



The Use of Innovative Avatar and Virtual Environment Technology for Counselling and Psychotherapy

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Abstract

Current use of Information Technology within the actual process of conducting therapy centers around three distinct areas - Online Text Therapy (e-mail and Internet Relay Chat), Video/Telephone Therapy, and Stand Alone CD-ROM software. This paper examines four further innovative radical technological developments currently being developed for Mental Health provision.

Introduction

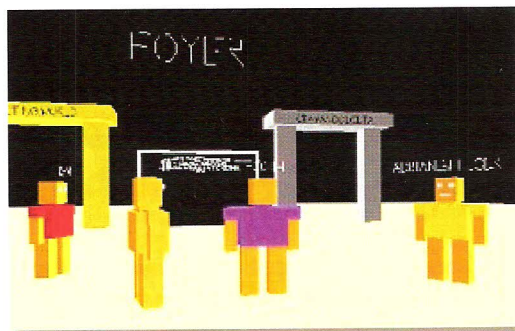
The concept of using innovative technology for Mental Health provision has been forthcoming since it became apparent that clients are not only willing to use technology to gain therapy services but in many cases actually prefer it (Anthony, 2000). Development of sophisticated computer generated representations of the self is the work of BTExact's Radical Multimedia Lab, and the application of this to the world of therapy has been developed in conjunction with OnlineCounsellors.co.uk. 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.

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** - 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 well being while bypassing the usual constraints of a face-to-face relationship (physical bias or having to look 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. Put these avatars into specific relaxing **environments**, and we can lose the impersonal waiting room or austere consulting room altogether. The positive use of a therapeutic virtual environment for adolescents facing hemodialysis has already been piloted and found to be a way for patients to distance themselves from the harshness of their medical condition (Bers et al, 2001).

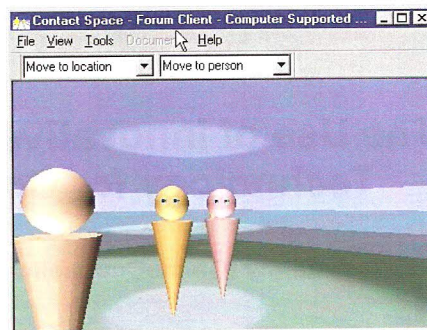
Avatars

The word “Avatar” comes from Hindu Sanskrit term³ meaning “A deity in visible earthly form”. In science fiction⁴ the word has been used to mean the visible representation of a human appearing in a computer generated world. This word has then been applied in the IT industry with the same definition – “A graphical representation of a human being in a computer graphical environment”⁵. Avatars come in many shapes and forms [Fig.1] and in the past their appearance has been limited by the graphical processing power of computer technology.

