

Mega Brain Series

Pacemakers
for the brain

Light & Sound Machines



Michael
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PACEMAKERS FOR THE BRAIN: THE SOUND AND LIGHT MACHINES

By Michael Hutchison

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Pacemakers For The Brain:

The Sound And Light Machines

By Michael Hutchison

(Extract from *Mega Brain Power* by Michael Hutchison)

DURING THE PERIOD I SPENT LIVING ALONE ON THE mountainside, I spent a lot of my time staring into the fire. I'd pile up some rocks in front of the lean-to for a fireplace, and would pass the evenings sitting on a log, gazing at the flickering flames, the multicolored embers shading from deep red to pure white. In a sort of semitrance, I observed images and sometimes whole scenes that were quite realistic—cities rising out of deserts, marching armies, a group of nuns strolling arm in arm, monkeys swinging from tree to tree. I knew that these things weren't really there, but I also knew that I would not be seeing them if I weren't staring into the fire. Somehow the shifting, flickering lights were stirring up visions inside my head. At times I would feel cut free from time—not a twentieth-century person, but simply a human, staring into the same fire humans have stared into for hundreds of thousands of years, seeing the same things. I got a powerful sense of how mysterious fire must have been to our ancient ancestors, and how entertaining—what need did they have for television when they had this constant source of images?

That a flickering light can cause mysterious and often entrancing visual hallucinations, then, is something humans have known since the discovery of fire. It must have been knowledge of great value to the ancient shamans and poets, who learned how to use the images in the flames to enhance their magic. Even the most ancient scientists were intrigued by this phenomenon. Around A.D. 200, Ptolemy noted that when he placed a spinning spoked wheel between an observer and the sun, at certain frequencies the spokes of the wheel appeared to become immobile or to move backward (something we've all experienced when as children we thrilled to the runaway stagecoach scenes in cowboy movies). Ptolemy also discovered that the flickering of the sunlight through the spokes of the spinning wheel could cause patterns and colors to appear before the eyes of the observer and could produce a feeling of lightheadedness and euphoria. In the

nineteenth century, French psychologist Pierre Janet, the influential teacher of Sigmund Freud, noticed that when patients of the Salpetriere Hospital in Paris were exposed to flickering lights they experienced reductions in hysteria and increases in relaxation.

Modern scientists have tried to analyze this phenomenon, and have conducted their experiments with light sources more sophisticated than fire. The great neuroscientist W. Gray Walter carried out a series of experiments in the late forties and fifties in which he used an electronic stroboscopic device in combination with EEG equipment to send rhythmic light flashes into the eyes of the subjects at frequencies ranging from ten to twenty five flashes per second. He was started to find that the flickering seemed to alter the brain-wave activity of the whole cortex instead of just the areas associated with vision. Wrote Walter, “The rhythmic series of flashes appear to be breaking down some of the physiologic barriers between different regions of the brain. This means the stimulus of flicker received by the visual projection area of the cortex was breaking bounds—its ripples were overflowing into other areas.” The subjective experiences of those receiving the flashes were even more intriguing: “Subjects reported lights like comets, ultra- unearthly colors, mental colors, not deep visual ones.”

One thing that was happening, Walter realized, though it did not explain the curious visual effects, was that the flickering lights were causing the EEGs of the subjects to change and take on the rhythm of the flashing light. This phenomenon had already been widely noted—almost from the moment the brainwave patterns of the EEG were first recorded in the late 1920s researchers had realized that photic (light) stimulation could alter the EEG. In 1934, scientists established not only that the EEG pattern could be changed by repetitive visual stimulation at a known frequency, but also that the brain would quickly respond by falling into the same frequency. This effect, known as *entrainment* or *photic driving*, is the visual equivalent of the audio-frequency-following response stumbled onto by Robert Monroe and others who subjected the brain to rhythmic sounds and found that the brain’s EEG pattern would assume the frequency of the sound.

In the 1960s, some British artists and American writer William Burroughs read of Walter's experiments, were fascinated by the reports that visual entrainment at certain frequencies apparently caused visual hallucinations, and put together a simple device to make use of it. They called it the Dreammachine. As one of the inventors described it in the rousingly apocalyptic terms appropriate to that psychedelic era:

The Dreammachine . . . is a pierced cylinder, which whirls around a light source to produce stroboscopic "flicker" over the closed eyelids of the viewer. "Flicker" at precise rates per second produces radical change in the "alpha" or scanning rhythms of the brain as shown by electroencephalographic research. Subjects report dazzling lights of unearthly brilliance and color, developing in magnitude and complexity of pattern as long as the stimulation lasts. When the flicker is in phase with the subject's alpha rhythms he sees extending areas of colored pattern which develop throughout the entire visual field, 360 degrees of hallucinatory vision in which constellations of images appear. Elaborate geometric constructions of incredible intricacy build up from multidimensional mosaic into living fireballs like the mandalas of Eastern mysticism or resolve momentarily into apparently individual images and powerfully dramatic scenes like brightly colored dreams. . . . "Flicker" is a threshold experience of induced experience produced by altering the speed of light to accommodate the maximum range of our alpha rhythms. "Flicker" creates a dazzling multiplicity of images in constantly altering relationships which makes the "collages" and "assemblages" of so-called "modern" art appear utterly ineffectual and slow. Art history is no longer being created. Art history as the enumeration of individual images ended with the direct introduction of light as

the principal agents in the creation of images which have become infinitely multiple, complex and all-pervading. The comet is Light.⁶⁴

Scientific interest in the flicker effect increase during the 1960s, and then blossomed in the early and middle 1970s with a burst of independent studies by researchers around the world.^{9, 53, 74, 111, 163, 242, 257, 275, 360, 374, 379} These reports repeatedly confirmed that rhythmic flashing lights rapidly entrained brain waves. However, the researchers went beyond mere verifying of photic entrainment and investigated what effects this photic entrainment might have on the subjects. What they discovered was surprising, exciting, and suggested that photic stimulation could be a powerful tool for improving the functioning of the mind and body. In independent studies, researchers discovered that:

- at certain frequencies (particularly in the alpha and theta ranges), the rhythmic flickers could alleviate anxiety during the period of stimulation;

- subjects who had received such stimulation reported long-lasting and substantial reductions in their anxiety;

- at those same frequencies, the flashing light induced in the subjects a state of deep physical relaxation and mental clarity;

- by using photic stimulation it was possible to “train” the brain to modify its EEG frequency;

- after such training the *verbal-ability and verbal-performance IQ* of the subjects was increased;

- at certain frequencies (again, in the alpha and theta ranges), the flashing light increased the hypnotizability and the suggestibility of the subjects;

- flickering lights could bring the two hemispheres of the brain into a state of greater coherence or synchronization;

—such coherence between the hemispheres is related to increased intellectual functioning;

—in children up to the age of about fourteen, the most commonly produced frequency is theta, while for adults, the most commonly produced frequency is beta—that is, the percent of theta in the normal EEG decreases and the amount of beta increases as an individual grows into adulthood—and thus by entraining adults’ brain waves at a theta frequency it is possible to return an adult to a freer, more childlike mental state, characterized by vivid spontaneous mental imagery and imaginative, creative thinking.

While this flurry of studies about photic driving of the brain waves was going on, other researchers were investigating *auditory driving* of brain waves. By monitoring the brain with EEGs while stimulating it with sound such as rhythmic clicks, tones, or pulsations of white noise, they found that the brain did respond to rhythmic auditory stimulation with increased brainwave activity at the same frequency as the sounds. That is, using rhythmic sounds alone it was possible to entrain brain-wave activity, although the entrainment effects of sound alone did not appear to be as pronounced or long-lasting as the entrainment effects of light. It was also discovered that, as with photic driving, auditory driving showed evidence of bringing the two hemispheres of the brain into a state of greater coherence or synchronization.

And while these separate studies of photic and auditory driving were being done, other researchers, as mentioned earlier, were discovering the existence of hemispheric synchronization and realizing that it was a state associated with a variety of benefits, such as deep relaxation, euphoria, and enhanced creativity and intellectual functioning.

SON ET LUMIERE: THE ARRIVAL OF AN IDEA

IT WAS OBVIOUS THAT THESE SEPARATE DEVELOPMENTS, when considered together, had some fascinating implications. Since both flickering light and pulsating sound could, by themselves, entrain brain-wave activity and increase hemispheric synchronization, then perhaps, the thought occurred to a number of independent researchers almost simultaneously, by combining both sound and light stimulation at the same frequency the entrainment effects—and the resulting hemispheric

synchronization—would be even more pronounced. Intrigued by these possibilities, these independent inventor-explorers set out to investigate the effects of combined sound and light stimulation, and to create new devices that would enable individuals to bombard their brains simultaneously with sound and light.

Clearly the creation and use of sound and light machines, or audiovisual integrators (AVI) was an idea whose time had come. As I mentioned earlier, humans had been interested in the effects of flickering lights for ages, and as technology advanced had even devised crude flicker-boxes, such as William Burroughs' Dreammachine, that allowed them to experience hallucinatory flicker phenomena with some degree of control. The use of stroboscopic lights in combination with the psychedelic rock music of the 1960s (and often in combination with psychedelic drugs as well) had intensified the awareness of millions of people of the fascinating visual and mental (and in some cases even spiritual) effects of flickering light. This popular fascination with flicker was shared by scientists, as demonstrated by the outburst of scientific studies of photic driving that took place in the 1970s.

Similarly, humans had always been enthralled by the effects of rhythmic sounds, and had from earliest times been aware of the mind-altering and brain-wave entrainment effects of rhythmic noises, as evidenced for example by the sophisticated auditory-driving techniques developed over thousands of years by tribal medicine men or shamans. As anthropologist and shamanism authority Michael Harner point out, "Basic tools for entering the SSC (Shamanic State of Consciousness) are the drum and rattle. The shaman generally restricts use of his drum and rattle to evoking and maintaining the SSC. . . . The repetitive sound of the drum is usually fundamental to undertaking shamanic tasks in the SSC. With good reason, Siberian and other shamans sometimes refer to their drums as the 'horse' or 'canoe' that transports them into the Lowerworld or Upperworld. The steady, monotonous beat of the drum acts like a carrier wave, first to help the shaman enter the SSC, and then to sustain him on his journey."

