

TIME FLASHES: A SHORT HISTORY OF SOUND AND LIGHT TECHNOLOGY

by Michael Hutchison

To those seeing them for the first time, sound and light devices may seem bizarre, like something out of a science fiction movie--the users seem laid back, out there somewhere, wired into a small box listening through headphones to some unheard sounds while eerie light pulsations flicker inside futuristic goggles. And to those encountering these devices from a background of meditative practice, the idea that one can attain heightened or meditative states of consciousness by using a machine, and the sheer technical computerized hardware of the devices themselves, must seem coldly materialistic. But while the hardware may seem new, the techniques being used are ancient.

LIGHT

The knowledge that a flickering light can cause mysterious visual hallucinations and alterations in consciousness 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. Ancient scientists were also intrigued by this phenomenon, and explored its practical applications. In 125 A.D. Apuleius experimented with a flickering light stimulus produced by the rotation of a potter's wheel, and found it could be used to reveal a type of epilepsy. Around 200 A.D. 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 spinning wheel could cause patterns and colors to appear before the eyes of the observer and could produce a feeling of euphoria.

Light researcher David Siever has found that in the 17th century, a Belgian scientist, Plateau, used the flickering of light through a strobe wheel to study the diagnostic significance of the flicker fusion phenomenon. As he caused the light flickers to come faster and faster, he found that at a certain point the flickers seemed to "fuse" into a steady, unflickering light pattern. Plateau discovered that healthy people were able to see separate flashes of light at much higher flicker speeds than were sick people. (In recent years, studies using light sources such as a tachistoscope to provide rapid light flashes have revealed that long-term meditators are able to see discrete flashes of light at much higher flicker rates than non-meditators.) At the turn of the century, French psychologist Pierre Janet noticed that when patients at the Salpetriere Hospital in Paris were exposed to flickering lights they experienced reductions in hysteria and increases in relaxation.

SOUND

Similarly, humans had always been enthralled by the effects of rhythmic sounds, and 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 shamans and priests. As anthropologist and shamanism authority Michael Harner, points out, "Basic tools for entering the SSC [Shamanic State of Consciousness] are the drum and

Researcher Andrew Neher investigated the effects of drumming on EEG patterns in the early 1960s 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."

And humans have always been keenly appreciative of the consciousness-heightening powers of music, which is of course, among other things, a succession of rhythmic auditory signals. 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.

SOUND AND LIGHT TOGETHER

Humans have also long been intrigued by the possibilities for influencing mental functioning that emerge from combining both rhythmic light and rhythmic sound stimulation. Ancient rituals for entering trance states often involved both rhythmic sounds in the form of drumbeats, clapping or chanting, and flickering lights produced by candles, torches, bonfires or long lines of human bodies rhythmically dancing, their forms passing before the fire and chopping the light into mesmerizing rhythmic flashes. Some composers of the past, 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

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. 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 brainwave 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, and they put together a simple flicker device called the Dreammachine. 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 I.Q. 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.

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 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. In 1973, scientist Richard Townsend published a description of his research with a device using goggle-mounted lights for photic entrainment. In 1974 a scientist at City College of New York, Seymour Charas, obtained the first patent on a combined sound and light stimulation device, though it was never put into commercial production. But 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—devices that could produce a rich assortment of tones, chords and even beat frequencies; that permitted the selection of a variety of light-flash patterns and intensities; that enabled the user to select the mode of interplay between lights and sound; that contained a number of preset “programs” designed to produce specific states of consciousness, ranging from sleep to meditation to extreme alertness, at the push of a button; and that permitted the users to design and store in the device’s computerized memory a variety of their own programs. Before the breakthroughs in microelectronics, 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 sound and light stimulators were relatively small—some of the first models were about the size of a portable typewriter; soon models were being made with consoles not much bigger than a pack of cigarettes.

As happened with personal computers, there seem to be new advances, new machines, and new generations of older devices appearing 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 20 sound and light machines in commercial production around the world, and we seem on the verge of an entirely new generation of devices that combine sound and light stimulation with biofeedback capabilities. These new devices enable the machine to read the user's dominant brainwave activity, and then provide the optimal frequency of sound and light to entrain brainwave activity toward the "target" frequency. One such device (the DreamWave) is already on the market.

Another significant development is the advent of a sound and light system on a simple board that can be plugged into your computer's expansion slot. One example currently on the market is the MindsEye Synergizer, a hardware-software combination that turns an IBM PC XT/AT/386 or clone into a research laboratory grade audio-visual synchronizer, permitting users to program hundreds of sessions of almost any length and complexity, to program each eye and ear independently (this permits extraordinary effects, such as combining alpha and theta frequencies, or setting up visual "beat frequencies"), create sounds, chords and beat frequencies on the computer with a stereo synthesizer, and program thousands of time ramps and sound-light levels into a single session.

These developments point the way toward the future. I believe it will be only a short time until we have a fully computerized integrated and interactive system that would allow the user to put on a few electrodes that would monitor EEG as well as other physiological indicators (muscle tension [EMG], skin potential, heart rate, skin temperature, breathing, etc.) and display them on the computer screen in real time;

would use this information to provide the optimal type of sound and light stimulation (as well as cranial electrostimulation and appropriate digitized music selections or preprogrammed audio suggestions, hypnotic inductions, information for accelerated learning, etc.); and would permit the storage of thousands of sessions, with individual users able to select desired mind states or experiences with the ease of selecting a channel on the TV, or play back or re-experience past sessions. The technology for such a system is already available.

SOUND AND LIGHT RESEARCH

It has been well established that these devices can rapidly produce states of deep relaxation, and may increase suggestibility, receptivity to new information, and enhance access to subconscious material. New work into the effects of these devices being undertaken around the world, and preliminary results suggest that the machines may be beneficial in the treatment of migraine headaches and learning disorders, alleviation of pain, enhancement of immune function, and much more. Here's a summary of some of the most interesting work done in the last decade.

In one preliminary 1980 study of one of the sound and light machines, Dr. Thomas Budzynski, then of the Behavioral Medicine Associates clinic in Denver, found that "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." This led Budzynski to speak of the device as a "Hypnotic Facilitator," and a "Facilitator of 'Unconscious Retrieval,'" that could have therapeutic value, since the device seemed "to allow the subject to recall past childhood events with a high degree of 'being there' quality." He also suggested that the device could be effective for accelerated learning, since it seemed capable of putting users in the theta (or "twilight state") of hypersuggestibility and heightened receptivity to new information.

Medical researcher Dr. Gene W. Brockopp of Buffalo, New York, speculated 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." 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 breakdown 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."

In 1988, anesthesiologist Robert Cosgrove Jr., Ph.D., M.D., undertook preliminary studies of sound and light stimulation. In his initial evaluations, in which he used the Alpha-Pacer II device, Cosgrove, an authority in pharmaceuticals and biomedical engineering, noted that audio-visual stimulation 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."

"We are also," Cosgrove continued, "quantitating the electroencephalographic (brainwave, EEG) effects... in both volunteers and patients. Our preliminary results show strong EEG entrainment."

The device, 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 device on maintaining and improving cerebral performance throughout life and possibly delaying for decades the deterioration of the brain

In 1989, another researcher, D.J. Anderson, used photic stimulation using red LED goggles to treat seven sufferers of migraine headaches--none of whom had been able to relieve their migraines with drug treatments. He found that out of 50 migraines noted, 49 were rated by subjects as being "helped," and 36 stopped by the photic stimulation. Significantly, brighter lights were found to be more effective.