Figure 1. A range of avatars, past and present



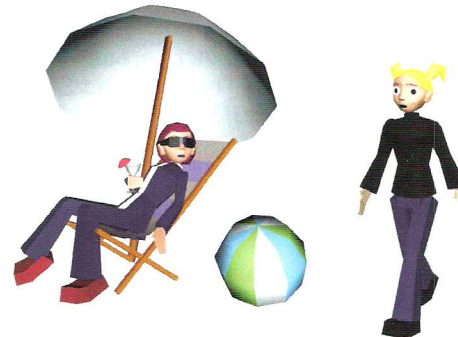
Very basic humanoid figures



Simple geometric style avatar representations



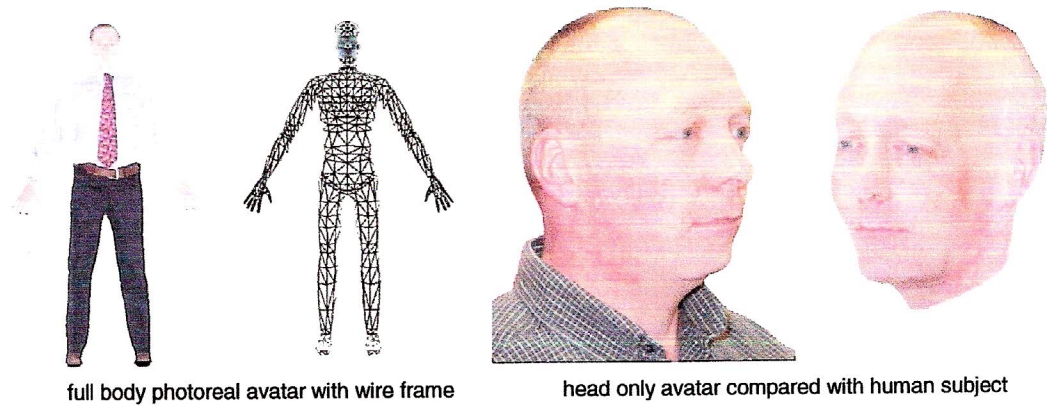
Cartoon Style 3D avatars¹¹



Full body human representations¹¹

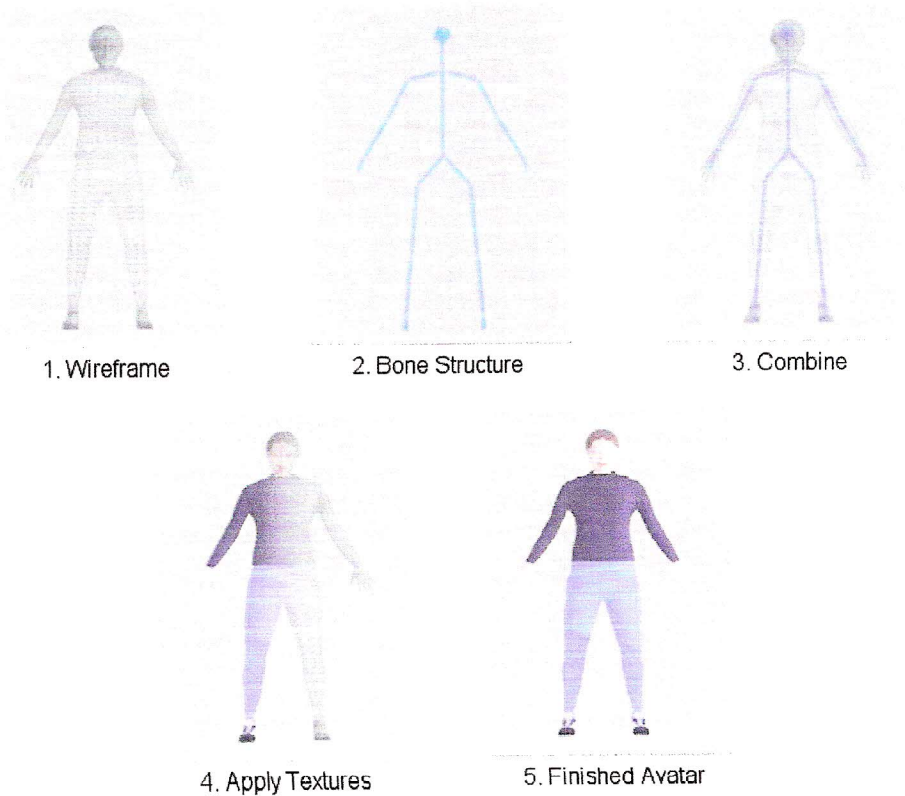
The explosive growth of widely available and cheap PC graphics power in recent years has led to the current state of the art in avatar technology – photorealism. This is the ability to create avatars that have the same “on screen” appearance as the physical appearance of a real human being [Fig.2]. These 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.