Researcher Andrew Neher investigated the effects of drumming on EEG patterns and found the rhythmic pounding dramatically altered brain-wave activity. Other researchers of shamanistic rituals, Harner observes, have "found that drum-beat

frequencies in the theta wave EEG frequency range . . . predominated during initiation procedures.”

Humans have always been keenly appreciative of the mind expanding powers of music, which is of course a succession of rhythmic auditory signals, and for thousands of years musicians and composers have consciously and intentionally influenced the brain states of listeners by manipulating the frequency of the rhythms and tones of their music.

Humans have also long been intrigued by the possibilities for influencing mental functioning that emerge from combining both rhythmic light and rhythmic sound stimulation. For example, ancient rituals for entering trance states often involved both rhythmic sounds in the form of drumbeats, rattles, cymbals, clapping or chanting, and flickering lights produced by candles, torches, bonfires or long lines of human bodies rhythmically dancing, their forms passing before the campfire and chopping the light into mesmerizing rhythmic flashes. Some composers of the past, such as the visionary Scriabin, created music intended to be experienced in combination with rhythmic light displays.

Technological advances made possible even more powerful combinations of sound and light. Moving pictures developed soundtracks, and moviemakers quickly exploited the potentials of sound to enhance the power of the flickering images onscreen, so that movies like *Gone With the Wind*, *The Wizard of Oz* and others that followed became true audiovisual experiences in which the rhythmic soundtrack was fused with the flickering light and the rhythmic flickering of montage editing techniques to create alterations in the consciousness of the audience that would have been impossible using only sound or only light. The interplay of electronic musical instruments and amplified sound with stroboscopic “psychedelic light shows” that took place in the rock concerts of the 1960s could produce rapid and profound alterations in consciousness.

Throughout history technological advances, such as those in cinema, have quickly been seized upon to stimulate the human fascination with rhythmic sound and light. Throughout the 1970s and early 1980s, technological advances also made it possible for scientists to understand more fully how sounds and lights influenced the electrochemical activity of the brain. The result was the flood of studies mentioned above dealing with

photic and auditory entrainment and hemispheric synchronization. In 1972, R. E. Townshe developed the first recorder device to use light-goggles rather than a separate flashing light source. At about the same time, brain-mind explorer Jack Schwarz began making and selling a similar variable-frequency light-goggle machine, which he called the ISIS. In 1974, a scientist in New York City, Seymour Charas, obtained the first patent on a combined sound and light machine, though it was never put into commercial production. By the early 1980s the time was right for a breakthrough in the combination of sound and light.

The catalyst was the revolution in microelectronics that was taking place at that time, a revolution that allowed home electronics buffs and garage inventors to put together astonishingly sophisticated and complex devices for producing and combining sound and light.

As with many good ideas, it seemed to occur to many people at once. Over a short period of time a number of inventors began turning out a variety of audiovisual integrators (AVI). Though they differed in a number of significant ways, these AVIs shared certain characteristics. They made use of eyepieces (often they were simply modified ski masks or welders' goggles) that contained miniaturized lights encircling each eye. These goggles were attached to a control console that allowed the user to adjust the intensity of the flashes, the pattern of the flashes, and to select any frequency from extremely high beta to very slow delta, simply by turning a knob.

In addition, the devices featured stereo headphones, also attached to the console, enabling the user to select or create an almost infinite variety of electronically synthesized sounds (clicks, heartbeats, surf, white noise, and a wide assortment of musical tones) at any desired intensity and frequency. Using sophisticated computer circuitry, the devices interlinked the auditory and visual pulsations into a synchronous relationship, so that as the flashes slowed down or speeded up, grew brighter or dimmer, the sounds kept pace. That is, as the lights stimulated the brain through the visual tract at a frequency of, say, 8 Hz, the sounds stimulated the brain through the auditory tract at exactly the same frequency, thus, according to the inventors, entraining or driving brain-wave activity in two separate ways.

The devices also expanded the potentials of the combination of photic driving and auditory driving by enabling the user to select a number of separate modes of delivering the signals to the brain: the pulses could be delivered simultaneously to both eyes and both ears, for example, or alternated between the eyes and ears (i.e., both eyes receive a flash, then both ears receive a noise), or alternated between the left eye and ear and the right eye and ear, or, finally, “cross woven,” by stimulating the right ear and left eye in alternation with the left ear and right eye. (Before the breakthroughs in microelectronic, such complex computerized devices would have been enormously expensive to build, and like the old UNIVAC vacuum-tube computers, their circuitry and components would have been huge and unwieldy. But these new audiovisual stimulators were relatively inexpensive, and small—some of the first models were about the size of a portable typewriter and soon models were made with consoles not much larger than a pack of cards.)

The scientific research with photic driving showed clear brainwave entrainment, and such associated effects as hemispheric synchronization; the research with auditory driving also showed entrainment. These new AVIs, hoped the experimenters who put them together, by combining both types of stimulation, should have had more pronounced effects. As they experimented with the devices, the users found that their effects exceeded their expectations—the combination of integrated sound and light at variable frequencies seemed to boost the powers of hemispheric synchronization and controlled EEG patterns into a whole new realm.

Subjects not only rapidly went into a state of deep whole body relaxation, but also reported that the machines induced a kaleidoscopic stream of brilliant and emotionally charged images—like the “flicker effects” described above by neuroscientist W. Gray Walker and William Burroughs, but even more intense and dramatic. Frequently users experienced vivid scenes with an extraordinary quality of “being there,” or visions that metamorphosed into a storylike string of connected scenes or images. Often the scenes were long forgotten childhood events; at times they were astonishing “mind movies.” Users also reported frequent Eureka events and flashes of creativity. And in many cases, the relaxation and sense of being mentally energized lasted for several days after using the device.

The individuals who had put these devices together were excited by the results, and, by the mid-1980s, they began to market the AVIs to health professionals, educators, and private individuals around the world. In some cases, the manufacturers or inventors made claims that were based more on their enthusiasm or their desire for a quick buck than on solid scientific evidence. One manufacturer and salesman for an early device called the Syncho-Energizer, a self-proclaimed “pioneer of science” named Denis Gorges, grandiosely told me that his machine was capable of increasing intelligence, sharpening perceptions, intensifying visualizations, improving both short-term and long-term memory, accelerating learning, increasing creativity, stimulating holistic problem solving, reducing the effects of childhood-formed inhibitions, curing drug and alcohol addictions and “permanently enhancing the efficiency of one’s brain.” “This thing,” Gorges grandly proclaimed, “is absolutely the most significant application of modern technology to increasing the abilities and functions of the human mind.”

Well now. Earlier I mentioned that many of the mind-machine makers, while keeping one foot in the scientific arena, also have their other foot firmly planted in the marketplace. In the past, the tensions between these two worlds have led to outright conflict and even suppression (as in the suppression of electro medicine by the medical mainstream after the 1910 Flexner Report). Gorges seemed to many to be an example of someone with both feet in the marketplace while clad in the costume of a scientist. Gorges, who one writer described as “a real-life portrayal of the mad scientist in a Saturday matinee movie,” and who reminded me more of the fast-talking snake-oil salesman with the traveling medicine show in that other Saturday matinee movie, claimed to have a Ph.D. as well as an M.D. and to be a psychiatrist, too. But his scientific credentials seemed hard to verify. As a writer for *The New York Times* observed, “Although the device is said to improve memory, Mr. Gorges could not recall the location of the New Jersey institution he said awarded him a Ph.D. after he completed a course in psychology through the mail.”

Many inventors and other researchers who were enthusiastic about the enormous potentials of AVIs were critical of Gorges remembering the more than half-century suppression of electromedicine that came in part from the exaggerated claims of unscrupulous pitchmen for electrical apparatuses, believing his questionable claims about his own medical degrees and his unsupported claims about the powers of audiovisual

stimulation cast a bad light on the entire field. These other inventors had created AVIs that were far more sophisticated than the one being touted by Gorges, technologically advanced devices with names like the D.A.V.I.D. (Digital Audio Visual Integration Device), the MindsEye, the InnerQuest, the Dreamwave, the Mind Gear and the Shaman. The inventors of these devices were aware of the need for rigorous research into the machines' effects.

I could understand their enthusiasm about the devices. After all I had seen a number of people, laughing up their sleeves, sit down in crowded and noisy rooms and put on the goggles and headphones, and quickly slip into deep trances or states of glowing euphoria. One hardheaded skeptic at a convention I attended donned an AVI and went into a twenty-minute trance so deep that when he came out of it he claimed that only a minute had passed and absolutely nothing had happened to him! And nothing would convince him otherwise until the operator of the AVI produced a Polaroid photo of him sitting slumped over in the chair, wearing the AVI and a blissful smile. I have seen the harried editor I mentioned in chapter 1 put on the machine and immediately begin hearing chanting monks, angelic choirs, and strange boogaloo blasting on his mental radio waves, and I remembered his first words after coming out of his trance and taking off the goggles: "I've got to have one of these things for myself!" And I had had my own experiences of extraordinary visions, waking dream states and peaceful ecstasy, while staring into the flashing lights of an AVI.

So I could understand the excitement that the inventors and users of AVIs had. There was no doubt that these gizmos could do something extraordinary. The question was, what were they doing? I decided to consult a few scientists and health professionals who had more experience in using these devices.

TWILIGHT LEARNING AND CHILDHOOD FLASHBACKS BY FLICKERING LIGHTS

THE FIRST PERSON I SPOKE WITH WAS ONE OF THE FOREMOST biofeedback authorities in the world, Dr. Thomas Budzynski, who was then with Behavioral Medicine Associates clinic in Denver. Budzynski and several associates had issued a "report" on one of the AVIs in 1980, while he was with the Biofeedback Institute of Denver.

According to the report, all of the staff members of the institute participated in at least five sessions using the device. “Results ranged from production of drowsy, hypnagogic-like states (with theta frequency used), to vivid, holograph-like images. At times, images from childhood were experienced.” When staff members began using the device with clients, the results were “quite encouraging.”