Further evidence of the potential therapeutic value of photic stimulation has come from researcher Jill Ammon-Wexler, Ph.D., of the Innerspace Biofeedback and Therapy Center in Los Gatos, CA, using a device that uses a flickering light stimulus without an accompanying sound stimulus. The device, called a Lumatron, uses a strobe light with color filters to provide rhythmic photic stimulation in variable frequencies and in selected wavelength or color bands [MEGABRAIN REPORT will devote a full-length article to this device in a future issue]. Ammon-Wexler did a controlled study of twenty subjects suffering from phobias and found that "remarkable resolution of the subjects' phobic systems had occurred over the process of the 20 experimental sessions. There was also 'across the board' evidence for enhanced self-concept, and clinically-significant reductions in both anxiety and depression."

Dr. Ammon-Wexler's findings about the potential medical benefits of photic stimulation have been echoed recently by 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. In preliminary work

with a number of AIDs sufferers he has experimented with the use of a sound and light machine (the IM-1) and found it extremely effective. He speculates it may boost immune function by producing states of deep relaxation, by enhancing the patients' receptivity to suggestions for healing, by improving patients' 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.

In 1990 Bruce Harrah-Conforth, Ph.D., of Indiana 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."

In a separate letter to MEGABRAIN REPORT, Harrah-Conforth writes: "I have little doubt that 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 byproducts 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. Megabrain, Inc. is providing assistance in this research by, among other things, making available a number of devices. Isaacs and his colleagues are using a 24 electrode color brainmapping 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 brainwave 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 (a fact discussed by the machine manufacturers in the roundtable discussion elsewhere in this issue). 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 brainwave 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.

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."

MEGABRAIN SOFTWARE

HOW TO USE MIND TECHNOLOGY FOR PEAK PERFORMANCE--AN INTRODUCTION

by Michael Hutchison

Today, PCs have transformed virtually every aspect of our lives, and recent surveys show that nearly 25 percent of all households in the U.S. have at least one PC, that PCs are used in virtually every office in the country, and that well over 50% of the population have some familiarity with PCs. It's hard now for many of us to imagine how we ever lived without our computers.

What happened over the last decade that made PCs into mass market consumer-electronics items? The first thing was that the hardware went through a series of extraordinary and rapid transformations: each new generation was smaller, easier to operate, vastly more powerful and far less expensive.

The second key to the mass popularity of PCs was the development of a huge variety of software--programs that enabled users to apply the massive computing power of the hardware toward specific tasks, ranging from word processing to spreadsheets to design to publishing to game playing. Without such software, the hardware would have remained virtually inaccessible to most users. Think now: how often would you use your computer if there were no software, if you had to create your own programs and do all your computing through your operating system?

The parallels are obvious: brain machines, which first were unwieldy, expensive, complex, and carried the weird-scientist aura of the laboratory, have now gone through a rapid evolution and emerged as small, easy to operate, inexpensive and as sleekly designed as miniature Braun coffee grinders. As an example, the old Synchro Energizer described in the first edition of Megabrain was the size of a suitcase, had to be manually operated, and cost over \$8,000. Today far more sophisticated and effective devices the size of a pack of cards, containing a multitude of computerized programs that can be operated with the touch of a button, and costing less than \$200, are sold by the thousands through mass market catalogues like Hammacher Schlemmer, Sharper Image and DAK.

Today the hardware of brain technology--the mind machines themselves--exists. It is inexpensive, effective, innovatively-designed, and, increasing amounts of scientific

evidence indicate, when used skillfully can produce peak performance brain states, heightened mental powers and enhanced mind-body interaction.

What is lacking, in our mind-machine-PC parallel, is the mind-tech software--the programs, systems, techniques or operating environments that will allow the user of the mind machine to apply its sophisticated circuitry and advanced potentials and capacities toward specific tasks and applications, such as accelerated learning, sports training, weight loss, or stress reduction; ways the machines can be used--not just passively experienced as novelties or instruments of pleasure and entertainment, but actively used as immensely powerful tools to attain desired goals.

Because of this lack of programs, many mind machine purchasers end up putting the devices on a shelf in the back of their closets once the novelty of the experience itself has worn off. "I really liked it," they say; "when I first got my light and sound machine I used it several times a day. It was fun, I had lots of fascinating experiences and I felt great. But then, after a few weeks, I just kind of lost interest. I mean, after a point, what are you supposed to do with it?"

What follows is an initial step toward the development of a compendium of mind machine "programs." In this article I present a variety of strategies/systems/applications/techniques that I have found to be extremely powerful and effective when used in combination with mind technology. The techniques have emerged from my own personal exploration, from experimentation with thousands of people in Megabrain Workshops, from the work of skilled therapists and clinicians who have made extensive use of mind machines in their practices, and from my conversations and correspondence with hundreds of explorers and experimentalists around the world.

Because this is an introduction, and due to space limitations, my descriptions of these techniques in this issue take the form of brief summaries (with information about where you can get more information about each technique in a "Resources" section at the end of the article). In future issues of Megabrain Report I will provide in-depth treatments of some of these techniques, including case histories, relevant research, and detailed, step-by-step instructions for using these techniques yourself.

The techniques are effective with virtually all of the brain technology now available, including light/sound, binaural beats (i.e. "brain sync" tapes), cranial electrostimulation, movement devices, acoustic field systems (Vibrasound, Betar, Genesis, etc.), flotation tanks, ganzfelds, biocircuits; and (it should go without saying) they're also effective with various combinations of brain technology used synergistically (i.e. CES while on biocircuits while listening to binaural beat tapes; or light and sound stimulation while on a motion system). For convenience and brevity, I will throughout this article use the abbreviation MT for mind technology, and it will refer to all the varieties of MTs mentioned above.

DEEP RELAXATION

The first step toward making active, systematic and productive use of your MT is to learn to use it to put you into a state of profound relaxation. But wait, you say, isn't that the responsibility of the machine? After all, many of these devices claim in their literature to be "relaxation" devices, and many of them, such as the light/sound machines, offer a variety of preset "relaxation" sessions.

It's true that numerous scientific studies have shown that MTs can induce deep relaxation states in untrained subjects; some studies have found MTs even produce relaxation states in untrained subjects as deep as or deeper than the relaxation attained by subjects with extensive training and practice in relaxation techniques such as Progressive Relaxation. Speaking generally, put on your MT (such as an alpha beat frequency tape or a light/sound machine that ramps down into alpha) and within 10 to 15 minutes you should be more relaxed.

The problem is that qualifier "more." Many of us start from such a high level of stress, muscular tension and/or nervous arousal that even though we become more relaxed in relative terms, we're still, in absolute terms, not in true deep relaxation--a highly beneficial hypometabolic state in which muscular tension throughout the whole body is dramatically decreased (users describe it as feeling their body "go to sleep" or "melt away," or as simply losing all awareness of having a physical body), and in which the beta brainwave activity of active consciousness diminishes, while alpha and theta activity increases and becomes dominant.

Also, many of us have had the experience of being so tense or agitated that we know we would benefit from relaxing, we know that using our MT would help us relax, but we're simply too wound up to put it on, or if we do put it on, we're unable to let go sufficiently for the MT to carry us into a relaxed state. In fact one of the main problems with popular relaxation and stress reduction techniques of all kinds--including biofeedback, "relaxation response" meditation techniques, and systematic relaxation procedures--is what the researchers call "lack of transference." They may be highly effective in a training seminar, during a quiet evening at home, at a doctor or therapist's office, or when you're in a mood of curious or calm self-exploration, but still remain extremely difficult to use effectively in the midst of the pressures and urgencies of the everyday world.

And finally, even thou
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period for our MT session, then we have little time to pursue active strategies such as those we explore in the rest of this article before our session is over and we're back into our busy schedule again.

