

ACCESSING ALTERNITY:

Neurotechnology and Alternate States of Consciousness

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DEDICATED TO THE PIONEERS OF ALTERNITY

*Aldous Huxley . . . who intellectualized it,
Alan Watts . . . who spiritualized it,
Timothy Leary . . . who liberated it,
John Lilly . . . who expanded and named it*

OFFERING

This work stands, hopefully, as a continuum of the quest for knowledge about our alternate states. It stands as a synthesis of much great work that has preceded it and my only wish is that it will provide the stimulus for its readers to go directly to the sources quoted or cited so that they may grow as much from those works as I have.

An inestimable debt is owed, therefore, to the individuals to whom this synthesis is dedicated—Aldous Huxley, Alan Watts, Timothy Leary, and John Lilly—as well as to all those authors whose works are included here. My great thanks go out to Robert Austin, whose support of my endeavors always seemed far beyond their true value.

Please read this work as you would participate in a conversation: openly, and with a willingness to allow my own tendencies and personality to show through. The half of the conversation that you will hold in your hands is open to your interpretation and investigation. It is my transmission of ideas that others have given me, and those I have discussed and pondered for several years. It is a living document of my own quest, and its future.

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INTRODUCTION: BECOMING THE BIONIC ANGEL

Better Brains Through Electricity

Interest in "brain entrainment" devices has grown mightily since the 1986 publication of Michael Hutchison's classic text *Megabrain*. This once unknown field has gained much public attention through the pages of the new age press, in publications such as *Omni*, *The New York Times*, *Psychology Today*, and even as discussed on nationally televised news shows. Celebrities, consciousness researchers, New Agers, and a whole host of other interested people have begun making trips to their local "brain salons," or actually purchasing their own brain machines. And, in addition to the machines themselves, a whole host of peripheral accessories—subliminal tapes, hypno-peripheral processing tapes, meditation and induction tapes, entrainment programs for personal computers, etc.—have developed around this rapidly advancing technology. It seems as though cyber-technology is combining with contemporary psychology to arrive at a point that interacts with areas of existence that are outside our normal realms of experience.

Although appearing to be revolutionary, the roots of this new technology actually lie in much older attempts to affect consciousness. The flashing LEDs of a light and sound machine can be traced back to the ancient practice of staring into a fire in order to induce trance. Contemporary entrainment sound tapes undoubtedly have their roots in ritual chanting and the use of shamanistic wind instruments. For millennia people have used available technology to enter alternate states of consciousness. This current era of neurotechnology was probably ushered in through the early experiments that were done in biofeedback. And the fruits of biofeedback resulted in the labors of some very special consciousness researchers, like Jean Houston, co-author with her husband, Robert Masters, of *The Varieties of the Psychedelic Experience*. Their text continues to be, more than twenty years after its initial publication, the seminal work in understanding the psychedelic experience. Based on the model provided by William James' *The Varieties of Religious Experience*, the Houston-Masters text traces the stages, both experiential and psychological, of an LSD trip.

Among the first to be legally permitted to conduct psychedelic research, Jean and Robert created the Foundation for Mind Research, with their emphasis eventually turning to non-drug means of altering consciousness. This decision had less to do with the eventual government ban against psychedelic research than it did the discovery that the same states experienced within the psychedelic session could be reproduced by non-drug means.

The psychedelic experience, while an extremely potent form of consciousness alteration, is really just another in that long line of vehicles that humans have used for this purpose. What made the psychedelic experience so effective, however, was the immediacy and degree of its results. Subjects were able to experience in one session what it might take a meditator a lifetime to achieve. This did not mean that the former is any more significant than the latter. What it did show, however, was that there were quicker ways of accessing states that were once thought to take years to accomplish. For within the psychedelic session one could both encounter and understand normally unique slices of the type of consciousness alteration that would take great time and

research to uncover with other methods of induction. The research that has been done with psychedelics, therefore, provided a solid ground upon which to examine all the other methods whose commonality with the psychedelic experience is lacking only in terms of length of time necessary to achieve these ends.

For this reason portions of this work will be devoted to comparing the psychedelic experience with these other techniques and with brain entrainment in particular. It bears mentioning, however, that there is a down side of the psychedelic experience that has little to do with the usual psychic critiques. Many drugs, most noticeably marijuana, seem to have a tendency to block production of certain brain wave states. The most important of these is the alpha state. So while some drugs of the psychedelic family may provide unique insights into our consciousness, they must be approached with a skeptical eye.

Although Houston's work began with psychedelics, and she is now known for her work with myth and ritual, it is often forgotten that she was also a technological pioneer. As part of the process of shifting from psychedelic to non-drug induced states, Houston created one of the first electronic brain entrainment devices: the AVE (an abbreviation for Audio-Visual Environment, as well as the salutation that the angel Gabriel gave to the Virgin Mary). The AVE was the first device to employ visual and auditory stimuli as a means of consciousness alteration. Not unlike many of today's audio-visual devices the AVE consisted of a wrap-around screen and headphones to bombard the sense with these two stimuli. Since the AVE there have been remarkable advances in similar technology.

Contemporary science has made the possibility of a bionic physical body an acceptable possibility, so it should be no great surprise that these advances should find that same technology expanding to include the less tangible areas of our being, like our consciousness. These regions, territories that were hitherto thought to be solely the province of religion or psychology, are now within the grasp and manipulation of technological means. "Better minds through electricity" is not such a farfetched idea anymore, and developing our knowledge of this field may allow us to more fully utilize these uncharted areas.

Recent theoretical developments, such as the still-emerging field of cognitive science, have moved ahead with the concepts of cybertechnology. First addressed by Norbert Wiener in 1943, these ideas saw the central nervous system as an integrated whole, relating this idea to the field of computer science. As Howard Gardner has pointed out, cognitive science creates "an analogy [between computers and] . . . the human system and to human thought processes. . . . The human brain (or 'bodily states') corresponded to the computational hardware; patterns of thinking or problem solving ('mental states') could be described entirely separately from the particular constitution of the human nervous system" (Gardner: 1985).

When one is presented with this type of holistic view of cognition, and links to our own contemporary technological metaphors, it is easy to extend them into consciousness and the recent discoveries of neurobiology. There are myriad new works providing inroads into the understanding of our neural and creative human processes, as well as their link with all of nature and the cosmos.

How does this new understanding connect with our consciousness, and what exactly is the potential for entering alternate states of consciousness with technology? Our everyday thought processes cause the approximately ten to twenty billion cells within our brain to produce electrical signals when firing together. These signals, detectable by EEG testing as specific frequency ranges, seem to vary from one state of consciousness to another. The products of the new neuro-technology

appear to make it possible to "tune" the brain to these various alternate frequencies, and in turn achieve new psychological states.

When one "tunes" these frequencies to a slower rate, our rationalized thought processes and the filtering action of the central nervous system are altered, causing the brain to slip into a deeper level of activity. On the other hand, when one tunes the frequencies to a faster, higher range of brain wave activity, one can expect a highly stimulating effect.

Flexing the brain's "muscles" in this way allows new pathways in the nervous system to be opened, and the resulting effect is often a noticeable improvement in one's mental attitudes as well as his/her physical faculties. Since the brain is essentially being exercised, as one would work out in a gym, it can also mean that the nervous system can become more stable and acute: an instrument working at maximum capacity.

My own interest in this technology was an outgrowth of several aspects of my personal and professional life. A child of the 1960s I was, as were most of my friends, involved in whatever came along that promised expanded awareness. The psychedelic experience was not a "kick" to us, but rather a chance to catch a glimpse of the ineffable: a means by which we hoped to find our own personal God-head.

Some researchers-cum psychedelic proselytizers such as Dr. Timothy Leary provided a valuable service to those of us who were acting as inner astronauts by stressing the need for the proper set and setting for the LSD experience. They also provided important guide books to this uncharted region through the publication of works like *The Psychedelic Experience*, a text that utilized the *Tibetan Book of the Dead* as a means of providing a guide to the various stages of an LSD trip. In spite of these good intentions, much of this experience was so intense, profound, and uncharted, that it often proved to be a case of just too much too soon.

My interest in this area did not wane after I left the arena of psychedelic experimentation. While working at a behavior modification clinic I had the opportunity to attend classes at Princeton's Neuro-Psychiatric Institute. The chance to acquire an understanding of the processes behind our common consensus state of consciousness was an opportunity that I could not overlook. This experience served to refuel my interest in this area. More recently, as a member of the Association for Humanistic Psychology I have continued expressing and working with my deep concern over our interpretation and utilization of conscious states, both "normal" and "altered." As a byproduct of this, I helped found the School for Transformational Ritual, a course that helped individuals find new meaning in and through their own personal mythologies, by the creation of new rituals and the reenactment of traditional rituals such as the Rites of Eleusis. I also returned to earlier interests and spent several years conducting academic research into psychedelics, both modern and traditional: participating in a Navaho peyote ceremony in the American west and traveling to Mexico to experience a sacred mushroom rite.

These two unique undertakings allowed me to acquire a deep respect for these ancient practices, while at the same time scratching the surface of understanding traditional psychopharmacology. Interest in these areas, a search for the more scientifically accessible "reality" behind these phenomenal states, led me into the field of biogenetics, and an investigation into the brain/myth complex, which will be discussed in more detail in a later section of this work.

As a folklorist, and lover of the great myths, I have long been involved in work that either directly or indirectly dealt the ideas and interpretation of consciousness. And, while doing graduate work as an ethnomusicologist, I became intrigued with the ritual use of sound as a means of

accessing alternate states. Throughout all of my experiences, however, one common theme, one search seemed to predominate: the search for a proper technology with which to access realms of consciousness. I was trained and practiced in identifying other states and could successfully appraise and advise the people who participated in the School for Transformational Ritual. I gave "good ritual," as it were.

While I was doing much of this work I was also completing my Ph.D., a process that took me through many mental crises. Through all of this work I seemed to be unable, or unwilling, to apply the ideas and practices I knew to be effective to my own life. In spite of an understanding of and employment in consciousness research I was suffering because I was letting my own consciousness do me in.

Plagued by a frequently overwrought nervous system, I suffered from a digestive system that was often out of sorts, other somatic symptoms of stress, and a weakened immunology: I was frequently plagued by colds and sore throats. More often than not I felt like I was fighting a battle with my body, until one day it dawned on me that it wasn't my body, but my mind. Sometimes we can't see the forest for the trees, and my own oversight seems to be a clear indication of this sad state of affairs that is probably indicative of much of what sociologists would call our modern alienation from our own experiences and senses.

The result of this new self-awareness was a turn toward a practice that I had once enjoyed, but left as my life became busier: yoga. Only a few sessions at a local yoga studio and I was once again limber enough to accomplish most of the yogic asanas. Invariably my body would feel relaxed after these sessions and my mind would seem as if it were in a state of bliss. The more adept I became at this practice, the better I felt. My digestive disorders cleared up, I gained weight, felt more relaxed, and stopped getting colds. My joy at this development was overshadowed only at my pleasure that the process offered such great rewards. My previous experience and training had shown me the efficacy of the techniques associated with yoga, but the directness of my own healing was a new and intriguing event. Unfortunately, this practice required a certain amount of dedication to continue producing results, a dedication not easily fit into a busy schedule. It was amazing to me that in the several thousand years that had transpired since yogic doctrine was established we just hadn't come up with anything that was more akin to our Western lifestyle. Biofeedback came close, but that technology often seemed cumbersome. What I was looking for was a move from these ancient technologies to modern ones. From meditation and native psychopharmacology to what? I wanted to move from building karma to building the bionic angel. My answer came in the form of brain entrainment.

Unfortunately, as I entered the new world this technology had to offer, I quickly discovered that, save for Hutchison's book, there were few readily accessible sources of hard data on the workings of brain entrainment machines. And although Hutchison's work is seminal, there have been so many advances since its publication, that much of the information is either obsolete or incomplete. For instance, when *Megabrain* was written, the only light and sound machine available was Denis Gorges' Synchro-Energizer, a costly and not particularly user-friendly device. Since that time, however, more than a dozen light and sound machines with varying parameters and efficacy have reached the marketplace at affordable prices: {the Mind's Eye Plus, Mind's Eye Courier, Mind's Eye Synergizer, Voyager, MasterMind, MC 2, Alpha Pacer Plus, Synchro-Mind Expander, D.A.V.I.D. and D.A.V.I.D. Jr., Inner Quest and IQ II, Somavision, Dreamer, Relaxman, Theta One, IM-1, Synchrosette, Lightwave}, and many others.

There are easily as many other brain entrainment devices using alternative technology such as pulsed electromagnetic fields, direct electrode stimulation, etc. As the cyber revolution pushes ahead with such amazing potentials as virtual reality, we can expect the entire field to expand human resources to a point where a new notational system for reality, a realm of consensual hallucination, may be accessible to all.

As mentioned earlier, there are many popular articles describing the various machines, and of course the accompanying literature put out by their manufacturers, yet these contain scant little scientific documentation on their efficacy. Appreciating that others might be facing this dilemma, and wanting to know more for my own personal research, I began an investigation into the principles and workings of brain entrainment. Initially I focused on light and sound machines, spending many days pouring over back issues of such journals as *Electroencephalography and Clinical Neurophysiology*. I soon discovered that, although not publicly acknowledged, there WAS a large body of material dealing with the scientific basis for brain entrainment. The bionic angel had already been discovered. It was only waiting to be used. Neuropsychologists, bioelectricians, and some enterprising innovators were sitting on a technology that could revolutionize our consciousness and understanding of ourselves.

This technology, and the scientific literature I examined, seemed to establish beyond doubt that it is not only possible to use stimulation to enhance brain functioning, increase the growth of individual brain neurons and enhance the richness and density of the connections between these neurons, but that it was possible to accomplish these goals almost immediately. It is also possible to achieve the kind of psychosomatic healing powers for which I had turned to yoga. The time-honored dogma and devotion that was a basic element of meditative training could, in fact, be supplanted by modern technology.

Then an even more important thought struck me as I pondered this new technology: this concept must invariably lead to the conclusion that if such enhancement and growth can be accomplished, then what we're really dealing with is a tool for the evolution of mankind. Hopefully, this work will provide useful background and inspiration for those interested in this exciting prospect.

The particular technology focus here is that of light and sound entrainment. Although the other available technologies are also effective tools for entrainment, light and sound devices because of their multiple stimuli, appear to be particularly efficacious and extremely pleasant to use. The flashing lights provide the user with an almost unparalleled trip into the world of visionary experience: multi-colored images, geometric patterns, dissolving scenes, and vibrant action. The sound stimulus lulls the brain into a very relaxed, yet alert state.

My own experiences, both subjectively and objectively tested using biofeedback equipment, was so striking that I could hardly believe the experience. I immediately accessed the same blissful state that I found in yoga, and in fact went far beyond this sensation. My dream life became more vivid, my mind seemed more alert and focused, I encountered what can only be described as classic OBE's (Out of the Body Experiences), and experienced a whole host of realms that will be discussed in detail in the following pages. Likewise, positive results were reported by every single person I included in my tests, and by friends and family as well. The most oft-heard response was: "When can I do it again?"

Although these reports are interesting in and of themselves, in order to fully appreciate the potential of this new technology it is necessary to take a few steps back into the time-honored

methods of consciousness alteration/realization. Once we understand how our traditional technology has achieved its results, the workings of the new brain entrainment devices will become more easily understood. Then, after investigating some of the basic theoretical underpinnings regarding consciousness, the whole field will spring into view.

SECTOR ONE:
STOKING THE NEUROPEPTIDES

1.1

Consciousness, Culture, and Altered States

Our normal, waking consciousness is, as pointed out by William James, only one type of consciousness, our experience of which is dependent upon the specific parameters of stimulus and response that constitute our brain's activity. Neurobiology teaches us that our "normal" state of consciousness lies within a range of exteroceptive stimulation (that is, stimuli from outside the body) that is considered optimal for the maintenance of this state. When one produces levels of stimulation that are either less, or greater than, this optimal range one can expect to access a realm in which one encounters states of consciousness other than the normal. These states are classically known as altered states of consciousness.

Alteration of the kind and degree of stimulation necessary to effect such a change may be accomplished in a variety of ways. For thousands of years people have found ways of accomplishing this very feat. The reduction of sensory input (monastic isolation for instance), or the repetition of monotonous stimulation (chanting or repeating a mantra), results in a reduction of external stimuli. Sensory overload (participation in a mass festival with dance, lights, music, etc.), excited mental states and profound emotional arousal (such as those encountered in religious rituals or the product of the exhortations of a spiritual or cult leader), on the other hand, result in increased external stimulation (Ludwig: 1969).