According to the report, the device was effective at producing “a sensation of detached relaxation.” The staff found that the machine was very useful as a “Hypnotic Facilitator,” and that “employing the 3-7 Hz range, we found that clients easily entered the hypnotic state.” Also striking was the way the machine acted as a “Facilitator of ‘Unconscious Retrieval.’” Staff members tape-recorded the clients’ intermittent verbal description of the imagery they were experiencing, and transcriptions of this material would be used by the therapist in the next session. According to the report, “Often this material provides valuable insight into unconscious processes relevant to the problem. The therapeutic process would appear to be accelerated by this procedure.” Perhaps most interesting was the staff’s use of the device to accelerate and enhance the user’s ability to learn and remember new material, a process the report calls “twilight learning.” Says the report: “Twilight learning implies that the client is presented with auditory material while in a twilight or hypnagogic [theta] state.” The report concluded that the AVI could “produce such a state after a period of 10 or 15 minutes.” Auditory material was then presented starting with very low level and slowly building to a comfortable listening volume. The material is absorbed in an uncritical fashion, thus circumventing certain resistances present in the fully conscious state.”

The report also noted that the lower frequencies (3-6 Hz) “seem to allow the subject to recall past childhood events with a high degree of ‘being there’ quality.” When they monitored the AVI patterns of subjects, they found that the AVI “drives the appropriate EEG frequencies after a 5-10 minute delay time.” Citing the need for serious scientific study of the machine, the report tentatively concludes that both “absorption of near-threshold verbal material” and the “Facilitation of Retrieval of Unconscious Material” may indeed be enhanced by use of the AVI.³⁵⁰

When I spoke to Budzynski over five years after this initial report, he emphasized that no really solid research had been done yet with the AVI, but he still remained

impressed with the device. “What the machine can do,” he said, “is promote a brain-wave state which is one of relaxation, at the simplest level-people report that they feel pretty relaxed and pretty good. It seems to have a tranquilizing effect for individuals who are quite anxious and high-strung. It tends to quiet them down for three to four days after a session. And eventually, with perhaps ten or twelve sessions, it seems to produce a longer-lasting effect—they feel more peaceful, more calm. It may be accomplishing a sort of integration of sorts. People do report a lot of childhood visual flashes or scenes that come to mind. Then we integrate that with therapy. They talk about what they saw and experienced while using the AVI, and we weave that into our psychotherapy program, and it does seem to be very useful for getting at some of these early and forgotten memories.”

When asked whether any EEG tests showed that the subject’s brain waves became entrained to the rhythm of the AVI, he said there was evidence that “when you use the theta frequencies eventually there’s an increase in theta energy. So there probably *is* some entrainment taking place. Not in everyone, but in some individuals. It seems that some people are more willing to allow the machine to train their brain waves than are others. I suspect it’s because it produces a slight feeling of vulnerability as it tends to pull you toward a theta state. Some people resist that and some go along with it.”

What about the use of the machine for “Superlearning”? Budzynski agreed that this was one area where the device could be potentially quite effective. “We combine the machine with subliminal tapes and certain guided image tapes,” he said. “These tapes are then used to promote positive kinds of mental processes. The machine enhances the absorption of the material. I definitely would say the machine increases suggestibility.” Budzynski pointed out that his studies have shown that the theta state in combination with a strengthening of right-hemisphere functioning enormously increases the ability to learn. (Or, as he had said on another occasion, “Get access to the right hemispheres of individuals very quickly and keep them in that state, and that’s where a *lot of work gets done very quickly*.” In this theta, or twilight, state, he said, the brain “has these properties of uncritical acceptance of verbal material, or almost any material it can process.”)⁵⁹ Since the AVI is a powerful tool for putting even anxious people into this receptive state, Budzynski suggested, it could, if used appropriately, dramatically boost one’s learning abilities.

Budzynski did add a cautionary note, saying he would be wary of recommending the machine for general use, because since the machine was such a powerful facilitator for the emergence of unconscious material, there was always a possibility that frightening or repressed material might emerge for which the user was not prepared. He also warned that anyone with a history of seizures could use the machine only under medical supervision.

I spoke next with Dr. Roman Chrucky, Medical Director of the North Jersey Development Center in Totowa, New Jersey, who had been using a sound and light device extensively in his practice. His observations supported Budzynski's: he too found that the machine had a very strong relaxing and calming effect ("It acts as a tranquilizer," he said, "and the effect seems to last two or three days. Usually you see the maximum change a day or two after they use the machine"); he too noted that the device "enhances and speeds up hypnotic induction" and enhances suggestibility ("When the client is using the AVI he's very receptive, so using it is a great way of introducing suggestions for changes the individual wants to go through, changing habits—stop overeating, quite smoking, and so on").

But as we talked, Chrucky kept returning to one aspect of the AVI which he felt was most intriguing: enhanced creativity. "A lot of people spontaneously told me that they've felt much more creative when they're using it," he said. "I've found that using the theta frequency I get that kind of response on myself as well, increased creativity."

Buffalo, New York, medical researcher Dr. Gene W. Brockopp, who has used an AVI extensively and been favorably impressed, finding it had dramatic effects on many subjects, set out to review the scientific literature for work that had been done in areas that were relevant to audiovisual stimulation devices, and summarized the research in a paper, "Review of Research on Multi-Modal Sensory Stimulation with Clinical Implication and Research Proposals." Among the areas he examined were research on photic and auditory stimulation of the brain, on consciousness and hemispheric differentiation, on EEG patterns and personality variables, and on the behavioral effect of induced stimuli patterns. Using this available research and combining it with his own research and clinical experiences with the AVI, he then made a number of tentative conclusions about the effectiveness of the AVI.

One of his findings was that “coherence of the high-frequency EEG output of the hemispheres is apparently related to increased intellectual function or related to the quality of intellectual functioning.” Thus, if the AVI is in fact creating hemispheric coherence of high-frequency EEG output in users, it could very well lead to increased intellectual functioning. Another finding, that “when a brain-wave state is experienced, learned, and practiced over a period of time, it is resistant to habituation (weakening), at least in the short term,” could explain why the machine seems to have a cumulative effect, so that after a series of experiences with the AVI users seem to find it easier to enter the desired brainwave state at will.

Exploring the clinical implications of the available research, Brockopp surmises that the AVI “may not ‘energize’ the brain but actively induce a state of deactivation in which the brain is passive, but not asleep; awake, but not involved with the ‘clutter’ of an ongoing existence. If this is true, then it may be a state in which new cognitive strategies could be designed and developed.”

Citing studies indicating that children spend much of their time in a theta state, Brockopp speculates that the AVI, through its “entrainment of the theta wave . . . may result in the recovery of early childhood experiences. . . . Also, increasing theta decreases the ability of the person to be vigilant and therefore may result in the person expressing ideas without the monitor of the more thoughtful brain processes being active. Information obtained from their earlier state is then available for evaluation and understanding by those more thoughtful and cognitive brain processes and therefore.” This return to childhood thought patterns and increased access to previously unconscious ideas may explain why so many users of the AVI report that the device frequently triggers vivid childhood memories, and acts as what Budzynski calls a “facilitator of unconscious retrieval.” (And, like Budzynski, Brockopp points out that the theta state induced by the AVI may, for some people, “have the undesirable side effect of precipitating or enhancing early memory patterns that the person may not be able to integrate into their personality without professional assistance.” Further, Brockopp concludes, “Individuals who are tightly organized or compulsive and who need to maintain their sense of vigilance will respond to the energizer either by experiencing discomfort or by going to sleep and thereby by-passing the conflict.”)

Noting that “there is some correlation between functional brain-wave state and personality pattern,” Brockopp suggests, “If we can help a person to experience different brain-wave states consciously through driving them with external stimulation, we may facilitate the individuals’ ability to allow more variations in their functioning through breaking up patterns at the neural level. This may help them develop the ability to shift gears or ‘shuttle’ and move them away from habit patterns of behavior to become more flexible and creative, and to develop more elegant strategies of functioning.”⁵⁶

This idea that breaking up patterns at the neural level can lead to more flexibility and creativity brings us back to Prigogine’s concept of dissipative structures. We can speculate that when the brain, a dissipative structure, is subjected to a high degree of stimulation by the AVI, its fluctuations or perturbations are too great to be handled by the existing structure (i.e., neural patterns), and it must abandon that structure and reorganize at a higher, more coherent, more flexible level, with a greater degree of communication between its neural components. Thus, the AVI may be forcing the brain to “escape to a higher order,” which would explain the frequent reports by users of enhanced creativity, intellectual functioning, and so on. In this sense, the AVI could be seen as a tool for forcing the brain to evolve and grow, much in the way that the enriched environment caused the Berkeley rats of Rosenzweig experiments to grow in brain size and intelligence.

When Brockopp wrote his summary in the mid 1980s there was little or no hard scientific research into the effects of actual combined audiovisual stimulation tools, since they were at that time only beginning to emerge onto the scene. But since then, with the development of advanced AVI devices with computerized controls that enable researchers to be sure that all of their subjects are receiving exactly the same type of stimulation, more and more mainstream scientists are eager to pursue research into audiovisual stimulation devices. Already, some of the results of this research are becoming known.

In a study of “The Effect of Repetitive Audio/Visual Stimulation on Skeletomotor and Vasomotor Activity,” performed by Dr. Norman Thomas and his associate David Siever, at the University of Alberta, a group of experimental subjects were given audiovisual stimulation from one of the AVIs, at a frequency of 10 Hz (in the alpha range) for 15 minutes while being monitored for muscle tension using an EMG and for

finger temperature. A control group, similarly monitored, was simply asked to relax and to visualize a tranquil scene, without audiovisual stimulation, for the same 15-minute period. Significantly, both the experimental group and the control group were what the researchers called “resistant” or “non-hypnotizable” subjects. While the control subjects expressed as sense of relaxation, the EMG and finger temperature monitors showed that, quite to the contrary, they were actually experiencing *increased* amounts of muscle tension and decreases in finger temperature (associated with tension or stress). On the other hand, the group using the AVI showed dramatic increases in relaxation, reaching profound relaxation states that continued for long periods after the 15 minutes of audiovisual stimulation. The researchers wrote: “It is concluded that autosuggestion relaxation is not as effective as audiovisually produced relaxation. Electroencephalography shows that a frequency following cortical response is evoked in the audiovisually stimulated subjects. It appears that audiovisual stimulation offers a simple hypnotic device in otherwise resistant subjects.”

In 1988, Robert Cosgrove Jr., Ph.D., M.D., of the Department of Anesthesia of the Sanford University School of Medicine, began initial studies of another AVI. In his initial evaluations, Cosgrove, noted that the AVI was “clearly very powerful in its ability to cause deep relaxation in most subjects. Its effectiveness has been so great that we are very enthusiastic about the prospect of evaluating the [AVI] for its sedative properties in patients prior to, during, and immediately following surgery. We are also undertaking studies to prove [its] utility in chronic stress.”