And yet true relaxation is a key to most of the various strategies and techniques that follow, from accelerated learning to visualization to problem-solving to self-healing to attaining a state of hyperreceptivity and hypersuggestibility. Fortunately, since the MTs themselves are helping induce deep relaxation, they speed up the learning process enormously: relaxation techniques that might take weeks of disciplined practice to master without the use of MTs can be mastered in just a few sessions on an MT. In fact, research suggests that all methods of relaxation or mental or physical self-regulation work more powerfully and effectively in combination with mind machines than in any other environment.

So no matter what MT we use, and no matter what our levels of stress, tension and arousal, all of us can profit enormously, and amplify the power of our MTs, by learning and practicing a relaxation technique that we use in conjunction with our MT. I suggest that each time you put on your MT your first step is to use your relaxation technique. Soon this will become almost automatic, and the relaxation process will accelerate: a technique that at the start might allow you to reach deep relaxation in ten minutes will soon take just seconds. Over time, your relaxation technique will become linked with your MT, so that simply by putting on your MT you will find yourself returning almost instantaneously to a relaxed state.

Herbert Benson of Harvard Medical School has studied the beneficial, healing "relaxation response," as well as many of the techniques, ranging from ancient meditative disciplines to modern systems, used to trigger this response. He found that they all worked by using certain specific techniques or elements in combination. The key elements he identified are:

Mental Device. There should be some sort of constant stimulus, such as a word or phrase repeated silently or audibly, fixed attention on an object or process. Attention to this mental device or technique shifts you away from logical, externally oriented thought.

Passive Attitude. Let the process happen, do not attempt to force it or control it. If distracting thoughts arise, simply observe them, let them go, and return to the process.

Decreased Muscle Tonus. Get into a comfortable position so that minimal muscular tension is required.

Quiet Environment. Try to use your MT where you won't be interrupted or distracted by external stimuli.

By using these elements in combination with your MT, you can quickly reach deep levels of relaxation. Following are brief summaries of some of the relaxation techniques that can be used to enhance your MT experience.

Breath Awareness

Abdominal Breathing. Relax your abdominal muscles, so that when you inhale, your belly expands, when you exhale your belly contracts. Shallow breathing (expanding and contracting the chest and rib cage) is physiologically linked to the fight-or-flight response; thus chest breathing causes the autonomic nervous system to remain in a state of arousal and inhibits relaxation.

Nose Breathing. One effective technique is simply to focus attention on the breath as it passes in and out of the nose. Feel the air, the coolness at the tip of your nose as you inhale. As you exhale, focus on the warmth at the same spot. If you wish, count your inhalations, numbering each from one to ten; when you reach ten begin with one again. Should thoughts rise into your awareness, don't resist them but allow them to pass, and then return all attention to your breathing.

Moving Around the Body. With each breath, direct your total attention to a particular spot in your body. Move systematically through your body (e.g. you may begin at the top of your head, and move breath by breath downward through your head, neck, chest, right arm and fingers, left arm and fingers, torso, right leg and foot, left leg and foot, and back up again to end at the top of your head; some find it more effective to count each spot, beginning at the top of the head with one, and ending up back at the top of the head at a count of sixty or so). As your attention moves from place to place it creates and is accompanied by strong body sensations--feelings of melting, warmth, brightness, growing "softer." By the time you have made a full cycle you should be deeply relaxed.

Visualization of Light. The nostril breathing practice described above can be combined with visualization: see the air entering your nostrils as pure white light. As you inhale, follow the flow of light through your nasal passages, into your abdomen; visualize it radiating to every part of your body. The as you exhale, see the light flow back out of your body. Focus on your breathing entirely.

There are many variations. For example, use visualization of light in combination with the moving around the body technique--with each count, as you focus your attention on another part of the body, see the light flow to that part, see it glowing warmly. Move the light around your body.

Mindfulness

Breath awareness is one element of a practice called mindfulness that can not only be an effective relaxation technique, but if practiced regularly can lead to profound transformations in your life. On the most basic level, mindfulness involves simply being aware, observing patiently, with detachment and without judging, what you are doing. Ultimately, with practice, mindfulness can lead to "waking up" from ordinary consciousness into a state in which each moment is a peak experience, and in which one has direct and immediate access to one's full powers.

The first step to mindfulness is breath awareness. As in the exercise above, simply focus your attention on your breathing and hold it there. Be aware of the sensations that accompany your breathing. Pay attention. Don't attempt to do anything; don't attempt to control your breathing; don't attempt to think about your breathing. Simply be aware. As thoughts arise, don't fight against them, don't judge them, simply be aware of them and then return your attention to your breathing. If you suddenly realize something has carried your mind off, notice what it was, and return your attention to your breathing.

You will find this practice rapidly calms the body and mind. Very quickly you become aware of your thoughts and feelings, and by observing them and returning your attention to your breathing, you learn that you are not your thoughts and feelings, that you can detach yourself from them. In time it can lead to feelings of inner stillness, clarity, and centeredness.

Body Scan. As your mindfulness practice progresses, and you find you can maintain sustained periods of continuous attention to your breath, you may want to practice other types of mindfulness. One technique is the Body Scan. As you become relaxed, turn your attention from your breath to your body, moving in a step-by-step fashion around your body, focusing attention on each part in turn, being aware of sensations, feelings, thoughts, whatever arises into consciousness, and then returning awareness to that part of the body. Feel each region fully, breathe to that region, be in that region, and then let go, feel all the tension and fatigue in that part of the body flowing out, and finally move on to the next region.

Mindfulness can also be directed at music: use a music tape in conjunction with your MT, and as you become relaxed, turn your attention from your breath to the music, not thinking about it or listening to it judgmentally, but simply being aware of the music, moment by moment, as pure sound, hearing each note. If thoughts arise or your attention is drawn away, simply return awareness to the music.

As your practice progresses, you may want to focus your attention on the thoughts that flow through your awareness. Be aware of their content, and the emotional charge that may accompany them, but don't judge them; simply observe them as "events," and let them go. Notice what thoughts keep coming back to you, what feelings and moods; don't get drawn into thinking about your thoughts, simply notice them and let them go.

Mindfulness and enhanced perceptions. Mindfulness is a practice that can be carried beyond your MT session into the rest of your daily life. The evidence is that it can have profound effects, ranging from boosting your immune system to enhancing your mental functioning to heightening your awareness to intensifying the pleasure and the quality of your life. One series of studies done at Harvard Medical School tested a group of subjects who practiced mindfulness and a control group, and compared their abilities to perceive brief, millisecond flashes of light on a device called a tachistoscope. The mindfulness group's perceptions were extraordinarily keen: while the control group was barely able to see the flashes or separate one flash from the next, the mindfulness group was able to perceive the flashes with such clarity that they could observe the instant the flash started, the moment it reached its peak, the moment the flash began to cease, the moment the flash was gone, etc.

Such studies are a clear indication that the practice of mindfulness can have dramatic effects on brain functioning and consciousness. Fortunately for users of MTs, reports from users suggest that MTs can be a powerful adjunct to mindfulness, not only helping novices learn mindfulness, but actually increasing our powers of mindfulness and attention.

Open Focus

For over 20 years Dr. Les Fehmi has been one of the leading biofeedback researchers, with a particular interest in developing techniques to induce peak performance brain states. His research led him to believe that one key to peak brain function was whole-brain synchrony--a phenomenon in which the dominant brainwave activity throughout the whole cortex shifts into a single, coherent, in-phase rhythm.

Fehmi designed a biofeedback device that would monitor the brainwaves for synchrony, and give the user a signal when synchrony was occurring. I have written in Megabrain about this device, the Biofeedback Brainwave Synchronizer. I've also used it extensively in Megabrain Workshops, and have found it's an extraordinarily

same state of whole-brain synchrony as could be learned by using the Brainwave Synchronizer.