Other events that may contribute to the alteration of consciousness are the presence of somatopsychological factors, or the alteration of body chemistry or neurophysiology (e.g., fasting, sleep deprivation, or the ingestion of hallucinogens). In the course of our everyday lives we mediate such factors and travel across a delicate tightrope so that our nervous systems will allow us to continue along in our normal consciousness. Without this filtering process we would constantly slip in and out of these alternate states. Our daily routines and experiences, therefore, do little to penetrate into these realms of alternate experience. Indeed, our self-awareness tells us little about even our "normal" consciousness.

While most of us would claim to be "conscious" beings, for instance, few if any could explain what that conscious state was, or by what means we are aware of its existence. Perhaps this is the reason that verification of existence and consciousness is at the crux of most philosophical thought. It is the most intangible aspect of human existence: how do we know that we actually are?

This task of self-awareness is complicated by the notion that we exist in a "nonphysical reality." Gary Zukav, in describing the relationship of consciousness to the new physics, adopts a viewpoint that is closely tied with mystical tradition. He calls this "nonphysical reality" our natural home. It is the residence of our higher self, the five senses, our intuition and personality, and is associated with the mystical spheres through its belief that our consciousness IS our reality. Our usual methods of knowing shed little light on this realm, for as Zukav adds: "[We] came from nonphysical reality, [we] will return to nonphysical reality, and the larger part of [us] currently resides in, and evolves in, nonphysical reality" (Zukav: 1990).

This movement of reality through Zukav's planes can be extended into and through our interface with other beings on the planet, and particularly with those to whom we are close: relatives, friends, lovers. This interface exists, in Zukav's words, as ". . . a form of data bank exchange." If we are to understand the importance of this embrace of a holistic view of existence, we must examine how it is that we ever deviated from this path in the first place.

The Cartesian mode was built upon the idea that there is a certainty to scientific knowledge. This overly simplistic approach, when applied to philosophy, created the idea that the mind and body were separate entities, to be studied separately using different methodologies. Dividing our most basic spirit in this way led to the idea that we exist as internal, egoic creations, and that work done with our brains is more important than work done with our brawn, and that our ailments had nothing to do with our psychology. The ultimate manifestation of this train of thought held that the universe was a machine.

When applied to living beings, this plan tended to reduce life to a state of mechanical automata, the same as it held the universe. So although Descartes posited a dualistic universe, the basic "stuff" of the universe in his scheme was matter-energy. Our consciousness, therefore, could be known through the study of the brain. Consciousness did not exist apart from matter.

From this view "the universe and all of the things in it also were automata" (Zukav: 1975). Dominating Western thought for centuries, it was only the advent of the new physics and quantum studies that Descartes' "Great Machine" curse was able to be lifted from our consciousness.

Newton, following in Descartes' footsteps, furthered the mathematical idea as a means of understanding nature. In Newton's universe, the cosmos was like a huge clock "consisting of intricately connected yet separate parts" (Harman: 1984). God, to Newton, was the clock-keeper, who kept the spring wound, oiling its works with his unchangeable laws, and whose actions were predictable as the swing of the pendulum: cause and effect. No greater argument could have been made for the determinist theory.

And if the universe was a clock, then one could examine it as one could the parts of every machine: as a set collection of "things," or matter. Matter, therefore, became the primary object of our existence and Newton's attention, and the focus of all the Western scientific thought for years to come.

This view disallows the kind of interpretation Zukav used that can be found within the explanations of traditional Eastern religion: that the universe is illusory, existing on what we call the level of matter only as vibrations of universal energy.

Psychologically, the Newtonian/Cartesian concept separated mind from body. It only allowed for psychological investigation through introspection, not through science. Within this separation, the mind was seen as a tabula rasa, a blank slate created by God and put in action by birth: another pendulum set on its way by the great clock-keeper, to run until the spring was finally unwound. It was supposedly this ticking of the clock that created our lives and consciousness. Freud, another subscriber to this mechanistic process, reduced mental functions analytically: as something that can be observed and, from that observation, predicted. Freud was actually trying to apply the principles of Newtonian mechanics to psychoanalysis.

Unfortunately, the difficulty the mechanistic view of physics had in attempting to account for paradoxes and anomalies in the physical world was just a minor disturbance compared to the problems that Freud's machine had with religious or mystical experiences, and certainly alternate states of consciousness. These occurrences could only be viewed as psychological aberrations.

There was only one place to go with this type of machine/psychology link, and B. F. Skinner found that path in the behaviorist school. The behaviorist approach was "a psychology without consciousness that reduces all behavior to mechanistic sequences of conditioned responses" (Capra: 1983).

Fortunately, not all scholars took this limited approach to the study of the mind and consciousness. As the new physics was to the Newtonian/Cartesian principles, Carl Jung was to psychological thought. Jung understood consciousness much the same way that quantum physicists now view the universe. He saw that we cannot extract any part of ourselves from the whole of existence. As a part of the whole of everything, our philosophical, psychological, and scientific attempts to examine the whole means that the whole is studying itself. As Jung himself said:

The psychological rule says that when an inner situation is not made conscious, it happens outside, as fate. That is to say, when the individual remains undivided and does not become conscious of his inner contradictions, the world must perforce act out the conflict and be torn into opposite halves (Jung: 1969).

Disciples of Jung have since translated his ideas into the language of the new scientific thought by viewing the psyche as moving from the inner center into the external, physical world, a link that by its very nature implies that "[the study of] physics is the study of the structure of consciousness" (Zukav: 1975). It is particularly unfortunate that traditional psychology shuns this realm since much contemporary empirical evidence has shown that the concept of alternate states of consciousness and related phenomena is valid (Goleman: 1980). While this view is completely harmonious with Eastern and mystic cultures, it is a major deviation from the traditional Western ideology about consciousness. Although William James wrote at the turn of the century that ". . . our normal waking consciousness . . . is but one special type of consciousness, whilst all about it parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different (1958)," the fact remains that nearly a century later the idea of alternate states existing as real experiences is shunned by traditional Western psychology.

The model followed by this conservative train of thought focuses on a human personality that is "limited to biography and to the individual unconscious as described by Sigmund Freud" (Grof: 1988). As further indicated by Grof, this traditional approach to the psychological history of the individual "appears to be absolutely untenable" with regard to our current understanding of consciousness (Grof: 1986). Evidence of this can be seen in the fact that there are any number of psychological observations and experiences that cannot be included in this traditional model. Comprising a major portion of this group are the transbiographical levels of experience:

Emotional and psychosomatic healing, personality transformation, and consciousness evolution that occur with powerful techniques, such as psychedelic therapy, healing trance dance, or certain experiential approaches in modern psychotherapy . . . breath[work], music, dance, and body work, and, quite regularly, in dreams. Laboratory mind-altering techniques, such as biofeedback, sleep deprivation, sensory isolation or sensory overload, and various kinesthetic devices can also induce many of these phenomena (Grof: 1988).

The shortcomings of the old psychological paradigm are quite clear when one considers that none of these transbiographical/transpersonal experiences can be accounted for within this older

realm of mechanistic thinking. The errors in logic associated with traditional academic thinking about psychological states are profound. For instance, the theoretical applications of the Cartesian/Newtonian theoretical base was seen, in the past, as a legitimate analytical tool for areas totally alien to its nature: psychology, biology, and medicine. On the basis of observation of the everyday world and the prediction of events based on that observation, this view is extremely limited when dealing with things that cannot be seen, like the mind, or subatomic particles. The Cartesian/Newtonian perspective, because of its reliance on the physical world, also connects its mechanistic world view with the patriarchal idea "of man dominating nature" (Capra: 1988).

The new physics, or quantum theory, on the other hand, recognizes that predictability is not a particularly desirable goal to seek. The subatomic level, for instance, cannot be predicted with any reliability at all. Our inquisitive perspective must, therefore, move from predictability to probability. With regard to consciousness, "the implications of quantum mechanics are," as Gary Zukav pointed out, "psychedelic. Not only do we influence our reality, but, in some degree, we actually create it" (Zukav: 1975).

A simple way of understanding how far these more traditional theories fall short of understanding extra-normal psychological experiences is to look at the near-death experience.

One of the most common phenomena associated with NDEs is one in which the patient witnesses himself leaving his body. So complete are these recollections that the clear vision of all resuscitative efforts, events which the patient could not possibly have seen in our "normal" experience, our common reality, are the norm. Blind patients have even reported this same experience with a degree of precision that is uncanny. Applying the traditional, old paradigm of observation, theory, and predictability to these types of events can lead to only one possibility: they could not have happened, are impossible, some form of mental aberration. This older mode of thinking, therefore, automatically precludes or denies not only a whole range of what must be considered valid experiences, but also the experiences and teachings of the world's great spiritual leaders and religions, for it is only in this Western mode of thought that alternate realms of consciousness are so vehemently disregarded.

Although consciousness seems to maintain its elusive nature—the more one tries to concentrate on it the more difficult it is to ascertain—modern science has provided us with a means of understanding consciousness without too much reliance on philosophical obfuscation. What was once unobservable is now commonplace, and our theories, intuitions, and dreams have expanded with the new visionary technology provided by the new physics.

1.2

A Paradigm of Integration

The cosmos, as we have come to understand our small place in it, is not the God-set clockwork of the Cartesian/Newtonian world. The atomic and subatomic world, Einstein's theory of relativity, the concepts of chaos and quantum physics have painted a picture of the universe of paradox. Accompanying this paradox is the notion that this new knowledge bears a striking resemblance to the many early, less-scientifically sophisticated ideas found in early man's spiritual quests.

When applied to consciousness, this "new" knowledge appears strikingly similar to the Buddhist idea of ultimate unity: a relationship neatly described by Stan Grof.

. . . [Consciousness is] an intrinsic characteristic of the universe. [It, along with creative cosmic intelligence] are literally woven into the universal web from the beginning. There are no areas in the universe where these elements are not present in some form (Grof: 1986).

If we are to accept the idea of consciousness as a characteristic of all existence we must, as a prerequisite of accepting the paradox of the universe, view consciousness as a working component of the paradigmatic direction of the new physics. This interface between consciousness and the new physics was described in the following manner by Fritjof Capra, author of *The Tao of Physics*:

. . . according to contemporary physics, [the world around us] is not a mechanical system made of separate objects, but rather appears as a complex web of relationships. Subatomic particles are not made of any material substance; they have a certain mass, but this mass is a form of energy. . . . All objects are merely patterns in an inseparable cosmic process, and these patterns are intrinsically dynamic, continually changing into one another, in a continuous dance of energy (Capra: 1975).

A direct and more personally satisfying extension of this new physics approach can be seen in the Gaia theory, which states that we are all a part of the Earth-consciousness, and all our actions and decisions are connected to the whole Earth. This connection serves as an important interface between consciousness and the study of material phenomena. This theory assumes that, at least on some level, there must be a global consciousness, some creative cosmic intelligence that operates on a universal level, that we are all what Gary Zukav calls "personality aspects" of the greater ecological whole (Zukav: 1990).

If we truly are all aspects of a greater unity, and recent quantum theories seem to indicate we are, then any glimpse into our own consciousness is a glimpse into this ultimate realm. We are merely metaphors for a greater scheme of things. As we develop new technologies that seem to destroy our concepts of the reality of the world around us, such as virtual realities, we must remember that all our products and our interpretations of them, are merely slices of a larger

metaphorical pie. We are, in essence, a personality aspect that owes much to the Little Jack Horner fable: we stick our thumbs into the universe, pull out a piece of it, and congratulate ourselves for increasing our understanding of the cosmos, when in reality we are still just sitting, like Horner, in one small corner of an infinite consciousness.

As Zukav states in *The Dancing Wu Li Masters*:

. . . in the need to cast off ordinary thought processes, and ultimately to go "beyond thought" altogether, and in the perception of reality as one unity, the phenomenon of enlightenment and the science of physics have much in common (Zukav: 1979).

The universality of consciousness and the "creative cosmic intelligence" as mentioned by Grof and the new physics themes of Zukav (as well as all the traditional concepts of unity) combine to demonstrate that accessing alternate states is not just a process of moving inside oneself. It is a process that pushes our spiritual boundaries outward, until we arrive at the heart of the universe: the birth of all existence. It is the paradox of moving in, to get out.

1.3

The Continuum of Consciousness

The only "constant" about our consciousness is that it constantly shifts from one state to another. Whether we relax, work, drink, smoke, have sex, sleep, dream, play, read, watch television, or whatever, our consciousness is shifting, rediscovering and/or reinventing our world.

Typically, literature demonstrates that altered states of consciousness manifest themselves in ten classic ways: alterations in thinking, in time sense, in self-control, in emotional expression, in body image, in perceptual imagery, in the meaning of things, in our ability to sense the ineffable, in rejuvenative sensations, and in suggestibility. The ways in which people gain access to these ten states can be seen as representative of the neurotechnological level of sophistication of the culture under consideration. At any given cultural point, whether approached synchronically or diachronically, people's understanding of their consciousness—their interpretation of the above-mentioned arousal state—is directly linked with their means of facilitating alterations such as those listed above. Their knowledge of consciousness stands as an indigenous science of how to create the proper stimulus for brain arousal, or more plainly, their consciousness technology.

Many of the various practices associated with shamanistic and religious ritual, if viewed from a pragmatic stance, can be clearly aligned to just such an indigenous understanding of what actions were necessary to induce altered states. To appreciate the concept of myriad states of consciousness most fully, it is helpful to view consciousness as a continuum.

Dr. Stanley Krippner has identified nineteen stages of neurological attention along the course of this continuum: dreaming, sleeping, hyperalertness, rapture, hypnopompia, lethargy, hysteria, fragmentation, trance, regression, hypnotic dream, meditation, day-dreaming, stupor, stored memory, internal scanning, coma, and expanded consciousness (Lawrence: 1972).

Our normal consciousness may more appropriately be labeled our common consciousness, for it is the realm of usual activity. "Altered states," on the other hand, are those states that we do not "commonly" experience. Although always present, they must be invoked through extra-ordinary means. A more appropriate designation for these states may be, therefore, that of "alternate states." They are not manifestations of changes in common consciousness, which would be indicative of a true "altered" state, but rather they stand as alternate states along the consciousness continuum.

What is "altered" is not our consciousness, but our brain mechanisms for achieving these states. As biofeedback researcher and psychologist Thomas Budzynski has pointed out, the acquisition of these states can be viewed as a change in the arousal-level continuum of the brain (Budzynski: 1976). The relationship between uncommon patterning of stimuli to the brain and the alternate states it produces has been uniquely described by John Lilly as an "alternity" (Mishlove: 1989).

Traditionally people have used fasting, isolation, meditation, chanting, prayer, trance states, hyperventilation, dance, music, the ingestion of drugs, etc., as the producers of alternity and can be understood as contributing to the alteration of the brain's biochemical, and therefore our

consciousness environment. It is not difficult to imagine that these traditional technologies were the basis of much myth and religion as attempts were made to merge space and time, to charge our mental/spiritual engines, or more clinically, to "stoke our neuropeptides," our body's chemical communicative linking devices: channels.

1.4

Alternity as a Traditional Technology

It has been well established in anthropological circles that ritual activity the world over has utilized repetitive stimuli as a means of influencing brain function. E. D. Chapple, for example, commented that: ". . . drums [and] rhythms of revivalistic ceremonies . . . synchronize the rhythms of muscular activity centered in the brain and nervous system" (Chapple: 1970). Dance, when employed in ritual, produces visual flicker effects due to shifts in ocular focus and the dancer's movement in relation to light source. These effects act as a photic brain stimulator assisting in the induction of trance.

Meditation techniques that utilize a mantra, or repetitive sound stimuli, produce the effect of overriding the verbal-logical major hemisphere of the brain and allow the emotional minor hemisphere to fully take charge. Chanting, singing, dancing, etc., all the traditionally accepted techniques of trance induction, result in the same stimulation of this minor hemisphere. There are also, however, less structured ways of altering consciousness.

Anyone who has sat and stared at a fire can attest to how the flickering embers seem to produce images. What the flickering light actually does is create a strobed photic stimulus for the brain, allowing it to approach the trance state. Anthropological, psychological, and biogenetic evidence seems to indicate that humans have discovered and practiced ways of altering the mechanisms that control their consciousness for millennia, and that this early technology seems to reflect a basic element of human activity: the search for newer, more meaningful states, perhaps even a glimpse of the ineffable God-head. As transpersonal psychologists Roger Walsh and Frances Vaughan have pointed out:

As theoretical understanding of altered states of consciousness evolved, it was gradually recognized that these traditions represented technologies designed for the induction of higher states of consciousness. It gradually became apparent that the capacity for transcendent states, which could be interpreted either religiously or psychologically as one chose, and the deep insights into self and one's relationship to the world that accompanied them, lay latent within us all (Walsh and Vaughan: 1980).

