

Creating Heaven on Earth: The Mechanics of the Impossible

How group practice of the Maharishi Transcendental Meditation
and TM-Sidhi programs radiates an influence of harmony
and progress into the world.

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THE BOOK IN BRIEF

CAN WE CREATE HEAVEN ON EARTH?

A wave of peace and freedom is rolling around the world. The Iron Curtain has melted, the Russians are holding elections, armies are marching home. The most disgraceful century in recorded history has suddenly turned to peace and light.

Now twelve scientific studies indicate that this global transformation has not been accidental. According to these studies, which have been critically reviewed and accepted for publication by respected academic journals, a powerful new technology has been discovered—a technology that harnesses the power of the human mind to generate world peace.

This discovery has resulted from a rare combination of ancient wisdom and modern science. The ancient Vedic tradition of India, the oldest continuous tradition of knowledge in the world, has long maintained that any nation can use trained meditation experts to create *rastri kavach* (“armor of the kingdom”)—an invincible shield of harmony and coherence. Now the *Journal of Conflict Resolution*, edited at Yale University, the journal *Social Science Indicators*, often termed the most influential academic publication studying quality of life issues, and many other academic publications have published studies that statistically define this startling phenomenon. When large groups of experts in the Transcendental Meditation® program taught by Maharishi Mahesh Yogi gather for group meditations, violence and disorder in the surrounding society simply dissolve.

The evidence comes from open, public statistics. When attendance at such a TM® gathering goes up, then violent crime, traffic accidents, and fires all go down. If open warfare is present in the society, then war deaths and injuries also decline. The effect has been replicated more than 20 times. Alternate explanations, such as weekends, holidays, seasonal variations, and weather changes have all been accounted for statistically. The correlations are highly significant—the chance of mere coincidence runs to one in 10,000 or less. Baffled academics in charge of the journals, unable to explain the results in any other way, have found themselves publishing the results.

“This is exciting research,” says Ved Nanda, an expert in peace studies and director of the International Legal Studies Program at the University of Denver. “It is a non-traditional conception, but the straightforward evidence gives the theory credence in my eyes.”

Says Raymond Russ, professor of psychology at the University of Maine and editor of the *Journal of Mind and Behavior*, “The hypothesis definitely raised some eyebrows among our reviewers. But the statistical work is sound. The numbers are there. This evidence indicates that we now have a new technology to generate peace in the world.”

This unexpected discovery has presented us with two rewards, once practical and one theoretical. First, research now indicates that we have in hand a statistically validated technology to create world peace. This technology has already been employed throughout the 1980s, with highly encouraging results. Given the active support of governments and people of good will in the 1990s, the studies show that it has the potential not only to create peace in the world but also to transform the quality of life in every society. Second, we now have ample scientific evidence to understand a profound new paradigm of human life. It is a new paradigm connecting mind and matter, consciousness and creation. It is a new paradigm which shows how all people can claim their birthright as full developed human beings, as individuals enjoying the perfect health and happiness of enlightenment.

These new ideas doubtless challenge our pre-conception. But the subject admits of both scientific investigation and systematic intellectual analysis. In a body of thought he calls *Vedic Science*SM, Maharishi has revived ancient understandings in a practical and structured way. Extensive research has by now provided objective support for both the meditation technologies he teaches and the underlying theories with which he explains

the effectiveness of those technologies. As Maharishi states, “We are not groping in the darkness for principles, and we are not at a loss for the procedure. Now we have it in our power to create an ideal, perfect civilization everywhere around the world. Now we have it in our power to create Heaven on Earth.”

CHAPTER ONE

THE MAHARISHI EFFECT: THE HYPOTHESIS

Golden morning light flows in through the fields of wild flowers to the ease of campus, over the gentle hills and through the great oak trees, and warms the rose brick buildings of Old Campus. Through these streams of light, streams of people flow from every corner of the 285 acres. They wind in two's and three's like slim rivers toward a central sea.

All the students are in these winding rivulets, all the faculty and staff, and hundreds of people who have moved to this small Midwestern town just for this purpose. They are headed toward the two Golden Domes of Pure Knowledge, round and gleaming in the soft morning light, modern buildings dedicated to an ancient practice. Toward the final moments the few people left behind start to run and wave and call, "Hold the door!"

And then, as the last of them slips inside, the outer doors close.

Everywhere on campus, there is silence.

Inside the older dome the curtains are drawn and the lights dimmed. A geometrical lacework of natural wood soars majestically overhead, and the flags of every nation lean out from the pillars that encircle the hall. Beneath this noble presence, wall to wall, one thousand men sit on the softly covered floor, fixing a small pillow, perhaps, or adjusting a back rest, making themselves comfortable for the most important moments of their day.

Lightly, a bell chimes and all one thousand close their eyes.

Then, in every mind, there is silence.

The school is Maharishi University of Management, the town is Fairfield, Iowa, and the time is every day, twice a day—at dawn and then again toward dusk. M.U.M., founded by Maharishi Mahesh Yogi in 1971, is a rigorous academic institution, accredited through the Ph.D. But the central feature of life at M.U.M. is that every morning and evening everyone gathers together (men in one dome, women in another) for the Super Radiance meditation assembly. There, sitting quietly together, they use the Maharishi Transcendental MeditationSM and TM-Sidhi[®] programs to create, as scientific research has now shown, an influence of harmony and progress throughout the United States and the entire world.

The idea is simple to state—though it may take a book to explain it in detail. Twelve published research studies have now shown that, like ripples on a pond radiating outward from a pebble's splash, ripples of orderliness and harmony radiate outward from this concentrated group of meditation experts. As the numbers at M.U.M. increase, crime, traffic accidents, fires, and war fatalities decrease. Not only do such signs of social disorder go down, but signs of coherence and progress go up. Patent applications, for example, stock market levels, and economic indicators all rise. Taken together, the more than twenty experiments reported in the twelve published studies show that in every statistical way the society becomes more peaceful, more coherent, and more progressive.

The Super Radiance assembly at M.U.M. is named after the super radiant effect in optical physics, in which a small proportion of coherent photons in a beam of light influence all other photons to join in the powerfully coherent beam we call laser light. The Maharishi Effect is named, in the scientific tradition (the Doppler Effect, the Meissner Effect), after the man who first predicted it, the founder of TM and the worldwide movement for the Transcendental Meditation program, Maharishi Mahesh Yogi.

Super Radiance assemblies, generators of social coherence, have gathered temporarily in England, Holland, Italy, Yugoslavia, Lebanon, Israel, and India. Groups of meditation experts have also gone to hot spot nations around the world to deliberately calm down violence and disorder. And in the three most encouraging short-term tests, brief gatherings of up to seven thousand meditation experts have coincided with a sharp

decline in terrorism and international conflict throughout the entire world (see chapter Two for details on this research).

The long-term benefits of Super Radiance, however, have the most bearing on world history. What would happen, for instance, after a decade in which many one- to three-week TM assemblies had been held, and in which three permanent TM assemblies, M.U.M.'s the oldest, had been constantly maintained on three different continents? In an ideal world, the answer to that might be: (1) the end of major warfare all around the world, (2) a dramatic decline in international terrorism, (3) the collapse of the Iron Curtain and a sudden worldwide wave of freedom and cooperation, and (4) a blossoming of respect and friendship between the two superpowers.

We are living in such a world today. A decade in which many Super Radiance groups have produced the Maharishi Effect all around the world has culminated in a sudden global transformation toward peace and freedom, a transformation predicted by no governmental leader or political commentator.

One person, however, did predict such a worldwide renewal. In the fall of 1987, Maharishi began to talk of the imminent arrival of world peace. While Iran and Iraq tore at each other in a seemingly endless war, while the Russians bombed craters every few feet into the barren ground of Afghanistan, Maharishi publicly proclaimed 1987 as his Year of World Peace. In speech after speech he talked of a coming "transformation in the trends of time." Repeatedly he predicted that such signs as a softening in the rivalry between the superpowers and an end to the Iran-Iraq war would not only come soon, but that they would serve as indications that a permanent state of world peace had arrived.