“We are also,” Cosgrove continued, “quantitating the electroencephalographic (brain-wave, EEG) effects of the [AVI] in both volunteers and patients. Our preliminary results show strong EEG entrainment,” wrote Cosgrove.

The AVI, Cosgrove noted, “with appropriately selected stimulation protocols has been observed by us to be an excellent neuropathway exerciser. As such we believe it has great potential for use in promoting optimal cerebral performance. . . . Furthermore, the long-term effects of regular use of the [AVI] on maintaining and improving cerebral performance throughout life and possibly delaying for decades the deterioration of the brain traditionally associated with aging are very exciting. We plan to test this hypothesis in brain-injured patients where the degree of recovery has been proven to be related to

sensory and cerebral stimulus, with the results having implications for long-term use in healthy normal brains.” Dr. Cosgrove concludes that the audiovisual stimulation device “exceeded my wildest expectations,” and voices his belief that audiovisual stimulation “may well revolutionize both neurosciences and medicine.”

As AVI technology advances, the prices on these devices have dropped dramatically in recent years. The old Synchro-Energizer sold by Denis Gorges, for example, had a price tag of over \$8,000. Technologically superior AVIs now sell for only a few hundred dollars. This is still not cheap, and many individuals may find they can get a more limited but still striking auditory-visual stimulation effect at less cost by using a stroboscopic flash machine (several of these devices, which emit flashes at variable frequencies including alpha and theta, are available at relatively low cost from biofeedback-equipment dealers), or simply by making their own Dream-machine or “flicker box.” (One way to do this is to cut out a series of appropriately placed holes in a large piece of cardboard, tape the cardboard into a large cylinder, place the cylinder on end atop a record turntable, and hang a light bulb inside the cylinder; as the turntable spins, one then gazes at the cylinder, and the light is seen in flickers as each hole in the cardboard cylinder passes in front of one’s eyes. It is essential that the holes be spaced in such a way that the flicker occurs at the desired frequency; e.g. for alpha, on a turntable spinning at $33\frac{1}{3}$ rpm, there would have to be about fifteen to twenty holes, for theta, about eight to twelve, evenly spaced around the cylinder.)

In 1990 Bruce Harrah-Conforth, Ph.D., of Indian University, completed a controlled study of one of the computerized sound and light machines (the MindsEye Plus), the result of over two years of research into the field of brain entrainment, and found that compared to the control group, which listened to pink noise with eyes closed, the group receiving sound and light stimulation showed dramatic alterations in their EEG patterns responding to the frequency of the sound and light device, and also showed evidence of hemispheric synchronization. Participants in the study were asked to describe their experiences. According to Dr. Harrah-Conforth, “the subjects’ comments were such typical descriptions as ‘I lost all sense of my body,’ ‘I felt like I was flying,’ ‘I was deeply relaxed,’ ‘I felt like I was out of my body,’ etc.”

The report by Harrah-Conforth suggests that sound and light devices may cause simultaneous *ergotropic arousal*, or arousal of the sympathetic nervous system and the cerebral cortex, associated with “creative” and “ecstatic experiences,” and *trophotropic arousal*, or the arousal of the parasympathetic system, associated with deep relaxation and “the timeless, ‘oceanic’ mode of the mystic experience.” In humans, Dr. Harrah-Conforth concludes, “these two states may be interpreted as hyper- and hypo-arousal, or ecstasy and samadhi.”

The effect, that is, may be very much like that of the *ganzfeld*, which uses a featureless and unvarying visual field to cause the “blank-out” effect. This theory brought to my mind the work of Dr. Gene Brockopp mentioned above, who suggested that sound and light stimulation could perhaps “actively induce a state of deactivation in which the brain is passive, but not asleep: awake, but not involved with the ‘clutter’ of an ongoing existence. If this is true, then it may be a state in which new cognitive strategies could be designed and developed.”

In other studies of sound and light machines, distinguished author, clinician and researcher C. Norman Shealy, head of the Shealy Institute for Comprehensive Health Care in Springfield, Missouri, has revealed that the blood and cerebrospinal fluid of subjects using sound and light stimulation devices show dramatic increases in the levels of betaendorphins. His research has shown these devices to be effective not only in the treatment of pain and stress, but for the treatment of anxiety, depression, insomnia, jet lag, and other problems. Other scientists have used photic stimulation devices for the treatment of migraines and found them extremely successful. In one study of chronic migraine sufferers conducted in 1989, of a total of 50 migraines recorded, fully 49 of them were rated by the patient as being “helped” and 36 as being stopped by using the photic stimulation devices.

Another area in which there is growing scientific evidence that sound and light machines can have profound and rapid effects is in the treatment of learning disorders. This makes sense in the light of emerging evidence that learning disorders are frequently linked to abnormal brain-wave activity in specific areas of the brain: in many cases the brain-wave activity in these areas is too slow, functioning in theta or delta when it should be functioning in beta. This is why drugs such as Ritalin that act as “speed” on normal

individuals actually help calm down “hyperactive” children: they are hyperactive because their brain-wave activity is too slow for them to be alert and focused; the drug actually speeds up activity in those parts of the brain that are functioning subnormally. If the photic stimulation can alter the brain-wave activity and speed it up to optimal frequencies, and there is much evidence that it can do so, then it can alleviate the root cause of the leading disorder, and it can do so without the need for drugs, with their potentially harmful side effects.

Dr. Harrah-Conforth writes me that: “I have little doubt than brain-entrainment technology is a highly effective means of inducing changes in consciousness.” He continues, “Brain entrainment, at least within my own research, has shown itself to be virtually foolproof and does indeed facilitate whole-brain experiences.” While pointing out that our current understanding of brain-entrainment technology is only in its infancy, he writes “there seems to be little doubt that this technology has a remarkable future. The evidence, my own and others, clearly indicates that brain-wave entrainment is produced by these machines. EMG tests have also made it quite clear that one of the by-products of this entrainment can be the relaxation response. And subjective reports range from heightened creativity, to beautiful visual trips, to increased alertness, and many other states.” He concludes that “the early indications are strong that this now-developing technology will profoundly revolutionize both our concepts of, and interaction with, our consciousness. . . . The evolution of human consciousness is a tangibly manipulable process. We can control our destiny. . . . It would appear as though brain entrainment will be among the technologies leading the way.”

California psychologist Julian Isaacs, Ph.D., working with a private research group called “The Other 90 Percent,” is now engaged in an ongoing study of the brain-wave effects of sound and light as well as other mind-altering devices. Isaacs and his colleagues are using a twenty-four-electrode color brain-mapping EEG, with newly developed software that permits extremely precise and sensitive measurement and statistical analysis of whole-brain electrical activity. In a discussion of his preliminary findings, he told me that there was “very clear evidence of brain-wave driving” using sound and light. He also said he’d found a very strong correlation between the intensity of the lights used (whether red LEDs or incandescent bulbs) and the brain entrainment: the

brighter the lights, the more entrainment. He mentioned one device he had tested that used dim lights, and found it had “no brain-driving capacity at all.”

However, Isaacs pointed out that it was easiest to entrain brain-wave activity in the alpha range, while it seems much more difficult to drive the slower brain frequencies, such as theta. However, the EEG evidence was quite clear that people using the devices did indeed spend much of their sessions in theta. Often, however, their dominant theta frequency was very different from the theta frequency being flashed by the sound and light machine. How to explain this? Isaacs suggested the possibility that while the devices can clearly and quickly entrain brain-wave activity into the low alpha range, what happens next is that the brain becomes habituated to the repetitive stimulus and the Reticular Activating System—the volume control and attention-directing part of the brain—simply tires of the repetitive stimulus and ignores it, or “blanks out” the conscious perception of the lights. As a result, the brain drops into the theta state.

As the prices of the AVIs have dropped, the technological sophistication has increased. Most devices now available include 10 to 20 computerized preprogrammed “sessions,” so that simply by pressing a button a user may select a program of sound and light combinations that are specifically configured to produce the optical audiovisual stimulation for sleep, accelerated learning, visualization, self-suggestion, creativity, and so on. Many of the devices also enable the user to program or design any sequence of sound and light stimulation desired, or simply to experiment and explore, and to store a large selection of self-created program sequences in the machine’s computer memory, to be recalled and replayed at any time with the press of a single button. Many of the devices feature powerful sound synthesizer systems that include not only preprogrammed sounds, but the capacity to change the pitch and tone color of each preset sound, and to create an infinite variety of sounds by raising and lowering pitch, selecting low-pass, band-pass and high-pass filters, by selecting and/or combining specific sound waveforms, such as sawtooth, triangle, pulse, or white noise, in combination with external stereo input. Some of these devices are packaged as portable, battery-powered units smaller than a Walkman, while others are available as simple electronic components or cards that can be inserted in your own PC, allowing you to use your own home computer to design and store your own repertoire of personalized sound and light experiences, to be combined with music of your choice played through your home stereo system.

And with these advances, the use of AVIs has increased enormously, with thousands of individuals now using such devices at home, at work, for entertainment and relaxation, and in clinical settings. Front-page articles and features about AVIs are now sprouting up everywhere, from *The New York Times* to *People* magazine to the *Wall Street Journal* to *Time* magazine, they are being sold by the thousands through such catalogs as *Sharper Image* and *Hammecher Schlemmer*, and it seems as if these flashy little gizmos could soon burst into the cultural mainstream, the next step beyond portable cassette players—personal, portable pacemakers for the brain. I can see it now: The city streets are jammed, with thousands of people strutting along and smiling, jogging in the parks, eating hot dogs, making love, with little sound and light units beeping and blinking on their faces, eyes encircled by flickering lights, placidly synchronizing their brains. Public AVIs everywhere—bars, doctors’ waiting rooms, airports, office and factory lounges, public toilets—like miniature jukeboxes for the mind. Put on the goggles and phones, and tune up a ten-minute program, maybe a blast of creativity, some down-home tranquility, a bit of jazzy dendritic growth, a classical transcendence opus, or an action-packed mind-movie thriller. And perhaps, now and then, gazing into the computerized high-tech flicker, someone will have an odd sensation of déjà vu, a dizzying feeling of being sucked back a half million years, and catch a momentary glimpse of hulking apelike shadows dancing against the wall of a cave, an image of woolly mammoths, saber-toothed tigers, the glittering eyes of the other members of the clan gathered around and gazing into the mysteries of the flickering fire.