While scientists such as Grof conduct their research they are still not free from the questions of the traditional mode of thought. The most oft-heard critique of alternate states of consciousness studies is that of a single, recurrent theme; namely that claims for capacities beyond what we currently recognize as our own are dismissed as deception, some form of mental trickery. A good example of this is the case of Eastern Yogis who for years claimed to be able to control parts of the nervous system and body long thought to be automatic: heart rate, blood pressure, gastrointestinal activity, hormone secretion, etc. These claims were dismissed as impossible by Western scientists whose theories and personal experience denied this possibility.

Biofeedback research has, of course, shown that many of the physical claims made by yogis

and other practitioners of alternate states of consciousness are not only accurate, but that such control is within the grasp of anyone who wants it. One is reminded of the famous experiments with Swami Rama carried out at the Menninger Foundation by Alyce and Elmer Green. Swami Rama was able to lower his heart beat to twelve beats per minute and actually stopped his heart beat for seventeen seconds (Green: 1977).

It must also be noted that evidence for the validity of parapsychological events, another part of the transpersonal realm, does exist within a substantial corpus of research activity. As Charles Tart has pointed out:

There are hundreds of published successful parapsychological experiments with the main analysis significant at the .05 level, and of these many have significance levels exceeding 10^{-6} (Tart: 1973).

In spite of all this evidence, the Western world of psychology continues to shun the concept of alternate states.

This disregard for extraordinary states can also be seen in the traditional psychological view of synchronicity. When approached from the traditional stance, synchronicity is not distinguished from a psychotic event. Whenever traditional psychologists are confronted with a patient's description of extraordinary coincidences, they invariably interpret them as "delusions of reference and [must be] considered a symptom of mental disease" (Grof: 1988). This despite the fact that no less a scientist than Albert Einstein saw the idea of coincidence as entirely compatible with the world of physics.

Yet another argument that traditional psychology presents against the reality of alternate states, is one that would appear to reflect that discipline's scholarly territoriality. This form of attack is used by Dr. Ernest Hilgard in his article "Consciousness in Contemporary Psychology" (Hilgard: 1980). In his discussion of alternate states, Hilgard criticizes the work of Charles Tart and his assertion that many alternate states, such as those experienced under LSD, are so profound as to be understandable only by those who have undergone a similar experience. Tart's assertion, of course, if correct, would have a major impact on psychological access to alternate states. Indeed, it would preclude the vast majority of psychologists from ever entering the realm of alterity. Although Hilgard readily acknowledges that Tart's arguments "appear reasonable," he nevertheless dismisses them as having "no substantial justification," without ever presenting sufficient evidence for doing so (Hilgard: 1980).

Even when presented with substantial justification, however, traditional Western psychologists answer the claims for alternate states with their notion that it is impossible to accurately correlate physiological states with psychological ones. They persist in clinging to this view, despite the published work of many researchers, like Toulmin and Peters, who put forth the proposition that strictly causal brain mechanisms lie as the basis for all our processes of consciousness (Toulmin and Peters: 1971). The traditional psychological response to this view is one in which alternate states are seen not as "rational thought processes," but as aberrations of "normal" consciousness.

This flies, once again, in the face of thousands of years of Eastern religion and philosophy. So one is forced to ask: "What is forcing the Western mind to produce such a vehement and strident anti-consciousness response?" Daniel Goleman, writer and editor for *Psychology Today*, answers that the traditional Western argument against alternate states may reflect our political/economic

state, the politics of consciousness vs. the politics of capital:

While the cultural value system which has led to the prominence of the waking state and the preclusion of altered states (except for alcohol intoxication) from the cultural norm has proved functional in terms of say . . . economic growth, they have also rendered us as a culture relatively unsophisticated in terms of altered states of consciousness. Other "primitive" and traditional cultures, while less materially productive than our own, are far more knowledgeable than we in the intricacies of consciousness (Goleman: 1980).

If Goleman's assessment is correct, then it is extremely unfortunate that Western culture has allowed itself to be so dominated by the production of capital and the conservative vision this process necessitates. This tendency toward a utilitarian view of our consciousness has left us in a state of spiritual impoverishment. From all corners of the world, virtually all cultures outside of traditional Western thought recognize both the existence and practical applications of alternate states of consciousness. Much of the West is left, therefore, in a morass of consciousness. There can be little wonder why the traditional Western psychological theories leave us in Jack Horner's corner. We have become our own fable.

1.5

The Function of Altrernity

While we may take the view that alternate states of consciousness do in fact exist, that understanding does not provide any information as to the function of these states. Why do we have the power to enter such states if they do not serve a legitimate purpose? Their very existence cries out for a deeper understanding of their role in our own existence. Arnold Ludwig has posited that alternate states "might be regarded as 'final common pathways' for many different forms of human expression and experience" (Ludwig: 1969). It may be of some use, then, to examine the reasons why and how traditional societies have utilized the induction of alternate states in a positive, functional way. In doing so we may discover something about our own Western perception and utilization of these states.

One of the major roles played by alternate states is that of healing, both physiological and psychological. It is worth mentioning that the split separating the mind from the body, particularly with regard to issues of health, is in actuality an aberration from the rest of the history of healing. For untold centuries, from the beginning of healing practices to the industrial revolution, most "healers" sensed that there was something important about the link between mind and body. As medicine grew more technological, however, "this part of history grew less and less important . . . and finally was omitted altogether" (Siegel: 1986).

It was not until the social experiments and revolutions of the 1960s that members of the medical profession began once again to entertain, albeit still on a very limited basis, the idea that something was to be gained by employing the use of consciousness alteration as an aid to healing.

Among the many benefits of using consciousness alteration to healing is that the increased suggestibility of subjects experiencing alternate states of consciousness can, when used correctly, permit healers to take advantage of this state for the benefit of the patient. Shamans have long practiced their craft with this in mind, relying on the suggestibility of the alternate state to serve as the main tool of their undertaking. Even in our own, supposedly anti-alternate states society, recent studies have shown that subjects under general anesthesia, which can certainly be called an alternate state of consciousness (particularly given the known alternate effects of such anesthetics as ketamine [used in this manner as ketalar] widely employed as an altrernity accessing tool by John Lilly), not only hear suggestions made to them at the time, but their healing may actually respond positively to such suggestions. As early as the 1950s Milton Erickson showed that voices were heard and understood even during anesthesia. Numerous reports exist proving that anaesthetized patients who were given such positive encouragement as, "You will not feel pain upon recovering," "You will heal very quickly," seemed to later respond to these suggestions and actually healed faster or experienced less pain than normally expected, even though they had no conscious recollection of hearing them.

On the most elemental level, the very existence of psychosomatic ailments should prove to even the most skeptical that there is evidence of the mind's potential for affecting the body. And

who would be brash enough to deny that if the mind can make the body ill, it can also heal it? Once again, Western scientists are discovering the efficacy of just such techniques as a tool for healing. Dr. Elmer Green, in *Beyond Biofeedback* described a technique in which a self-directed alternate state of consciousness is used to promote healing. Dr. Bernie Siegel, working with cancer patients, has demonstrated how state of mind can affect one's susceptibility to cancer, and how the body's healing powers can be made most effective. In a great leap backward to our holistic sense, Siegel has explained that our mind does change the state of our body: our nervous system, our endocrine system, and our immune system. My own practical experience with yoga and health, and subsequently with brain entrainment and health, presented me with direct evidence that, as Siegel said, we do create our realities, and that health is only one sphere within our influence:

Peace of mind sends the body a "live" message, while depression, fear, and unresolved conflict give it a "die" message. Thus, all healing is scientific, even if science can't explain exactly how the unexpected "miracles" occur (Siegel: 1986).

Experiences such as these have many doctors convinced that "the mind can penetrate to the cellular level of the body" (Dossey: 1990). The degree of control over the body that the mind has, when in alternate states, has likewise been shown to influence healing *even after return to a more "normal" state*. Contemporary medicine is only now beginning to realize what traditional healing practitioners have known for millennia: Heal the mind and you heal the body. Regardless of the technology employed, access to alternate states can have a positive effect on our emotional and physical health.

Psychopharmacology has likewise shown itself to be a useful tool in the healing process, although this time the healing may be emotional. Because of their ability to induce such states as temporary dissociation and the relief of repression, psychoactive substances have proven to be an extremely efficient means for shamans to either "heal" their patients, or to "cast out demons." What was really occurring, of course, was a traditional counterpart to a modern psychiatrist prescribing anti-anxiety agents, antidepressants, or utilizing other drugs for therapeutic purposes.

In addition to these medical reasons for inducing alternate states, traditional man has used them as a vehicle to enter new realms of knowledge and experience. It would be impossible to count all the cultures that use alternate states to get in touch with their Gods, to gain knowledge of upcoming hunts or wars, or to gain inspiration for creative acts. In this regard, alternate states must be seen as a means toward the enhancement of everyday life.

SECTOR TWO:
BOOTING THE BRAIN FOR SCIENCE

2.1

The Legitimacy of Alternate States

If we are to accept the scholarly legitimacy of the investigation of alternate states, the topic must be subjected to one important question: "Is there any acceptable way to verify and/or validate alternate states?" The question of the validity of contemporary neuro-technology is intrinsically tied to the paradigmatic choice one makes in choosing a methodology for its analysis.

One main method in any analytical process is observation, and so we can begin by assuming that the experience of consciousness alteration must exist in an observable way. This invariably must lead to a series of extremely basic questions about the nature of the observer and the observed.

How does one observe an alternate state of consciousness? At the outset this sounds like an impossible task, and yet it may be asked, "How does one observe 'normal' consciousness?" Neither state can be placed under a microscope, quantified by spectral analysis, or understood by dissection. How do we "know" our normal consciousness? Is this latter task any less difficult than knowing alternate states? Is it really any easier to verify "normal" consciousness than it is "altered" consciousness or unconsciousness? The question has plagued philosophers for millennia.

Adding to this dilemma is the normally accepted concept that scientific observation must be done objectively. The only truly objective observations that can ever be made are those that exist outside the realm of influence of the observer. This necessitates a state in which the observer and the observed exist in two different realms: the observed "out there," and the observer "in here." This would, by its very nature, seem to exclude the observation of consciousness. As Heisenberg discovered when he came upon his "uncertainty principle," our status as organic parts of a larger whole makes it impossible for us to ever achieve a truly objective state: our observation makes us part of the observed. We can never "see" anything as it "is," we can only see how it reacts to our method of observation. "What we observe," Heisenberg wrote, "is not nature itself, but nature exposed to our method of questioning" (Heisenberg: 1958). If we accept the Heisenberg principle as correct, this can lead to only one conclusion: that we are all responsible for our individual realities and, that as a whole, our interaction with the rest of the universe is responsible for its reality.

Examples of how we create our own realities are all around us: the yogi who can control his bodily functions, the very difference between Eastern and Western views of consciousness, the healing of our bodies, the feelings we have of love, the hallucinations that we call dreams or those associated with illness -- these are all kinds of reality creation.

Perhaps it is some innate understanding of this state that has caused our observation of all the facets of our existence to be based upon a process of consensus, including history, science, politics, culture, and certainly normal consciousness. If we accept that all observation results in the observer influencing the observed, and that true objectivity is therefore impossible, then the rationale for this consensus state seems to become clear. It is a way in which our "subjective," rather than "objective" observation can be validated, or at the very least, corroborated. Alternate states, although seemingly more difficult to ascertain due to their mysterious nature, may also be observed

by consensus.

2.2

Quantum/Consensus Reality

Our consensus understanding of the totality of our existence is perhaps the most compelling piece of evidence to refute the Newtonian/Cartesian theory and elevate the Quantum/new physics theories. Our consensus of reality IS Quantum in nature: it is a cluster of info units, accessed through mutual agreement. Our reality, then, can be defined as a consensual agreement of Quanta (info units), facilitated by an info technique: or a Quantum technique reality.

If, for example, 100 people are subjected (technique) to the same degree and frequency of alpha stimulation, and a statistically significant number (Quantum info units) of those people relate their experiences to a specific sensation, it must be considered that the alpha state, for these people, may indeed have some correlation with this state (Quantum technique reality). This should be true whether or not we understand the actual meaning of alpha waves themselves. Observation of alternate states may be accomplished, therefore, by conducting experiments and examining the results for a statistically high percentage of a commonality of experience: a consensus of psychological events, or what Timothy Leary calls Quantum psychology (Leary: 1987).

Alternate states, as data of our Quantum technique reality, may be viewed as a consensual, notational state. That is, they are, via consensual verification, a system of info units of representational symbols—archetypes, hypnogogic imagery, etc.—by which consciousness voyagers define and construct their new realities. Indeed, one is reminded of the symbolic typewriter of experience designed by Dr. Leary for use in his early LSD experiments at Harvard. This device, perhaps the first tool of cyber-psycho-technology, took just such a notational system of symbols and permitted subjects to utilize it in the creation of a representation of their experience, which in turn could be compared to others to create a consensus of experience. The result of this work was nothing less than the creation of a tangible psychedelic reality: a glimpse inside the working of our consciousness. Observation of consciousness, then, is within the realm of human inquiry.

The public repeatability of the alternate states experience is extremely important to the creation of the above-mentioned Quantum reality. If an event, or info unit, is reproducible, and is to form a reality, it should be achievable by any who undertake a similar investigation. Alternate states and brain wave forms have been shown to fulfill this criterion, for there is a wealth of scientific literature dealing with the objective (EEG), and correlating subjective, reports of various brain wave stimuli.

These studies, done in many countries, all tend to indicate that there is a valid consensus of these correlates: beta being roughly equivalent to our normal waking state, alpha to a more relaxed state, theta deeply meditative, and delta comatose or sleep (Cade: 1979). For nearly sixty years investigators, when using photic and auditory stimuli for brain wave alteration, have noted similar results. (These findings are more fully discussed in Section 2.4.) Alternate states of consciousness of this kind, therefore, seem also to fulfill the idea of consensus agreement.

When creating theories about alternate states, as in the production of any scientific theory, one must make sure that the theories match the data. For example, while we may not be able to say that the induction of alpha waves is directly responsible for relaxation, we are able to say that there are certain areas of the brain that control relaxation, and that these areas tend to lie within those regions that contemporary science has told us are manipulable. Also, it has been demonstrated that when Yogis, whose ability to voluntarily control internal states is now scientifically acceptable, manipulate those areas to produce relaxation they also produce huge amounts of alpha waves. When brain entrainment subjects are exposed to alpha stimulation and report a similar occurrence, validated by EEG and EMG testing, a theory may be posited that alpha is in some way related to relaxation.

2.3

Neurotechnology and Consciousness

Many of the most recent EEG tests on photic and auditory stimulation have been based upon earlier research and the theories developed from them. For instance, the early work of Adrian and Matthews (1934), in discovering that the brain would follow the frequencies of electronic stimulus, led to the discovery that various frequencies seemed to correspond to psychological states (Kamiya: 1968), and ultimately the work of Green et al. (1977) which demonstrated the ability to control these states and frequencies. One might say that these tests were the first to show how the brain may be "booted" up, like one "boots" a computer: the proper input "turns it on."

The results of these modern tests seem to validate the probabilities of brain wave/consciousness alteration of these theories. Further, the technological progress of brain entrainment devices, from early biofeedback, through more complex forms such as the Mind Mirror, to the current range of machines would seem to be directly linked to this final criterion. Enough data and theories have been advanced that, based on this prior information, new devices are being constructed based upon probability principles of earlier work.

There are other, additionally useful methods of evaluating the efficacy of brain entrainment technology, and they have been delineated by Hegge, Tyner, and Gesner (1983) in their work *Evaluating Human Technologies: What Questions Should We Ask?* The questions they deem important, and are germane to this research are: 1) What changes will the technique produce?; 2) What evidence supports the claims for the technique?; 3) What theories stand behind the technique?; and 4) What are the implications of the technique?

The first question is a theme that runs throughout the entirety of this work. Brain entrainment produces changes in brain wave frequency and this results in changes in the physiological state that can be measured. It produces relaxation, visionary experiences, and appears to effect changes in creative performance and in levels of mental acuity. Throughout these discussions, evidence will be given to support the technique (the second of evaluative questions). This evidence consists of previous research done by many biofeedback and neurological researchers, as well as the subjective and objective research generated by this study. There is an ample body of data, growing daily, that supports the claims for brain entrainment as achieving the ends mentioned above.

The third question ("What theories stand behind this technique?"), is directly addressed within the early historical notes with which this book begins. The theoretical basis for this technology must be traced all the way back to primitive man using the flickering of a campfire to induce visions. Finally, question four ("What are the implications of this technique?"), is discussed in Sector Seven and consists of several hypothetical applications for future use of brain entrainment technology.

However, since we are not dealing with a realm congruent to the Newtonian/Cartesian principle, and since we are more open-minded and willing to look for a new way of thinking, we

must seek a new paradigm: a holistic view of Quantum reality.