To do this he hooked subjects up to the Brainwave Synchronizer and tried various spoken inductions and procedures, searching for something that would produce synchrony. As he experimented, Fehmi drew on his own experiences as a Zen meditator. He felt that whole-brain synchrony was linked to attention. In modern western civilization, he observed, we value the ability to have a narrowly focused attention: the ability to concentrate on a single matter and ignore other "distractions" is highly rewarded. Unfortunately, Fehmi became convinced, this narrow focus of attention also leads directly to tension, stress, and all the stress-related ailments.

Experienced Zen meditators, on the other hand, strive to open up their field of attention to take in everything. They have what Fehmi called open focus. When he analyzed the brain state it took to produce whole-brain synchrony on his Biofeedback Brainwave Synchronizer, Fehmi discovered that it too was an open focus state. He found, as he told me, that brain synchronization "is correlated experientially with a union with experience, an 'into-it-ness.' Instead of feeling separate and narrow-focused, you tend to feel more into it--that is, unified with the experience, you are the experience--and the scope of your awareness is widened a great deal, so that you're including many more experiences at the same time. There's a whole-brain sensory integration going on, and it's as if you become less self-conscious and you function more intuitively."

Seeking a simply way to produce this widening of attention, this open focus, Fehmi developed a spoken induction that uses "objectless imagery" to guide the listener through a progressive opening of focus. When subjects were hooked up to his Brainwave Synchronizer EEG, he found that the open focus exercise produced a state of whole-brain synchrony. As he began to experiment with the open focus exercise, he also found that it was effective in learning enhancement, stress management, pain control, improved health, psychotherapy, and peak sports performance, among others.

When you listen to the basic Open Focus exercise, what you hear is a voice asking you a series of questions that begin with the words, "Can you imagine. . . ?" You begin with an opening of awareness in your head (Can you imagine the distance between your eyes . . . between your ears . . . the volume of your tongue . . . the space inside your throat) that progresses throughout your entire body, requiring a gradual opening of awareness (Can you imagine the distance between your hands, the volume of your fingers, the space between your feet, the volume of your feet), and moves you beyond the limits of your own body to an awareness of everything within you and around you.

The tape ends by having you imagine that you can enter this open focus state any time you wish, and there's no doubt that after you've gone through the exercise enough times you can learn to enter the open focus state at any time, simply by remembering what it feels like and by intentionally being there. Most importantly for the purposes of this article, the open focus state adds an extraordinary dimension to the use of any mind machine.

On the first level, you can listen to an Open Focus tape while using an MT, and I think you'll find there's a unique synergy: the MT seems to make you more "into it" (to use Fehmi's terms), more at-one with your experience, and thus more able to enter the open focus state; the guided exercise on the tape, on the other hand, seems to organize or give shape to your MT experience, giving it a direction and a dynamism that it might otherwise lack.

On the higher level, once you have learned to enter the open focus state quickly, on demand, you can begin all of your MT experiences by putting yourself into open focus and then doing whatever else it is your primary purpose, such as accelerated learning, sports performance training, self-suggestion, self-healing, etc. Being in open focus seems to make all these other techniques and practices even more effective.

ACCELERATED LEARNING

One of the most often-mentioned uses for MTs is as "superlearning" tools. Some MT manufacturers even label their products "relaxation and learning" devices. But exactly how are these tools supposed to be used for learning? There are several quite different techniques, each of which has different results and can be used for different types of learning. I will summarize these different accelerated learning techniques in this section.

But first, it's important to point out that the manufacturers' claims (and the widespread perception) that MTs are effective tools for accelerated learning are based on strong scientific evidence. I'll review a few of the most compelling studies linking MT use with increases in types of learning (for more detailed discussions, see the new, revised and updated 1992 edition of Megabrain).

At Texas A&M, a controlled study compared the learning and thinking abilities of a group that heard the lessons while relaxing in a dark room with a group that heard the same lessons while in a float tank. The groups were later tested on how much they'd learned, with the learning being evaluated on three levels of increasing difficulty: 1) simple memory or rote learning, 2) the ability to apply the learning to new situations and problems, and 3) "synthesis thinking," the ability to combine the ideas learned in new and creative ways.

The results showed that the float group learned much more than the control group on every level. Most intriguingly, as the degree of difficulty and complexity of the learning tasks increased, the superiority of the float group over the control group increased sharply. The scientist who conducted the study concluded, "There's no question that the [float] group learned more, but where they learned is the most important point. People who floated learned at a different cognitive level. The results showed that the more difficult the concept, the bigger the difference in the performance of the two groups."

In a carefully controlled study of learning, Dr. Daniel Kirsch and Richard Madden compared the learning abilities of a group that was given a computer-learning task while being stimulated with low levels of cranial electrostimulation (CES) with a group doing the same computer-learning task without receiving CES. The CES group not only learned more than the control group, but over repeated trials, when the control group's learning levels dropped off (perhaps due to boredom or fatigue), the CES group's learning rate continued to increase. Other studies using CES have shown increased learning as a result of CES, and still others have demonstrated increases in IQ (for alcoholics and subjects with brain damage).

Investigating the effects of motion devices (such as the Graham Potentializer and the SAMS Potentializer), EEG researcher Marvin Sams of Dallas has found that such devices can optimize the Neuro-Efficiency Quotient--the speed with which neurons pass information--an EEG measure that is closely correlated with IQ. Ongoing studies using light/sound machines and light/color devices (such as the Lumatron) suggest that these devices can have powerful learning-enhancement effects.

Granted the evidence that MTs can serve as excellent accelerated learning tools, how can they be used most effectively for specific learning tasks?

IN-SESSION LEARNING

The most obvious method of MT accelerated learning is presenting the material to be learned while in the midst of the MT experience. The research of Bulgarian psychiatrist and educator Georgi Lozanov (popularized as Superlearning in a book of the same name by Lynn Schroeder and Shiela Ostrander) suggests that we can tap into the brain's extraordinary powers of learning and memory by presenting the material to be learned while the learner is in an optimal learning state. The essential elements of this optimal learning state include:

--**Relaxation.** Lozanov and similar accelerated learning techniques attempt to induce relaxation in the learner by using rhythmic breathing and playing slow stately music (such as Baroque largos) intended to produce relaxation and slow brainwave activity. Interestingly, researchers studying the Lozanov technique have found that not only is deep relaxation essential to the process, but the deeper the relaxation, the more the student is able to learn.

--**Slow brainwave activity.** The various Superlearning techniques use music, breathing and relaxation to shift the brain from the beta brainwaves of ordinary waking consciousness to the slower alpha and theta brainwaves, characterized by a heightened receptivity to new information, and (as suggested by the Texas A&M study mentioned above) a heightened ability to synthesize ideas, think creatively and master difficult concepts.

The Lozanov and other similar Superlearning techniques have proven to be extremely effective in boosting learning abilities. However, a wealth of research into the effects of MTs suggests that they can be far more powerful learning boosters, in part because they simply are more effective in producing the essential elements of accelerated learning. As for relaxation, for example, as we have seen, MTs can assist the user in rapidly attaining states of relaxation far deeper than most people can reach without MTs, even though they may have extensive training and practice in relaxation techniques.

As for slow brainwave activity, most MTs are designed with the specific purpose of slowing brainwave activity into the alpha and theta ranges through such techniques as entrainment, restricted environmental stimulation, or rhythmic movement of the body.

Virtually all MTs can be used in combination with audiocassettes. Some, such as CES devices, binaural beat frequencies and flotation tanks, can be used with videocassettes as well. An ideal program for accelerated learning would be to begin use of the MT, use one of the quick relaxation techniques described above, and then, after five to ten minutes, begin presenting the material to be learned via audiocassette. One convenient way of doing this if you're working by yourself is to put the material to be learned on a cassette that begins with five to ten minutes of relaxing music and then moves on to the material to be learned.