The Technicolor Symphony:

Orchestrating Your Brain

with Light and Sound

By Michael Hutchison

(Extract from *Mega Brain Power* by Michael Hutchison)

Anthropologists tell of how chimpanzees trek long distances to sit gazing entranced at sunlight flashing off a waterfall. These tales suggest to me that from our most ancient origins, humans have enjoyed exploring the way a flickering light can cause mysterious visual hallucinations and alterations in consciousness. Humans have probably attempted to control these flickers since the discovery of fire. Ancient shamans and poets used the powers and images of flickering flames to enhance their magic.

Ancient scientists explored the practical applications of flickering light. In A.D. 125 Apuleius experimented with the flickering light produced by the rotation of a potter's wheel and found it could be used to diagnose a type of epilepsy. Around A.D. 200 Ptolemy noted that when he placed a spinning spoked wheel between an observer and the sun, the flickering of the sunlight through the spokes of the wheel could cause patterns and colors to appear before the observer's eyes and could produce a feeling of euphoria. At the turn of the century, French psychologist Pierre Janet noticed that when patients at the Saltpêtrière Hospital in Paris were exposed to flickering lights, they experienced reductions in hysteria and increases in relaxation.

Modern scientific research into the effects of rhythmic light and sound began in the mid-1930s when scientists discovered that the electrical rhythms of the brain tended to assume the rhythm of a flashing light stimulus, a process called entrainment. For example, when they flashed a strobe light at a frequency of 10 Hz into the eyes of a subject monitored by an electroencephalogram (EEG), the subject's brain waves tended to fall into a 10 Hz frequency.

During World War II a radar technician named Sidney Schneider was fascinated by the effects of the rhythmic light flashes on radar operators, who tended to drop into

altered states while gazing at the radar screen. He then went on to develop the first commercial/medical device specifically designed to entrain brain-wave activity. First manufactured in the late 1940s, this device, called the Brainwaves Synchronizer, was essentially a variable-frequency strobe. It is still marketed and in wide use around the world as an aid to hypnotherapy.

Research shifted into high gear in the late 1940s when the great British neuroscientist W. Gray Walter used an electronic strobe and advanced EEG equipment to investigate what he called the “flicker phenomenon.” He found that rhythmic flashing lights quickly altered brain-wave activity, producing trancelike states of profound relaxation and vivid mental imagery. He was also startled to find that the flickering seemed to alter the brain-wave activity of the whole cortex instead of just the areas associated with vision. Wrote Walter: “The rhythmic series of flashes appear to be breaking down some of the physiologic barriers between different regions of the brain. This means the stimulus of flicker received by the visual projection area of the cortex was breaking bounds—its ripples were overflowing into other areas.” The subjective experiences of those receiving the flashes were even more intriguing: “Subjects reported lights like comets, ultra unearthly colors, mental colors, not deep visual ones.”

Walter’s research aroused the attention of many artists, including the American novelist William Burroughs, who put together a simple flicker device called the Dream machine. As Burroughs described it in the 1960s:

Subjects report dazzling lights of unearthly brilliance and color. . . . Elaborate geometric constructions of incredible intricacy build up from multidimensional mosaic into living fireballs like the mandalas of Eastern mysticism or resolve momentarily into apparently individual images and powerfully dramatic scenes like brightly colored dreams.

A flood of subsequent scientific research in the 1960s and ’70s revealed that such flicker effects at certain frequencies seemed to have amazing powers. Various scientists discovered that such photic stimulation could have a variety of beneficial effects, such as increasing IQ scores, enhancing intellectual functioning, and producing greater

synchronization between the two hemispheres of the brain. Other researchers found that the addition of rhythmic auditory signals dramatically increased the mind-enhancing effects. In Chapter 7 we explored some of the wide range of clinical benefits produced by flicker devices, such as the Lumatron.

The Light Fantastic: From Shaman's Fire To Laser Wheels

In the last chapters we discussed sound and light separately. However, humans have always been intrigued by the possibilities for influencing mental functioning that emerge from combining rhythmic sound and rhythmic light stimulation. Ancient rituals for entering trance states often involved both rhythmic sounds in the form of drum beats, clapping, or chanting and flickering lights produced by candles, torches, bonfires, or long lines of human bodies passing before the fire and chopping the light into mesmerizing rhythmic flashes. From Greek plays to Western opera, our most popular entertainment forms have made use of combinations of lights and sounds. Some composers, such as the visionary Scriabin, actually created music intended to be experienced in combination with rhythmic light displays.

Technological advances made possible even more powerful combinations of sound and light. Moving pictures developed soundtracks, and moviemakers exploited the potentials of sound to enhance the power of the flickering images onscreen. Movies from *Gone With the Wind* and *The Wizard of Oz*, to the *Star Wars* epics became true audio-visual experiences in which the rhythmic soundtrack was fused with the flickering light and the rhythmic flickering of montage editing techniques to create alterations in the audience's consciousness that would have been impossible using only sound or only light. The interplay of electronically amplified musical instruments with stroboscopic psychedelic light shows that what took place in the rock concerts of the 1960s could produce rapid and profound alterations in consciousness.

In the early 1970s Jack Schwarz, known for his feats of self-healing and self-regulation, began selling a device known as the ISIS, which used variable-frequency lights mounted in goggles combined with rhythmic sounds to produce heightened mental

states. Since then increasingly sophisticated variable-frequency light and sound (LS) devices, have been developed.

Light and Sound Breakthroughs

By the 1980s the time was right for a breakthrough in the combination of sound and light. The catalyst was the revolution in microelectronics, a revolution that allowed home electronics buffs and garage inventors to put together astonishingly sophisticated and complex LS devices using microchip technology. These computerized devices incorporated sound synthesizers to produce a rich assortment of tones, chords, and even beat frequencies. They developed computer like “programming” capacities that permitted the user to choose one of a number of preset “sessions” designed to produce specific states of consciousness, ranging from sleep, to meditation, to extreme alertness, at the push of a button. By 1990 these devices had emerged as popular consumer electronics items, sold through catalogs and stores such as Sharper Image and Hammacher Schlemmer.

As with personal computers (PCs), new advances, new machines, and new generations of older devices appear almost constantly; and as with PCs, the advances have included smaller size, greater versatility and power, and steep reductions in price. As this is written, there are well over forty LS machines in commercial production around the world, and a new generation of devices is emerging. These new devices can “download” programs into the system’s memory from some external source or to link the system to a compact disc (CD) player, so that sounds embedded in the compact disc activate complex LS sessions. They also can combine LS stimulation with EEG biofeedback capabilities. In the new LS-EEG devices, the machine reads the user’s dominant brain-wave activity and then provides the optimal frequency of LS to entrain brain-wave activity toward the “target” frequency. Several such devices are now on the market and seeing increasing clinical use for treatment of learning disorders, anxiety, depression, and drug addiction, among others.

Another significant development is the advent of LS systems on a simple board that can be plugged into your computer’s expansion slot or serial port. These boards permit users to program hundreds of sessions of almost any length and complexity.

Still other LS systems are being packaged in combination with cranial electro-stimulation (CES), so that user receives pulsed electrical microcurrent stimulation at the same frequency as the LS stimulation.

These developments point the way toward the future. Soon we will have a fully *interactive* system that will allow the user to put on a few electrodes to monitor EEG as well as other physiological indicators and display them on the computer screen in real time. The system will monitor and analyze this information constantly to provide as feedback the optimal type of LS stimulation (as well as CES and appropriate digitized binaural beats, high-frequency signals, music selections or preprogrammed audio subliminal or peripheral suggestions, hypnotic inductions, information for accelerated learning, and so on). The system will store thousands of sessions, with individual users able to select desired mind states or experiences as easily as selecting a TV channel, or play back and reexperience past sessions. The technology for such a system is already available. That means it is already outmoded, at least in the mind of the inventors. The *real* future LS system will surely move in directions outside my ability to predict.

Sound and Light Research

It has been well established over the last fifty years of research that these LS devices rapidly can produce states of deep relaxation, may increase suggestibility and receptivity to new information, and may enhance access to subconscious material. Recent evidence from around the world indicates that the machines are beneficial in the treatment of migraine headaches and learning disorders, alleviation of pain, enhancement of immune function, and much more. Here's summary of some of the most interesting work done in the last decade.

Brain-Wave Entrainment

California psychologist Julian Isaacs, Ph.D., working with a private research group called The Other 90 Percent, studied the brain-wave effects of LS devices using an advanced brain-mapping EEG. They found "very clear evidence of brainwave driving" as well as a very strong correlation between the intensity of the lights used (whether red light emitting diodes [LEDs] or incandescent bulbs) and the brain entrainment: the brighter the lights, the more entrainment.

Stimulating Neurochemicals

Research by Dr. C. Norman Shealy and others shows that light stimulation alone (with the Lumatron and simple red LED goggles) and LS devices can increase levels of a variety of neurochemicals and hormones, including endorphins and growth hormones. This may explain many of the benefits noted by users, ranging from alleviation of stress, anxiety, depression and pain, to increased mental alertness and memory.

Gateway to the Unconscious

Dr. Thomas Budzynski has made extensive clinical use of LS devices, and notes that the effects range “from production of drowsy, hypnagogic-like states (with theta frequency used), to vivid, holograph-like images. At times, images from childhood were experienced.” This leads Budzynski to speak of the device as “Hypnotic Facilitator” and a “Facilitator of Unconscious Retrieval” that has immense therapeutic value, since the device seems “to allow the subject to recall past childhood events with a high degree of ‘being there’ quality.” He also finds LS devices effective for accelerated learning, since they can put users in the theta (or “twilight state”) of hyper suggestibility and heightened receptivity to new information.

Deep Relaxation

Dr. Norman Thomas and his associate David Siever, at the University of Alberta, gave a group of experimental subjects LS stimulation at an alpha frequency for fifteen minutes, while they were being monitored for muscle tension, using an electromyograph (EMG), and for finger temperature. A control group, similarly monitored, was asked simply to relax, without any LS devices, for the same fifteen minutes. Significantly, both the experimental group and the control group were what the researchers called “resistant” or “non-hypnotisable” subjects. While the control subjects stated that they believed they were very relaxed, the EMG and finger temperature monitors showed that they were actually experiencing *increased* amounts of muscle tension and decreases in finger temperature (associated with tension or stress). On the other hand, the LS group showed dramatic increases in relaxation, reaching profound relaxation states that continued for

long periods after the fifteen minutes of LS. The researchers wrote: “It appears that audio-visual stimulation offers a simple hypnotic device in otherwise resistant subjects.”