These predictions were based on Maharishi's assessment of the cumulative effect produced by Super Radiance assemblies around the world. Research had shown that each short-term assembly had an immediate positive effect on crime and accidents—even on open warfare. In Maharishi's view, the cumulative effect of the short-term assemblies, plus the permanent groups in America (at M.U.M.), Europe (in England), and India (near New Delhi), had purified the world's atmosphere. The overall level of tension and stress had been reduced enough to produce a dramatic worldwide shift toward harmony and peace.

Unlikely as Maharishi's ideas might have seemed at the time, the transformations came as predicted. First, in December, 1987, in Washington, D.C., President Reagan and General Secretary Gorbachev signed the INF treaty—a superpower breakthrough which, for the first time, did away with an entire class of nuclear weapons. Six months later, after nearly eight years of bloody and fruitless fighting, the Iran-Iraq war suddenly came to an end. With these two events, moreover, came a sudden rush of international accord. The Soviet Union began to pull its troops out of Afghanistan, the Vietnamese theirs out of Cambodia, and years of fighting in southern Africa wound down at last. At the end of 1988, *Newsweek* magazine hailed that year as the "year of miracles."

Maharishi, however, was not yet satisfied. An end to over fighting no longer seemed a high enough goal. If an encouraging level of global peacefulness had already been achieved, and if a systematic technology had been discovered to continuously increase the levels of harmony, orderliness, and progress in the world's atmosphere, then it was time to set a higher goal. "Now it is time to put an end to suffering and problems all around the world," Maharishi said. "Now it is time for all good everywhere and non-good nowhere. Now it is time for the creation of Heaven on Earth."

Maharishi said this was a long-term goal, hardly to be fully achieved overnight, but world events did soon seem to take a turn in a direction almost too hopeful to believe. Eighteen months after Maharishi began to talk of Heaven on Earth—by the end of 1989—children were riding bikes on the Berlin Wall. Nations held in bondage through most of this century suddenly found freedom in the streets of their cities. One year earlier it was accurate to say that no Communist totalitarianism had ever surrendered control of a country once gained. Now, suddenly, Communists were voting themselves out of power throughout eastern Europe. Elsewhere in the world, Nelson Mandela was freed after three

decades in a South African jail, the IRA requested a ceasefire in Ireland, the first it had sought in twenty years, and in Chile and Nicaragua, authoritarian governments quietly submitted to the power of the ballot box. If life was not yet heavenly on earth, still it was apparent to all that 1988's wave of peace had been only a beginning. A historic transformation was taking place in the world—a transformation for which most commentators had no explanation.

THE MECHANICS OF PERFECTION

Is there such an explanation? Have Super Radiance assemblies radiated harmony and orderliness into the world? Can we really take seriously the idea that group meditations radiate peace into the world like a lamp radiates light into the darkness?

If so, this is clearly an issue that requires careful thought. When people first encounter this idea, there are three questions they often ask:

1. Does the research really show the Maharishi Effect? Aren't these results just coincidence—affected by the weather, the time of year, or other factors going on in the society?

2. Who are the people involved in Super Radiance? Are they intelligent, reasonable, stable people?

3. What plausible theory could possibly account for this effect/ What sound reasons are there to believe such a theory?

Such questions are well taken, and brief answers are in order—as an introduction to the more detailed discussions that follow.

As for the first questions, the statistical evidence for the Maharishi Effect will be covered in detail in Chapter Two. One point worth noting now is that, in keeping with good scientific procedure, the experimental studies have been replicated many times. Since the fall of 1978, the TM organization has held many large Super Radiance assemblies. Each assembly has been a definable experiment, with meditation experts first gathering, then dispersing. Often specific predictions about the positive effects have been made to scientists and the media before the assemblies have gathered. The result: each assembly has coincided with statistically significant changes in the surrounding society. Nearly forty of these experiments have been conducted in all, and more than half of them have already been written up and accepted by academic journals. Elaborate statistical precautions have ruled out the possibility that weather, holidays, or other extraneous factors interfered with the experiments. Even without a theory to explain it, in other words, the statistical impact of the Maharishi Effect is, in the words of researchers, “significant and robust.”

Second, it is important to know what kind of person is involved in Super Radiance; you can tell an idea by the friends it has. People who come to M.U.M. expecting a New Age happening, a replay of the Sixties, are inevitably surprised by the focused and businesslike atmosphere on the campus. M.U.M. is a solid school, accredited through the Ph.D. by the nation's oldest and largest accrediting organization, (the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools, 30 LaSalle St., Suite 2400, Chicago, IL 60602 (800) 621-7440), with a strong emphasis on the hard sciences and mathematics and an enviable record of placing its graduates in the best post-graduate programs around the country.

As journalists who visit Maharishi University of Management have noted, experts in the TM technique and the advanced TM-Sidhi program (people known informally as *Sidhas*) are a sensible, down-to-earth group. The M.U.M. students appear “more affluent

than most, better-dressed than most, but otherwise not unusual" (*Boston Globe*). People at M.U.M. "wear no exotic dress; they practice no curious rituals. . . ([Among the businesspeople who have moved to Fairfield to join the large group meditations] are stock brokers, investment counselors, and securities traders with credentials from the biggest firms on Wall Street. . . . There are 22 Sidha millionaires in town" (*New Republic*). Taken as a whole, "they're about as together a group of men and women as you're likely to find anywhere, confident and secure in themselves, pink-cheeked and health, and fond of kidding and a good laugh" (*Milwaukee Journal*).

Visiting academics are similarly impressed, particularly with the M.U.M. student population. "The student interest in matters intellectual and the general enthusiasm, creativity and energy was striking, much higher than I am accustomed to seeing in the typical undergraduates at other universities," said James T. Townsend, Professor of Mathematical and Experimental Psychology, Purdue University.

"I've been to 200 campuses all over the country," said Jack Burnham, chairman of the Art Department at Northwestern University. "The students I've encountered at M.U.M. are better motivated, more like a family. They seem to be more wide awake, more lively in terms of their thinking."

The friends of Super Radiance seem impressive to those who meet them.

Finally, the third question: *is* there a sound explanation for the Maharishi Effect? How can it happen? Can science produce a theory for what at first sounds impossible?

The answer is yes. There is a well-documented theory, a theory consonant with the latest scientific thought in other fields. Though this book has been written to lay out this theory in detail, the main idea can be stated simply. Like every other aspect of nature—like gravity, like electromagnetism—consciousness is at basis a *field*, an infinite, unbounded, unmanifest reality. And waves travel this field like ripples travel the surface of a pond.

Radio provides an analogy. It works the same way and, one hundred years ago, it was just as hard to believe. Marconi invented the first radio in the late 19th century. He gathered his friends to tell them he could use a small box to transmit his voice many miles through thin air. There was no longer any need for intervening wires, he assured them. His voice could travel invisibly through the air. In response his friends committed him to a mental institution for three weeks of thorough testing.

A century later we are familiar with the radio, however, as well as with television, radar, and other examples of the phenomena physicists call *fields* and *field effects*. The electromagnetic field, for example, exists everywhere in the universe. This field is unbounded and all-pervading, as though all the universe were submerged in an invisible ocean. Radio, TM, and radar work by sending waves through this electromagnetic field. These waves can't be seen, but they have their effects. When you turn on your television, you gain the benefit of an electromagnetic field effect. The gravitational field works the same way, as do the two other force fields of nature, which manifest themselves only at subatomic distances. As the basic mechanism of nature, invisible, immaterial waves move through invisible, immaterial fields. Although Marconi's friends thought that impossible, even insane, we have grown used to the notion by now.

To understand the Maharishi Effect, it is only necessary to posit that consciousness operates like every other aspect of nature. In this view consciousness, too, is an infinite, invisible field—with waves that radiate throughout society.

THE NATURE OF CONSCIOUSNESS

This is not our normal understanding of consciousness, of course. In fact, in modern society, the concept of consciousness is not often considered at all. We know we are conscious, we know we are awake. But what is *wakefulness*, what is *consciousness*? We

vaguely picture our mind inside our head, closed up in our skull, as though the brain and the mind were one and the same. But the theory examined in this book indicates that consciousness, like other aspects of nature, is a field, an unbounded, all-pervasive ocean everywhere available, and the human brain is, among other things, an intricate broadcasting and receiving station for the waves that travel this field.