Alpha or Theta? Since many MTs, such as light/sound devices and beat frequency tapes, permit the user to select a target brainwave frequency, the question arises as to what is the best state, or the "appropriate depth," for learning: the relaxed, receptive alpha state, or the hypersuggestible, drowsy, dreamlike twilight or theta state.

Evidence suggests that alpha is ideal for learning new information, data, facts, material that the learner wants to be fully aware of and readily available in waking consciousness. On the other hand, theta is the ideal frequency range for the uncritical acceptance of external suggestions, for bypassing defense mechanisms and resistance and presenting important self-change messages to the deeper parts of the mind. That is, to present messages having to do with attitude or behavior change to the unconscious mind, without the critical screening present in waking consciousness, it is best to get into the theta range. As Dr. Thomas Budzynski points out, "the material is being stored in the brain much the same as verbal information assimilated during anesthetic surgery, i.e., it cannot be recalled, but does influence behavior."

Thus a suggestion for those who have light/sound machines and other variable frequency devices and want to find the best program for peak learning: if the material to be learned is informational, a useful program might be to begin by entraining brainwaves from a waking EEG (anywhere from 14 to 18 Hz--experiment to find what "feels" right), ramp down slowly to a low alpha frequency (from 8 to 10 Hz, again find out what feels right), remain at this frequency for the duration of the learning tape, and then ramp back up to a final relaxed but alert frequency (from 10 to 14 Hz).

Those wishing to learn material having to do with attitude or behavior change would begin by entraining brainwaves in beta, ramp down slowly to theta (around 4 to 6 Hz seems most effective), remain at theta for the duration of the learning session, and then ramp back up to 10 to 14 Hz. For both types of learning the material seems to be better assimilated if the user spends several minutes after the learning material has been presented remaining in a relaxed alpha or theta state before ramping back up to beta, ending the session and returning to ordinary consciousness.

CES devices, of course, permit you to use a wider range of learning modalities, including reading, writing, typing, using a computer, etc. Evidence from several studies, and anecdotal reports by many CES users, suggest that when you're using the machine your memory and concentration are at a peak. Some speculate that the electrical stimulation of the brain "turns up the volume" on the reticular activating system (the brain's alertness and attention control system) and stimulates the hippocampus (a key to the formation of memories).

POST-SESSION LEARNING

Most MT users notice a feeling of mental clarity and sensory acuity that lasts many hours after a MT session. This can be explained by the continuing elevation of certain neurochemicals associated with heightened consciousness, and with the continuing presence of slow brainwave activity.

There is evidence, from tests of blood and cerebrospinal fluid, that MTs, including light/sound and CES devices, produce elevations in such neurochemicals as beta-endorphin, norepinephrine and dopamine, all of which have been linked by neuroscientists to feelings of heightened mental clarity and to the formation of memories. In addition, research indicates that the slow brainwave activity induced by the MTs can be detected many hours, even days, after an MT session. One study of floaters, for example, found that a one hour float raised theta activity sharply. But surprisingly, when the researchers did follow-up EEG tests of both the float group and a control group, they found that they could still detect higher levels of theta activity in the brains of the floaters three weeks after their float session.

There's no doubt that most MT users experience an increase in mental and physical acuity for several hours after a session. That makes this post-session period an ideal time for enhanced, high-efficiency, high-quality learning: the brain is still extremely receptive to external information, and still in a free-floating state that is conducive to imaginative and creative thinking. Many have found that it's in the hours after a session that they find themselves discovering solutions to problems or being seized with new ideas, and often notice that this is a time when reading, studying, listening to music and so on are particularly rewarding and productive.

Remember also the Texas A&M study mentioned above demonstrating that users of one type of MT (the flotation tank) not only learned more than a control group, but as the difficulty of the concepts to be learned increased, their superiority over the control group increased. And it was in the highest, most difficult type of learning--"synthesis" thinking or creativity--that the float group was most superior to the control group. Since the period after a session still partakes of many of the elements of the session itself--relaxation, mild euphoria, heightened clarity, slow brainwave activity, elevated mind-enhancing neurochemicals--it makes sense that this period is an ideal time for learning, particularly learning of the more difficult type, learning that involves opening up to new ideas and trying to understand difficult or subtle concepts. This is the time, for example, to open up that philosophy text, or to get your mind around the ideas in that book about the new physics, or to synthesize some of the concepts in that sprawling world history or comparative religions book. This is the time when the exciting Eureka! can take place.

PRE-SESSION LEARNING

There are certain types of learning, I believe, that are best accomplished when the learning takes place before the MT session. The best example of this is one I cited in Megabrain. One floater, a flower-farmer from Long Island who was trying to learn Dutch (for his flower-buying trips to Holland), told me that he had recently gone for a float immediately after his Dutch lesson. He didn't get time in the next few days to review the lesson or to study at all, but when he went in for his next lesson, he had virtually total recall of the last lesson, and his instructor remarked that he must have

studied very hard! He felt that somehow the float had subconsciously solidified the information in his brain. Was that possible?

Shortly after that I was reading some reports of sensory-restriction research and read of a study in which researchers read a lengthy passage from Tolstoy's War and Peace to two groups of subjects. They didn't tell the subjects to remember this passage, didn't even say why they were reading the passage. Then the control group stayed in an open room while the experimental group went into a sensory-restriction chamber. After 24 hours the groups were retested. The researchers found that while there was a steep drop in retention of the Tolstoy passage for the control group, there was none for the experimental subjects. In fact, the sensory-deprivation group remembered more after 24 hours than at first! In interviewing the subjects, the researchers found that none of them had expected a retest on that material, and only one had reported that he had even thought about the Tolstoy passage during the interim. The researchers dubbed this the "reminiscence effect." Somehow, simply being in a state of sensory restriction caused an increase in memory for something that happened before the sensory restriction.

How to explain this? Scientists now agree that there are at least two different types of memory, generally known as short-term memory (STM) and long-term memory (LTM). STM deals with information we need to hold in our minds temporarily, like a phone number, but which can then be quickly forgotten. On the other hand, there's another type of information that can be held in consciousness just as fleetingly as, say, a telephone number, but can become so permanent that it can be recalled with absolute clarity a lifetime later, such as the memory of some brief event observed momentarily by a child, but remembered clearly 90 years later. This is information that has passed into LTM.

Studies using drugs that inhibit protein synthesis in the brain have proved that STM consists of short-acting electrochemical changes in the brain, while protein synthesis in the brain (i.e. actual physical growth of axons or dendrites, increase in number of glia, increase in number and richness of dendritic connections) is necessary for LTM. When drugs that inhibit protein synthesis in the brain are given soon after subjects learn something, the information is forgotten--that is, it never makes it into LTM. However, when the drugs that inhibit protein synthesis are given more than an hour (in some studies two hours) after the learning, the information is not forgotten, which means it has already become a part of LTM. In other words, information passes into LTM--protein-synthesis takes place in the brain--during the hour or two after the information is received.

Other studies by psychologists have demonstrated a similar sort of disrupting effect on learning by interposing other events or information. That is, when subjects are given something to learn, and then, within an hour (i.e. before protein synthesis has taken place in the brain and the information has passed into LTM) something else

happens--a vivid event, other types of information to be learned--the original material is not remembered as well.

To return to the "reminiscence effect," we can surmise that this effect results from the fact that after being given the information, the sensory-restriction group was placed in an environment that cut them off from new sensory input, from things that would compete with the information for long-term memory. Thus, the original information, in this case the passage from Tolstoy, was given enough time for protein synthesis to take place, enough time for the information to "solidify" or become a part of LTM.

