

## What the Research has to say about Brainwave Entrainment . . .

**Dr. Roger K. Cady, Dr. Norman Shealy in "Neurochemical Responses to Cranial Electrical Stimulation and Photo-Stimulation via Brain Wave Synchronization." Study performed by the Shealy Institute of Comprehensive Health Care, Springfield, Missouri, 1990, 11 pp.:**

Eleven patients had peridural and blood analysis performed before and after the relaxation sessions using flash emitting goggles. An average increase of beta-endorphin levels of 25% and serotonin levels of 21% were registered. The beta-endorphin levels are comparative to those obtained by cranial electrical stimulation (CES). This indicates a potential decrease of depression related symptoms when using photic stimulation.



**Dr. Norman Shealy, Dr. Richard Cox In `Pain Reduction and Relaxation with Brain Wave Synchronization (Photo-Stimulation). Study performed by the Forest Institute of Professional Psychology, Springfield, Missouri, 1990, 9pp.**

Cerebral synchronization was obtained with photic stimulation devices and tested on more than 5,000 patients suffering from chronic pain and stress-symptoms during the `80s. A detailed study on 92 patients indicated that 88 obtained relaxation results higher than 60% after 30- minute sessions at 10 hz. Thirty patients had sessions in Theta (5 hz) and experienced relaxation states of 50-100% after five minutes as well as improved pain relief. Eight patients had blood tests before and after the sessions and showed improved beta-endorphin levels of 10-50%. All of these relaxation results are improved when combining the photic stimulation with relaxation audio tapes.



**Dr. Thomas Budzynski in "Biofeedback and the Twilight States of Consciousness," in G.E. Schwartz and D. Shapiro eds., Consciousness and Self-Regulation, vol. 1, New York, Plenum 1976 and non-published studies at the Biofeedback Institute of Denver, 1980:**

Using a first-generation prototype, Dr. Budzynski concluded that "these devices produce a distinct relaxation state. Programming the device between 3 and 7 hz, it takes about 10 to 15 minutes for the patients to enter--effortlessly-a state of hypnosis. They terminate the sessions relaxed and with a feeling of well-being." Also, "the device has a calming effect on nervous or anxious patients. In a majority of cases the patients feel relaxed and calm during a period of three to four days after the session. It happens that the subjects have a reminiscence of childhood experiences, particularly when in Theta. They related their experiences which we incorporated into our psychotherapeutic program."

**Dr. Gene W. Brockopp, Review of Research on Multi-Modal Sensory Stimulation with Clinical Implications and Research Proposals (non-published,1984):**

Dr. Brockopp analyzed audio-visual brain stimulation and in particular hemispheric synchronization during EEG monitoring. "By inducing hemispheric coherence the machine can contribute to improved intellectual functioning of the brain. Like children spending most of their time in Theta, the machine allows a reduction in learning time. With adults a return into Theta allows them to rediscover childhood experiences. The machine is like a 'lost and found office' for the subconscious."

Dr. Brockopp's conclusion is that dissipative structures allow the mind-via audio-visual stimulation-to abandon certain present neurological structures in order to maintain a higher, more coherent and flexible state of consciousness, thus allowing for improved communication of neuro-entities.

**Dr. Norman Thomas and David Siever, University of Alberta, Florida. Several publications, notably: The Effect of Repetitive Audio/Visual Stimulation in Skeletomotor and Vasomotor Activity, 1989:**

"We stimulated one of two groups of 30 people with a brain- stimulation device to test relaxation levels, using 10 hz frequency while observing their muscular tension with an EMG and their index skin temperature. The second group had to relax without machines via traditional means of autosuggestion. Most of the people in the second group said they felt relaxed while demonstrating greater tension (EMG) and lower skin temperatures, both of which are stress and nervous tension indicators. The group using the machine obtained deep relaxation state going beyond the programmed 15 minutes. EMG curves confirmed relaxation of the cortex due to the frequency adoption response." These findings were also verified by James Greene and Dr. E.J. Baukus of FOCUS Human Research Development in Bourdonnais, Illinois. The muscular tension curve of the trapezius muscle were indicative of deep muscular relaxation.

**Dr. Robert Cosgrove, Jr. of the anesthesia department of Stanford University School of Medicine, Stanford, California.**

Dr. Cosgrove proceeded in 1988 with multiple experiences with the same devices and concluded that states of deep relaxation are obtained with these machines. "We are very optimistic about the possibilities of calming our patients before and after surgery. By the way, we already treat chronic stress affected patients. Thus, our EEG analysis shows that optimal cerebral functioning can be obtained with regular use of such audio-visual apparatus. The machines could eventually slow the decreasing cerebral performance with the elderly. This type of machine could 'revolutionize neurology and medicine.'"

**Dale S. Foster of Memphis State University, "EEG and Subjective Correlates of Alpha Frequency Binaural Beats Stimulation Combined with Alpha Biofeedback," 1988:**

Mr. Foster's conclusions indicate that the combination of binaural sounds with audio-visual stimulation machines allow access into Alpha states of consciousness much faster than with traditional biofeedback techniques.

**Elisabeth Philipos, Pepperdine University, California, and James McGaugh, University of California, Irvine, have tested the effects of Theta frequencies on learning.**

During their study a group of 20 students learned 1,800 words of Bulgarian in 120 hours while using Theta stimulation programs. In about 1/3 of normal time they spoke and wrote the new language.