Figure 2. A selection of photoreal avatars



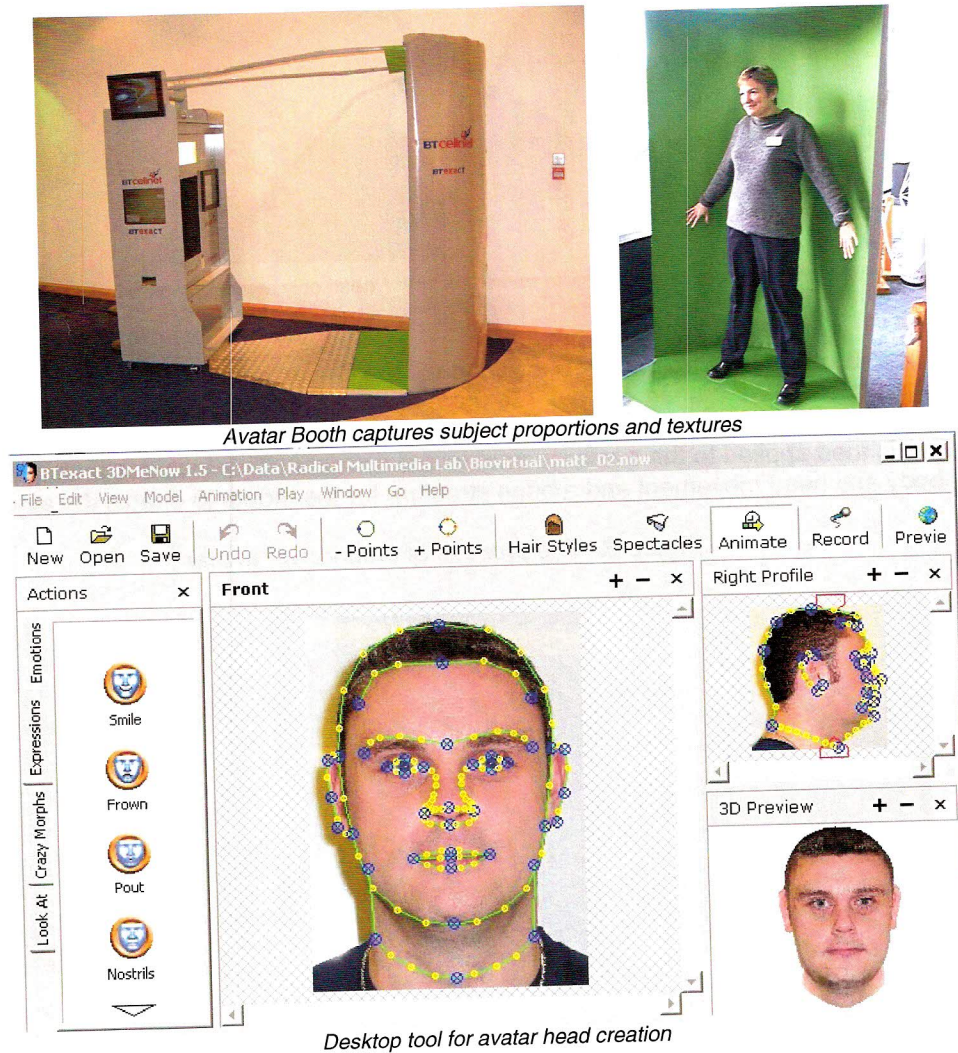
The avatar is created by deforming a polygonal “wire mesh” structure to match the proportions and appearance of the human subject. Texture information captured from high resolution digital photography is then overlaid on the mesh to provide the avatar’s “skin”. An underlying bone structure is then applied to the avatar to enable it to animate. This includes a simple skeleton for limb, body and head movement and a bone structure for the mouth to enable the avatar to talk.

Figure 3. The process of creating an avatar¹²



This process can either be implemented by a graphics designer using desktop avatar building tools⁶ [Fig.4] or by using a special avatar scanning booth^{7,8} [Fig.4], which captures the information in an automated process and then builds the avatar.

Figure 4. Desktop Tool and Avatar Scanning Booth



The avatar is given a voice by means of a text to speech (TTS) engine or by synchronizing its lips to a real human voice like a virtual ventriloquist's doll. This can be done dynamically or by using pre-recorded speech samples. Animation can be applied to the avatar's facial features so that it is capable of facial expression [Fig.5] and emotional responses such as surprise, interest, empathy, the need for clarification, etc

Figure 5. Images of avatar facial expressions



Once created, a remote therapist can control the avatar in a real time on-line Counselling session, speaking through the avatar to the client. This overcomes some of the problems associated with video conferencing such as low bandwidth availability and lack of eye contact. Alternatively the avatar can be configured to act as a virtual host on a web site or CD ROM and provide a "human style" interface to an automated Counselling system such as the original 1966 Weizenbaum creation ELIZA⁹ (see <http://www-ai.ijs.si/eliza/eliza.html>). In this case the avatar needs to act independently and as such needs a form of virtual intelligence and knowledge. A natural language engine combined with a knowledge database provides this.

Natural Language Scripts and Knowledge Data Base

In order to interact effectively with the client, the therapist avatar will need two parts to its "virtual intelligence"¹⁰. 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 a sensible and correct response to those issues might be. We call this a knowledge database, which is the sum of the avatars 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 structure and deliver a meaningful response.

Knowledge Database

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 of 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.

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 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. E.g.

Word	Individual Meaning
I	Personal Pronoun
Feel	To examine by touch
Really	In fact
Down	A lower position or state

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”).

Word	Individual Meaning
I	Personal Pronoun
Feel	Emotion
Really	Emphasis (strong)
Down	Depressed

As a result it can refer to the knowledge store and structure a sensible response. E.g.