Clearly MT users can put this reminiscence effect to good use as a part of their MT accelerated learning program. Whatever information they want to put into their long-term memory should be studied prior to their MT session (or should be presented via video or audio tapes during the early part of the session). The session that follows--ideally at least an hour--should allow time for the necessary protein synthesis to occur in the brain to permit the information to become consolidated and committed to long-term memory.

This pre-session learning, I believe, is ideal for certain types of learning, specifically rote-learning types of information: vocabulary words and tenses, facts, data, details. The kind of material you want to feed into your own data banks. On the other hand, this is probably not the best time for complex or synthesis types of learning. That kind of subtle learning dependent on synthesizing ideas and information from many different sources probably does not get directly translated to LTM very effectively, since it's largely dependent on creating new information from information that already exists in LTM. The ideal time for this type of synthesis or creative learning, for understanding difficult concepts and combining these concepts in original and imaginative ways--to come up with new answers to problems, to create new knowledge--is, as suggested above, during the session itself or in the post-session period.

There's no doubt MTs can be a revolutionary instructional tool, with students of all fields of study using MTs as a means of rapidly absorbing large amounts of information and gaining insight into difficult concepts. But where MTs can be of greatest value, I suspect, is on the cutting edge of knowledge--in solving problems, in creating new wisdom and understanding. For it the MT's learning-enhancement effect increases as the difficulty and complexity of the material being learned increases (as the Texas A&M float tank study suggests), then it must be the scholars, the original thinkers, the creators, the finest minds, dealing with the newest and most difficult information and concepts, who will profit most.

BEYOND RELAXATION: SELF-HYPNOSIS AND SELF-SUGGESTION

One of the most direct and powerful ways to use the MT experience to effect changes in your attitudes and behavior is by using autosuggestion while you are in a hypersuggestible state. This is just another way of saying self-hypnosis.

As noted above, one of the characteristics of the theta or twilight state is hypersuggestibility (i.e. suggestions or statements enter directly into your brain or unconscious mind, and are accepted as being true, bypassing the mental filters and critical defense mechanisms by which we usually judge such statements). In theta, as Budzynski points out, our mind has the property of "uncritical acceptance of verbal material, or almost any material it can process." Our subjective experience of theta, however, is one of a drowsy, largely unconscious state--as soon as we become conscious, or begin actively paying attention to something, we pop out of theta, and are no longer hypersuggestible, since our critical screening defenses are once again operating. For that reason, the best way of profiting from the hypersuggestibility of theta is by using audiotaped suggestions (or suggestions spoken by someone else). That way we can stay in theta and let the suggestions wash over us without paying any attention to the suggestions or the process.

Self-hypnosis, on the other hand, permits us to enter a hypersuggestible state and to actively offer ourselves suggestions for personal action and change even while monitoring ourselves to be certain we remain in a hypersuggestible state and while remaining in conscious control of the process. Self-hypnosis is not a difficult or arcane procedure. It is quite simple, and can be easily learned from any of the popular "how to" books available. It consists mainly of three elements: deep relaxation, focused attention, and suggestions.

We know that MTs are unprecedented tools for producing states of profound relaxation. As for focused attention, I've suggested above in the sections on Mindfulness and Open Focus that MTs, in part by effectively blocking out external stimuli, provide an unparalleled environment for calming, clarifying and focusing the mind. Some research with MTs and hypnosis has been done, and as you might expect, it shows that people using MTs go into a deeper state of hypnosis than they do when hypnotized without MTs. In addition, there's evidence that MTs significantly increase hypnotizability--that is, people who ordinarily can't be hypnotized can go into deep hypnosis when using an MT. One study of flotation, for example, concluded that some of the subjects who initially were virtually un hypnotizable "became hypnotic virtuosos" in the tank.

The first step toward self-hypnosis is called induction. Without MTs, this process can be lengthy, but much of the time is spent in becoming progressively more deeply relaxed and mentally focused. However, with MTs, this process can be speeded up enormously, simply by using one of the relaxation techniques described above, and

combining it with a focusing of attention on the induction procedure, using the focusing skills gained from your practice of mindfulness or Open Focus.

Relaxed and focused, you can proceed with your induction by using some sort of sequence that takes you progressively deeper into hypnosis. For example, you might count backwards from 100 to 0, combining your count with suggestions to yourself that you are becoming more suggestible, more focused and more relaxed with each count, and that by the time you reach zero, you will be in a deep, relaxed, focused, hypersuggestible trance. (There are countless ways of moving into trance; examples include visualizing yourself walking down stairs or moving down a series of escalators, each one taking you deeper into hypnosis; floating downward through clear tropical waters; somersaulting backwards through space, with each somersault taking you deeper into trance, etc.)

Once you are deeply relaxed and focused, you can offer yourself suggestions for personal change. A few general principles that will enhance the effectiveness of suggestion include:

Suspend judgment (try to feel that the suggestion is true, experience it as real in your imagination);

Be positive (positive suggestions seem to have more force than negative ones; instead of "I am not afraid . . ." you might say, "I am bold . . ." or "I reject fear . . .");

Be concrete and specific (brain research indicates that right hemisphere speech comprehension is simple and concrete, that that it doesn't process abstract material well, if at all);

Use many senses (don't simply use a verbal suggestion, but visualize--actually see yourself successfully performing the activity--and, where appropriate, smell and feel the activity);

Repeat (repetition is perhaps the most widely used suggestion technique, used by everyone from political leaders to TV commercials; repeat your suggestion several times using various wordings and images);

Use rhythm (suggestions are more effective when stated rhythmically, and linked to your own rhythms of breath and voice; researchers have found that voice intonation and rhythm are processed through the right hemisphere and can have greater emotional impact--compare the powerful rhythms and changing voice intonations of gospel preachers with the monotonous, unrhythmic speech patterns of a Henry Kissinger).

While in trance you should capitalize on your hypersuggestibility to implant suggestions that will help you reenter the hypnotic state quickly and easily. Many like to use a signal or cue word: e.g. you might suggest to yourself that when you are in a relaxed state and speak the word "shazam" to yourself, it is a signal for you to go directly into a deep hypnotic trance, relaxed, focused and hypersuggestible.

Ideomotor Signals. While in a trance state one has more direct access to hidden or unconscious material. One effective way of learning information that is hidden away in your unconscious mind is the use of ideomotor finger signals: suggest to yourself that you will ask yourself questions, that you will respond to those questions truthfully, and that if the answer to a question is "yes" you will respond by moving your right forefinger; if the answer is "no," you will move your left forefinger. This is a valuable technique for everything from uncovering past (and long suppressed) traumas to making decisions to remembering where you put the car keys.

Anchoring

One of the most remarkable features of being in a trance state is that you can plant suggestions so that they take effect at some later point, when you're no longer in trance. We're all familiar with the concept of post-hypnotic suggestion: the hypnotist plants the suggestion in the hypnotized subject that when the subject receives a certain signal or stimulus, a whistle, for example, the subject will then feel compelled to tie his shoelaces. In recent years a variation of this technique has been developed and refined that permits individuals in trance to give themselves a trigger mechanism that later, when it's employed, can automatically activate specific desired behaviors or states. The device is called an anchor.

An anchor is basically a stimulus/response mechanism: Pavlov conditioned his dogs to salivate at the sound of a bell by teaching them to associate the bell with food. Anchors are created whenever we're in a heightened or intense mental state, and we receive a specific signal or stimulus at the peak of that state: at that point a neurological link between the stimulus and the state is created. Pavlov's dogs were in a heightened state (hunger) when they were given food, and at the peak of that state the bell rang; in time the bell alone was enough to cause the dogs to salivate. In a similar way hundreds of Oldies but Goodies trigger a response in me: I was in a heightened state (sexual arousal) in the back seat of a car, for example, when the Fleetwoods came on the radio playing "Mr. Blue," and now thirty years later when I hear the song it triggers a Pavlovian response in me--the song is an anchor for that intense psychophysiological state.