What happens neurologically when we enter alternate states of consciousness is still far from being understood. This gap in our knowledge of these realms is due largely to both the inadequacies of the research tools and philosophies employed by scientific investigation, and our society's general reluctance to accept such states as real. Within traditional scientific practice it is important to understand how our brains create the bridge from stimulus to alternate states. But such an understanding still tells us very little, or nothing, about the psychological correlates with which we are able to interpret our experience of alternate states. As stated earlier, consciousness, whether alternate or "normal," is a combination of brain arousal and interpretation: a constant dance of change.

This dance of change, this negotiation and renegotiation of our cosmology of consciousness, has eluded most researchers as their tools allow them only to focus on singular aspects of data. In an attempt to understand the way stimulus relates to our psychological state, therefore, they have tended to focus their attention on measuring the voltages of the occipital region of the brain (the cortical area that serves as the "visual-projection" area to which all of our visual signals are projected). A major flaw with this approach, however, is that brain waves, in and of themselves, "are not known to have any sensory representation whatsoever. . . ." On the other hand, it is important to understand that "what can be detected and manipulated [by the brain and entrainment technology] are such factors as focus of attention, thought processes, and feelings" (Green, et al.: 1977). What this teaches us is that it is possible to measure physiological changes that seem to go hand-in-hand with various psychological changes.

The preeminence of the psychological state is an important perspective to keep, for when measuring physiological changes it is easy to assume that the changes one observes actually are the manifestation of some control over our bodily functions: blood flow, temperature, etc. As this research has so aptly pointed out, we do not control these physical manifestations of our bodily functions. On the contrary, we control the existential states, the central nervous system, which governs these functions. The changes we see in the body, therefore, are mirrors of the changes in our psychological state. It is this inner cosmological view that is representative of our Quantum reality.

Once we accept this premise as our root metaphor for alternate states, it then becomes possible to posit that our brain wave frequencies, as indicators of our psychological states, correspond to the various ways we produce what Elmer and Alyce Green have called "our view of the outside world" (Green, et al., 1977). That is, these frequencies are the cyber-units of our Quantum reality. This is how we create, outside the sphere of influence of the Heisenberg principle, our unified fields of experience. And, in keeping with the continua of our consciousness, a host of researchers in addition to the Greens have established that these frequencies seem to correspond to various alternate states of consciousness.

These frequencies, ranging from about 30 Hz to .5 Hz (these figures represent EEG amplitude) refer to those beta, alpha, theta, and delta EEG waves that predominate during alternate states. Although opinion ranges as to what these different frequencies actually mean, if anything, many scientists believe that they do reflect a certain level of awareness and unity with other, ineffable states. C. Maxwell Cade, a fellow of the Royal Society of Medicine, conducted EEG tests on 70 subjects and ESR (electrical skin resistance) tests on another 120 and, applying his results to the work of Terry Lesh (1970), was able to construct the following chart representing the subjective

and objective correlates of these states (Cade: 1979).

States of Consciousness		
Subjective Correlates of each state	Relaxation Microamps	EEG Rhythms
Just beginning to relax Difficulty stilling the mind.	25 to 20	alpha & beta
Befogged consciousness or sensation of anesthesia	20 to 16	reduced beta continuous alpha
Calm and relaxed flashbacks	16 to 13	continuous alpha no beta intermittent theta
Well defined state floating sensation increased imagery. More sustained concentration.	13 to 10	falling alpha almost continuous theta
Vivid awareness of body alteration between internal & external awareness	10 to 8	continuous alpha theta falling in frequency
Lucid consciousness deep satisfaction intense alertness calmness & detachment	8 to 5	continuous theta alpha near theta border
New way of feeling intuitive insight synthesis of opposites into higher unity	below 4	occasional delta

BETA WAVES

The beta state, 30Hz to 13Hz, according to psychological studies, corresponds roughly to what we call our "normal waking consciousness" of active thinking and attention. We are in beta when we talk with friends, watch television, or read. It is a state that is characterized by high frequency, low amplitude brain waves. Beta does not seem to be particularly conducive to problem solving, however, and it appears as though when presented with such a task the subconscious slips down into alpha for assistance.

ALPHA WAVES

The alpha state, existing roughly from 13Hz to 8Hz is somewhat lower in frequency yet higher in amplitude than beta. Alpha waves are the most prominent rhythm in the entire spectrum of brain activity. The alpha state is generally associated with relaxation and concentration. Occipital alpha is produced when one closes ones' eyes or when we focus our attention on internal experiences. We enter the alpha state when we are daydreaming, a state with which we are all familiar in which we hear or see nothing but our reverie.

Experienced meditators produce well-organized alpha waves and it is in this state that people fire-walk, pierce their flesh with needles and keep from bleeding, and produce other "extra-normal" events. These "tricks of consciousness" are generally understood to be the result of continuous trains of alpha waves, creating an alpha-blocking response to external stimuli. It seems as though highly stimulated alpha waves produce, among other things, a control over the body.

As one becomes more relaxed and more focused, the alpha waves drop to the alpha/theta border. It is in this state that one produces the "relaxation response," which will be discussed in detail in a later section.

Alpha may also be divided into three substages: alpha, alpha 1, and alpha 2. EEG studies have shown that each of these alpha stages seems to correspond to a different ego state. Alpha results in a relatively intact ego. In alpha 1, on the other hand, ego functioning becomes impaired and results in a destructuralized ego. The loss of contact with the external world during this stage appears to be responsible for this manifestation of ego. This withdrawal from the external world may, in a psychological sense, cause a defense mechanism to be brought into play by the brain and this may account for the creation of hypnogogic, archetypal imagery: a visual link to the world we seem to have, at least for the moment, left far behind us.

During alpha 2 the alpha waves approach the theta border and the hypnogogic period, and there is a return to a more plausible, realistic state, although contact with reality is completely lost. This state is characterized as a relatively restructured ego (Vogel et al.: 1969). Interestingly, alpha itself does not seem to be associated with inward attention or well-being. These states are usually a combination of alpha and theta waves.

THETA WAVES

Generated by the hippocampus, a part of the limbic system, the theta response may be the result of the hippocampus filtering out irrelevant data, leaving in its place only meaningful stimuli (Healy: 1986). Theta in this regard may actually be the mirror of the unconscious. This theory would help explain many of the psychological traits of the theta state.

The subject who produces theta waves is usually in a semi-conscious state accompanied by a quieting of the emotions and thoughts, and increased relaxation of the body. This is the state that we all enter immediately before we fall asleep. Interestingly, although barely conscious, this state allows for things normally unseen or unheard to surface in the consciousness, a manifestation known as "hypnagogic imagery." This manifestation (discussed in more detail in a later section) is responsible for the production of archetypal images and mythic creation. Further, the theta state would appear to be responsible for the creation of new ideas and the synthesis of information within the unconscious intuition.

In addition, the alpha\theta state is one in which the individual finds him/herself with the seemingly unique ability to actually control his/her bodily functions: to raise or lower blood pressure and temperature, contract or dilate blood vessels, and control the nerve impulses sent to the muscular system (Stern: 1976). Perhaps as a byproduct of this, subjects seem to increase their healing ability when they produce alpha\theta waves.

DELTA WAVES

Delta waves, the longest and slowest of all frequencies, range from about 0.5 Hz to 4 Hz. The delta state is one in which the subject enters a deep trance-like state. Its presence is usually accompanied by sleep or a similarly unconscious state.

2.4

Contemporary Neurotechnique

Neural technology has, interestingly, produced a means whereby one may gain access to these frequencies and their accompanying alternate states without the dogma of sacred or secular doctrine, or the danger that psychedelics and native psychopharmacology may present. As early as the 1920s it was known that the brain produced electrical rhythms that appeared to correlate to specific states. Hans Berger was the first to note the EEG patterns of the brain and began to use his studies to create a map of the mind. Berger was, to our knowledge, the first to try to link the various frequencies he discovered with various states of consciousness.

Berger discovered the alpha and beta rhythms and he attempted, through the use of a wide range of subjects ("normal" people, drug addicts, schizophrenics, maniacs and epileptics) to see how changes in the frequencies were responsible for conscious sensations.

In 1934, it was discovered that the rhythms of the brain could be "entrained" to increase in amplitude and assume the frequency of a flashing light stimulus (Adrian and Matthews, 1934). This was the first step on the road to the present brain entrainment technology. The next significant step took place in the 1950s when neuroscientist W. Gray Walter discovered that photic stimulation affected the whole of the cerebral cortex, not just the visual areas stimulated by the light. This was an important discovery, particularly since EEG tests tend to report on only those areas of the brain that are serviced by the attached electrodes. A "whole brain" EEG, therefore, was not within the spectrum of scientific knowledge and yet science now had evidence that stimulation could affect the entire brain. Perhaps most importantly, this discovery indicated that photic stimulation is probably affecting even those parts of the brain that are outside of our current level of understanding.

Following along these lines, A. Neher (1961; 1962) produced electroencephalographic (EEG) recordings from individuals exposed to photic stimulation synchronized to the brain's alpha frequency. The results of these tests showed increased wave amplitude and demonstrated that entrainment of brain rhythms is easily accomplished using rhythmic photic stimulation. Because the optic nerves connect to such a large percentage of the brain, this form of stimulation is particularly effective. This was science's first insight into the potential of altering brain wave function through contemporary technology. Further, these tests corroborated Walter's earlier findings and demonstrated that this effect quickly spreads throughout the brain so that altering the frequency of the light stimulus produces a corresponding change in the frequency of the brain waves (Neher, 1962: 153).

More recent biofeedback research, such as the seminal work done by Joseph Kamiya, began to link the various brain wave frequencies to psychological experiences. Kamiya found that when alpha waves were produced, subjects described the experience as "tranquil, calm and alert . . . very pleasant." Kamiya likened these results to Zen and Yoga meditation (Kamiya, 1968). It was results such as these that prompted experimentation with Zen masters. In all of the subsequent tests it was found that when meditating, these masters were producing huge amounts of alpha waves. Anand,

Chhina, and Singh, for example, discovered that meditating Yogis "showed persistent alpha activity with increased amplitude modulation during samadhi" (1961). J. P. Banquet produced similar results in his testing of meditators, but added to the information by showing that "The most striking topographical alteration [of the brain's functioning] was the synchronization of anterior and posterior channels" (1973). Kasamatsu and Hirai further showed that as Zen masters moved through their meditation their brain waves slowed to the theta level, and that this state "could not be clearly differentiated from those seen in hypnogogic state or the hypnotic sleep" (1968).

The employment of such technology to actually induce a new state of consciousness under scientific observation was developed by Jean Houston and Robert Masters at the Foundation for Mind Research. Using their device, the AVE, they were able, in mere forty-five minute sessions, to produce effects where their subjects reported such things as melting environments and creative action. One novelist who was invited to try the AVE had an amazing experience, detailed in the following report:

Soon, she began to see the characters in her novel come to life before her eyes. "They" moved and spoke and acted out scenes she had written. The "they" began to move in new ways. "That's it," she thought, "that's the way I should have written that section." And so it went, as her characters wrote their own dialogue and solved her writing problems for her (Lawrence: 1972).

This may have been the first example of the "Aha!" moment of creative reverie ever produced by electronic means under laboratory conditions. The ramifications and potential for future development seemed almost unbelievable.

M. Bertini, Helen Lewis, and Herman Witkin took this technology into the realm of sensory deprivation with a process that induced drowsiness and a sense of leaving one's natural state. By utilizing Ganzfeld glasses, the halves of two ping-pong balls placed over the eyes and illuminated by an even light source to produce a state in which the subject cannot distinguish between open and closed eyes, and static-like white noise to block out one's auditory sense, they produced remarkable effects. The following is an account of the experience of a medical student using this device:

Green bottle . . . interesting green bottle . . . I just fell inside. I keep falling inside the bottle. I can't tell whether I have any clothes on or not. What am I gonna do in the green bottle? I can't get out. I only keep scratching at the walls. That's silly. Why don't I do something? I'm gonna get out of the bottle. Ridiculous. Looks kind of like W's bottle. Say, what happened to that? Did he give it away? . . . maybe I'm trapped in his wine bottle. Now I'm up in a pink cloud (Lawrence: 1972).

As more researchers began to explore this field, testing demonstrated that there is a significant correlation between the use of light and sound stimulus, photic driving, and the alpha attenuation response (San Martini, et al., 1979). The following graph, based on this research, demonstrates the increase in various wave states due to photic stimulation.

Frequency bands

	Delta%	Theta%	Alpha%	Beta%
(a)				
light and sound vs. baseline	+11.3	+10.8	-15.2	+6.5
(b)				
Flashes/sec				
6	+9.1	+6.9	-10.0	+5.6
8	+6.1	+7.6	-10.1	+5.3
9	+5.1	+4.9	-7.0	+5.0
10	n.s.	n.s.	n.s.	n.s.
11	n.s.	n.s.	n.s.	n.s.
12	n.s.	n.s.	n.s.	n.s.
14	+8.7	+4.9	-8.2	+7.1
16	+5.1	n.s.	-8.1	+6.9

(San Martini, et al., 1979)

Part (a) of this graph indicates the enhancement of power in each wave form (delta, theta, alpha, beta) induced by a light and sound stimulus. Part (b) shows a similar result with regard to specific flashes per second, or frequency. As flash rates were altered there was a significant change in the various brain waves produced. A similar result was reported by Nogawa, et al., with regard to the increase in alpha activity following light stimulation (Nogawa, et al., 1976).

Research conducted with brain entrainment devices has likewise corroborated these results and demonstrated the efficacy of this new technology. Biofeedback testing of subjects before, during, and after entrainment sessions has shown that these machines assist the subjects in producing alpha and even theta waves. Galvanic Skin Response (GSR) testing, temperature biofeedback, as well as EMG tests likewise show that these machines can produce a profound state of relaxation. It appears beyond doubt that photic and auditory stimulation can alter brain wave production. But this still does not explain how these changes relate to psychological states.

As Green, Green, and Walters have stated:

Every change in the physiological state is accompanied by an appropriate change in the mental-emotional state, conscious or unconscious, and conversely, every change in the mental-emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state (Green, et al.: 1970).

While the physical results of stimulation seem to be clinically definable, establishing the workings of our psychological correlates is less easily accessed. If, as discussed earlier in this

sector, our observation of any state influences that state, then our interpretation of psychological manifestations must proceed from both an internal and an external means of analysis. That is we must observe our states of consciousness simultaneously through subjective consensus and through more empirically-grounded means. The key to unlocking the door of our psychological interpretations of this complex process may be found if we examine recent neuro-psychological research. This is the realm of neuro-technology: the realm of brain entrainment.

**SECTOR THREE:
FLEXING THE SYNAPSES:
THE MIND/MACHINE CONNECTION**

3.1

The Technology Speaks

Some of the most effective brain entrainment devices appear to be those employing the already described light and sound stimulation. Using these devices is quite the mental equivalent of working out on the nautilus or cybex equipment in a gym. Just as we can use this technology to flex and strengthen our physical realm, we can similarly use brain entrainment to exercise our brains. Even more exciting is the possibility that during this exercise, or as a result of it, we may transcend the physical realm altogether. Within us all lies a state that is encountered during peak performance that is, to the best of our earthly-bound consciousness, indistinguishable from the realm of the mystic/spiritual continuum. The type of mental exercise provided by light and sound machines would seem to make this state accessible to anyone who wants to reach it.

The experience of using this technology is a strange amalgam of sensations. I have personally found it simultaneously exhilarating and relaxing. This is a particularly amazing effect, for while one is deluged with visual imagery almost beyond description, heightening one's senses and mental acuity, one is also losing one's body in an all-enveloping swath of relaxation.

To use this technology one generally finds a comfortable position to lie or sit in and then dons a pair of ski or similar goggles fitted with LED lights in each eye piece. The goggles are comfortable and the better ones block out any exterior light source. Next, one puts on a set of stereophonic headphones and settles back for a voyage into his/her innermost consciousness. One "does" nothing, but relax and let the entrainment process guide you deep within yourself. The light source begins and pulsed sound—sometimes white or pink filtered noise that sounds remarkably like ocean waves or the rain, or chords, hemi-tones, or a combination of these aural effects—begins creating a new space, far out, yet deep within, one's body and consciousness.

These two stimuli (photic and auditory) operate in synchrony with the desired frequencies: beta, alpha, theta, or delta. The result, as stated above, is a removal from the outside world and an immersion into the inner self, devoid of physical stimulation, concentrating only on the immediacy of the machine's, and the brain's activity. Before too long, usually within minutes, one becomes lost in this new world, and willingly goes along with this voyage: through various mental avenues to deeper planes of relaxation, or rising to new heights of mental exhilaration if the program calls for beta waves. Regardless of going up or down, the result is always the same: OUT. Out of one's body, and out of time and space.

