the natural language engine goes much further than this. It is able to understand that the client is having a strong feeling of depression or gloom and that this feeling has been caused by some yet to be defined event (“what has happened”).

5. Avatar in Group

It is possible to take the *avatar* technology one stage further by representing the client as an *avatar* along with the counsellor and visualizing both from a third-person perspective in a virtual environment. In this context, any number of client *avatars* can be placed together in the virtual environment and be controlled in real time by the clients from their remote workstations. This allows us to create a virtual group therapy experience in the same way in which a virtual business conference might occur. Interaction between the participants can be through a number of methods. A few of such methods are: (1) Text chats where the *avatars* provide a spatial and more realistic visual connection with the other participants. (2) Voice conference call where each avatar’s lip movements are synchronized to that of the participant it represents. (3) Animation can be applied to the *avatars* through tracking the body movements of the clients at their desk by using simple screen top video cameras and applying the movement data to the *avatars*. Similarly, facial expression can be given to the *avatars* by tracking the facial expression of the client at their desktop.⁷ (4) Alternatively, where video tracking facilities are not available, animation and facial expression can be triggered by the clients pressing pre-programmed hot keys on their keyboard or by using the text emoticons commonly used in SMS format.

There are many areas of research within these concepts that need to be explored and examined, from a theoretical, practical and, of course, ethical points of view. This is an innovative use of technology at its best –

⁶Anthony, “Counselling in Cyberspace,” 650-655.

⁷Anthony, “Counselling in Cyberspace,” 670-675.

the combination of computer technology with the human soul, previously satirized by society as at best impossible and at worst a danger.⁸

6. Advantages and Disadvantages

Recent technology, based on published scientific research, has allowed us to ‘see’ into the brain and assess problems that were previously ‘invisible’. We find that many patients are incorrectly diagnosed when symptoms or behaviours are confused with similar problems. By accurately and objectively evaluating the brain’s neurophysiology, we are more precise in our interventions and obtain better results – often without medication.

In addition, the advantages of using *Avatars* for online and automated therapy are many. *Avatar* Therapy provides a more intuitive and human interface than the current purely text-based systems. Clients who are restricted by geography have instant access to specialists. Think of a place in cyberspace where clients can select their counsellors from a range of *Avatars*, an image that they can relate to completely by gender, colour, and appeal. The human soul behind the *Avatar* is real – the physical representation need not be. Add a virtual environment that has no physical restrictions on any level – not even being bound to the Planet Earth or, indeed, to any reality.⁹ Let the client remain anonymous by changing his/her identity through the respective *Avatar* and, then, use that choice of physical representation within the therapeutic work to explore role-play, the identity management, and the client’s true perception of the “real self.”

Indeed, the technological progress must be put to use in scientific advances supporting physiological and psychological wellbeing of human beings. Technical devices do not, however, substitute the value of face to face work. While the benefits we can derive from taking such positive steps to look at areas of our life that cause any need for concern or anxiety are varied, there are enough indications to be cautious in such moves.

⁸L. B. Moran, P. F. Durrenberger, N. R. Pearce, and M. B. Graeber, “Two New Molecular Markers of Lewy Bodies in Parkinson’s Disease,” *Journal of Neurology, Neurosurgery and Psychiatry* 78, 9 (2007), 2-4.

⁹Eliza J. Weizenbaum, “A Computer Program for the Study of Natural Language Communications between Men and Machines,” *Communications of the Association for Computing Machinery*, New York: Communications of the ACM, 1966, 36-45.

7. Conclusion

Generally speaking, human beings are equipped to handle various problems they face in and through their loving families and friends. However, it is quite normal to gain support with therapy in a non-judgmental, safe, and confidential manner. Life can be very complex and sometimes friends and families may not be equipped to deal with issues as everyone would like. It is possible that sometimes they are affected on a personal level too. This can cause even more pain and lead to more arguments than necessary as feelings of not being understood, not being truly heard, or even being 'disrespected' can get in the way. In this context, neuro-technology and its use in counselling are essential and appropriate.

Mind science or neuro-technology is all about the way the brain sequences, stores and uses memory, and the chemistry behind the process to create feelings. Online counselling can be our first taste of taking therapy to see how effective this type of therapy can be and to really help us break any limiting beliefs we may have. Limiting beliefs, for example, is one area which can be addressed through this medium of neuro-technology. The signs are positive and, therefore, neuro-technology's application in different areas of counselling intervention is said to be highly prospective. Researches are on and we have a long way to go; indeed, we need to explore further for better therapeutic outcome in the arena of neuro-technology.