Relaxation for Sedation

In 1988 anesthesiologist Robert Cosgrove Jr., Ph.D., M.D., undertook preliminary studies of LS. In his initial evaluations, Cosgrove, an authority in pharmaceuticals and biomedical engineering, noted that LS was “clearly very powerful in its ability to cause deep relaxation in most subjects. Its effectiveness has been so great that we are very enthusiastic about the prospect of evaluating the [device] for its sedative properties in patients prior to, during, and immediately following surgery. We are also undertaking studies to prove [its] utility in chronic stress.”

Neuro-Pathway Exerciser

Cosgrove noted that LS

with appropriately selected stimulation protocols has been observed by us to be an excellent neuropathway exerciser. As such we believe it has great potential for use in promoting optimal cerebral performance. . . . Furthermore, the long-term effects of regular use of the device on maintaining and improving cerebral performance throughout life and possibly delaying for decades the deterioration of the brain traditionally associated with aging is very exciting.

Increased Creativity and Mental Flexibility

Medical researcher Dr. Gene W. Brockopp has speculated that LS could “actively induce a state of deactivation in which the brain is passive, but not asleep; awake, but not involved with the ‘clutter’ of an ongoing existence. If this is true, then it may be a state in which new cognitive strategies could be designed and developed.” Brockopp also suggested that

If we can help a person to experience different brain-wave states consciously through driving them with external stimulation, we may facilitate the individuals' ability to allow more variations in their functioning through breaking up patterns at the neural level. This may help them develop the ability to shift gears or "shuttle" and move them away from habit patterns of behavior to become more flexible and creative, and to develop more elegant strategies of functioning.

Migraine Relief

Light stimulation (through red LED goggles) was used to treat seven sufferers of migraine headaches—none of whom had been able to find relief with drug treatments. Out of fifty migraines studied, forty-nine were rated by subjects as being "helped" and thirty-six were stopped by the photic stimulation. Significantly, brighter lights were found to be more effective.

Chronic Pain

Frederick Boesma and Constance Gagnon of the University of Alberta's Department of Educational Psychology studied the effects of regular LS on three chronic pain patients over periods of nine to seventeen months. At the outset of the study all three individuals experienced much pain and stress caused by the disabling and psychological effects of their pain, to the point that two of them were seriously contemplating suicide. But over the course of the study each subject showed significant reductions in pain and required less medication. The effect of LS did not diminish with time but actually improved in effectiveness with use. Consistent LS usage seemed to be associated with lower pain levels, easier sleep, and improved handling of stress. Long-term usage seemed to reduce and then abolish the incidence of suicidal thoughts. The patients also reported that learning how to use LS gave them greater control over their lives.

Relief of Anxiety and Stress

Dr. Juan Abascal and Dr. Laurel Brucato have conducted several LS studies (including studies of officers of the Metro-Dade Police Department) at Mindworks, a Miami psychotherapy and stress reduction center. Results indicate that LS significantly reduces stress symptoms such as heart rate, blood pressure, muscle tension, and both state and trait anxiety (state anxiety measures the level of anxiety experienced at the time the research is conducted, while trait anxiety measures the disposition of individuals to experience anxiety, and is generally fairly stable over time).

Enhanced Immune Function?

William Harris, M.D., director of the Penwell Foundation, an organization for the investigation, research, and application of different modalities for the treatment of those with AIDS/HIV, has experimented with LS devices and found them extremely effective. He speculates that LS devices may boost immune function by producing states of deep relaxation, by enhancing the patients' receptivity to suggestions for healing and improving their ability to visualize and the clarity of their visualizations. "At this point it's conjecture," says Harris, "but I think that this type of machine may actually be stimulating . . . the body to produce its own chemical substances," and that these natural substances may enhance immune function and healing.

Learning Disorders

A variety of research and clinical work has demonstrated beyond doubt that by speeding up brain-wave activity into the beta range, LS machines can produce dramatic increases in IQ and in fact affect the entire personality. For a discussion of this work, see Chapter 30.

Ecstasy and Samadhi

In 1990 Bruce Harrah-Conforth, Ph.D., of Indiana University, found that compared to the control group, which listened to relaxing sounds with eyes closed, a group receiving LS stimulation showed dramatic alterations in their EEG patterns responding to the frequency of the LS device and also showed evidence of hemispheric synchronization. Harrah-Conforth suggests that LS devices may cause simultaneous *ergotropic arousal*, or arousal of the sympathetic nervous system and the cerebral cortex, associated with “creative” and “ecstatic experiences,” and *trophotropic arousal*, or the arousal of the parasympathetic system, associated with deep relaxation and “the timeless, ‘oceanic’ mode of the mystic experience.” In humans, Harrah-Conforth concludes, “these two states may be interpreted as hyper- and hypo arousal, or ecstasy and samadhi.”

Consumers' Guide to Light/Sound Devices

Is there ever too much of a good thing? It's hard to imagine. But for many potential purchasers of light/sound machines, it may seem that way. It's a bit like purchasing your first (or your next) computer—there are so many of them out there! But most buyers find that they are able to select the right machine for their purposes using virtually the same criteria as computer purchasers: size (is portability important?), cost, power, capacity for running a variety of programs, ease of operation.

Today LS devices are the most popular of the new brain tools. They consist of a console about the size of a paperback book (some as small as a deck of cards), into which are plugged stereo headphones and goggles that position tiny lights (in most cases they are red LEDs) in front of each eye. When the machine is turned on, the user hears sound patterns that pulse in rhythm with the stroboscopic flickering of the lights.

The machines range in sophistication from devices that permit you to create and store hundreds of intricate sound and light programs, to simple goggles that flash at a rate you adjust by turning a dial. The prices similarly vary from over \$600 for the most advanced versions to under \$100. Here I list the devices I've found to be the most

effective. Because they range widely in cost and complexity, one key to my evaluation is which devices deliver the most bang for the buck. To purchase or obtain further information about any of the devices described below, write: Megabrain, P.O. Box 2744, Sausalito, CA 94966, or call 1-800-456-9887.

The DAVID Paradise combines the best features of small portable devices with the sophisticated programming options of the most costly systems. Cost is about \$595. Less flexible and less programmable, but also good, are the *DAVID Paradise Junior* (cost about \$495) and the *DAVID 2001* (cost about \$295), in which all the controls are integrated into the headphones.

The *Minds Eye Synergizer* is the best computer-linked system. Plug it into your PC, and you can use a mouse with a Windows-like graphical interface to create and store hundreds of sessions of almost any length and complexity. The capacity for creating complex binaural beats allows you to play it almost like a musician would play a keyboard. The cost is about \$595.



The DAVID Paradise
(David Siever)

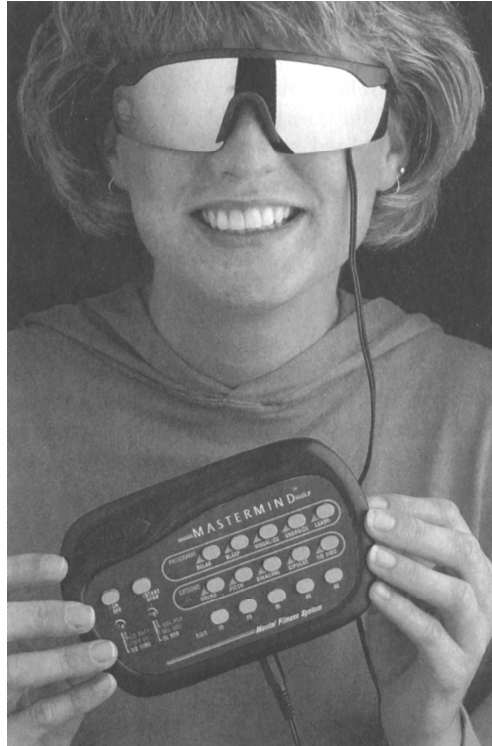
The *Photosonix Galaxy* offers superb preset programs (just press a button and the machine does the rest) and also permits the creation and storage of personalized sessions. This is the best in this price range—cost is about \$295.

The *MindLab DLS with PolySync* is simple, attractive, and very user-friendly. It's superb for technophobes. The "download" feature allows you to feed numerous custom-designed sessions into the device from an audiotape. It costs about \$295. An identical system without the download capacity, the *Mindlab DLS*, goes for about \$230.

The *Mind Gear SLX* is unique among inexpensive systems in providing both manual control and sixteen preset programs playable at four different time settings (giving you in effect sixty-four different presets). This system gives maximum flexibility at a minimum price—cost is about \$150.



The Photosonix Galaxy
(Tools for Exploration)



***The Mastermind DLS
(Tools for Exploration)***

Suggested Reading

A good introduction to LS is *Megabrain Report: Special Light and Sound Issue* 1(2) (1991), which includes reviews of over twenty devices, interviews with leading manufactures and researchers, and a survey of LS research. For creating sophisticated LS programs, see *Awakening Mind: Programming Advanced Light & Sound Sessions* by James Mann (Enlightened Enterprises, 1992). Therapists and others interested in using LS for therapeutic applications should see *Clinical Guide to Light and Sound* by Thomas Budzynski, Ph.D. (Seattle, WA: Syntetic System, 1991).

Sound:

The Heartbeat of Life

Mommy Sounds

By Michael Hutchison

(Extract from *Mega Brain Power* by Michael Hutchison)

Humans have always been enthralled by the effects of rhythmic sounds and aware of the mind-altering and brain-wave entrainment effects of rhythmic noises. After all, the first sound any of us hear, and perhaps the most powerful and evocative memorable sound, is the rhythmic booming of blood through our ears as we rest inside our mothers.

Humans were quick to find ways to duplicate this evocative rhythm and many others. In fact, it could be argued that the rhythmic use of sound to produce heightened states of consciousness may have been humankind's first great development in mind technology. Think of the first proto-hominid who picked up a stick and pounded it on a hollow log. Boom. Then he or she did it again, and again and again, while the other tribe members turned, stared, sat, listened, and joined in, awed and amazed. What a mesmerizing power.