Though this field theory of consciousness is a new idea in an age of objective science, in fact, it is an idea thousands of years old. While it is true that scientists have validated the central points of the theory in just the past decade, the theory itself was first laid down in the dawn of recorded history. The civilization which gave rise to these ideas—the Vedic civilization which flourished in India millennia into the past—took human consciousness as its chief point of focus. The great “scientists” of that civilization investigated subjective truths rather than objective truths—mind rather than matter. They did their investigations sitting with eyes closed, using mental technologies to probe the depths of human awareness.

In exhaustive records still available today, these pioneers of consciousness meticulously catalogued three aspects of their subject: (1) the various inward levels of the mind—the deep, foundational levels of consciousness which uphold the surface level of mental activity experienced every day; (2) the relationship between mind and matter—between the laws of consciousness and the laws of the material world; and (3) the hidden potentials of consciousness—detailed descriptions of higher states of consciousness.

The central tenet of this ancient Vedic wisdom is that human life can be lived on a much higher plane than the mature, well-adjusted adulthood commonly held to be the highest goal in modern societies. In fact, the whole of the ancient literature is filled with precise descriptions of higher states of consciousness—and in these higher states, theoretically, a person becomes much more awake. Perception is said to refine and knowledge to deepen. Just as the fuzzy vision of a near-sighted man can be turned to clarity with the right type of glasses, so the relative dullness of ordinary states of consciousness can be sharpened in these more evolved states. The ordinary ways of seeing and thinking are left behind, outmoded and outgrown, and a person is said to directly perceive the heart of nature’s functioning. Linguists know that language evolves to label and discuss the experience of its speakers. Interestingly, the original Sanskrit in these descriptions of higher states of consciousness is replete with words and phrases not available in any modern language, words and phrases which label and describe nuances of mental experience which have been until recently almost unknown.

It is through the experience of these higher states of consciousness that the ancient *Rishis*, the seers, theoretically cognized the deepest realities of man and nature. They gained the knowledge directly, subjectively, through immediate awareness of creations; mechanics.

MAHARISHI VEDIC SCIENCE: THE HYPOTHESIS

Until recently these Vedic descriptions, when considered at all, have been thought mystical—even imaginary. But two things have happened in recent years. First, Maharishi Mahesh Yogi has revived the ancient Vedic teachings in a holistic and systematic manner. These teachings had become thoroughly confused in recent centuries, even in India. But now Maharishi has systematized the teaching of meditation to produce uniform and scientifically verifiable results, and he has clarified the logical understandings of meditation, which has opened a dialogue with the objective disciplines. Second, in just the past few years it seems that modern science has begun to catch up with ancient wisdom. Largely by accident, physics has glimpsed an ancient understanding of nature, and physiology an ancient understanding of human nature. The two together have helped make logical, objective sense of an intuitive, subjective truth. They have indicated a profound possibility for human life, a possibility that comes anew

to an age of science after long centuries of confusion and neglect: the world of nature and the world of the mind can be united at their source. Like the five fingers united on one hand, the all-pervading force and matter fields of the material world can be united with an all-pervading field of consciousness—in one fundamental, universal wholeness.

To put the hypothesis as compactly as possible: the human mind can bring peace to the world because the human mind is one with the world, at the most basic level.

From the standpoint of modern science, the most useful aspect of these understandings revived by Maharishi is that they can be tested rigorously. Ancient, subjective knowledge can now be checked through modern, objective means. Ideas usually deemed metaphysical or mystical can resolve to objective fact. It is this objectively verifiable nature of the central Vedic teachings that has led Maharishi to term his teaching Vedic Science.

For this book, one particular principle of Maharishi's Vedic Science is central. The Vedic literature prescribes a technology whereby even a small percentage of any given population can create what was termed *rastri kavach*, and invincible shield of *national armor*. Rather than focusing on weapons, military preparedness, and other aspects of a strategy abased on the outer, objective level of life, the Vedic strategy was to focus inwards, through a technology for enlivening the inner, subjective strength of consciousness. Even a few experts specializing in this subjective defense technology were said to radiate an influence so coherent and powerful that no enemy would dare to attack—and, even more importantly, an influence so harmonious and positive that no enemy would be born in the first place. Thousands of years ago the Vedic seer Patanjali encapsulated this idea in a single phrase: *Tat sannidhau vairatyagah*, which means, "In the vicinity of the settled mind, hostile tendencies fall away."

The essence of this understanding can be summed up in a mental picture, an analogy first sued by theoretical physicist Lawrence Domash. Imagine a time thousands of years into the future when intrepid archaeologists dig down and find the remains of a large television broadcasting station. The machinery has been perfectly preserved, all the wiring and gauges and switches still intact. There is a handbook for operating the broadcasting machinery, written in a language the archaeologists understand. They take the handbook, read the directions, and throw the switches to turn on the equipment. Nothing happens. They pore over the machinery, re-read the manual, and still cannot get the machinery to respond. They are about to give up when one of their number notices a long cord extending from the machinery. It ends in a three-pronged plug. It is lying on the floor. The archaeologist picks up the plug, sticks it into a wall society nearby, and the broadcasting station hums to life.

In the understandings of Maharishi Vedic ScienceSM, we today are archaeologists of consciousness, just now beginning to dig down and unearth the capabilities latent in the human brain. The brain is a magnificent piece of electronic equipment, more complexly wired than the largest computer. There are billions of neurons, each neuron with thousands of filaments—thousands of connectors that reach out for other neurons. There are, by one estimate, more possible connections in the brain than there are atoms in the universe. But until recently, if the Vedic understanding is accurate, we have forgotten how to take this magnificent piece of equipment and connect it to its source. In his Vedic Science, Maharishi indicates that there is an infinite field of pure potential, a field of all possibilities, at the basis of nature, and that the human mind can enliven its dormant capabilities by directly contacting this field. Once the mind settles down to attune itself with this field of infinite potential, then, like he broadcasting station, it can begin to work with the splendor of its full potential and radiate into its environment a powerful influence of peace and positivity.

This understanding resolves into four postulates, four concepts which can be taken by a scientific age as predictions or hypotheses ready to be tested. Each one of these conceptions has already been the subject of some of this century's most revealing

scientific investigation; each will be the subject for one of the succeeding chapters in this book. These four hypotheses:

1. One unified field of all the laws of nature. Vedic science maintains that there exists one basic field of existence—not many different fields of nature but one *unified* field that is infinite, timeless, and transcendental—a field which underlies and supports all other fields, all the mechanics of nature’s functioning. As the same ocean gives rise to all waves, so the same unbounded, omnipresent field is said to give rise to all the laws of nature that structure our universe.

2. Human connection to this basic field through a fourth major state of consciousness. In the Vedic understanding, the human mind can settle down deep within its own nature and directly contact this underlying unified field—by experiencing a unique *fourth state of consciousness*. This fourth state of consciousness is precisely described and is said to be completely different from the common three states of waking, sleeping, and dreaming. As a farmer can drop a well to an underground reservoir, so the human mind can settle down deep within its own nature and directly experience the unified field.

3. Evolution of human nature toward higher states of consciousness. Vedic texts maintain that, once the human mind begins to attune itself with the deepest level of creation, human nature leaves behind its apparently fixed status and begins to evolve rapidly. Life starts to become more successful—more coherent, progressive, and harmonious. Mistakes decrease, suffering falls away, and this qualitative improvement builds up over time as the mind begins to experience higher states of consciousness.

4. Collective growth toward ideal society and invincible defense. In his Vedic Science, Maharishi explains that invincible defense is a creation of consciousness. Defense is created spontaneously by a harmonious, coherent, and positive state of consciousness within an entire nation. In the lore of the hunter, a man with no fear will not be attacked by wild animals. In the understandings of Vedic Science, a nation with no fear will not be attacked by its enemies. And even a small fraction of the population can theoretically radiate this field effect, this harmonizing, positive influence, throughout the collective consciousness of the entire nation. Those few minds, as they become fully attuned to nature’s laws at their source, purify stress, tension, and fear from their environment. They create an impenetrable harmony and unity in the collective consciousness of the nation which disallows invasion by an enemy. Even a single lamp can light an entire room; even one group of highly trained minds can enlighten an entire society—and thereby create the invincible defense of *rastri kavach*.