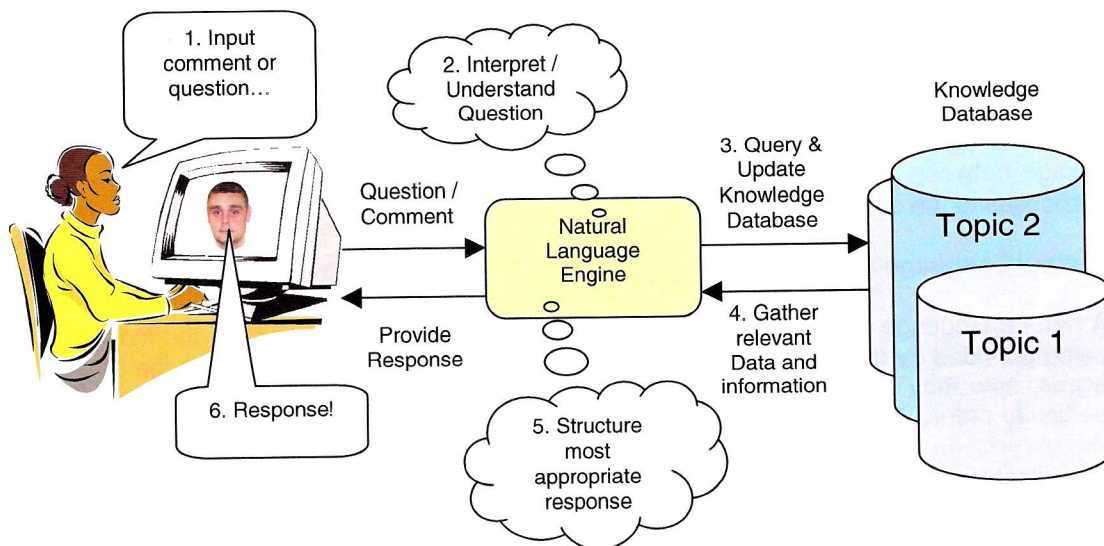
“What has happened and why is it making you feel so down?”

The knowledge store may even be dynamically updated as the avatar learns about the client. So in a past session it may have learnt that the client was going through a divorce. In which case the avatar might respond with....

“Is it the divorce that is making you feel this way?”

The process might be described in the following way [Fig.6]

Figure 6. Virtual Intelligence process for the Avatar Counsellor

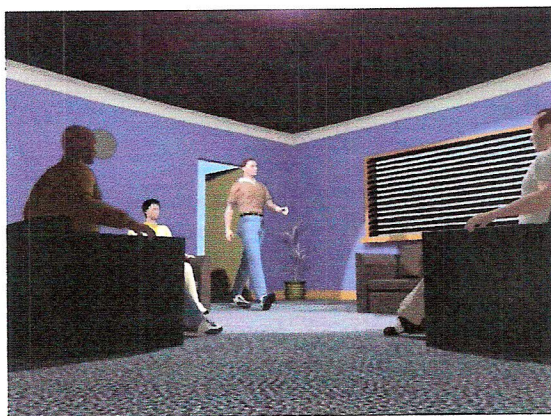


Group Meetings

It is possible to take the use of avatar technology one stage further by also representing the client as an avatar along with the Counsellor and visualizing both from a 3rd person perspective in a virtual environment (see next section). This is not limited to only two avatars. Any number of client avatars can be placed together in the virtual environment and 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:

- Text chat where the avatars provide a spatial and more realistic visual connection with the other participants
- Voice conference call where each avatars lip movements are synchronized to that of the participant it represents
- 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.
- Alternatively where video tracking facilities are not available, animation and facial expression can be triggered by the clients pressing preprogrammed hot keys on their keyboard or by using the text emoticons commonly used in SMS messaging.