Entraining Brain Waves

One clear explanation for the powers of rhythmic sounds is that they dramatically alter brain-wave activity. Researchers have found that rhythmic clicks produce clear brain-wave entrainment throughout many parts of the brain—not just in those parts associated with hearing. According to anthropologist Michael Harner, scientists studying shamanic rituals have “found that drum beat frequencies in the theta wave EEG frequency range . . . predominated during initiation procedures.” So, simply by making a noise at a specific frequency, and making it rhythmically and repeatedly, you can alter your brain waves. With a simple drum, in other words, you can draw listeners downward from their waking beta rhythms into the relaxed alpha state, and even deeper, into the mysterious

theta state—an ideal state for producing profound effects, through the telling of stories, the singing of songs, the casting of spells.

Binaural Beats

Listen to a record of chanting: Tibetan monks, Gregorian chants. If you listen carefully, you will begin to feel the voices become one and create a single pulsating tone. One of the most noticeable effects of several instruments playing or human voices chanting at approximately the same pitch is that you will tend to hear a *wah wah wah* vibrating effect, or “beat,” as the voices or instruments come into unison and then drift slightly apart. As the tones come into unison, the beat slows down; as the tones drift farther and farther out of key, the beat speeds up.

The frequency of the beat produced by two separate tones equals the frequency of the difference between those two tones. Thus, for example, a frequency of 200 Hz and one of 204 Hz would produce (among other overtones) a “beat frequency” of 4 Hz. Players of guitars, violins, and other stringed instruments use this beat phenomenon when they tune one string to a second string: When the beat slows to zero, the two strings are in tune.

This phenomenon might have remained of little interest to non-musicians were it not for the work of an intrepid explorer of inner spaces named Robert Monroe. Monroe first came to wide notice in the 1960s with his book *Journeys Out of the Body*, in which he describes a series of extraordinary experiences that took place while his physical body was asleep. Monroe became interested in finding some way of inducing this out-of-body experience. As he knew that his own experiences had something to do with a feeling of vibrations, he set about to create similar physical vibrations using sound.

Monroe discovered that while scientists had known about “beats” for years, they had not really explored the effects of beats when played over stereo headphones. He found that when the separate sounds were played through separate ears, they created what was called a binaural beat. When pure audio signals of different frequencies are delivered to the brain through separate ears—for example, when a signal of 200 cycles per second

enters one ear and one of 204 cycles per second enters the other ear—the two hemispheres of the brain function together to “hear” not the actual external sound signals but a phantom third signal—a *binaural* beat—which is the difference in frequency between the two actual sound frequencies. This beat frequency is not an actual sound, but an electrical signal that can be created only by both hemispheres of the brain working together simultaneously.

And, as Monroe found, when precisely controlled tones are combined in the brain, a part of it—the olivary nucleus—begins to become “entrained to” or resonate sympathetically to this “phantom” binaural beat, like a crystal goblet vibrating in response to a pure tone, in what is known as a frequency following response. As the olivary nucleus becomes entrained, it sends signals upward into the cerebral cortex that mix with the existing patterns of brain activity there to produce noticeable state changes. As Monroe continued his investigations, he found that by using certain frequencies, he could produce a unique and coherent brain state—a state he called hemispheric synchronization.

What binaural beats can provide, then, is a very simple but powerful way of altering brain-wave activity. Combining a signal of 200 Hz in one ear with a signal of 210 Hz in the other produces a very subtle, gentle vibrating effect, yet it is stimulating the listener’s deep brain at a 10 Hz frequency state. This gentle technique is far less intrusive or irritating than simply banging a drum in the listener’s ear ten times per second. Thus binaural beats can provide a method for rapidly, subtly (even subliminally) altering brain-wave activity into a more organized or coherent brain state and boosting listeners into specific altered and expanded states of consciousness.

What’s more, as electroencephalogram (EEG) researchers have found, these carefully tuned binaural beats can be superimposed, layer upon layer, producing complex sound matrices with powerful state changing effects. Certain frequency combinations, for example, can produce powerful alpha activity, while other combinations effectively suppress alpha and increase synchronous theta and beta. Other combinations produce a state that combines profound relaxation with heightened alertness—a state Monroe calls “mind awake/body asleep.”

There's no doubt these beats have profound brain-altering effects. A large body of research has proven their effectiveness in a variety of applications ranging from accelerated learning, to pain reduction, to boosting immune function. One recent study at Memphis State University by Dale Foster, Ph.D., used EEGs to measure the amount of alpha brain-wave production in subjects using biofeedback EEG training, subjects hearing alpha binaural beats, subjects using a combination of biofeedback and binaural beats, and a control group. Foster's conclusion: "An interactive effect was found in which the group with both alpha binaural beats and alpha biofeedback produced more treatment alpha than the group with alpha biofeedback alone." Additionally, a majority of the subjects receiving both binaural beats and feedback reported "being able to control alpha production via their focus on the alpha binaural beats." Foster concluded that "the combination of alpha frequency binaural beats and alpha brain wave feedback resulted in significantly more alpha production than alpha brain wave feedback alone."

Other evidence is emerging from Washington state educator Jo Dee Owens that for older people, the combination of delta binaural beats with high beta beats can have an extraordinary vitalizing effect. Binaural beats are used on a variety of widely advertised audio tapes and compact discs (CDs). You may have seen ads for the best-known of these tapes, which describe the process as "ultra meditation," "high-tech meditation," and so on.

While some of these tapes are effective, many are not, because they assume that, simply by creating binaural beats at a certain frequency and sending them to the brain through the ears, they can directly trigger brain-wave activity at the same frequency. But as EEG researchers such as F. Holmes Atwater have noted, this "classical evoked potential" concept is "flawed from the onset." Binaural beats simply do not work that way.

EEG research shows that binaural beats do not directly alter EEG activity; rather they actually are "heard" in the lower auditory centers—in the olivary nucleus of each hemisphere, deep inside the brain. There the actual oscillations in response to binaural beats can be measured directly. To produce the desired state-change effects throughout the cortex, binaural beats must be combined in a highly specific mix that makes use of what Atwater calls the "audio-encephalographic interferometry effect." In essence, the

binaural beat oscillations must be mixed via the olivary nucleus with existing brain-wave patterns to create “interference” patterns or wave combinations that produce higher-order patterns, out of which emerge the expanded states of consciousness.

Beyond Hearing: Supercharging the Brain

Rhythmic brain-wave entrainment, such as clicks, drum beats, and the more subtle binaural beats, have obvious effects on the brain. Another type of sound—high-frequency sound—may have even more profound effects. The first to explore the effects of high-frequency sounds systematically was the French eye, ear, nose, and throat specialist Alfred Tomatis, M.D. He found evidence that brain development is powerfully influenced by the sounds we hear while in the womb. During this time, we are suspended in amniotic fluid, with the fluid filling our ears. Since sound travels through water five times more efficiently than through air, our sense of hearing would be five times more acute. Tomatis covered microphones and speakers with membranes and submerged them in water to produce and record the type of sounds infants hear filtered through amniotic fluid—the sounds of the mother’s pulse, respiration, voice, intestines, heart, and all the sounds of the external world filtered through the mother’s taut belly. He found that these sounds were predominantly high-pitched squeaks, hisses, swishes, and whistles in the frequency range above 8,000 Hz.

When he recorded mothers’ voices and other sounds at the high frequency range and played them back to children with learning disabilities—autism, dyslexia, hyperactivity—he noticed immediate and dramatic improvements in learning and behavior. This high-frequency sound, Tomatis theorized, “awakens a sense of our most archaic relationship with the mother.” Such sounds seem to touch our most ancient and primordial memories—the bliss of the womb, oneness with the mother—and provide listeners with a memory and whole body experience of oneness and wholeness. Tomatis also found that these sounds seemed to boost brainpower, energize the body, and reduce stress-related problems of all sorts.

Supercharged Monks

Tomatis's research and clinical experiences led him to conclude that the ear is a primary organ of consciousness. Until then, most people, including scientists studying the ear, thought of the ears as having only a single function: hearing. They were not aware that hearing is only one aspect of a larger, dynamic process, a process that involves every cell in the body.

Tomatis discovered that the ear not only "hears," but the vibrating waves it hears also stimulate sensory nerves in the inner ear, where they are transformed into electrical impulses that travel along several routes to the brain. Some travel to the hearing centers, where they are translated into sounds. Others send a charge of electrical potential into the cerebellum, which controls physical motion and sensations of balance and equilibrium; and from there into the limbic brain, which controls emotions and the release of hormones and other biochemicals that influence the entire body. The electrical potential created by sounds is also transmitted to the cortex, which controls the higher functions of consciousness. Thus sounds provide nourishment for the brain and the entire body in the form of electroneural stimulation to the brain. They seem to charge up the brain in the same way batteries are recharged.

And, Tomatis surmised, since sound nourishes the body and brain, then it is possible that insufficient sound, particularly in the crucial high-frequency ranges, can have similar effects as insufficient food nutrients, depleting our resources and leading to sickness.

At one point Tomatis was called in to treat all the monks in a Benedictine monastery for fatigue and listlessness. Tomatis found that a new abbot had eliminated their normal practice of chanting for six to eight hours every day. With its high echoing overtones, chanting is a rich source of high-frequency sound. After Tomatis instructed the monks to resume their chanting, all quickly recovered their vigor. According to Tomatis, "Some sounds are as good as two cups of coffee. Gregorian chants are a fantastic energy source."

As Tomatis monitored the process by which sound was translated into nerve energy in the inner ear, he found that high frequencies—8,000 Hz and over—accelerated the recharging process. Sadly, while most humans are born with the ability to hear sound waves between about 16 and 20,000 cycles per second, noise pollution and physical and psychological stress have dramatically diminished the hearing range of most people. In these noisy, stressful days, even children show stress-related hearing loss in the high-frequency ranges. This means that many people in modern society have become deaf to the energizing, healing nutrients of these sounds. We are, in a real sense, in a state of *sound deprivation*.

Pumping Sounds with the Ear Muscles

Tomatis developed a sound recording process called the “Electronic Ear” that filters out ordinary sounds while reproducing and emphasizing the high-frequency ones. With this “fitness center for the inner ear,” he could switch between the high- and low-frequency sounds, alternately tensing and relaxing tiny muscles in the listener’s ears. Just as repeatedly pumping weights builds muscles, Tomatis found that this repeated contraction and expansion exercised and strengthened the ear muscles, and the ears slowly regained their ability to hear the higher frequencies again. Once the ears had been “opened,” he found, the brain could recharge quickly by absorbing the nutrients of full-frequency sounds.