Anchors can be created under virtually any circumstances--we do it all the time, when we unconsciously link a specific slogan with a specific product ("Just Do It"), or a signal with a feeling-state (a Christmas tree), or a signal with an action (the stop light turns red). Athletes anchor themselves constantly: the batter tugs his shirtsleeves just so, pounds the bat twice in exactly the same spot, pulls the bill of his cap once, and only then, having anchored a feeling of confidence, is he ready to swing at the pitch. However, we now know that the more intense or heightened our mental state, the more rapidly and powerfully are we going to create anchors, and the longer will those anchors last. Mind machines, as much evidence indicates, are highly effective tools for creating intense and heightened mental states. In the self-hypnotic trance we enter a heightened and intensified condition called hypersuggestibility. The combination of these two, self-hypnosis and mind machines, is one of the most extraordinarily effective and rapid ways of creating powerful anchors that has yet been discovered.

How do you create anchors? The first step is to get into the state you wish to anchor. This is where self-hypnosis is so valuable. Let's say you tend to get flustered and slow-witted when in the midst of staff meetings, and want to anchor a feeling of cool-headedness and verbal ease, fluency and control. You put on your MT, enter your hypnotic trance, and when in a hypersuggestible state, you visualize yourself at a staff meeting, seeing all your associates, creating the meeting room, hearing the sounds, smelling the smells, feeling your chair, all in concrete detail; and you experience yourself as being fluent, cool-headed, witty and controlled. You experience this as intensely and powerfully as possible. Then, at the peak of this entire experience, when you are fully and intensely experiencing the exhilaration, the confidence, the sensations of mastery . . . at that point, create your anchor.

The anchor may be any distinctive stimulus. You might, for example, place your thumb against the first knuckle of your right forefinger. Evidence indicates that the best anchors are those that combine several different sensory modalities--sound, image, sensation, etc. So you might want to create an anchor that combines the thumb against right forefinger with a spoken word (something like "Speak Now"); perhaps you might even want to add an image to the anchor (perhaps a bright image of a sun shining).

Once created, the anchor serves as a sort of post-hypnotic suggestion. The next staff meeting when you feel the need to speak you will then activate your anchor. You will find yourself experiencing the feelings of verbal mastery and coolheadedness that you experienced in your trance state: these feelings are neurologically linked to the anchor.

If you create your anchor when you are in a highly focused and intense state, one time will be enough to produce a strong response when you activate it later. However, in all cases repetition serves to strengthen an anchor. By enabling you to quickly, consistently and reliably return to your deeply relaxed, focused state, MTs are invaluable for the creation of strong and effective anchors.

Having intentionally created one anchor you can then move on toward the creation of an entire repertoire of anchors--one for relaxation, one for a sudden burst of physical energy, one for pleasure, one for intense concentration, one for creativity, one for self-healing, one for pain relief, one for confidence, etc. (In fact Robert Monroe, creator of the Hemi-Synctm tapes, has devised a tape series that in effect helps you create a multitude of anchors. He has called the series H-Plus (Human Plus), A Program of Planned Self-Evolution. Each of the more than 50 tapes presents the listener with a new anchor [what Monroe calls an "action signal"], ranging from anchors to enhance memory to anchors for enhanced circulation to the brain. I recommend this series highly, and have found it works well when used in combination with other MTs.) In any case, your ability to create and use anchors is limited only by your imagination.

SELF-REGULATION AND EXPLORATION

Once you have learned a few of the simple techniques outlined above, a whole new universe of ways to use your MT opens, and your MT use becomes not simply a way to relax and passively entertain and enjoy yourself, but a versatile tool for actively transforming your life. In the sections below I will briefly touch on a few of the ways you can use your MT for self-exploration, problem-solving and personal growth.

PAIN RELIEF

There's abundant research showing that virtually all type of MTs--float tanks, CES, light/sound, motion systems, binaural beats at certain frequencies--are effective in alleviating pain. Evidence indicates that, among other pain-alleviating effects, many of these MTs stimulate the release of beta-endorphins, with their opiate-like pain reduction properties. However, there are ways of using MTs to increase and accelerate their pain-reduction power.

Body-Scan. Perhaps the best way to start working on your pain is to use the mindfulness body-scan technique mentioned above. Use the body-scan to focus on your pain, and to become aware of how it effects the rest of your body and your life. This mindful body-scan may provide you with information about how you can alleviate your pain, and how you might be able to change your style of living or your activities to alleviate the pain. For example, someone with chronic headaches might

find on an attentive body-scan that they have tension in their shoulders or neck, and that by loosening that tension they can eliminate their headaches. Similarly, by using your MT session to conduct a daily body-scan, you can be aware of the increases and decreases in your pain, and begin to associate levels of pain with your daily activities: you might find, for example, that your lower back pain peaks the day after you spend long hours completing a report on your computer, something you've never noticed before, and then take action to change your physical posture at the computer.

Breathing. Having completed a body-scan, you might want to then use one of the breathing techniques outlined above and visualize each breath as a white light that eliminates pain--as you inhale, the pain-relieving light flows directly to the source of your pain, where it creates a glowing ball of light. With each inhalation, the ball of light grows in intensity, with each exhalation, you visualize yourself exhaling pain. In a very short time you'll find the pain diminishing and disappearing.

Self-hypnosis. Or, after completing your body-scan, you may want to do a self-hypnosis induction. Having reached a state of hypersuggestibility, you may suggest to yourself that your pain is gone--this suggestion can be strengthened by using

repeated presentation of the counter-script, preferably while in a deeply relaxed or hypnotic state. The L/S [light/sound machine] is used both to facilitate the uncovering and the rescripting itself." Budzynski notes that "the L/S, during the uncovering, can help produce this deeply relaxed state and, possibly, entrain the EEG pattern that was dominant at the time of the trauma." This refers to the fact that light/sound machines can help users to enter the theta state--the brainwave state that is predominant during most of the childhood years, when the original scripts are laid down. "During the rescription phase," Budzynski continues, "the L/S again helps produce the deep relaxation (or facilitates the hypnosis) as the positive outcome scene is repeatedly imagined."

Uncovering. The first step toward rescripting is uncovering. After putting on the MT, relaxing and moving into a deep theta state (or entering a self-hypnotic trance), you may find suppressed memories surfacing spontaneously in the form of visual flashbacks or images. You may want to proceed with a conscious process of uncovering by using ideomotor finger signals. You may ask if the problems you want to deal with are the result of a single traumatic experience. If so, you may continue using your ideomotor signals to narrow in on the date (how old were you when the experience occurred), the location, etc. You may combine this with suggestions that you can visualize the experience. Dr. Budzynski points out that "Uncovering is a very sensitive and potentially anxiety-evoking process" and recommends it be attempted only by trained mental health professionals. However, you may feel confident that you can confront these past experiences; and you may provide an additional safeguard by having another ideomotor finger signal (such as a movement of the thumb) that indicates to you, "I don't want to deal with this material at this time," and is a signal for you not to delve more deeply until a later time.

Rescripting. Once the harmful script has been uncovered, the next step is to develop a counter-script. Budzynski mentions several types of rescription: "The client can change the way he or she was thinking in the situation (cognition), or the external behavior (behavior), or the words that were said (verbal), or any combination of the three. Usually, a change in external or verbal behavior will produce a change in the other person's behavior and therefore, a different, hopefully more adaptive, outcome."

