

## Chapter 37

# Neurotechnology in the Development of Cyber–Psychotherapy Systems for Inducing and Measuring Altered States of Consciousness in Transpersonal Psychotherapy

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### ABSTRACT

*Transpersonal psychotherapy is based on transpersonal psychology and considers that the psyche is multidimensional and that there are several “levels of consciousness” and each has different characteristics and is governed by different laws. Transpersonal psychology is the study of human nature and proceeds on the assumption that human beings possess potentials that exceed the limits of their ego and integrate the spiritual experience within a broader understanding of the human psyche and consciousness. Altered states of consciousness have been used as psychotherapy in transpersonal psychology for decades. Although there are very well known techniques to induce altered state of consciousness as holotropic breathwork, Neurotechnology offers an alternative way not only to induce these states for transpersonal therapy but also to measure the level of a state of consciousness. The objective of this chapter is to provide a review of the main concepts of Neurotechnology and the main technologies that can be used to induce and measure altered state of consciousness for transpersonal psychotherapy and propose an architecture for a Cyber psychotherapy system that uses these technologies.*

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## **INTRODUCTION**

Cyber therapy is an Internet based computer-mediated system used to facilitate psychotherapy (Botella et al. 2009). This includes new applications of technology within psychology and healthcare, which utilize augmented and virtual reality components in order to facilitate psychotherapy (Botella et al 2009). Interest in Neurotechnological devices has grown strongly since the release of 1986's classic text of Michael Hutchison "Megabrain" (1986). Besides Neurotechnological machines, the industry has developed a range of related devices including peripherals-tapes, subliminal tapes, Hypno-peripheral processing, sound meditation devices and altered state induction software programs for personal computers, etc. It seems like Neurotechnology combined with contemporary psychology may seem to be revolutionary but its roots are much older as humanity has made many attempts in the past to involve consciousness with technology. The flashing LEDs in a light and sound machine can be traced back to the old practice of starting a fire in order to induce trance. Sound recordings of brain entrainment undoubtedly have their roots in the ritual singing and shamanic use of wind instruments.

This current era of Neurotechnology was born from the experiments made in biofeedback that resulted in the work of some researchers of consciousness as Masters and Houston (1966) that created the AVE (an abbreviation of Audio Visual Environment) that is one of the first electronic brain entrainment devices. The AVE was the first device to use visual and auditory stimuli as a means of altering consciousness. Not much different that many of audiovisual devices of today, the AVE consisted of a wrap-around screen and headphones to bomb the sense in these two stimuli.

These signals generated by AVE devices and detectable by electroencephalogram (EEG) tests at specific frequency ranges; seem to vary from one state of consciousness to another for their users. The products of Neurotechnology appear to make possible to "tune" the brain to these different alternating frequencies, and in turn achieve new psychological states.

When you "tune" into these frequencies at a slower pace, our thought processes and central nervous system are altered, causing the brain to fall into a deep level of activity. In addition, when one is tuned to a frequency faster and a higher range, the wave activity can have a highly stimulating effect on the brain.

Altered states of consciousness have been used as a therapy for modern psychological paradigms as transpersonal psychology (Valverde 2015). Although there are several techniques such as holotropic breathing used to induce these altered states of consciousness, Neurotechnology offers a more easy to control alternative to the transpersonal therapies.

In order to understand Neurotechnology, this review begins with an introduction to the technologies that made possible the modern Neurotechnology including biofeedback, quantum physics, quantum biofeedback, theory of consciousness, principles and applications of Neurotechnology for inducing altered states of consciousness in transpersonal therapies. Finally, the chapter proposes an architecture to conduct transpersonal therapy over the internet with the use of Neurotechnology in order to induce and measure altered states of consciousness.

## **BIOFEEDBACK**

Biofeedback literally means, "responding to life". The work of Miller opened the doors to research processes in biofeedback. Miller (1978) constructed an apparatus equipped with sensitive electrodes connected to a monitor on which the patient could see how the skin temperature behaved, teaching

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