Even ten or fifteen years ago, such notions could have been dismissed as mystical dreaming, seemingly absurd and surely unscientific. But objective research has progressed rapidly. Recent investigations in physics, physiology, and sociology bear directly on these four Vedic principles. In every case, the latest evidence indicates that the Vedic understandings are accurate.

1. Physicists have defined one unified field of all the laws of nature. The deepest penetrations of quantum physics have revealed that all the different force and particle fields of nature find their common source in one *superfield*, one unified field of all the laws of nature. Like the oceans that give rise to all waves, this field can be mathematically defined as an infinite, eternal, transcendental reality at the basis of nature’s functioning, a home of all the laws of nature, which gives rise to all the natural forces and sub-atomic particles that structure our universe (see Chapter Three).

2. Physiologists have defined a fourth major state of human consciousness.

Inventive and well-controlled experiments by neurophysiologists at UCLA, Harvard, the French National Institute of Medical Research, and other research centers have defined a fourth major state of consciousness. Identified in people practicing TM and the advanced TM-Sidhi program, this fourth state is markedly different from the three common states of consciousness. It is identified by increased orderliness in brain wave functioning, a profound level of physical rest, and many other physiological changes (see Chapter Five).

3. Hundreds of research studies have demonstrated rapid growth toward higher states of human functioning. Hundreds of published research studies, carried out at major universities and research centers throughout America and around the world, have shown that regular experience of this fourth state of consciousness leads to progressive improvement in both body and mind. These studies documenting the benefits of the TM and TM-Sidhi programs show that human nature need no longer be fixed, that it is possible to measurably and markedly unfold potentials latent within both mind and body.

4. Open, public statistics have shown measurable improvement in whole societies which coincide with large Super Radiance assemblies. The data are repeated and impressive (see Chapter Two).

The remaining chapters in this book will take in in-depth look at these findings. The subjective research first done by Vedic investigators deep within the mind has been corroborated by objective research done by modern scientists in up-to-date laboratories. Four basic principles of Maharishi Vedic Science—the Unified Field, the fourth state of consciousness, rapid evolution of human nature, and the production of peace through *rastri kavach*—are now well-documented elements in a long lost theory of human life, a theory of the interconnectedness between nature and human nature, between creation and consciousness.

In a scientific age these ideas undoubtedly come as a surprise. Yet throughout the history of science, leading scientists have pulled ideas once thought mystical or metaphysical into the realm of objective research. Yesterday's myth is today's hard fact. People once thought the shape of the earth a metaphysical question, a matter of personal belief, of subjective preference, beyond any objective test. Even one hundred years ago, physicists considered the inside of the atom utterly unknowable, as much a matter of pure speculation as the angel population on the head of a pin. But the progress of analytic thought and the improvement of measuring instruments eventually included the shape of the world and the contents of the atom within the range of science.

Science is not determined by subject matter, in other words. Science is determined by methodology. The history of science is a history of old ideas confronted by new evidence — and if the evidence has been carefully gathered, then the old ideas give way. It's often wrenching for people to change the conceptions they acquired growing up; when Galileo announced that the sun, rather than the earth, is the center of the universe, for example, the authorities of his day locked him up for the last eight years of his life. By now it is clear, however, that any theory is scientific if it can be treated scientifically. If a theory is logically consistent, if it is open to experimental investigation, and if that investigation supports the theory, then the theory is scientific. A theory is accepted because its logic is sound, because its reach is broader than competing theories, because it explains phenomena otherwise inexplicable (or, to put this another way, it predicts things otherwise unpredictable), and because, at those points where it can be experimentally verified, tests are always positive.

It is now possible to see that major tenets of the ancient Vedic literature, measured by these criteria, belong within the realm of science. Their structure is consistent, their reach is broad, their explanatory or predictive value great, and at all the points where they are open to objective investigation, the findings are consistently positive.

It is Maharishi who has provided the techniques and the explanations which have produced this objective understanding of subjective wisdom. He comments upon the objective validation of Vedic wisdom in these terms:

Now we have this knowledge from three sources. We have it from the ancient tradition of the Vedic literature. We have it from personal experience through Transcendental Meditation and the TM-Sidhi program. And we have it from the objective investigations of modern science. Now we can use the term Vedic Science. And this Vedic Science is so very profound. It harnesses the total potential of nature's organizing power, which is located in the unified field of all the laws of nature. It allows the human mind to align itself with all the laws of nature at their source, on the basis of the intimate relationship between consciousness and matter. This is the glory of Vedic Science.

Recent scientific investigations suggest that Maharishi Vedic Science is a newly rediscovered treasure of immeasurable value. This is why Maharishi, while traveling the world the last three decades teaching the Transcendental Meditation program, has spent a great deal of his time reviving interest in the Vedic literature. In his view the deepest meanings contained in this literature have been largely lost even in India. To enliven the ancient wisdom once again, he has over the years organized scores of assemblies and symposia, bringing together the most learned of Vedic scholars with highly qualified Western scientists, in a systematic search for first principles. Among the frequent participants in these cross-fertilizations have been physicist Brian Josephson, Nobel Laureate from Cambridge University, physicist E.C.G. Sudarshan, Director of the Center for Particle Theory at the University of Texas, Harvard-trained physicist John Hagelin, one of the world's leading experts on the most recent unified field theories, geologist/cosmologist John Lewis from MIT, and biochemist Ilya Prigogine, also a Nobel Laureate. In large part, fruits of these discussions form the content of this book.

KNOWLEDGE FOR ACTION

When former American President Ronald Reagan first put forward his controversial Star Wars anti-missile proposal, the Strategic Defense Initiative, his stated motives could be universally admired. "I call upon the scientific community in our country," he said, "those who gave us nuclear weapons, to turn their great talents now to the cause of mankind and world peace: to give us the means of rendering these nuclear weapons impotent and obsolete." The President's specific proposal has been often questioned, but his goal was unarguable. There has been urgent need for a totally new technology, a systematic procedure which could put the threat of war behind us.

Certainly nothing we had tried in the past gave any hope of success. Stockpiling weapons had never led to anything but warfare. Nor had negotiations and peace treaties offered any real hope; researchers have located roughly 9000 peace treaties concluded in the three millennia of recorded history, and their average life span has been approximately eight years.

But now a new technology has become available. Rather than tinkering with weapons and treaties, hoping thereby to create a peaceful atmosphere in the world, Maharishi's approach is to create a peaceful atmosphere directly — through a sophisticated mechanics of consciousness. Super Radiance does not work on the *means* of war, but on the *cause* of war — on the tension, fear, and anger felt by people everywhere.

It is admittedly a totally new approach — but as Maharishi emphasizes, only a new seed can yield a new crop. Recorded history has been a constant story of suffering and struggle, of violence and warfare. Just since the end of World War II and the foundation

of the United Nations, there have been more than eighty wars in the world. If this tradition were to change, something new would have to be added to human knowledge.

Maharishi Vedic Science has provided such a new seed of knowledge. Super Radiance has already been systematically applied in the world, with results that can be checked in both statistical studies and daily headlines. But much more needs to be done. The world's current wave of peace and freedom has unsettled a large fraction of the world's population, socially, economically, and politically. If major warfare among the leading nations of the world already appears a part of the past, still there are turbulent changes to come as neophytes in freedom try to find their feet and ethnic factions assert their new liberation by reopening old rivalries.

The evidence presented in this book suggests a single answer to these multifarious problems. The statistics encourage us to establish large Super Radiance assemblies everywhere around the world — to blanket the globe with a statistically measurable influence of harmony, orderliness, and progress. Maharishi himself recommends the following formula: one permanent assembly of 10,000 should be established on every continent, and one smaller assembly (equal to the square root of one per cent of each relevant population) should be permanently established in every nation, province, and city.