As mentioned, these machines achieve their results by directing repetitive photic and auditory stimuli of frequencies ranging from high alpha through theta and into delta directly into the brain via the optical and auditory nerve centers. And, as discussed in Sector One, there appears to be something very special about repetitive, rhythmic stimulation that makes it an effective means of altering consciousness.

It is now understood that this type of stimulus generates a high degree of arousal of the brain's limbic system. Considerable scientific research has shown that repetitive auditory and photic

stimuli drive the brain's cortical rhythms, which in turn produces a pleasurable, ineffable effect (Walter et al.: 1949, Gellhorn et al.: 1972).

Repeated testing (tests included EEG monitoring, EMG, GSR, and Body Temperature) has demonstrated that there is little question that these machines DO induce alternate brain wave frequencies. In biofeedback testing done before, during, and after sessions, subjects were shown to produce large quantities of those frequencies for which the machine was programmed, i.e., if the machine were programmed to produce a stimulus of 8 Hz, the biofeedback would show that the brain was also producing 8 Hz (alpha/theta). If the machine were programmed to produce a stimulus of 25 Hz (beta), the brain would do likewise.

There is likewise no question that these machines induce profound physical changes in the body. EMG testing showed a statistically significant reduction in muscle tension while undergoing a brain entrainment session. The effects of these sessions lasted for some time afterward. And there is also no question that this relaxed state can cause increased body temperature, and other somatic indications that the subject's very physical essence was undergoing change. Alternate states of consciousness, it would seem, are partners with alternate states of physicality.

3.2

Listening to the Voice of God

One of the oldest procedures by which people have been able to alter their consciousness is through the use of sound, or music. Since the earliest times and for virtually every culture known to man, sound/music was related in some way to the mystic realm. Examples of this can be found across the globe: from India to Africa, South America to Polynesia. Tibet, where bells and horns have long been used by priests as part of their spiritual induction techniques to the chants and songs of North American indigenous peoples.

From Gregorian chants, to those of shamans, East or West, a spiritual quality of sound was appreciated and utilized in religious practices. Virtually every religion has incorporated music as part of its ceremonies. It is quite clear that this employment of sound was not merely an aesthetic decision. Our knowledge of psychoacoustics has allowed us to understand how effective sound is in the alteration of consciousness. To speculate that the rhythmic products of these practices induce trance states because of their manipulation and stimulation of a higher order of unity, either neurobiological or mystic, not only seems to be validated by the neurosciences and religion, but acts as a link between the scientific realm and the mystic. It is a unity of science and spiritualism.

This unitary field may be the product of the very vibrational qualities of the universe. Quantum physics has shown that everything in existence is vibrating, or creating sound. Joachim-Ernst Berendt has explained how harmonics lie at the very root of the microcosm. For instance, he states how atomic structures are in reality a part of the sonic vibration of the universe: the electron shell of the atom [for instance], saturated according to the rules of nuclear physics and in the steps of the basic theorem, produces the tone scale C-D-E-F-G-A (Berendt: 1987).

The structure of DNA corresponds exactly to the Pythagorean Tetractys, a subdivision of an octave into octave, fifth, fourth, and major second. According to the work of Rudolf Haase of the Vienna Academy for Interpretive Acts, the periodic system itself "is based upon the notes C', C'', D'', AND C''''—that is, primarily on higher octaves of the basic tone C" (Berendt: 1987).

There can be little doubt that all existence, in some way, corresponds to a similar vibrational theorem. What is even more important is the idea that all vibrational items synchronize, or entrain, themselves with one another. Again, physics tends to tell us that everything in the universe vibrates in relation to everything else.

This drive toward harmonic relationships is the focus of the universe. And this, this synchronicity of sound, may be the most salient demonstration of the new physics interplay of creator and creation. As we seek harmonic relationships with all the other vibrational components of the universe, we entrain each other, and our mutual reality is made whole: one in each other, a collective consciousness of synchronous experience.

The innate knowledge we seem to possess about this realm, coupled with the advances of psychoacoustics, has led to the employment of sound as an effective and pleasing alternative or addition to mind machines, and can be experienced through the body of brain entrainment tapes

now being produced. On the basis of research done in the field of psychoacoustics, these tapes are useful in producing alternate states when used alone. When used in conjunction with brain entrainment machinery (virtually all machines have the capacity to include an external sound source) the effects can be staggering.

These tapes use various frequencies (beta, alpha, theta, and delta, much like the machines) and sound patterns to alert the brain's Reticular Activating System (RAS). This stimulation directly affects the cerebral cortex and as a result can induce extremely deep states of consciousness. Some of these states include: Accelerated Learning, Psycho-Immunology (self-healing), Stress Management, Meditation, Brain Entrainment, and such psychotherapeutic processes as Addiction Recovery.

This methodology combines what sounds like ordinary pleasing music with specific frequencies chosen for their efficacy in affecting certain portions of the brain. The "music," therefore, is not merely cosmetic filler, but an integral part of the entrainment process. These tapes also utilize differential signaling, that is, different tones sounding in each ear at the same time. This process is similar to the Hemi-Sync system developed by Robert Monroe, and is based upon the concept that when each ear receives a different frequency, an oscillation or pulse is created that causes the brain to generate a frequency-following response, entraining the brain to that frequency.

What such tapes offer that brain machines do not is the employment of "transformational metaphors." These statements may be subliminal or audible, but in either case they speak to the unconscious mind and the seat of our archetypal images. In essence, when one uses this tape technology to tap into this archetypal realm, one is "turning on" his/her own internal voice of God. Various messages that may be programmed by the "transformational metaphors," may also concern improved health, sexual activity, relaxation, forgiveness, and a host of related topics.

Extremely pleasing, these tapes can add a very interesting dimension to the brain entrainment experience. The sounds of rain on a garden, birds, the seashore, only serve to enhance the type of stimulation initiated by brain machinery. Testing these tapes with the same equipment and procedures used in testing entrainment machines (i.e., EEG, EMG, GSR tests) has shown that, when properly produced this technology offers a wide range of highly effective experiences. Much like brain entrainment machines, these tapes have been shown to reduce muscle tension, induce relaxation and visionary experiences, and even produce out-of-body experiences.

3.3

Trophotropic and Ergotropic Arousal

The type of stimulation produced by brain entrainment brings about intense discharges from the sympathetic and parasympathetic nervous systems. These two systems travel through three stages of "tuning" to arrive at their maximal states. First, one system's reactivity is increased while the other decreases. The second stage is characterized as a reversal phenomenon in which the other hemisphere dominates. The third stage is one in which the systems discharge simultaneously. The effect of this latter process is a physiological state known as trophotropic and ergotropic arousal.

Trophotropic arousal, or minor or non-dominant hemisphere arousal, includes as somatic indicators parasympathetic changes (reduction in heart rate, blood pressure, sweat secretion), significant striated muscle relaxation, blocking of the shivering response, increased secretion of insulin, estrogens androgens, and synchronized cortical rhythms.

Psychologically, trophotropic arousal is associated with the states known as *Zazen* and *Yoga samadhi* (Lex, 1979). A result of this arousal is departure from the beta wave state and entry into the slower, more powerful, alpha. Indeed, progressive trophotropic arousal is characterized by EEG waves of progressively lower hertz frequencies, as indicated in chart A, culminating in the *Yoga samadhi* of 4 Hz or less (Fischer, 1971). In addition, Ornstein (1972) has theorized that the trophotropic/minor hemisphere provides for a shift from the linear mode of time-bound verbal thought (as indicative of the ergotropic brain) to the timeless, "oceanic" mode of the mystic experience.

The ergotropic system, or dominant or major hemisphere, governs analytical verbal and causal thinking and consists of the sympathetic nervous system. Ergotropic arousal results in somatic indicators such as increased heart rate, blood pressure, sweat secretion, increased skeletal muscle tone, increased secretion of catabolic hormones, epinephrine, norepinephrine, cortisol, thyroxine, growth hormone, ADH, and aldosterone.

Psychologically, ergotropic arousal results in an excited cerebral cortex, or desynchronized rhythms, heightened activity, and emotional responsiveness (Lex, 1979), and includes creative, psychotic, and ecstatic experiences.

As ergotropic and trophotropic levels of arousal increase, our interpretive behavior becomes less free of the subcortical substratum in which it is generated. This presents an interesting combination of effects. In animals, ergotropic arousal leads to rage, while trophotropic arousal leads to sleep. In humans, these two states may be interpreted as hyper- and hypo-arousal, or ecstasy and *samadhi*.

Roland Fischer has explained how verifiable perceptions within these arousal states may be empirically described by "assigning them to low sensory-to-motor (S/M) ratios," and how hallucinations and dreams may be understood in terms of "increasing S/M ratios as one moves along the perception-hallucination or perception-meditation continua toward ecstasy or *samadhi*" (Fischer: 1979). These ratios, derived from psychomotor performance testing, specifically

handwriting area and pressures during a drug-induced hallucinatory experience, indicate that certain states of measurable arousal seem to have psychological correlates, understandable through the transformation of such perceptual constancies as time/space, size, color, hue, and taste (Fischer: 1979).

As one progresses along the path of this psycho-physical arousal, these perceptions are altered until ultimately reaching the ecstatic state. Trophotropic arousal produces an observably increased stereotypy along the perception-meditation continuum. It is this stereotypy that allows one to "lose the sense of self" and turn inward, to shut off outside stimulation. Long trains of alpha, and even some theta waves are produced during this state, verifying our earlier statements relating this cause and effect.

Ergotropic arousal appears to be paralleled by an increasing restriction of our perceptual-behavioral interpretations, and this restriction creates a situation in which certain levels can be interpreted as artistic, religious, or psychotic experiences:

Although a religious interpretation is a common feature of catatonic ecstasy, which is the mystical experience of the Oneness of everything, results from a creative breakthrough out of catatonic hyperarousal. During the ecstatic state, there is neither capacity nor necessity for motor verification of the intense sensations. In the mental dimension, in contrast to the physical, the all-pervasive experience of absolute certainty does not require further verification and will be structured according to current mythology or the belief system of a St. Francis, Pascal, or Ramakrishna. What is one man's loss of freedom, therefore, may be another's gain in creativity (Fischer: 1979).

Taking this notion of creativity directly into the neurology of the brain, Eugene d'Aquili and Charles Laughlin, Jr., have hypothesized that the changes in the brain may relate to our interpretation of conscious states. The creation of much of our imagery and the transformation of our most basic structures of belief and myth may be, according to their research, a function of a number of brain operators. Their research states that mythmaking, for example, is "a behavior arising from the evolution and integration of certain parts of the brain," (d'Aquili, 1979), most importantly those identified as cognitive operators: the holistic operator, the causal operator, the abstractive operator, the binary operator, the formal quantitative operator, and the value operator.

D'Aquili describes how these operators underlie abstract dyadic opposition and conceptualization, the seat of myth construction. He also reiterated the above points in an attempt to understand how humans have discovered various means, among them exposure to rhythmic auditory, visual, or tactile stimuli, by which they may tap into this neurological function in the service of mythic needs (d'Aquili, 1979). These repetitive or rhythmic stimuli generate a high degree of arousal in the brain's limbic region resulting in "the kinds of mystical feeling accompanying religious rituals" (d'Aquili, 1979). D'Aquili's ideas about how our mythic creations may be related to our neurobiology would seem to be further corroboration of the new physics' holistic view of the unity of the universe.

We have seen how traditional ritual accomplishes the mystic experience through movement, dance, chanting, drum-beating, and so on. But as this research will suggest, there are other, more direct links to this mythic base, and brain entrainment is one of them. Perhaps the most interesting effect of brain entrainment stimulation of the brain is the process of "kindling" that it may induce. Kindling is psychological term for the phenomenon of repeated brain stimulation that creates a

hypersensitivity in the areas stimulated. Gradually, as the intense arousal of the trophotropic and ergotropic systems continues through entrainment, these areas of the brain grow continuously more sensitive to normal stimulation.

When kindling is the result of stress it can result in negative effects on the nervous system such as anxiety or panic attacks. It may be theorized that with the type of kindling produced by entrainment devices, an increased sensitivity to positive, passive, alert mental states can be achieved. Repeated use of entrainment technology, therefore, produces a kindled state in which the brain easily falls into these positive alternate states.

There seems to be little dispute of the theoretical implications of brain entrainment and its application to consciousness research. But theorizing is only part of the issue, and if we are to understand the nature of the "set and setting" of our inner states, we must look toward other forms of validation.

SECTOR FOUR:
HANGING TEN ON THE EDGE

4.1

Surfing the Transpersonal Wave

Since a case can be made demonstrating that, as Green, et al., have put it, "every change in the mental-emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state" (1970), our trips along the consciousness-continuum are manifested by a wide range of psychological and physiological alterations. Alternate states induction takes our mental functions to places normally beyond the reach of our everyday consciousness, those areas normally reserved for religion, mysticism, and the ingestion of psychoactive substances. This voyage makes the inner astronaut not too much unlike the surfer who "hangs ten" on his surfboard: he's taken his capabilities to the edge of his resources, but still maintains control over the trip. It is a state of intense stimulation.

The experiences one encounters during a voyage through consciousness fall within the realm of psychological experience known as transbiographical, or the transpersonal. These transpersonal experiences are such that they exceed the normal limits of our existence. They involve the individual in all the forms of data bank exchange described earlier, and include realms that even transcend that state.

These transpersonal realms depart from the empirical manner of knowing, initiating the human into an encounter with those areas of consciousness that are, under normal conditions and consciousness, still largely inaccessible to us. This process of leaving the empirical, normal, physical limits of our existence seems to serve as additional evidence of the Ultimate Unity described in religious, mystical and philosophical thought, the Gaia theory, and quantum physics. Consciousness alteration is a means whereby we CAN examine the ineffable, not by putting it under a microscope, but by directing our minds and spirit into ourselves. We can directly experience this state consciously, simultaneously existing in both the physical and nonphysical planes.

Stan Grof has classified the portion of these planes that fall into the transpersonal into the following system: 1.) The Transcendence of Spatial Boundaries, 2.) The Transcendence of the Boundaries of Linear Time, 3.) The Experiential Extension Beyond Consensus Reality & Space-Time, and 4.) Transpersonal Experiences of a Psychoid Nature (Grof: 1988).

4.2

Transcending Spatial Boundaries

The first category of transpersonal experience is one in which the subject transcends, or seems to transcend, spatial boundaries. It is in this state that Grof places the Experience of Dual Unity: a loosening of the boundaries of the physical realm and ego and the sensation of merging with all and everything.

This process is quite familiar to psychedelic researchers, and is becoming increasingly common with other alternate states research as well. These technologies, through their action on the brain's limbic system, disintegrate the duality of Western Society -- of self versus other, self versus the environment. Such a dissolution of self comes about in a variety of ways, hence the stages delineated by Grof.

Among these stages exists the possibility of leaving one's body. Robert Masters and Jean Houston described this "fairly common experience" in their book, *The Varieties of Psychedelic Experience*:

. . . the subject seems to himself to project his consciousness away from his body and then is able to see his body as if he were standing off to one side of it or looking down on it from above (Masters and Houston: 1966).

Similar reports have been described by brain entrainment subjects. When subjects use brain entrainment for consecutive days or weeks, a classic out of body experience seems to be more the rule than the exception. Typically these experiences manifest themselves as spontaneous sensations of flying above a landscape. These sensations may even be accompanied by seeing or meeting people, plus the ability to travel around and into the buildings one encounters. Interestingly, some of the landscapes one comes upon may not be familiar. I can recall several flights to very three-dimensional planes that I have taken using neurotechnology in which I circumnavigated structures and landscapes with which I was not familiar. In each case, however, every item in my journey was as clearly delineated, with infinite detail, as is the room in which I now sit. This is a three-dimensional experience yet where or when it exists is unknown.

It is not at all uncommon for the same out-of-body sensation to occur in the many different practices that are aimed at accessing alternity, as well as showing up as the major theme of near-death experiences.

It is also possible, under similar conditions, to experience other people as if they were oneself:

About ninety per cent of our psychedelic drug subjects have experienced at least once some state of mind that many term "empathy." [One such experience is where] the . . . subject appropriates the other person, the other being drawn into oneself and regarded as a part or extension of oneself In the mystical union, with its sense of "I am you—We are One," the self is described as being finally extinguished altogether (Masters and Houston: 1966).

Likewise, entrainment subjects sometimes report the sensation of "being" a friend or relative.

This type of relationship alteration not only transcends human social intercourse, but the actual nature of relationships themselves. Not only is it possible to be somebody else in these states, it is even possible to "be" an inanimate object.