**D.J. Anderson, B.Sc., M.B., "The Treatment of Migraine with Variable Frequency Photo-Stimulation," in Headache, March 1989, pp 154-155:**

D.J. Anderson used photo-stimulating goggles with variable frequency using red LEDs in order to stimulate the optic nerve, through closed eyes, right and left with frequencies between 0.5 and 50 hz. The study included seven patients who suffered a total of more than 50 migraines during the observation period. Forty-nine of these migraines were relieved (either by reducing the average duration or by increasing the frequency interval in between migraine crisis) and 36 other migraines could be stopped while using the goggles.



**Dr. Glen D. Solomon, "Slow Wave Photic Stimulation in the Treatment of Headache-A Preliminary Report," in Headache, November 1985, pp 444-447:**

Dr. Solomon works for the Department of Internal Medicine at the U.S. Air Force Medical Center in Scott, Illinois, where 24 patients with chronic headaches and migraines were treated with photic stimulation apparatus at 5-8 hz frequency. Fourteen of 15 patients with sustained headaches and 5 of 6 patients with chronic headaches noticed complete relief after the treatment. Four patients treated with the same photo-stimulation apparatus showed no reaction.



**Bruce Harrah-Confort, Ph.D., Indiana University, "Alpha and Theta Response to the MindsEye Plus," 1990:**

The study included 15 persons between the ages of 24 and 38 years old who were asked to relax via auto-suggestion with headphones dispensing a synthetic sound (100 cycles at 60 hz) and then to use the audio-visual stimulator MindsEye Plus™. EEG graphic analysis showed that the first relaxation method did not alter the EEG-trace significantly vs. normal. MindsEye Plus users had, however, strongly improved Alpha and Theta tracings and experienced profound relaxation. There were also signs that would validate hemispheric synchronization during the experience.

**Joseph Glickson, Department of Psychology, Tel Aviv University, "Photic Driving and Altered States of Consciousness: An Exploratory Study," in *Imagination, Cognition and Personality*, vol. 6(2), 1986-87, pp 167-182:**

Four persons were exposed to photic stimulation in the 18, 10 and 6 hz ranges. A frequency response was established by two subjects during the initial session according to EEG measurements. These persons had an altered state of consciousness, and reported their visual and auditive experiences. The two other subjects had similar experiences during follow-on sessions. The study concludes that photic entrainment provokes altered states of consciousness according to the applied frequencies.



**Paul Williams and Michael West, Department of Psychological Medicine, University Hospital of Wales and University of Wales Institute of Science and Technology, Cardiff, Wales, "EEG Responses to Photic Stimulation in Persons Experienced in Meditation," in *Electroencephalography and Clinical Neurophysiology*, 1975, 39, pp 519-522:**

Williams and West tested photic entrainment on two test groups of 10 people. The test group produced significantly more Alpha waves and smaller Alpha blocking compared to the control group familiar with traditional meditation techniques. Alpha induction was realized faster and more frequently within the test vs. the control group.



**Tsuyoshi Inouye, Noboru Sumitsuji and Kazuo Matsumoto, Department of Neuropsychiatry, Osaka University Medical School, Japan, "EEG Changes Induced by Light Stimuli Modulated with the Subject's Alpha Rhythm," in *Electroencephalography and Clinical Neurophysiology*, 1980, 49, pp 135-142:**

Seven of nine persons undergoing the test obtained occipital Alpha of both hemispheres and concurrently coherence and phase between right and left occipital EEG. These results tend to confirm a hemispheric synchronization tendency by subjects using photic stimulation in the 10 hz (Alpha frequency) range.



**Ronald Lesser, Hans Luders, G. Klem and Dudley Dinner, Department of Neurology, Cleveland Clinic Foundation, "Visual Potentials Evoked by Light- Emitting Diodes Mounted in Goggles," in *Cleveland Clinic Quarterly*, vol. 52, No. 2, Summer 1985, pp. 223-228:**

A comparison of stimulation by stroboscopic lights and LED diodes shows that both methods have similar effects. LED stimulation may be preferable in intensive care units or during surgery because the type of stimulus is less disturbing.

**Richard E. Townsend, Ph.D. of Neuropsychiatric Research, U.S. Naval Hospital in San Diego, "A Device for Generation and Presentation of Modulated Light Stimuli," in *Electroencephalography and Clinical Neurophysiology*, 1973, 34, pp 97-99:**

The author describes a system allowing generation and presentation of modulated light stimuli with variable frequencies and wave forms. He concludes the possibilities of stimulation and positive responses during sleep-preparation and insomnia troubles.



**Dr. William Harris, Director of the Penwell Foundation, USA in 1990:**

Preliminary studies with audio-visual brain stimulators used by patients with AIDS indicate that "the devices are extremely efficient in terms of providing mental clarity, improved sleeping patterns (for sleep preparation and sleep duration) allowing for better physical disintoxication by the liver. The apparatus also stimulates immunology functions through states of deep relaxation."



**Dr. Olivier Carreau, Saint-Louis Hospital in Paris, on "Efficiency of the MindsEye Plus audio-visual stimulator in treatment of the psoriasis during puvatherapy," study completed in January 1991.**

Dr. Carreau analyzed 20 patients over a period of five months. Patients were treated one per week alternately via UVA and audio-visual stimulation (30-minute sessions) for psychosomatic skin disorders. All patients experienced deep relaxation during the sessions and had a feeling of well-being during the entire day. Five patients claimed that this feeling lasted for the following 2-3 days. Patients with combined therapy did better than with puvatherapy alone.