Figure 7. A virtual group therapy session using avatars¹²



An avatar enters the virtual room



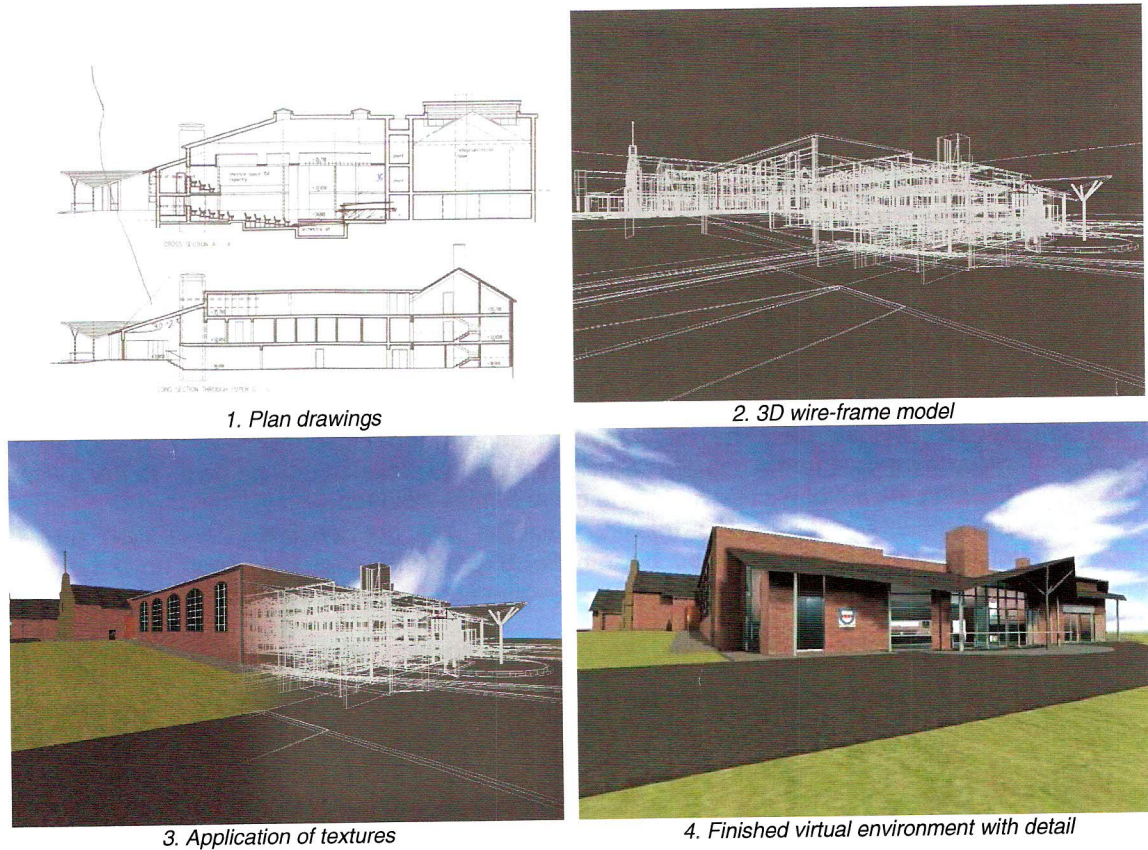
The virtual session begins

Virtual Environments

A virtual environment can be defined as “A simulation of a physical space using 3D graphics. The space can be based on a real world location or can be purely the product of someone's Imagination.”

Virtual environments are created in a similar process to avatars. The proportions and dimensions of the space, usually acquired from plan drawings, are then visualised in a 3D “wire-frame” or mesh format. Texture information is then acquired either by taking digital photographs of real world locations to provide a photoreal experience or the textures can be created by the designer. These textures are then applied in the correct way to create the finished virtual environment. Lighting effects, shadows and other details can then be added, such as furniture, curtains, exteriors, etc.

Figure 8. Process for creating an example 3D environment (in this case a new theatre)¹²

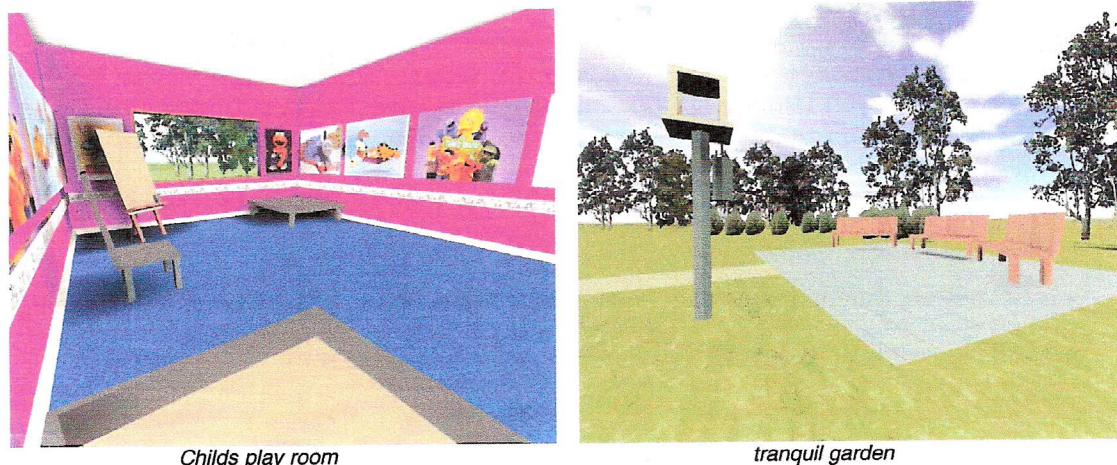


The virtual environment provides a context in which meetings such as group therapy sessions using avatars can take place. In the case of the image shown in Figure 7 this is a fairly standard 3D model of a conferencing room. As in the definition above this could be based on a real world conference room that the client is familiar with or generated by the therapist to suit his or her taste.