The psychedelic subject may "feel" that his body has been altered in a variety of ways. He may feel, for instance, his normally flesh-and-bone body transmuted into some other substance, as if by psychedelic alchemy. Then he will experience himself as made of wood, of metal, of glass, or whatever (Masters and Houston: 1966).

Although somewhat differing in effect, perhaps due to the profound relaxation produced by brain entrainment, the latter's subjects nonetheless report a similar manifestation. The difference comes in the shift to malleable states. Rather than becoming a solid object, brain entrainment subjects tend to report such sensations as: "My body was made of water," "I felt like I was made of fabric," etc.

Much of the ineffable nature of this experience may be due to the fact that stimulation of the ergotropic hemisphere can result in the neural stimulation of the binary and abstractive operators, while stimulation of the trophotropic hemisphere results in the neural stimulation of that system's holistic operator. Further, the concomitant discharge of both systems stimulates the median forebrain bundle and generates "a sense of union with conspecifics and a blurring of cognitive boundaries" (d'Aquili: 1983).

This simultaneous stimulation of paradoxical operators—polar opposition and unity—may explain the creation of specific, almost universal, mystical paradoxes: the Being/Nothingness of Yogic doctrine, the "unico mystica" of Christian tradition, or what has been called the AUB (absolute unitary being). A state common to all mystical/religious literature, the AUB is characterized as a loss of the sense of discrete being, a loss of the sense of time, and the acquisition of a state of undifferentiated consciousness. As hinted above, the AUB appears to be attained via "the 'absolute' functioning of the holistic operator" (d'Aquili: 1986).

The synchronization and subsequent stimulation of both hemispheres by brain entrainment technology may result, therefore, as indicated by Fischer and d'Aquili, in the creation of the spiritual "one with God/nature." In fact, d'Aquili raises the point that "every incremental taste of wholeness [caused by the dual stimulation of systems and the excessive drive of the holistic operator] is a greater taste of God" (d'Aquili: 1986).

In many spiritual and secular traditions the condition in which one loses one's self, surrenders to the void and becomes one with the God-head, is the most sought-after goal. As discussed earlier, all the traditional attempts to achieve this state were based on a technology that manipulated the brain in the same way: a way that overlaps, if not duplicates, the process of brain entrainment. Our current understanding of neural operations puts this process into focus. As Roland Fischer has pointed out:

With increasing ergotropic and trophotropic arousal . . . [the daily routine of the outside world which is experienced as separate from oneself] . . . gradually disappears, apparently because in the 'Self'-state and ecstasy and samadhi, cortical and cortical activity are indistinguishably integrated. This unity is reflected in the experience of Oneness with everything, a Oneness with the universe

that is oneself (1971: 174).

4.3

The Transcendence of Linear Time

The second category of transpersonal experience is realized as a transcendence of linear time. This state seems to fuse our past and present consciousness. The influence of alternate states on the concept of time is a function of the seemingly eternal nature of this experience, an element that places the user at a spot out of time. Psychedelic research has shown that this phenomena can produce baffling results.

Brain entrainment subjects report with almost universal agreement that they lost all sense of time during their session. Seconds can seem like hours, and in some cases, time can cease to exist, leaving the subject floating in a state in which there is no past or future, only the moment that exists. These varying views of time produce myriad images and sensations. Subjects often report past-life recollections, their own development from conception through adulthood, and even experience other people's lives and times.

4.4

Transpersonal Archetypes

The third category of transpersonal experience deals with realms that are generally dismissed by Western culture: the realm of the archetype. Carl Jung called archetypes the contents of the collective unconscious. He further thought that these prototypical images were: engraved by [endless repetition] in our psychic constitution, not in the form of images filled with content, but at first only as forms without content, representing merely the possibility of a certain type of perception and action (Hall & Nordly: 1973).

Archetypes, and archetypal experiences, are extremely important to our understanding of consciousness since they act as our link to the "transpersonal bands" of our consciousness. These transpersonal bands represent the region of consciousness that is best classified as supra-individual, the realm "where man is not conscious of his identity with the All and yet neither is his identity confined to the conventional boundaries of the individual organism" (Wilber: 1980).

It is through archetypes that these transpersonal bands can be directly experienced. This link was realized by Jung when he stated that "Mystics are people who have a particularly vivid experience of the processes of the collective unconscious. Mystical experience is the experience of archetypes" (Jung: 1968).

The archetypal experience is frequently described by brain entrainment subjects. It was reported by the Greens, and was indicated by the responses to this current research. It seems that within the brain entrainment experience there is a high incidence of subjects producing archetypal images. And this experience seems to grow in direct relation to the number of entrainment sessions one experiences. With repeated exposure, the kaleidoscopic, typically "psychedelic," visions appear to be replaced with more archetypal ones. These images classically fall into one of the following categories:

Biological archetypes:

Woman, Man, Mother, Father, Child; members of the White, Black, or Yellow Race, etc.

Psychological characteristics:

"Good" or "Terrible" Mother, "Tyrant" Father, Lover, Martyr, Trickster, etc.

Social and Professional Roles:

Scientist, Healer, Enlightened Ruler, Dictator, Worker, Revolutionary, etc.

(Grof: 1988)

It is also not unusual to have entrainment users report non-human archetypes such as architectural visions. Some researchers have suggested that some of these may represent human events—a tunnel, for instance, may be indicative of the birth canal. The appearance of archetypal images may be more than just a visual glimpse of the collective unconscious, however, for their universality may point to, and assist, the subject in understanding classic philosophical or religious questions. It may be that the mind, unable to use our linear, teleological, and limited linguistic

structures, may revert to universal imagery in order to transmit deeper concepts to us.

This seems to act as a verification of the previously mentioned link between the type of entrainment produced by the light and sound devices and the brain-myth complex described by d'Aquili and which has been examined by researching the dimensions of the psychedelic experience.

Psychedelics act upon the limbic area and may produce many of the same sensory phenomena as the traditionally accepted modes of inducing alternate states and gaining access to our centers of mythic creation: dance, chanting, meditation, etc. So great is the psychedelic link to this brain-myth complex, that Robert Masters and Jean Houston were quite able, in their seminal work *The Varieties of Psychedelic Experience*, to index psychedelic mythic patterns with regard to archetypes. These archetypal myths arise, according to Masters and Houston, during the third, or symbolic, level of an LSD trip. They seem to be indicative of:

. . . the subject's participation in mythic and ritualistic dramas which represent to him in terms both universal and particular the essentials of his own situation in the world (Masters and Houston, 1966).

It is hardly surprising that the creation of psychedelic archetype may correspond to the archetypal themes produced by brain entrainment. This is particularly true in reference to d'Aquili's work, for both psychedelic substances and brain entrainment appear to act as vehicles to the mythic workings of the brain. They may provide us with a glimpse of the original impetus for much traditional thought: a kind of mental "big bang" theory. As Peter T. Furst has pointed out:

The entire subject of chemical substances in nature and their relationship, actual or potential, of alternate states of consciousness . . . extends toward the origin of what Jung called "archetypes," mythmaking and common world-wide themes in oral tradition, . . . art and iconography, traditional cultural systems of perceiving and ordering reality, . . . conceptions of Otherworlds, death and afterlife, mysticism, and, indeed, what we call religion itself (Furst, 1976).

In view of contemporary mind research, I think it is highly appropriate to add brain entrainment to Furst's description, as another link to the ineffable archetypal realms of consciousness.

4.5

Transpersonal Psychic Realms

The fourth and final category of transpersonal experience deals with "phenomena that are on the interface between consciousness and matter" (Grof: 1986). When one enters this state the doors fall open to the realm of psychic phenomena: transcendental experiences (i.e., direct knowing), classic ESP (i.e., direct sensing), and psychokinesis (i.e., the realm of direct action or influence on objects). It is important to our understanding of consciousness to investigate these realms since they delineate an alteration of our consensus reality and stand in sharp opposition to our traditional psychological interpretations of consciousness. Further, they represent a physical, empirically testable step into the ineffable.

Much of what seems to take place within the transcendental experience of parapsychology seems to be what many of us commonly call synchronicity. Synchronicity can be defined as an acausal principle of the coincidental connection of events in space/time. Carl Jung, who first described the notion of synchronicity, saw that this state could relate to many transcendental experiences. These synchronistic events may link dreams, visions, meditative states, and other internal experiences with tangible events in the life of the subject.

The psychokinetic realm uniquely combines both the external world and consciousness: spiritualism and poltergeists are included here, with their accompanying experiences, such as moving objects and plasmic manifestations seeming to violate the physical laws of nature.

Although this would appear to be yet another world that is shunned by traditional Western science, an increasing number of professional researchers are testing its validity. Some have even posited that ESP may be linked to alpha states (Lawrence: 1972). Dr. Edward Bokert, of the American Society of Psychical Research, has analyzed psychic states and has concluded that they are, at least in their initial stages, "characterized by a highly aroused autonomic nervous system" (Lawrence: 1972), precisely what one finds in the ergotropic arousal associated with brain entrainment usage.

Dr. Charles Honorton, of the Maimonides Medical Center has likewise found that ESP seems to be associated with "relaxation, mild dissociation, passivity, and a reduction of visual imagery" (Honorton: 1970), a state commonly found when alpha waves are being produced with brain entrainment. Indeed, Honorton found that the higher the alpha production, the higher that person scored on ESP tests. It would seem as though many of the psychic states that Grof identifies as part of the "Experiential Extension Beyond Consensus Reality & Space-Time" can be associated with changes from one level of consciousness to another.

4.6

Psychic Theta

Although, as Jodi Lawrence has pointed out: "Most shifting stages of consciousness contain a high degree of alpha waves" (Lawrence: 1972), there appears to be something special about the link between psychic phenomena (psi) and the theta state. Testing with individuals who claim to have psi powers have shown that those who successfully demonstrated such powers utilize certain techniques to achieve a trance state. Hyperventilation seems to be a technique chosen by many psychics for just such induction. Not so surprisingly, hyperventilation has been shown to be a powerful tool for the induction of theta waves (Healy: 1986).

It should also be mentioned that Stan Grof uses a form of hyperventilation as the basis for his holotropic breathwork, a highly effective means of uncovering psychic blocks, problems, etc. As Grof himself has pointed out, hyperventilation has been used for centuries as a means of altering consciousness. Controlled breathing is, as an example of this use, the basis for Pranayama, Siddha, and Kundalini yoga.

Importantly, breathing has also been the focus of many of the individuals involved in psychological body work (see Sector Six). Wilhelm Reich, for instance, discovered that emotional distress restricts breathing patterns, and with them psychological growth and development. Hyperventilation has been successfully used by people like Reich and Grof to assist subjects in "progressive relaxation, [encountering] intense sexual feelings, or even mystical experiences" (Grof: 1988). Although Grof does not make overt connections between hyperventilation and the theta state, it would be remiss of this research not to point to the parallels and posit that the hyperventilating subject is indeed entering the same theta state as that produced by brain entrainment.

In an important test by Rex Stanford and Ian Stevenson, it was shown that "slower EEG activity (theta waves) might further facilitate performance (of psychic powers)" (Stanford and Stevenson: 1972). The Greens likewise found that "there was a significant increase in the amount of theta production in the occipital cortex" during psychic events produced by their subjects (Green, et al.: 1977).

Studies of Robert Monroe's famous out-of-body experiences showed that he was in theta during these occurrences. Charles Tart, in his study of Monroe, discovered that ". . . the theta waves in his sleep patterns showed bursts of three to eight theta waves which had amplitudes of 150 to 200 microvolts" (Tart: 1967). What makes this particularly noteworthy is the fact that, as Tart mentions, the usual range of theta activity falls below 50 volts.

Other psi research with theta has been done with people who claim psychic powers with the result being that these people also produced very high ranges of theta activity. In spite of all this evidence, however, it must still be remembered that there are individuals who can produce similar effects, OBEs, psychokinesis, etc., in other frequency ranges. And so, while there does appear to be something special about theta, it does not have exclusivity over psychic phenomena.

Given the efficacy of brain entrainment in producing both the alpha and theta state, it should not be surprising to find a link between brain entrainment and psychic abilities.

Grof asserts that all these experiences are observable in psychedelic sessions, holotropic breathwork sessions, and other nonordinary states of consciousness. Adding a much larger cosmological basis to his ideas, Grof likens his findings to a system, he states, that is "in general agreement with perennial philosophy" (Grof: 1988). The perennial philosophy, as described by Aldous Huxley, is the inner core of all the world's religions. This philosophy, Huxley stated, "recognizes a Divine reality substance to the world of things and lives and mind; . . . places man's final end in the knowledge of the immanent and transcendental Ground of all being" (Huxley: 1944).

Ken Wilber, expanding on Huxley's ideas, has described the core insight of the perennial philosophy as the notion that "man's 'innermost' consciousness is identical to the absolute and ultimate reality of the universe, known variously as Brahman, Tao, Dharmakaya, Allah, the Godhead. . . . Man is identified with the universe, the All—or rather, he 'is' the All" (Wilber: 1980)

If Huxley and Wilber's description of this philosophy is correct, then some elements of it should be found in all the known vehicles of consciousness alternation/enhancement, including brain entrainment. If there is such a universal validity to the perennial philosophy, it is at least in part due to the fact that the same basic conditions of stimulation and their psychological results serve as the foundation for virtually all practices involving consciousness, regardless of differences in spiritual or secular dogma.

A major part of the process of creating a state of alternation, a goal of such practices as meditation, yoga, chanting, etc., is, as has been described, the product of an extreme arousal of the ergotropic and trophotropic systems. When accomplished via the type of photic and auditory stimulus provided by brain entrainment devices, this stimulation "tunes" the brain and lessens inhibition of the trophotropic/minor/right hemisphere, allowing this sphere to dominate, further mixing trophotropic-ergotropic excitation, synchronizing cortical rhythms, and ultimately evoking trophotropic rebound.

This "rebound to superactivity" or "spillover," of one hemisphere to the other creates a form of interhemispheric communication that appears to enhance the positive, ineffable "oceanic" effect associated with the religious, mystical, or psychedelic experience.

4.7

The Mystic Experience and the Validity of Alternities

We cannot sum up a discussion of this transpersonal realm, the most ineffable of all experiences, without considering that it may involve and reflect a "direct awareness of the very processes which physicists and biochemists and neurologists measure" (Leary: 1965). Although Timothy Leary made this comment about the religious nature of the psychedelic experience, it appears to hold similar truths for the experience of brain entrainment. The very same regions of the brain and consciousness are explored by both psychedelic and brain entrainment vehicles, and as Stan Grof has implied, these new technologies may easily replicate many of the same phenomena as their older, more traditional cousins. Because of the new technologies' link to older, more traditional phenomenological experiences and practices, and the similar way in which both religious practices and brain entrainment act on the brain, we may look at the latter through the same lens Leary pointed at the religious experience.

When speaking of the religious experience, Leary claimed that it "is the ecstatic, incontrovertibly certain, subjective discovery of answers to four basic spiritual questions. . . . The Ultimate Power Question (What is the Ultimate Power or Basic Energy which moves the universe, creates life?), The Life Question (What is life, where did it start, where is it going?), The Human Destiny Question (What is man, whence did he come, and where is he going?), and The Ego Question) What am I? What is my place in the plan?)" (Leary: 1966). If brain entrainment technology has the capacity to produce, or induce, the ineffable mystic experience, then it should also address these four questions.

Whenever we attempt to delve into the question of Ultimate Power in a scientific manner, researchers tend to push their tools backward toward an understanding of the origin of the universe. The first few seconds of creation, as described by these researchers, are usually accompanied by a vision of that early matter existing as a web of cosmic energy/matter.

Brain entrainment subjects and psychedelic users alike, interestingly enough, frequently describe visual nets of vibratory patterns, a world in which every object is alive with its own "particleness." Such experiences usually convince the subjects that reality is a constituency of energy, and that what they've seen is really a glimpse into what is always there, but lies just out of our normal reach. As mentioned earlier, this visual effect may actually represent a glimpse into the process of consciousness: a view of the very workings of the cosmic unity.

Likewise, brain entrainment subjects report visions of the void and archetypal images of tunnels and a great white light. They may experience a dissolution of their physical presence and a merger with all matter. There is little wonder why these subjects also frequently speak of understanding, or at least sensing, a link with the Ultimate Unity.

The Life Question, as answered by science, is linked to the discovery of DNA and RNA that allowed science to make major advances in understanding the assemblage of life. Unfortunately,

this same understanding provides little insight into where it is going. Brain entrainment technology, on the other hand, much like the psychedelic experience, can allow the subject to enter his/her body and understand life as apart from the physical trappings that are the mainstays of science.