To this point, Super Radiance assemblies have all been sponsored by Maharishi's worldwide movement. The cost has largely been borne by the participants themselves. This has meant that, except at M.U.M. and at an elementary and secondary school established by Maharishi in India, large, permanent assemblies have been impossible. For the many temporary assemblies held throughout the Eighties, participants had to secure leave from their jobs or schools and pay their own travel costs. Economic realities have thus hindered more widespread use of Super Radiance.

One institution in every nation has both the responsibility and the resources to establish large Super Radiance groups: the government. The government of every nation is responsible for the welfare of that nation. The government has the power of the purse. The government has large bodies of people available to be trained as Super Radiance experts — including police forces, military personnel, and students. It appears to be in any government's interest, and easily within its capabilities, to establish large, permanent Super Radiance assemblies. In Maharishi's words,

Here is a beautiful opportunity for every head of state. Quantum field theories have shown that all the activity in creation emerges from one unified field. From the unified field, nature governs the universe in perfect order, and always in an evolutionary direction. Today, every government can make alliance with this government of nature. Now we have in our possession that beautiful technology which can change the trends of time. We have the means to completely transform the weaknesses of all the people everywhere, the weakness of their thinking that results in all negative trends, all violence, all the wars between nations. When we create that powerful influence of coherence from one place through a large Super Radiance assembly, then everywhere in the world the human brain is infused with that influence of harmony and peacefulness from within. It may seem a magical effect, but the research is there to verify the effect. Every government in the world now finds itself in the position where it can act for the welfare of the whole world, where it can create that enormous, powerful influence of positivity and coherence, and take away all the black clouds that shroud mankind. By enlivening the unified field of natural law all around the globe, governments can make an alliance with the government of nature and bring harmony and peace and progress and real freedom from fear and suffering. The world can truly be made a heavenly place.

To feel confident in this possibility, it is necessary to understand in detail the four principles of Vedic Science — the four ancient "predictions" now open to scientific investigation. The place to begin is with the Maharishi Effect itself. Is there such a phenomenon? Do large group meditations actually radiate an influence of harmony and coherence into the surroundings? Is the Maharishi Effect a measurable reality?

CHAPTER TWO

THE MAHARISHI EFFECT: THE EVIDENCE

It was after midnight when we went on board the 707. This was London, but we were transshipping from New York, and we saw nothing of Merry Olde England but the signs in the tunnels telling us we were there.

There were forty of us, men in their twenties and thirties mostly, dressed in suits and ties. As we ducked into the plane, the first news was good — there were only five or six other people on the plane, and sleeping across empty seats would be possible for all. The low passenger count wasn't really a surprise. This was Zambian Airways. The next stop was the capital city: Lusaka.

We were late onto the plane, which backed out as we buckled up, and we plowed steeply upward into the night sky before a stir passed through the delegation of forty. Someone had picked up a newspaper from the seat beside him. Soon other papers had come from the flight attendants. There weren't enough for everybody, and I had to wait several minutes until the man in front of me passed his copy back. It was the Lusaka Times, the official paper printed in Zambia's capital, dated that same day, Monday, November 4, 1978. An eight-column headline across the top of the front page declared, "Lusaka Bombed Again."

As our plane hummed through the blackness, each of us huddling under a cone of light, the newspaper told us why we were heading for Zambia. Neighboring Rhodesia [now Zimbabwe] was entrapped in a bitter civil war, blacks against whites, a bloody conflict that had been escalating for years and showed no sign of easing. The whites, led by Ian Smith, had the government and the army, the blacks the numbers and the will. Zambia, a black republic landlocked inside Rhodesia in the southeastern quadrant of Africa, had been dragged in as a staging ground for two different guerrilla factions. Rhodesia had lately taken to repeated bombing raids of its neighbor, partly to harass the guerrillas and partly to convince Zambia not to host them. Bombing had been frequent the past month. The newspaper didn't say so, but now we knew: we were going there to stop it.

The forty of us on that plane could accurately be called a delegation of meditation experts. Each of us had been practicing the Transcendental Meditation technique for many years and the advanced TM-Sidhi program for at least a year. Most of us had put in a year or more on long meditation courses, devoting time and attention to more profound personal experience during meditation and, as scientific research has by now made clear, to the refinement of the operation of the brain and nervous system. But it was only recently, in the past couple of years, that it had begun to appear we were doing something else as well. We were preparing to create peace in the world.

The first research had appeared in 1974. In eleven American cities where at least one percent of the population had learned the basic TM technique, the crime rate fell. Since then, hundreds of cities around the world had gone over the one percent mark, and the trend had held good. Not only did the crime rate go down, but hospital admissions declined and traffic accidents decreased. Then, in just the past summer, in August, 1978, as many TM-Sidhi-trained experts as possible gathered in a single state or province of 108 nations. With the advanced TM-Sidhi program, especially when practiced in groups, the radiating effect seemed much stronger. The results of this Ideal Society campaign were encouraging. In Rhode Island, for instance, where Americans gathered, researchers looked at statistics for accidental deaths (an easy statistic to gather quickly) and found a sharp decrease in the numbers during that August — compared to the months before and after and compared to the same month in earlier years.

Repeated evidence was showing that meditation experts could radiate an influence of coherence and positivity into their environment.

For forty of us, the next step was a plane ride to Zambia.

The experience was a new one for all of us. We knew about the crime rate research. We knew that groups had gone before us, a month ago, to Nicaragua and surrounding nations, and that the civil war there between the Somoza government and the Sandanistas had come to a halt (a pause that would last from October 1978 to January 1979). Now it was our turn, and the newspaper made the challenge clear.

If our mission seemed dramatic, however, our methods were staid. Once we arrived in Lusaka, we took up residence at the Andrews Motel, the finest travelers' facility in Lusaka (though it would be at best a two-star road stop in America) and essentially never left the grounds for the next six weeks. We did make an early trip to tell local government officials of our aims in Zambia, but we never met a soul who had anything to do with the fighting, and, in fact, we hardly met anyone at all. Our day consisted of long stretches of group meditation, punctuated by meals and three daily meetings. There was no intent, in other words, to affect Zambia's situation through discussion or persuasion. Our focus was simply to stay together, meditate, and radiate the abstract influence of harmony and peacefulness which experience had shown to be effective.

For years afterward we had no significant statistical evidence to prove what seemed true at the time. As far as we could tell from reading the newspaper and listening to the radio peace returned to Zambia overnight. Bombing stopped on the day of our arrival, and there were no serious incidents of either domestic or international violence reported in Zambia during the six weeks of our stay. Probably the strongest indication of the success of the project came a month after we arrived. We had intended to leave at that time, but two government officials came on separate visits to the Andrews Motel to ask us to stay. Both the Provincial Secretary for Lusaka Province (a rank equivalent to governor) and the Provincial Minister (comparable to a Senator) told us that the month prior to our arrival had been the worst since Zambia's independence and that the change since that time was both obvious and welcome. Now national elections were scheduled, the first in years, and as in most third-world countries, Zambia had a tradition of unrest on election day. The newspaper had recently featured prominent stories on the violence expected. The Provincial Secretary and the Minister asked us to stay at least two more weeks, until the elections were over.

We did stay. The elections were held in an atmosphere of peace and calm throughout the nation.

Two days after the election, we packed up and caught the daily flight back to London at nine in the morning. That afternoon Lusaka was bombed.

FROM STORIES TO STATISTICS

If you tell a story like that one to a social scientist, prepare yourself for a tolerant smile and a polite dismissal of merely *anecdotal* evidence. A story is an anecdote, and the word anecdote often means joke. Anecdotes are not treated seriously by scientists.

In the more than a decade since that trip to Zambia, however, the evidence for the Maharishi Effect has gone from dinner-table stories to often-published statistics. A team of researchers at Maharishi International University, well-trained and indefatigable, has fought a battle of the numbers for twelve long years. Using ever more rigorous experimental design and statistical analysis, these researchers have honed their studies until, finally, even the most skeptical editors of academic journals and conference proceedings have relented and published the research.

For those unfamiliar with research procedures, the fact that a particular study is *published* means more than that it has simply been printed and distributed. Most research journals are *refereed*; that is, a panel of distinguished experts in the field (the referees) read and judge every study that is submitted. Their goal is to prevent information from being published which is inaccurate or insufficiently demonstrated. These referees are

especially concerned with research methodology — the scientific and statistical procedures that have been used in any particular study — to make sure that the correct experimental design and the correct mathematical analysis have been used for any particular experiment. When the point being made in a study is new or particularly controversial, the referees tend to read such a study even more critically than usual and judge it against the strictest requirements.