Virtual environments are extremely flexible and as a result can be tailored to the needs of the client(s). It is not necessary for the client to receive therapy in a room that looks like a traditional Counselling room. Rather the client can be offered a venue that best facilitates the discussion or choose from a range of available rooms. In special cases the client could specify the environment themselves. Examples of where this might be useful include:

- Child therapy in a room filled with toys and looking like a play room, perhaps including interactive multimedia games to facilitate the discussion
- Re-living an experience where having the correct environment helps the client to recall details – such as a crime scene
- Neuro-Linguistic Programming techniques can use manipulation of environments to change their emotional meaning to the client
- Helping a client to relax by using a familiar leisure location such as their local pub or a tranquil garden from their local park

Figure 9. Different "client tailored" virtual Counselling environments¹²



Conclusion – The future of Avatar and Virtual Technology in Therapy

There are many areas of research within these concepts that need to be explored and examined, from a theoretical, practical and of course ethical point of view. This is innovative use of technology at its best – the combination of computer technology with the human soul, previously satirized by society as at best impossible and at worst a danger.

But 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 by means of a virtual session where bandwidth provision doesn't allow for videoconferencing. A virtual environment can be the choice of the client to maximize their comfort and facilitate the therapeutic work.

Think of a place in Cyberspace where clients can select their Counsellor 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. Let the client remain anonymous by changing their identity through their Avatar, and then use that choice of physical representation within the therapeutic work to explore role-play, identity management and the client's true perception of the "real self".

Then, think of the future of technology – haptic bodysuits that allow people to occupy the same space while many miles apart – total immersion in a virtual environment with tactile feedback. And how far away is the possibility of beaming a hologrammatic therapist into our living rooms? In the year 1999, when OnlineCounsellors.co.uk started offering workshops on IT in Therapy – this concept was offered as a lighthearted look at the realms of possibility. Now, just three years later, it is very much offered as a serious and likely development within our lifetimes.

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References

1. Anthony, K. (2000). "Counselling in Cyberspace". *Counselling Journal*, 11 (10) 625 - 627. Also available online at www.onlinecounsellors.co.uk or www.kateanthony.co.uk
2. Bers, M., Gonzalez-Heydrich, G., DeMaso, D. (2001) "Identity Construction Environments: Supporting a Virtual Therapeutic Community of Pediatric Patients Undergoing Dialysis" In *Proceedings of Computer-Human Interaction (CHI'01)* ACM.
3. E M Kirkpatrick, *Chambers 20th Century Dictionary*, 1983 Edition, Pg 84, Definition of *Avatar*
4. Neal Stephenson, "Snow Crash", October 1994, ISBN: 0140232923
5. Matt Lawson, *Entering Cyberspace at the Millennium Dome*. UCL Library, Aug 2000. Pg 10
6. Biovirtual web site, www.biovirtual.co.uk
7. D Ballin, M Lawson, MA Lumkin, J Osborne, *Personal Virtual Humans – inhabiting the Talkzone and beyond*, *BT Technology Journal*, Vol 20 No 1. Jan 2002
8. *Practical, Reliable, Repeatable: Scanning Avatars in the Millennium Dome*, Daniel Ballin, Matthew Lawson, Stephen Crampton, Tim Child, Adrian Hilton, *Virtual Human Modelling, Scanning 2001*, Paris.
9. J. Weizenbaum. *ELIZA -- A computer program for the study of natural language communications between men and machines*. *Communications of the Association for Computing Machinery*, 9:36--45, 1966
10. *Intelligent Virtual Agents*, *Proceedings of third workshop on Intelligent Virtual Agents*, Angelica de Antonio, Ruth Aylett, and Daniel Ballin (Eds), *Springer Lecture Notes in Science* 2001
11. *Artwork from Theatre Of Work Enabling Relationships*, EU 5th Framework project, <http://tower.gmd.de>, Amanda Oldroyd et al
12. *Artwork and 3D images by Mick Lockwood*, *Radical Multimedia Lab*, BT Exact Technologies