Evolutionism is the way that science responds to the Human Destiny Question, but evolution is almost always seen as a physical development, and the concept of evolution of mind is left to a few scholars, like Julian Jaynes (1977), who are willing to accept criticism on behalf of their radical beliefs in the evolution of consciousness. If, as has been previously discussed, contemporary neurobiology of the type being done by d'Aquili and Laughlin, points to our cellular nucleus remembering some unbroken chain of evolutionary process and our genetic blueprints, then any technology, whether it be psychedelic drugs or brain entrainment that can tap into those centers ought to provide us with data about our evolutionary status.

The Ego Question, finally, is answered by behavioral scientists, in terms of our social and personal development. Psychologists answer with psychogenesis and personal evolution. But do these approaches adequately address our internal states? With regard to consciousness, which stands as our most basic essence, they do not. And yet, the issue of consciousness is the underlying theme of all trips into alterity. We cannot know who we are until we are able to stand alone, without the constraints of our physical trappings. This singularity of existence is only approachable through alternate states. The ineffable "oceanic" experience, therefore, stands not only as a major effect of alternate states, it is the crossroads from which we may understand our place in the scheme of things.

SECTOR FIVE:
PSYCHOACTIVATING CREATIVITY

5.1

Heightened Creativity

Creativity, like consciousness, is a very difficult concept to define or understand. It is only in recent years that psychologists have rescued it from being "unscientific, mysterious, disturbing, and too corruptive of the scientific training of graduate students" (May: 1975). In depth-psychology, creativity has been seen by such noted scholars as Alfred Adler, as a compensation for cultural inadequacy. Whatever creativity is, however, these theories fail to understand it as a process: a process that may emanate from our neuro-biology.

New genetic research is expanding our understanding of the link between our behavior and biology on a daily basis. The implications of this research on creativity are far-reaching, for if creativity is a product of our neuro-biology, then the "birth of an idea," as well as the act of "bringing something new into the world," both phrases commonly associated with the creative act, are not only appropriate but remarkably astute. Perhaps our folk vernacular revealed more about the nature of creativity than any of our modern sciences.

Understanding the nature of creativity as emanating from our neuro-biology is easier if we accept that creativity is part of a continuum of activity of our consciousness. Ranging from our everyday acts of creativity to the more complex "breakthrough," "Aha!" states associated with artistic or scientific problem solving, this continuum easily parallels our continuum of consciousness.

Our simple, everyday acts of creativity may be little more than simple recall, the occurrence of having a name, place, or date essential to the moment suddenly pop into your consciousness. This act occurs daily, but we never pause to ask ourselves how—how did this data find its way to our conscious focus? Some unconscious creative activity was taking place influencing our conscious mind.

At the opposite end of the spectrum are those breakthrough events in which one is suddenly presented with a holistic experience: heightened sensitivity, the production of profound images, or answers to deeper, more universal questions. Most of us have had the uncanny experience of suddenly just seeming to "know" . . . standing outside of oneself and sensing that you understood the deeper order of things: understanding with trying to understand. This ineffable experience seems to have been the genesis of many artistic and philosophical insights. And yet the one thing we don't seem to ever "know" is what that very process means, from whence it came, or whether it is innate or learned.

This "breakthrough" event, this moment of "knowing," is very important to the understanding of creativity and our psychological well being, for it stands as a moment when the ineffable makes itself known to us: it is time when we straddle both our consciousness and unconsciousness. This unique combination of realities results in a creative act that conjures up our deeply seated psychic knowledge, makes a greater statement about our humanity than is normally possible in just our waking consciousness.

We may truly call this moment an alternate state of consciousness since it brings to the surface material that normally resides in the unconscious.

The alternate states of consciousness made available by brain entrainment technology are natural kin to this heightened state and may help provide answers to the above-mentioned questions. As Harry Hunt has pointed out, "altered states of consciousness tell us something about the processes of metaphor. . . . [And] they have something essential to do with the manifest novelty and creativity of recombinatory thought" (Hunt: 1984). In approaching this viewpoint, one must invariably pass through the notion that altered states produce a glimpse into our semiotic systems of structural creation of our reality, that is, the "mechanism of metaphor."

Building upon this notion, thought becomes a multifaceted synaesthesia in the form of "unifying sequence[s] of visual microgenesis and [it is] based on the various geometric 'form constants' emerging from luminosity" (Hunt: 1984). The semiotic "deep structure" of our thought processes, which most often are translated into language, leads as a direct link to classic mysticism, or alternate states. These latter phenomena stand, therefore, as exteriorizations of what Searle has called our "felt meaning" (Searle: 1980). In other words, alternate states show the processes of our underlying "presentational" side of existence. An example of this type of representation of our processual side can be seen in the findings of psychedelic research. In exploring the types of visual hallucinations experienced during the LSD experience researchers have found that the visual hallucinations of webwork patterns of flowing three-dimensional energy, may actually be the subject's "seeing the process of seeing," an externalized manifestation of an internal process. This type of "turning around" ". . . create(s) a broader sense of context, setting, or perspective than ordinarily possible to a more pragmatic, narrowed use of intelligence" associated with our normal consciousness" (Hunt: 1984). The "turning around" of this normal state stands as the peak performance state of the creative act.

Creativity, as defined by Jung, is "the opening of a door of access to the collective unconscious." The wispy, ephemeral, ineffable material of human consciousness seems rooted with the human capacity for creative visualization. Visualization activity within the brain has been linked by some researchers to a specific band of brain wave frequencies: 5-7 Hz. This frequency level is that of low alpha/high theta.

Within this level the mind is free to make a subconscious swan dive into the pool of consciousness, allowing for an immersion into another world of color, image, etc., and experiences here find themselves being known to us in larger, structured patterns. This may be the root of the creative act that can be combined with other, more normal experiences with the result being the birth of the artistic product.

The low alpha state is a perfect level for this activity to take place, for the passivity of the alternate state associated with low alpha is ideal for mental immersion and the synthesis of images. The Greens, in fact, found that such synthesis is a common event of the low alpha/high theta border. In addition, they discovered that past recall was also greatly enhanced by this state. The recall of the past, or memory, is generally conceived as "repetition, relative recency . . . emotional content, state of arousal, and . . . attitude of mind prior to remembering" (Cade: 1979). These two factors—imagery synthesis and past recall—may be the crucial tools of creative action.

Spiritually, or more cosmologically, the creative act may be seen as yet another reflection of ultimate unity. As a product of the combination of interpretive (cortical) and interpreted (subcortical) structures "meaning" becomes "meaningless" and communication of this ineffable

state must come from metaphor. This effect may in part result in the sense of heightened creativity experienced by some light and sound users; for in searching for a metaphoric vehicle with which to express itself, the brain creates the artistic impulse.

This creative turn is the result of new associations or correlations of stored data. These data remain as such in the unperturbed mind. With the introduction of any perturbation, psychedelics, meditation, sensory deprivation, or photic and aural alpha/theta stimuli, these fixed associations become disrupted, producing a state conducive to that which we recognize as "creative action."

This "creative action," is often described as a state of "reverie" and has been associated with many creative thinkers from Robert Louis Stevenson to A. E. Housman, from the fine arts to the hard sciences. Shakespeare, Shelley, and Keats were all known to visualize as they created their arts. L. E. Walkup, in researching the relationship of creativity and visualization has theorized that creative people seem to have the ability to "visualize—almost hallucinate—in the area in which they are creative" (Walkup, 1965). His conclusion was that reverie, hypnogogic imagery, dreaming, and creativity are all closely related.

In fact, some creative people may have a state of mind that is constantly producing visual imagery. All the artists and scholars mentioned earlier, as well as untold others, have reported the same type of constant visual imaging that seems to accompany the creative act. And once again, this creative state seems to be linked to a specific frequency of brain activity: theta waves and very low alpha waves, with this wave production apparently inducing, or facilitating, hypnogogic-like imagery, what the Greens have called the "sine qua non of creativity."

In closing this section it must also be mentioned that in addition to facilitating visualization, brain entrainment technology also enhances the creative act through its relaxation properties. The famous research done in 1908 by Robert Yerkes and John Dodson showed that, in general, as our stimulus state increases, so does our performance, but only to a point. Performance levels decrease very quickly and drastically once stresses or anxieties pass the level of peak activity.

The simultaneous production of relaxation and creative stimulation by brain entrainment devices, therefore, produces an ideal state within which the mind may fulfill its quest for artistic metaphor.

5.2

Hypnogogic Imagery

Hypnogogic imagery, stemming from the Greek hynos, "sleep," and agogos "leading," is, according to researchers like the Greens, associated with the theta and delta wave border. This is a deeply internalized state that appears to fulfill all the criteria deemed necessary for the brain to produce the physical manifestation known as the "relaxation response." This is a state of quieting of the body, and reduced emotions and thoughts. This is an extremely mysterious state, with different people experiencing different sensations.

Some people have absolutely no recollection of the hypnogogic state. They may enter the theta/delta state and have no recollection of seeing any imagery. For others, however, entrance to the hypnogogic arena is full of visions, music, and insight. Not to be confused with daydreaming, in which one's conscious mind remains active, guiding one through events, hypnogogic world of images and ideas seem to appear out of nowhere.

Accessing this state seems to be a product of slowing brain waves from normal beta to alpha, and eventually to the theta level. During this process, the state of sleep begins in which we begin to produce REM (rapid eye movement) activity. Our egos are still in action here and we maintain a certain amount of control over our experience. As the process continues and brain waves become even slower, SEM, or slow eye movement, begins to take place, accompanied by a lessening of the ego. In the third stage, the ego is dissolved and hypnogogic imagery predominates.

McKellar and Simpson, in their 1955 work "Types of Synaesthesia," identified four main characteristics of hypnogogic imagery: vividness, independence of conscious control, originality, and changefulness (McKellar and Simpson, 1955).

M. Bertini, et al., produced a classic study of the hypnogogic state and observed that the drowsiness induced by this state appeared to be conducive for the spontaneous appearance of imagery. Quite interestingly this research discovered that there were distinct similarities in the visual and auditory imagery that their subjects experienced. These images, not surprisingly, seem to have been archetypal in nature. (The nature and importance of archetypes is described in greater detail elsewhere in this book.)

The range of our experience during the hypnogogic state falls into specifically easily categorized divisions: childhood recollections, alterations of emotional openness, the creation and fulfillment of fantasies, a sense of psychological well-being, and changes in associational flow. These divisions of experience bear a striking resemblance to the general characteristics of alternate states identified by Ludwig and mentioned earlier in this work.

The childhood recollections, for instance, may relate to alterations in the time sense. Emotional openness clearly seems to relate to alterations in emotional expression. The creation and fulfillment of fantasies would seem to be indicative of perceptual distortions. The sense of psychological well-being may be related to the sense of rejuvenation. And, the changes in associational flow may relate to alterations in meaning or significance and the sense of the

ineffable.

The hypnogogic state and its accompanying sudden onset of new ideas or images usually results in a sense of creative enhancement that increases artistic ability, and also the effects of spoken-word tapes, accelerated-learning tapes, etc. Writers, visual artists, musicians, and others may all benefit from this elevated creativity. The production of alpha-and-theta-rhythms and their juxtaposition with creativity may allow unrecognized talents to emerge from individuals who thought they lacked such abilities.

5.3

Psychological Well-Being and Peak Performance

It's interesting to note the creative aspects of the alpha/theta conjunction, but there are many more benefits that can be immediately accessed by brain entrainment users. One obviously productive byproduct of this technology is an integrative experience that gives users a sense of psychological well-being. Once again, the Greens' research is seminal in this regard, for they make note of the fact that subjects who frequently entered the alpha-theta state reported "more energy. . . . [the ability] to encounter things easier. . . . more relaxed" (Green, 1977). Improved interpersonal relationships as well as increased ability to concentrate and perform school tasks were also reported.

The production of alpha waves, in fact, seems to go hand-in-hand with inner pleasure. Dr. Marjorie Kawin-Toomin has described the alpha experience as a pleasing experience that may serve as its own reward. "Learning to know and control parts of one's being, previously mysterious and apparently involuntary," she points out, "is exciting" (Lawrence: 1972). She continues to remark that "[the ability to] discriminate the kind of thoughts, feelings, and attitudes which represent an easy flowing with the environment and with [our] inner selves, generally [makes] life more comfortable" (Lawrence: 1972).

And, when one becomes more self-assured it is no surprise to find psychological and physiological performance enhanced. Many professional athletes and other "performers" have mentioned that they are in an almost trance-like state when they are performing at their optimal. This is a state in which the performer is almost unaware of his/her performance. Much research has indicated that this performance enhancement may have something to do with creative visualization. Accessing this state produces two visualized events: replaying the past, and seeing the future.

In a nod of modern thought to traditional Zen practices, this activity is a process in which athletes or performers revisualize what they learned in practice sessions or previous matches and then "see" their undertaking. They see the flow, seeing forward to anticipate the entire event like a Zen archer sees the flight of the arrow before he launches it. Dr. Armand Nicholi of the Harvard Medical School worked with the New England Patriots football team to help them achieve peak performance. The final game of the Patriots' 1985-86 season called for a substitute player to be inserted in the final two minutes. Visualizing his play and seeing outside his own frame of reference, the player translated this creative action into peak performance and scored the winning touchdown (Benson: 1987).

This type of mental activity is such that it must be activated during training and then reactivated during performance. Some athletes and trainers have used hypnosis, meditation, or creative visualization to achieve this state and its rewards. Brain entrainment, since it produces the same effects as the above-mentioned techniques, seems to offer the same potential for enhancing peak performance levels.

SECTOR SIX:
I SING THE BODY ELECTRIC

6.1

The Relaxation Response

As mentioned earlier, one by-product of light and sound stimulation is a profound relaxation of the skeletal muscle system. Commonly associated with what has become known as the "relaxation response," this state is universally recognized, from a medical and psychological viewpoint, as being beneficial. First delineated by Dr. Herbert Benson of the Harvard Medical School, the relaxation response is a highly desirable state of reduced muscle tension and stress. Not unusually, the process developed by Benson, like other methods of brain manipulation, has antecedents in the various traditional practices of both Eastern and Western mysticism. Religious leaders of both cultures throughout history have produced reports of their experiences through the various techniques of prayer and meditation, reports that seem to indicate that these mystics found ways to induce their own relaxation response. The relaxation response, as defined by Dr. Benson, is an involuntary response (like all alternate states) that results in a reduction of the activity of the sympathetic nervous system. Success in achieving this response is dependent upon four basic criteria:

1. The subject must focus on a constant stimulus: sound, word, phrase, or fixed gazing. This repetitive stimulus, the basis of much meditative technique, apparently facilitates the shift away from logical, externally oriented thought.
2. The subject must maintain a passive attitude.
3. One should be lying or sitting in a comfortable position so as to reduce muscle tension.
4. The subject must be in a quiet environment in which there is little external stimulus.

When these criteria are present it is possible for the brain to shift down to the alpha/theta border and achieve the desired relaxed state, a state that naturally occurs at these frequency levels. The research done for this book indicates that light and sound machines are quite successful in supplying these four criteria. It is not too far-fetched to claim that the relaxation response is a natural byproduct of this technology.

Without doubt, brain entrainment technology produces a constant stimulus. This stimulus, programmed at the specific frequencies of alpha, theta, or delta range, fulfills Benson's first criterion and serves the same purpose, in this regard, as the traditional use of a mantra. Benson's second criteria, maintaining a passive attitude, is almost a given considering the type and degree of stimulation. Virtually all brain entrainment test subjects felt as though they were being gently nudged into a state in which they just "let go," allowing the machine to pave the way for them to enter a passive, comfortable state. Electromyography (or, EMG, a type of EEG for the muscular system) has shown that brain entrainment stimulation produces a profound relaxation effect in the trapezius muscle, the muscle in the back of the neck and upper back that stores tension. This same testing has shown, that with photic stimulation, muscle tension drops in synchrony with the

flashrate of the light source (Green, et al., 1970, 5). This explains the extremely deep relaxation that users of brain entrainment devices report. This reduction of muscle tension must surely fulfill Benson's third criteria.

And finally, the stimulus of brain entrainment technology so fully shuts out external stimulus that one is rarely aware of his/her environment. It is almost a given, therefore, that brain entrainment fulfills all the criteria for inducing the relaxation response, but the positive effects of this state do not stop at mere relaxation.

Psychologists who focus on the body have developed an important understanding into the role our body armor plays in our spiritual growth. Wilhelm Reich (who coined the phrase "body armor"), Ida Rolf, and Moishe Feldenkrais are only some of the better known members of this school. Their contribution to the understanding of consciousness has helped facilitate the leap from biographical to transpersonal psychology. Traditional psychologists of the Freudian school claim that the unconscious can only be freed through in-depth psychological work. Reich, Rolf, Feldenkrais, and the rest of their school have helped us to learn that physical relaxation and "body work" can accomplish the same goals.