Such heightened defenses, designed to protect the academic world from an onslaught of the faulty and the ill-considered, faced the researchers from MIU. For years the journal referees asked, in ways rigorously methodological, the many common sense questions that any sensible person would want to ask about Super Radiance: Does it work every time it is tried? Do the changes always begin after the gathering of a group of meditators? Do the changes ordinarily cease when the gathering breaks up? How do we know the changes weren't going to occur anyway? Do such changes ordinarily happen at the same time of year? What other factors might explain the same results? just generally, in such a complex system as human society, how can one ever be sure of the effect caused by any one particular agent?

The MIU researchers knew from the beginning that they would have to deal with such questions. The theory they were propounding was too unconventional to expect anything else. It was a theory they usually expressed in terms of a new sociological concept — the idea of collective consciousness. In the words of Dr. David Orme-Johnson, chairman of MIU's department of psychology, "What the Super Radiance studies show is that a few individuals, when they experience more coherence within their own consciousness, radiate increased coherence into the collective consciousness of the entire society."

By collective consciousness Dr. Orme-Johnson means roughly what news magazines mean by national mood, stock brokers mean by the investor climate, and historians mean by the German word *Zeitgeist* ("spirit of the times"). There is an overall tone or flavor characteristic of any particular population in any particular period, a reality well-known to the traveler who rapidly moves from, say, England to Italy to Egypt. There is a national character indigenous to each country and usually it is easily perceived. It is this overall quality which Orme-Johnson defines in the following way:

Collective consciousness we see as the sum total influences of all the individual consciousnesses within a society. An analogy is provided by a series of small magnets. If they are put all together with their poles aligned, they create an overall field which then, in turn, affects all the individual magnets. Collective consciousness arises in the same way, from the individual members of a society, and then it has a reciprocal influence on those same individuals, modifying their thought and behavior. Incoherent individuals create an incoherent collective consciousness, which increases the probability of crime, sickness, accidents, etc. We hypothesize that a Super Radiance group of sufficient size creates an influence of coherence which increases the coherence in the collective consciousness of the entire nation, and that this overall improvement helps produce increased coherence within the individuals of that society.

If the individuals in a society are thought of as smokestacks, each one puffing a certain amount of stress and anxiety into the atmosphere, then the collective consciousness is the overall result. If the collective consciousness is polluted by the individuals, then the whole atmosphere is filled with excessive stress and negativity. In the understanding of Maharishi Mahesh Yogi, it is this turbulence and disorder in the collective consciousness which gives rise to turbulence and disorder in the life of the nation. In other words, the relationship between individual consciousness and collective consciousness is reciprocal. Although the individuals are the original source of stress, still the build-up of stress in the collective consciousness also distorts the thought and

behavior of the individuals in the society. In Maharishi's words, "All occurrences of violence, negativity, conflicts, crises, or problems in any society are just the expression of growth of stress in collective consciousness. When the level of stress becomes sufficiently great, it bursts out into external violence and war, or internal crime, accidents, and disorder."

This implies that there is one solution to all problems of internal and external disorder: reduce the level of stress in the collective consciousness. Radiate an influence of harmony and orderliness that purifies the atmosphere of the nation. This is the role of Super Radiance assemblies.

If this unusual theory posed a challenge to MIU's researchers, however, they also had one notable advantage. Their research methodology could be both simple and easily verifiable. The evidence they needed could come almost exclusively from open public statistics — war deaths, crime rate, traffic accidents — data which is gathered by governments and other organizations and available to anyone who wants to see it. Super Radiance is supposed to affect the entire society; therefore, statistics which measure any aspect of society should demonstrate the effect. It is true that many of the statistics that are available measure only the negative aspects of society (including fires, infectious disease rate, drugs, divorce rate, etc.) while many of the most important statistics from a human point of view, such as number of smiles passed between mother and child, or number of poems written per capita per day, are not available. Moreover, it is sometimes true that relevant statistics are not available in relevant ways; daily or weekly numbers may be needed and only monthly or yearly figures obtainable. These limitations, however, are usually challenges rather than insurmountable obstacles. Super Radiance research can ordinarily be carried on simply by collecting public data and analyzing it intelligently. Any researcher can do it. The data fits the most important scientific requirement: replication of the results is easily performed.

Though the ideas of collective consciousness and the Maharishi Effect amount to a new paradigm, very little in the social sciences is open to such simple and precise verification. That is the main reason why MIU's researchers, though they faced a worthy gauntlet of skeptical questions, finally broke into the journals.

REVERSING THE CRIME WAVE

The first man to succeed was Dr. Michael Dillbeck. A psychologist who earned his Ph.D. at Purdue University, Dr. Dillbeck has the good-humored patience and clear eye for detail that mark the best statistical researchers. His research papers, like the paintings of Persian miniaturists, are filled with precise and daunting detail, the perfect style to break a paradigm-shattering idea into academic print.

For his first paper, Dr. Dillbeck went back to the original Super Radiance discovery. In 1974, researchers Garland Landrith III and Candace Borland had found that when one percent of a city population has begun the basic Transcendental Meditation technique, even though they all practice the technique singly in their own homes, still the crime rate in that city falls.

This finding was especially significant because crime — in any society where open warfare is not present — is the most disorderly and violent disturbance of the peace. If Maharishi's Transcendental Meditation program is a methodology for the direct creation of peace in the world, then it must surely be able to reduce crime.

The effect was first found in 11 cities which had gone over the one-percent threshold in 1972, but that original study left a number of questions unanswered. In the first place, there were actually 24 cities which had crossed the one percent threshold in 1972, and they all needed to be studied. In the second place, there are many social factors which affect crime, such as income levels, unemployment, and age, and these had not been taken into account.

To tighten this study into statistically convincing shape, Dr. Dillbeck's first step was to carefully match each of the 24 cities which reached the one-percent threshold in 1972 with other cities that were statistically similar in all the factors which affect crime. To have this done both accurately and objectively, he enlisted the aid of an independent consultant from Bowling Green State University. Once he received the choices for the 24 matching cities, Dr. Dillbeck ran a statistical check to see if the two groups of cities were actually a good fit. Eight demographic variables were most important, eight variables which have often been shown to correlate strongly with average crime rate: (1) city population, (2) population density per square mile, (3) unemployment rate, (4) income, (5) median years of education, (6) percentage change in residence each year, (7) percentage of families below the poverty level, and (8) percentage of persons in the age range of 15 to 29 (the range with the highest probability for involvement in crime). No one city, however carefully chosen, could ever be an exact match for any other city on all these variables. If the control cities are well-chosen, however, then the averages for the 24 one-percent cities should be quite close to the averages for the 24 control cities. The figures showed that the consultant had done his job well. Seven of the variables matched almost exactly. The only significant difference: the one-percent cities had a higher median for years of education. Higher levels of education have sometimes correlated with lower crime rate, but this finding was matched by another which showed that in the five years before the one-percent level was reached in 1972, crime was actually rising at a faster rate in the one-percent cities than in the control cities. Given the design of the study, then, most of the factors which usually affect crime canceled each other out, and the one factor which remained (a higher median level of education, which has sometimes correlated with lower crime rates) seemed roughly balanced by the statistical reality that in those cities crime had been in fact rising more quickly.

Rough balance is not enough for statisticians, however. Dr. Dillbeck took recourse to a statistical tool known as ANCOVA (analysis of covariance) to control for the inequality in education. If a statistician were measuring people's height and wanted to control for the fact that one person was standing on a box, he would subtract the height of the box from that person's overall measurement to find his real height. Dr. Dillbeck used standard ANCOVA procedures to find and subtract the effect that higher education could have given to the one percent cities.