While in your deeply relaxed state, you should recreate the original traumatic experience, using as much concrete detail and as many sensory modalities as possible. However, as the scene is recreated, you should alter it in such a way that it produces a positive outcome. Budzynski describes a case of a woman who had an inexplicable pain in her arms who, upon going into hypnosis and using ideomotor signals, revealed that while she had been hospitalized and unconscious after a fall from a horse, and while a nurse was inserting an IV in her arm, a visiting relative remarked, "Gee, that looks like it would sting!" The woman's unconscious mind, in an altered state, apparently took this as a command. "The rescription was simple," says

Budzynski, "an old but wise 'Dr. Welby' type physician was introduced to the scene. When the triggering remark was made, the wise physician said, 'Oh sure it stings for a few seconds, but then it feels as good as new.' When the client awakened, the pain was gone!"

Like anchoring, rescripting gains in power with repetition, and the more vivid the rescripted experience (engaging several senses and with concrete details) the more power it has to counter the old script.

THE SWISH

A slightly different rescripting technique is widely used by practitioners of Neuro-Linguistic Programming (NLP), and is called the Swish pattern. NLP teaches you how to do a Swish pattern in ordinary consciousness. However, I've found that using this (and other NLP techniques) in the midst of an MT experience boosts it to a higher order of effectiveness. I have used this technique in many of my Megabrain Workshops, and have found that it can produce rapid and dramatic effects. As Anthony Robbins writes, "A swish pattern takes internal representations [i.e. scripts] that normally produce states of unresourcefulness and causes them to automatically trigger new internal representations [i.e. counterscripts] that put you in the resourceful states you desire."

Having uncovered, for example, the script that causes you to overeat, you create a script that would counter the overeating script, and establish a mental link between the two scripts, so that each time you think of overeating, the counterscript would be triggered.

Once you have entered the MT experience and taken yourself to a deeply relaxed, theta or self-hypnotized state, the first step is to identify the behavior you want to change. Having done so, the next step is to create a visual image of it--a simple but vivid scene or "picture." The next step is to create a second picture--a representation of yourself as you would be if you had made the desired change in your behavior.

The next step is to "swish" these two pictures so that the unwanted behavior automatically triggers the new behavior. Anthony Robbins describes this procedure: "Start by making a big bright picture of the behavior you want to change. Then, in the bottom of the right-hand corner of that picture, make a small dark picture of the way you want to be. Now take that small picture, and in less than one second, have it grow in size and brightness and literally burst through the picture of the behavior you no longer desire. As you do this process, say the word 'woosh' with all the excitement and enthusiasm you can." Having done this, open your eyes for a split second to break the state, and then repeat.

The key to the swish is speed and repetition. Once you're in your theta state, or your hypnotic trance, perform the swish pattern over and over, taking only a second or so for each repetition. If you experience this swish pattern intensely enough, you should find that whenever you begin to act out your old, harmful script, you will immediately find yourself switching to your new script.

FOCUSING

Another learning/uncovering, mindfulness, and problem solving technique that is highly effective when used in combination with MTs is called Focusing. Developed by University of Chicago psychologist Eugene Gendlin, focusing enables practitioners to manipulate their brains in such a way that they reach new insights that lead to dramatic and beneficial behavioral changes.

In focusing, one attempts to get a "felt sense" of the problem, and through a series of focusing steps that turn attention away from the external environment and increase awareness of subtle emotional states and physical sensations, one reaches a point at which one experiences a "felt shift," an experience marked by a sudden release of tension, a feeling of deep physical relief, a sense that the problem or unclear feeling has been understood.

We've all experienced focusing and felt shifts. For example: you leave your house and soon have an uneasy feeling you've forgotten something. You "focus," trying to identify the problem: have you left the gas on? the water running? In each case you know that's not the answer because you feel no inward release. Finally you get the correct answer--you forgot your briefcase--and with a "felt shift," a feeling of understanding, release from tension, and satisfaction sweeps over your body. Aha!

One EEG researcher was curious to find out what happens to brainwave activity when one of these "felt shifts" occurs. Making a computer analysis of over 8,000 EEG readings, he discovered that just preceding the moment the felt shift occurs, there were peaks of alpha and theta activity.

If alpha and theta activity accompany the focusing process, it's likely that by actively inducing alpha and theta activity by using an MT, we can induce or facilitate the focusing process.

RESOURCES

To learn more about some of the techniques and procedures I've touched on above, you might want to consult some of the following books and tapes.

Relaxation. A number of relaxation techniques are included in my work The Book of Floating (Morrow/Quill, 1984). See also The Relaxation Response (Morrow, 1975) and The Mind/Body Effect (Simon & Schuster, 1979) by Herbert Benson, M.D.; also Minding the Body, Mending the Mind, by Joan Borysenko (Bantam, 1988), and The Fine Arts of Relaxation, Concentration and Meditation, by Joel Levey (Wisdom Publications, 1987).

Mindfulness. Perhaps the best introduction to mindfulness meditation is Full Catastrophe Living, by Jon Kabat-Zinn, Ph.D. (Delacorte, 1990). Other excellent works are Seeking the Heart of Wisdom: The Path of Insight Meditation, by Joseph Goldstein and Jack Kornfeld (Shambala, 1987), Stephen Levine's A Gradual Awakening (Anchor/Doubleday, 1979), and Shunryu Suzuki's Zen Mind, Beginner's Mind (Weatherhill, 1986).

Open Focus. The best introduction to Open Focus is The Open Focus Handbook by George Fritz, Ed.D. and Les Fehmi, Ph.D., or the Open Focus Audiotapes, available in a six-tape or twelve-tape series, leading from a basic introduction through advanced tapes for pain control and sports training.

Accelerated Learning. A fine overview of accelerated learning techniques is Superlearning by Sheila Ostrander and Lynn Schroeder (Delacorte, 1979) and the more recent Super-Memory: The Revolution, (Caroll & Graf, 1991) which includes information about the use of brain machines for enhanced mental functioning.

Self-Hypnosis. An introduction to self-hypnosis is included in The Book of Floating (William Morrow/Quill, 1984), which I wrote before writing Megabrain. For more, see Leslie LeCron, Self-Hypnotism (Prentice-Hall, 1964). A superb and consciousness-transforming work that includes much valuable information about self-hypnosis, including sample induction and self-suggestion scripts, is The Psychobiology of Mind-Body Healing by Ernest Rossi (Norton, 1986). See also The Answer Within: A Clinical Framework of Ericksonian Hypnotherapy, by Lankton and Lankton (Bruner/Mazel, 1983).

Anchoring and the Swish Pattern. For a good introduction to these and other NLP techniques, see Unlimited Power by Anthony Robbins (Fawcett, 1986). The "H-Plus" tape series from the Monroe Institute of Applied Science provides numerous "action signals" (i.e. anchors), delivered in combination with binaural beat frequencies and a

spoken induction that guides you into a hyper-suggestible state, delivers the action signal, then brings you back to waking consciousness.

Rescripting. See Thomas Budzynski's excellent articles, particularly "Brain lateralization and rescripting," Somatics, 3, 1-10 (1981), and "Clinical applications of no-drug-induced states." In B. Wolman and M. Ullman (Eds.) Handbook of States of Consciousness (Van Nostrand-Reinhold, 1986). A wonderful classic is Programming and Metaprogramming in the Human Biocomputer by John C. Lilly (Julian, 1972). See also the valuable Software for the Mind: How to Program Your Mind for Optimum Health and Performance by Emmett Miller (Celestial Arts, 1987).

Focusing. See Focusing by Eugene T. Gendlin, Ph.D. (Everest, 1978).

Visualization. An excellent introduction is Seeing with the Mind's Eye, by Mike Samuels, M.D. and Nancy Samuels (Random House, 1975). See also Creative Visualization by Shakti Gawain (b???????) for helpful guided visualization and self-suggestion techniques and scripts.