One key discovery by Tomatis was that “the voice can only produce what the ear can hear.” Since our hearing range is so diminished as a result of stress and noise, our verbal expression has been stripped of richness. Most of our verbal communication and our hearing is limited to a narrow frequency range between 300 and 3,000 Hz—something like eating a diet limited to meat and potatoes. But Tomatis found that when ears are “opened” by high-frequency sounds, they not only regain their ability to hear high frequencies, they produce a whole-body healing and energizing effect, a dramatic increase in mental powers from the increased ability to “hear” and be aware of external reality, and a noticeable opening and enriching of the vocal range.

Think of the narrow, lifeless, wooden tones of people who are sick, depressed, or under severe stress, and compare them to the rich tones and sweeping vocal range of vital

and vigorous singers, political orators, or religious leaders. People whose vocal and auditory range is wide are clearly more open, aware, and responsive to others, as a result of their highly sensitive ability to hear others. This may explain why orchestra conductors are among the longest living people in the world. And the direct link between stress and vocal range casts light on why professional singers are notoriously subject to laryngitis and other vocal problems when under stress.

Tomatis began using the high-frequency sounds of his Electronic Ear for therapeutic purposes and achieved extraordinary success in treating a wide variety of disorders. What is now called the Tomatis Effect has been scientifically tested and confirmed by researchers and therapists around the world. The technique, which involves progressively introducing more and more high-frequency sounds and alternating them with low-frequency and full-frequency sounds is now used in over 180 centers throughout the world to alleviate deafness, emotional disturbances, hypertension, insomnia, speech defects, epilepsy, hyperactivity, dyslexia, autism, depression, and more. Many performing musical artists claim the technique has increased their musical abilities and sensitivities by expanding their abilities to hear and sing. Other documented results from the Tomatis method include heightened creativity and mental capacity, improvement of memory and concentration, deep relaxation, weight loss, and much more.

Sound Therapy for the Walkman

However, since the Tomatis method requires patients to sit for several hours a day wearing headphones, listening to music through the sophisticated Electronic Ear equipment in the therapist's office, the cost in both time and money was too great for widespread use. The development of the Walkman changed all that. In 1984 Canadian writer Patricia Joudry wrote a book explaining the Tomatis technique, *Sound Therapy for the Walkman*, and produced a series of "filtered" classical music tapes, also called "Sound Therapy for the Walkman." What had formerly required over \$20,000 in equipment, or thousands of dollars in treatment fees, was now available at a cost of about \$235 (for four ninety-minute cassettes), and could be listened to over an inexpensive cassette tape player. This enabled users to hear the brain-charging music while they went about their daily lives, instead of having to sit in a therapist's office for hours each day.

What they hear is classical music recorded in the normal full-frequency range alternating periodically with the same music recorded through high-pass filters, which record only the sounds between approximately 8,000 Hz to over 15,000 Hz. These high frequencies sound like hisses and extend into ranges that are not really “heard” but nevertheless have a stimulating effect on the ear. This switching between high-frequency and full-frequency music expands and contracts the tiny ear muscles and opens up hearing to progressively wider ranges.

Since Joudry released her tapes, newer techniques have emerged to deliver high-frequency sounds. Joudry recorded her series on metal tapes. This increases the life span of the tapes, but it also sharply decreases the life span of your cassette player. The metal tapes played hour after hour over the sensitive playback head of the cassette player have the effect of sandpaper, wearing it down and quickly reducing its sensitivity to the very same high-frequency sounds you want to be hearing.

Silent Stimulation?

Newer techniques avoid that pitfall. These include the Klangtherapie (Sound therapy) CDs from the German company Lambdona that are now widely used in European clinics with impressive results. Perhaps the most important breakthrough in the delivery of high “sound therapy” frequencies is a newly patented Silent Stim process. Recent tests have shown that it can produce sound therapy tapes and CDs that are over 75 decibels stronger in the high-frequency ranges (which translates mathematically to about 12 million times more powerful) than the Joudry cassettes.

The process gains much of its power by sweeping (frequency modulating) the high-frequency end of the audio program from about 6,000 to 18,000 Hz. It also sweeps the low-frequency end from about 20 to 200 Hz. Both ends are swept in rhythmic alternations, forcing the ear muscles to exercise by expanding and contracting between the high- and low-frequency sound groupings. Since these sounds are partially outside the normal human hearing range, they can be played on the tapes or CDs 100 percent of the time as “silent” background to music or other sounds, (the high-frequency sounds of the Sound Therapy tapes appear about 10 percent of the time). They can thus have profound brain-stimulating effects without even being audible.

Consumers' Guide to Sound Therapy Technology

One of the most powerful “sound therapy” techniques, of course, is music. Pure music, without high-tech add-ons, has been proven in recent scientific studies to boost immune function; reduce pain, anxiety, and depression; treat mental, neurological, emotional, and physical disorders (including autism, learning disabilities, and stroke); and much more. Evidence suggests that certain types of music seem to have the most powerful positive effects—among them are baroque, classical, romantic, types of jazz, chants, and the relaxing, spacious, meditative sounds of much “new music,” including the mind-altering music of composer/musicians such as Constance Demby, Iasos, Marcey, Jim Oliver, and Boris Mourashkin.

All good music is, in this sense, mind altering. However, a number of new audio programs or products make use of advanced technology, such as the binaural beats and

high-frequency effects just described, or other advanced-state change techniques to directly influence brain waves and brain chemistry, increase mental powers, and produce heightened states. The following are some of the most effective of these “psychoacoustic” programs. While they are effective alone, I have found them to be especially powerful when used in combination with other types of mind technology, such as light/sound devices, flotation, ganzfelds, motion, and sound tables, etc. To purchase or obtain further information about any of the tapes and CDs described below, write Megabrain, P.O. Box 2744, Sausalito, CA 94966, or call 1-800-456-9887.

Acoustic Brain Research tapes use a variety of psychoacoustic techniques, including binaural beats, to produce states ranging from deep relaxation to “Mind Gymnastiks.”

Brain/Mind Research tapes and CDs, created by Dr. Jeffrey Thompson, use state-of-the-art acoustic techniques along with “primordial sounds” and evocative “new age” music to include trancelike states of deep relaxation.

Brain/Mind Resonance tapes use a combination of psychoacoustic techniques to produce specific states such as “up” (maximum productivity), “down” (relaxation), “now” (centering), and “forever” (consciousness expansion).

Changeworks tapes by Ericksonian hypnotherapists Tom Condon and Carol Erickson use a “double-induction” technique, with two voices reciting poetic monologues and stories through separate ears—they cause you to drop quickly into a relaxed, trancelike state during which you unconsciously assimilate many of the hidden suggestions contained in the stories.

Hemi-Sync tapes, devised by Robert Monroe, use binaural beats. Many use spoken hypnotic inductions to guide you to heightened states or instruct you in learning to “imprint” certain states so that you may recall them later using “cues” or signals you create yourself.

Hypno-Peripheral Processing tapes, by Dr. Lloyd Glauberman, use a “double-induction” technique—you hear two separate fairy-tale-like stories, one through each ear,

that contain imbedded suggestions for behavioral change. The process is enhanced by binaural beats.

Neurosonics tapes are the brainchild of Dr. Richard Bandler, co-creator of Neurolinguistic Programming (NLP). They combine psychoacoustic techniques along with Bandler’s mastery as a hypnotist—he is a compelling and unique vocalist—to guide you through a series of dynamic, supercharging experiences.

Paraliminal Tapes fuse Neurolinguistic Programming techniques with psychoacoustic sounds to guide you through a variety of behavior-changing experiences, ranging from changing belief systems to generating a “new history.”

Sound RX tapes and CDs are created by the pioneering and multitalented Steven Halpern, using binaural beats and other brain-wave-altering techniques, enhanced by his own spacious, mysterious musical compositions.

Gregorian Chants have been recorded by the monks of Solesmes and the nuns of St. Cecilia’s, and are available in a variety of tapes and CDs. They provide the rich high-frequency overtones that Tomatis’s research has found to charge the brain.

My own *MegaBrain* tapes use a unique combination of psychoactive sounds and binaural beats at bioactive window frequencies combined with brain-charging high-frequency sounds and powerful infrasonic or subaudible sounds as well as clicks, phasing effects, and other brain-expanding techniques to produce a variety of specific brain states ranging from deep relaxation, to transcendence, to high-energy exercise tapes.



The Binaural Signal Generator
(AWI Electronics)

The *Binaural Signal Generator* plugs into your home audio system and permits you to create your own binaural beats, so you can record personalized audio tapes or play binaural beats through your own system, alone or in combination with your favorite music. Cost is about \$390.

Suggested Reading

For a good introduction to the healing and mind-enhancing powers of music, see *Healing Sounds: the Power of Harmonics* by Jonathan Goldman (Rockport, MA: Element, 1992) and two thought-provoking anthologies edited by Don Campbell: *Music: Physician for Times to Come* (Wheaton, IL: Quest, 1991) and *Music and Miracles* (Wheaton, IL: Quest, 1992). See also *Sound Health: The Music and Sounds That Make Us Whole* by Steven Halpern and Louis Savary (New York: Harper & Row, 1985).

For more information about the sound explorations of Dr. Tomatis, see *Sound Therapy for the Walkman* by Patricia Joudry (St. Denis, Saskatchewan: Steele & Steele, 1984); *About the Tomatis Method* by Tim Gilmour, Paul Madaule, and Billie Thompson; and Alfred Tomatis's own *The Conscious Ear* (Barrytown, NY: Station Hill Press, 1991).

For binaural beats, see "Auditory Beats in the Brain" by Gerald Oster, *Scientific American* 229 (1973): 94-102.

ABOUT THE AUTHOR

With the publication of his book “Mega Brain”, Michael Hutchison is credited with accelerating developments in the field of mind technologies.

Michael’s book informed and educated the general public about the new developments in mind technologies and how to use them for many benefits from education and learning to sports, stress management, sex, and spiritual growth.

You can connect with Michael Hutchison at www.MegaBrainWorld.com and www.Facebook.com

RESOURCES

Websites

www.MegaBrainWorld.com

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www.Amazon.com

One of the best websites for latest information on the topic of "Mega Brain" devices and tools.

Books In The "Mega Brain Series"

Michael Hutchison has several books available in Kindle edition on Amazon.com.

Just search "Mega Brain" or "Mega Brain Hutchison" on Amazon.com.