Only this one ANCOVA adjustment was needed to produce statistical parity between the two groups of cities. Against this statistically neutral background, then, the crime rate figures stood out sharply. In 1973, the year after the one percent threshold was reached in the initial 24 cities, there was a marked average decrease in crime in those cities. In the control cities, on the other hand, the average crime rate continued to climb. The difference between the two was, by standard statistical checks, significant at the $p < .002$ level, which means there were less than two chances in 1000 that such a strong result could have happened by chance. Researchers will usually call a particular finding significant only if it reaches $p < .05$, less than five chances in 100 of mere coincidence. If the level reaches $p < .01$, they call it highly significant, and $p < .001$ is called very highly significant. By these criteria, Dr. Dillbeck's first finding was highly significant and missed being very highly significant by only one chance in a 1000.

To add to the strength of the study, Dr. Dillbeck followed the crime rate in all 48 cities over the next five years. Through that whole period, the rate of increase in crime in the one percent cities was significantly lower than in the control cities ($p < .02$). Crime thus dropped significantly in the first year, and continued to grow more slowly over the next five. Dr. Dillbeck did a bivariate analysis for both the changes (the probability that they could have both occurred by chance) and the result was very highly significant ($p > .001$.) Dr. Dillbeck's careful work paid off. He had accounted for every factor usually thought to affect crime, and still the result was statistically strong. In 1981 his study was published in the journal *Crime and Justice*. The first scientific paper had appeared which

showed that meditation experts could promote the well-being of society. The Maharishi Effect had received its first published confirmation.

FROM *TM* TO THE *TM-SIDHI* PROGRAM

Even before this study appeared, however, several unpublished experiments had already shown that there was a more powerful way to transform the social environment. To the basic Transcendental Meditation technique this approach added two more factors: (1) the use of the advanced TM-Sidhi program as well as TM; and (2) assembly of the meditation experts into large groups that practiced the techniques all together.

The effectiveness of these Super Radiance groups proved important to MIU's researchers. To create societal changes with the basic TM technique, practiced by individuals on their own, required that one percent of the population learn to meditate. But by adding the TM-Sidhi program and gathering the meditators into Super Radiance assemblies, the statistical effects began to appear when attendance reached a level exponentially smaller - the square root of one percent. In the United States this Super Radiance number was, in the early 1980s, about 1530. For England it was 400. For the world as a whole it was 7000. These were manageable numbers, attendance figures which could be deliberately produced in different spots on the globe and thus statistically investigated in many different times and places.

Dr. Dillbeck set out to capture the statistical reality of what was then called the extended Maharishi Effect. To produce powerful statistical effects, his strategy this time was to write one research paper that reported on four separate experiments. "Regardless of how strong any one experiment is," Dr. Dillbeck said, "it can still seem easy to dismiss as mere coincidence. When you report on four experiments at once, however, you make coincidence a very difficult argument to sustain."

As the main focus of his study, Dr. Dillbeck once again emphasized crime rate as the best single indicator of social incoherence, of stress in the collective consciousness. As experiments he picked four of the largest Super Radiance assemblies held between 1978 and 1984, assemblies held where crime rate data was available for evaluation. The first was a summer-long project in the state of Rhode Island in 1978, part of the worldwide Ideal Society campaign, in which more than 300 TM-Sidhi experts gathered in the smallest state in the union. The second assembly involved 3,500 TM-Sidhi experts who visited New Delhi, India, in the fall of 1980 for a course on Maharishi Vedic Science. The third assembly took place in Puerto Rico with 200 meditators gathered for a long course that lasted more than six months. Finally, a gathering of 1,200 meditators took place in Manila, the Philippines, in the late summer and fall of 1984.

In every case, crime rate dropped markedly in the local area during the duration of the Super Radiance assembly. After the assembly, crime climbed back to pre-assembly levels. In every case, the results were statistically significant and, as Dr. Dillbeck had predicted, the joint statistical probability that crime had dropped all four places merely by chance was vanishingly small. The joint p value was less than one in one million.

After completing his study, Dr. Dillbeck sent it to the *Journal of Mind and Behavior*. The editor of this journal, Dr. Raymond Russ, professor psychology at the University of Maine, was immediately intrigued by what he saw. "On the one hand, the paper was based on an extremely unconventional idea," Dr. Russ said. "On the other hand, this idea was backed up by rigorous statistical analysis, a level of mathematical sophistication rarely seen in psychological or sociological studies."

To deal with this unusual challenge, Dr. Russ took an unusual step. Not only did he submit the paper to experts in psychology, who were asked to judge the clarity, consistency, and completeness of the theory being proposed. He also submitted it to an expert in statistical analysis, a non-psychologist, who was asked to judge whether the appropriate statistical tools had been applied and if they had been applied correctly.

When the referees were finished with their analysis, Dr. Russ received word from the psychologists that the theory sections were internally logical and consistent and from the statistician that the mathematical methods were correct and competently applied. Said Dr. Russ:

I decided to publish. The theory being proposed was a complete departure from the norm in either psychology or sociology, but this study was well-done. The statistical evidence was persuasive. What I had to consider is that judging new ideas in any scientific field is an extremely delicate task. On the one hand, you never want to propound errors. On the other hand, you need to keep the field open for innovation and progress. I'm afraid that many times, new ideas don't lose out on their merits. They lose out because established people in the field don't want to see their power eroded by new ideas which threaten their expertise and authority. In any event, Michael Dillbeck had written a strong paper with solid evidence. I didn't see how I could deny that paper publication.

For the second time, Dr. Dillbeck's systematic statistical approach had won academic acceptance. This time, moreover, because the numbers of people involved in the Super Radiance assemblies were so small, the evidence more clearly pointed toward a mechanism based on an underlying field. Said Dr. Dillbeck,

These findings give credence to a field theory of consciousness. The proportion of participants in the TM-Sidhi program was extremely small in each experiment, and because the participants were often involved in residential courses of limited duration in which they did not interact with the general population, it seems impossible that they could have affected society by any direct personal interaction. Thus, it appears that some kind of field effect is implied by these results, by virtue of which an influence is spread throughout a social system. Since this effect is experimentally associated with groups of individuals practicing a technology of consciousness, it is strongly suggested that the field through which the effects found here are generated is directly connected with the nature of consciousness.

AN EXPERIMENT WITH OPEN WAR

While Michael Dillbeck was polishing his multiple-city crime rate studies, two other MIU psychologists were planning one isolated, dramatic experiment to demonstrate that Super Radiance can neutralize open warfare. The aim of the experiment: to significantly reduce the nearly non-stop fighting in war-torn Lebanon.

Dr. David Orme-Johnson, the head of the psychology department at MIU, is a graduate of Columbia University with his Ph.D. from the University of Maryland. While teaching at the University of Texas in the early 1970s, Dr. Orme-Johnson produced one of the earliest and most influential studies on the Transcendental Meditation technique, a study showing that regular practice of TM allows the autonomic nervous system to become more settled and stable. Since then Dr. Orme-Johnson has published more than 50 scientific papers on TM.

Dr. Charles Alexander, associate professor of psychology at MIU, earned his B.A., M.A., and Ph.D. from Harvard University. A recently published study by Dr. Alexander, showing that TM extended the life span of elderly people, has received nationwide attention. Dr. Alexander is also co-editor of a new book from Oxford University Press,

Higher Stages of Adult Development — a book enthusiastically received by experts in the field.

It was Dr. Alexander who conceived the Lebanon experiment originally. He explained,

Previously, all experiments on Super Radiance had been what researchers call naturalistic experiments. Super Radiance assemblies had gathered for various reasons, and researchers had decided after the fact to gather statistics and see what the effect had been. The statistical evidence had been strong, but many researchers prefer an experiment that has been deliberately created by the experimenters, with predictions made in advance. That was what we wanted to do in Lebanon.

Known as the International Peace Project, this study was funded in part through a grant honoring William Ellinghaus, President of American Telephone and Telegraph, and supplied by the Fund for Higher Education in New York.

The project was designed to bring together in Jerusalem 200 experts in Maharishi's Vedic Science, people who practiced both TM and the advanced TM-Sidhi program. Jerusalem was chosen, rather than a city in Lebanon, because Israel already had 30,000 people trained in the basic Transcendental Meditation technique and several hundred more in the advanced TM-Sidhi program. As Dr. Dillbeck's one percent research had shown, the 30,000 TM meditators should have been enough to produce the Maharishi Effect for a population half the size of Israel and Lebanon together. Thus, in theory, the Super Radiance assembly would have to attract enough people together to take care of the other half of the population. This Super Radiance number was 197.