Body work therapy begins with the assumption that our emotional states are intrinsically linked with and reflective of our bodies. It is the integration of realms we have discussed in other portions of this work and which is essential in understanding our cosmological consciousness and presence. As Ida Rolf has stated:

A man who undergoes integration of his corporeal structure experiences the basic link that exists between structure and emotion. As he moves toward structural balance, he knows that his psychological make-up has changed as well . . . [and] . . . his psychological hang-ups . . . disappear . . . as the flesh changes, as the barriers within the flesh are disengaged, and as the free flow of body energy and fluids is established (Rolf: 1977).

The crux of this approach lies in the acceptance of the physical personality as a mirror of the psychological person; "the 'I' seen in three-dimensional form" (Rolf: 1977). Extending this philosophy into the external world sees our environment as a projection of our psychological states. Whether one calls this outlook "monism" (i.e., the belief that all manifestation is the expression of one substance), as does Rolf, or Tantric yoga, the idea is centuries old, and was, as we have already seen, pushed aside by the dualistic split of mind/body of the Cartesian/Newtonian paradigm.

Those familiar with massage know that it is not uncommon to experience the manifestation of memories and images as one progressively relaxes. One of the main tenets of this school of psychology is that the body, through the tightening of muscles, anchors certain items of psychic distress within the skeleto-muscular system. We can all see this when we experience anger. As our emotions rise, our muscles tense. Fortunately for most of us, these tensions are resolved and the body once again relaxes. On a more subtle level, however, there may be many different degrees of psychic distress that we carry with us in our bodies without ever fully recognizing this crippling state.

Relaxation, through the use of brain entrainment, and enhanced by that technique's facility to induce hypnogogic imagery, may be an extremely important tool in uncovering our own psychic armor and allowing our unconscious to break through our self-imposed emotional barriers.

6.2

The Kundalini "Out-of-Body" Effect

A further physiological by-product of the rebound from one hemisphere to the other is what is known in the language of tradition as the Kundalini experience. "The Kundalini experience apparently starts with a . . . [stimulus state] . . . linked to trophotropic arousal and rebounds into an out-of-the-body type of experience that is linked to ergotropic arousal" (Fischer; 1979).

The reports of several users of brain entrainment devices who entered this state of arousal seemed to verify that they had experienced a classic "out of body" sensation: flying over landscapes, being outside their body looking down at it, seeing friends or relatives in their homes many miles away, etc. And, even in those few respondents who did maintain a sense of body, that sense was usually associated with some form of synaesthesia: "I felt that I was hearing music with my whole body," for instance. It appears, from a psychophysiological view, that this latter change in body image may be due to the very low levels of muscle tension left in the body during and after entrainment use, freeing the mind to accept whatever stimulus it chooses to help create a corporeal being in which to temporarily reside.

Interestingly, voyaging across the consciousness continuum has, as a by-product of this loss of physical being, a subtle yet measurable loss of freedom. This loss is apparently responsible for the ineffable nature of the experience; for it does not permit any verification through motor activity. The penultimate moment of trophotropic arousal, of samadhi, is experienced, therefore, as "nothing but [one's] own self referential nature, devoid of compelling contents" (Fischer 1979).

Even more revealing is the observation that the converse of this experience is true with regard to our "normal" states: when we are engaged in our daily routines we are almost completely devoid of contact with the ineffable. This multiplicity of experience tends to suggest that these experiences may serve as tangible evidence of our simultaneous existence on more than one plane of being: the objective everyday world, and the subjective world of altnernity.

Much in the same way a yogic master may not notice any outside stimuli during this deep meditation, users of brain entrainment technology likewise report losing conscious touch with the light and/or sound signals: the lights blurring into a constant field followed by a "blank out"—typically associated with the Ganzfeld effect—and the sound pulse becoming similarly imperceptible. This type of sensory deprivation causes one to lose a sense of whether his/her eyes are open or shut, or whether his/her ears are hearing. It is a complete turn inward, away from the outside world of stimulation.

The fact that the conscious brain no longer notices the brain entrainment stimuli does not mean, as it can in meditation, that the brain fools itself into a state of complacency and ceases to proceed any further into the meditative state. On the contrary, this light and sound stimulation continues to entrain deep wave patterns within the brain until a maximal meditative state is achieved.

This highest state of arousal creates a condition in which meaning can no longer be

expressed in the dualistic terms associated with the physical realm and our egoic interpretation of it. "All" becomes "One" without specificity. Indeed, Dr. Lester Fehmi, director of the Princeton Biofeedback Research Institute believes that stimulation of the kind that appears possible with light and sound devices, creates a hemispheric synchronization. When this occurs, the two hemispheres, which normally produce brain waves of different frequencies, become synchronized and generate the same waves.

This synchronization is accompanied by an increase in the amplitude of each hemisphere's waves, and ultimately their combination into a wave form twice the height of the single, original wave form. Fehmi believes that it is this hemispheric leap that produces a union with experience: an into-it-ness in which the subjects *are* their experience. And, most importantly, this interhemispheric communication of the verbal, left brain and the visuo-spatial, right brain may be the genesis of "innovative ideation or creativity" (Fischer: 1979).

6.3

Mind Over Illness: Consciousness & Healing

One of the most dramatic, if not the most useful, byproducts of voluntary control of consciousness is the realm of physical healing. As discussed in Sector One, mental powers to heal the body are just now being understood and explored by the medical profession. What they are coming to learn is that the body's three main forms of systemic self-protection—the central nervous system, the hormonal systems, and the immune system—are all linked, communicationally, by those "molecular messengers," the neuropeptides (Harman: 1988). Communicative coordination of these three systems is imperative to our physical well-being. Any interference with any of these systems is cause for one to fall ill.

Stress, ranging from the kind we encounter every day at our jobs or while in line at a supermarket all the way to that kind associated with traumatic events, affects the central nervous system causing our hormonal and immune systems to break down. For instance, it is not uncommon for people under stress to either lose their sexual drive or catch colds, flu, etc. Understanding this interrelationship is important in appreciating our capacities to heal ourselves. Harman, in *Global Mind Change*, cites a now-famous case of mind over health:

Dr. Philip West . . . was treating a man with severe cancer, who begged to be given the experimental drug Krebiozen. At that time Krebiozen was being touted by its proponents as a miracle cancer cure. After only one dose of the drug, the patient's tumor masses "melted like snowballs on a hot stove" Shortly thereafter, however, he [the patient] read about studies indicating that Krebiozen was ineffective. His cancer began to spread again, and he was hospitalized. . . . His doctor . . . promised treatment with a new, more potent Krebiozen . . . [but] was given only water, but nevertheless his condition improved significantly (Harman: 1988).

The patient in the report eventually died, but not before he read another report that stated that the American Medical Association and the Food and Drug Administration had proven the worthlessness of Krebiozen. If he had only understood that his recoveries were coming from within, that it was his own mind in control, he may have been able to fight the cancer for a longer period. Perhaps even cure it.

Although alternate states, including those produced by brain entrainment, can aid in this regard (i.e., increasing our awareness of our own internal powers), it is extremely important to understand that brain entrainment machines are *NOT* medical devices. No brain machine will heal anybody of anything. What they *MIGHT* allow, however, is for one to enter a natural state that is conducive to healing, and within which we can focus our mental energies upon our body's health.

The potential for brain entrainment to produce this type of healing knowledge is great, for they allow the voyager to enter his/her own body, to understand it as a holistic creation, to appreciate the voluntary control we have in creating our own realities, and to actualize our potential as our own gods and goddesses.

SECTOR SEVEN:

MILLENNIA III: CYBERPUNKING THE POLITIQUES OF CONSCIOUSNESS

7.1

Making Bliss Our Normal Consciousness

The recent advances in consciousness studies have been attributed to many things: a "New Age," an astrological shift in the universe, a "Harmonic Convergence," a new spirituality, a turn away from the shallowness of everyday capital life, an evolutionary leap, and the eventual outcome of the movements of the 1960s. While several, or even all of these factors may have had a hand in producing the new state, perhaps the most important element responsible for producing that state's technology is the creation of a new class of inventors. In the 1980s they were called Hackers: computer savvy individuals who wanted to see how far they could push the technology, and who, as a consequence of their curiosity and quest, went astray of conventional procedures and technological applications. As the decade began to come to an end, many of these same hackers began to look to more substantial ways of applying their talents, and the creation of a new world and mythology based on cybernetics is where they went.

Christened the "Cyberpunk" movement (a term already *démodé*), these inventive souls began plying their trade on mind technology and began, quite literally, to cyberpunk our consciousness. "If we are to find meaning in this existence," they said, "we must not be afraid of technology." Indeed, we must find a way to use it to make bliss our normal consciousness.

The technology of this emerging field already seems vast, ranging from brain entrainment to virtual realities and encompassing everything from physiological changes to psychological ones. But this is only the beginning, and we can expect that Millennia III of the common era will bring about revolutionary advances in this realm and our understanding of it.

7.2

Meeting the Buddha Within

Exploration of consciousness via brain entrainment technology is not some "far-out" idea, or quackery, cooked up by unscientific individuals as its critics would like the public to believe. It is merely a contemporary extension of our time-honored and traditional consciousness techniques, developed by a brand of scientific mavericks, for achieving the same goals. Examining the rationale behind all of these techniques, it becomes obvious that the same impetus and processes are at work: to make sense out of a frequently capricious universe through the conscious manipulation of the processes by which we perceive that universe. Or, as has been more plainly described in this book, to recognize and utilize the fact that we create our reality.

There is no longer any need to invest long periods of time and effort to achieve a glimpse of the ephemeral God-head. What once took devotees months, years, or even decades can now be accomplished by novices in only days or hours. It is a simple fact that every culture, throughout time, has used the technology that is at its disposal: they have used what their resources have allowed. Should we be any different and turn our back on the new answers brain entrainment provides solely because they do not validate the time-consuming processes of old? The answer must be a resounding and emphatic NO! There is no reason to fear or critique this new technology simply because it seems so much easier than meditation, safer than psychedelics and traditional psychopharmacology, or missing some religious doctrine. This new technology is merely a more efficient means by which we may continue the centuries-old search for ourselves, within ourselves.

Still, there are many who use a kind of "Protestant mind ethic" to proclaim that nothing of value, certainly nothing with regard to consciousness, can be achieved that easily. Taking a close look at their criticisms, however, reveals the flaws in their reasoning and begins to hearken back to the Newtonian/Cartesian mechanistic separation of mind and body. John Clark, president of the Himalayan Institute, a yogic research center, has criticized brain entrainment technology as a "danger to our minds." He says:

"... we run a great risk when we use [brain entrainment] to instantaneously induce [the effects produced by traditional meditation]. It's only one step away from hallucinogens. . . . It's another example of turning over your life to the experts." (Leviton: 1990).

Interestingly, Clark is both right and wrong in his assessment of brain entrainment technology, but he is entirely wrong in his conclusions.

He is wrong when he says that there is a risk to instant induction. Stimulation of this type, as already discussed, has been scientifically researched for over sixty years. In all that time the only negative side-effects ever reported are that some hypersensitive people may find photic stimulation disturbing, and person's prone to epilepsy or heart conditions should not use photic stimulation since flashing lights can possibly set off seizures. Even this latter hypothesis may prove incorrect,

however, as Robert Austin, president of Synetic Systems, manufacturers of the Mind's Eye line of devices, has recently indicated that research is under way exploring the possibility that photic stimulation can actually prevent epileptic seizures.

Though Clark is right when he says brain entrainment is a step away from hallucinogens, this assessment is not what Clark infers it to be, and is certainly not a negative criticism. As this book has shown, yogic meditation, chanting, ritual dancing, and all the other traditional technologies can also be considered one step away from hallucinogens. All technologies that induce alternate states, from the most traditional to the most contemporary, share certain characteristics with hallucinogens. Brain technology, whether it be yoga or electronic entrainment, acts to stimulate certain areas and chemicals within the brain. This is precisely why they are effective, and precisely why Clark's argument is specious at best.

Finally, Clark calls entrainment "another example of turning your life over to the experts." On the contrary, brain entrainment may actually be a quicker way of getting away from the experts and in control of your own life. Followers of yogic meditation may spend years, even decades of their lives, devoted to a particular teacher. And no teacher can guarantee that this devotion will be accompanied by success in controlling one's inner states. What can occur, however, is a frightening dependence on the teacher as leader. The recent history of cult activity and the horrible results of places like Jonestown are examples of what can go wrong in this type of environment.

Users of brain entrainment technology, on the other hand, can eschew this type of dogmatic influence in favor of the adventure of self discovery. Stress reduction, increased mental functioning, improved immunology, as well as a host of transpersonal experiences, are all at the almost instantaneous disposal of brain entrainment users.

Swami Chetanananda, founder of the Nityananda Institute and teacher of kundalini yoga, has voiced many oppositions to brain entrainment that are all in line with Clark's. Chetanananda states that brain entrainment is ". . . hogwash. It's impossible to shortcut any of the steps that need to be taken and still arrive at the highest state. Shortcuts . . . insure failure" (Leviton: 1990).

Chetanananda's criticism, like Clark's, may reflect the voice of vested interests. If brain entrainment actually does what it claims, as this study indicates, there would be little reason for anyone to spend the extreme amounts of time necessary for success at schools like those run by both Clark and Chetanananda. Short cuts to the "highest state" are not only possible, they may actually insure success, the exact opposite of Chetanananda's claim.

What neither Clark nor Chetanananda neglect to mention is that their time-honored techniques of meditation can fool the brain. Because of the increasing levels of relaxation that one encounters during a meditative session, it is quite common for meditators hooked up to EEG machines to have their brain "shut down" before reaching the desired state. The brain, in effect is saying to the body, "You feel extremely relaxed, and so there's no need to go any further." These EEG tests have demonstrated that a majority of practiced meditators may never reach the lower levels of alpha that some yogic masters do, even though they believe they are succeeding in their pursuit. Brain entrainment, on the other hand, has been shown to be an almost fool-proof method of achieving these desired results.

The brain *DOES* follow the type of stimulus provided by brain entrainment technology. A photic flash rate of 8 to 12 Hz will produce alpha waves. A rate of 4 to 7 Hz will produce theta waves. Because of this effective method of wave alteration, the opposition to brain entrainment

technology expressed by meditation-boosters is probably inflicting a greater disservice to their own cause than to entrainment technology.

In a field that seems to be an ideal marriage of Eastern metaphysics and Western technology, meditators who refuse to accept the potential of entrainment are being left out in the cold. Their refusal to accept new techniques may be causing them to miss out on a means of insuring the positive results of their own efforts. It has been demonstrated time and again throughout many different modes of testing that those brain entrainment subjects who are already experienced in meditation enjoyed more vivid and deeper states of trance during entrainment sessions than they had ever achieved on their own. And, frequent use of this technology seems to be able to entrain the brain to replicate these states at will. Brain entrainment is a technology, therefore, in which we may all, experienced meditator and lay person alike, join in the common bond of meeting the Buddha within each and every one of us.

7.3

Here and Now and the Future of the Conscious Mind

Our current understanding of "brain entrainment technology" is only in its infancy, yet there seems to be little doubt that it has a remarkable future. The evidence clearly indicates that some form of brain wave entrainment is produced by brain entrainment technology. 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.

Research on the entire range of brain entrainment stimulation has been done, and is ongoing in places like San Francisco's Neurotechnologies Research Institute, as well as university labs and biofeedback centers across the nation. The early indications strongly indicate that this now-developing technology will profoundly revolutionize both our concepts of, and interaction with, our consciousness. As we reach toward Millennia III, the boundaries of global politics will naturally reach out to include the politics of consciousness. The new technology that has already emerged, and that is yet to come, both of which serve this link of politics and consciousness, will become what might be called a "politique": a process by which our neurobiology is linked with a global awareness through the technology of brain entrainment.

The evolution of human consciousness is, as this book has tried to explain, a tangibly manipulable process. We create our realities, and our collective creation is the universe. We have always had the ability to control our destiny, and reach out to what *Omni* has described as a "psycho-Utopia" (Hooper: 1989). What has been lacking is a convenient means to recognize this fact.

Early man's attempts to facilitate this process needed to be couched in certain forms of religious or spiritual dogma in order to have the most influence over the greatest number of people. But this dogma also prevented any of the traditional responses from ever truly achieving its goal: it automatically shut out all "non-believers," and even sought means by which to exterminate them.

The global shift in consciousness paradigms has not only moved away from this hierarchical mode of action, it has moved toward the unity that existed before our early attempts to "put it back together." The ecological phrase popular in the 1960s seems all the more appropriate today: "You can't put it together (referring to the earth), it already IS together." Brain entrainment is not a method for putting ourselves together, but rather is a means by which we can access and understand that all existence IS together, and that it is within each and every one of us.

SECTOR EIGHT: DATA BANK

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