In several ways this study was more revealing than the research previously discussed. In the first place, as Dr. Alexander indicated, the International Peace Project was what scientists call a *prospective* study rather than a *retrospective* study. Precise predictions of the results were made in advance. Drs. Orme-Johnson and Alexander took the unusual precaution of lodging these predictions with leading independent scientists in both the United States and Israel. The clear-cut predictions, made months before the study took place, made clear that statistics were not being chosen after the fact simply because they happened to work.

In the second place, the experiment was designed as a multivariate study. Most earlier studies on Super Radiance had focused on only one benefit at a time — on the reduction of warfare, for instance, or decreases in crime or traffic accidents. But Super Radiance is defined as a holistic influence that affects the entire society at once. In fact, *rastri kavach*, the influence of invincible defense, is said in the Vedic literature to arise spontaneously from a society that has increased internally in orderliness and coherence in every aspect of the social structure. A bridge is more invincible if all of its parts are well-made and coherently fitted together; a society is more invincible, in this theory, if all its parts are coherent within themselves and coherently fitted together. Given this holistic definition of the Maharishi Effect, it should be possible to measure many different variables in a society and demonstrate improvement in them all simultaneously. That was one goal of this study. The researchers predicted, among other things, that as numbers at the Super Radiance assembly rose, automobile accidents and fires in Jerusalem should decrease, the Israeli stock market and the national mood (as measured by systematic analysis of the local newspapers) should improve, and, most important, the continuing warfare in neighboring Lebanon should decrease, as measured both by reported war deaths and by content analysis of media sources.

In the third place, the International Peace Project provided, quite inadvertently, an experiment that replicated itself several times within two months. The goal of the program was to gather 200 experts and keep them together throughout August and September of 1983, but practical considerations made this impossible. Suitable hotel

space was only irregularly available, most students had to leave at the end of August to return to school, and many employed people found it difficult to get long leaves of absence. As a result the number of meditation experts slowly built up for the first two weeks of August, attained high levels for the second two weeks, and then rose and fell irregularly throughout September. Though unplanned, this up-and-down pattern produced a compelling experiment. The statistics on crime, fires, the war, etc., would now have to move repeatedly, in correlation with the attendance numbers at the Super Radiance assembly, rather than only once.

Finally, Drs. Orme-Johnson and Alexander chose to use a powerful statistical method, known as *impact assessment analysis*, or *time series analysis*, to analyze the data. This statistical tool gives a mathematical answer to the question, "How do you know that such a result wasn't going to happen anyway, even without the Super Radiance group?" It analyzes the *impact* of some new factor on a continuing situation. Using such time series analysis, researchers can, for instance, look at the daily history of automobile accidents for several months up until the day a Super Radiance group first gets together. Time series analysis allows them to construct a mathematical formula which accounts for all the systematic ups and downs those automobile accidents were already showing, day by day. That formula therefore automatically takes into account all the different factors that have already been affecting automobile accidents, because those factors are reflected in the changing pattern of the statistics. This formula can then be used to generate predictions about the immediate future of automobile accidents — *if no new factor becomes active in the situation*. Then, if automobile accidents suddenly drop much lower than the prediction, there is strong statistical evidence for believing that something new has happened. The recent history of accidents gave no statistical reason to expect such a drop.

All these factors together provided a firm foundation for viewing the data that developed. Once again, the Maharishi Effect stood out with statistical clarity. Every one of the predictions was confirmed, and the results were all statistically significant. The most heartening statistic showed that when attendance at the Super Radiance assembly was high, as compared with days when attendance was low, war deaths in neighboring Lebanon dropped an average of 76%. When Super Radiance numbers went up, moreover, the Lebanon war intensity (as measured by content analysis of daily newspapers) decreased ($p < .01$), automobile accidents decreased ($p < .0005$), fires decreased ($p < .0001$), and the Israeli stock market went up ($p < .025$).

Four other features of the study were intriguing. In the first place, events in the two weeks when the Super Radiance number was highest were dramatically more positive than the other six weeks of the study. War deaths in Lebanon averaged only 1.5 per day during the two-week high-number period and more than 20 per day the rest of the time. Automobile accidents were 15% lower during that two-week period than during the other six weeks, fires 26% lower, and the stock market 27 points higher (averaging 457 as opposed to 431). These marked changes during weeks of high attendance provided additional evidence that an increase in meditation experts can provide an increase in the Maharishi Effect.

In the second place, the effect of the Super Radiance assembly appeared to be stronger closer to the source. Even when the attendance at the assembly was relatively low, local statistics in Jerusalem were positively affected. As the number rose, statistics in Israel as a whole began to change, and only when the numbers were high (in the highest quartile, the highest 25%), did warfare in Lebanon drop significantly. This is consistent with the theory of the Maharishi Effect — to influence a larger area with a larger population, a larger Super Radiance number is theoretically required. The statistics showed just such an effect.

In the third place, the correlation between the numbers of people meditating together and the sum total of all the variables was striking. Different variables such as war deaths, accidents, and fires can all be compared statistically if all are transformed to standardized

Z scores, a statistical tool based on standard deviations from the mean. This is a standard statistical method which allows a researcher to, as it were, add up apples and oranges. When the standardized Z score for all the variables together is plotted over the Z score for the number of people meditating each day, the fit between the two is visibly much closer than the fit between the meditating numbers and any one variable by itself. If you wanted to draw a picture of the Maharishi Effect, this statistical picture could serve admirably. One chart shows that many quite different aspects of a social situation, such as stocks, automobile accidents, and war deaths, are summed up in a single picture of overall improvement.

Finally, as the Super Radiance numbers increased, various statistics which usually have no relationship with each other suddenly began to move in step. Many different social measures ordinarily do not relate to one another at all. No one would try to predict stock prices, for instance, by looking at statistics on automobile accidents. The two have nothing to do with one another. This was exactly the situation during weeks on the International Peace Project when the meditating numbers were low — the different measures moved independently of each other (in statistical terms, there was high *variability* between the measures). When the meditating numbers increased, however, there was a strong tendency for all the different measures to begin moving together and to move in the predicted direction. This tendency to coherence was so marked that its p value was less than one in ten thousand. Thus, when the Super Radiance group became large enough, factors in society which are normally uncorrelated (random or incoherent), suddenly became correlated (orderly or coherent). This sudden decrease in variability suggests that some new factor, a factor not previously evident, had begun to affect all the statistics simultaneously. Maharishi indicates that all negativity and disorder in a society has one underlying cause: stress in the collective consciousness. By reducing this collective stress, the entire society can theoretically be improved. The statistics of the International Peace Project support this theory. Says Dr. Orme-Johnson,

The question posed by the data is why does the group practice of Transcendental Meditation and the TM-Sidhi program lead to wide-spectrum changes in the society? The answer we suggest is that these Super Radiance assemblies produce a marked increase in the coherence of the collective consciousness in the society. When individuals practice TM, their brain wave patterns, as well as a large number of other physiological and behavioral measures, show an increase in coherence. When a large group practices together, the entire society shows a similar increase in coherence among a wide range of measures. From physics we know that an incoherent system is one with destructive interference: the various wave patterns interfere with each other in such a way as to annihilate each other. A coherent system, on the other hand, shows constructive interference: the waves reinforce each other, rather than canceling each other out. This is what the statistics show in a society affected by a Super Radiance group. The different elements in the society decrease in destructive interference. Crime is one aspect of society destructively interfering with another, and crime decreases. Automobile accidents are a clear example of destructive interference, and automobile accidents decrease. In every sphere of action, there is an increase in orderliness and cooperativeness. The interests of the society tend to be supported more by each member. The collective consciousness has been purified of negativity and stress, and the results can be measured in many different ways.

OLD IDEAS AND NEW FACTS

The International Peace Project had been dramatically conceived. The statistical results were strongly significant. Now Drs. Orme-Johnson and Alexander decided to aim high: they submitted their results to the journal usually deemed the leading publication in the field of peace studies, the *Journal of Conflict Resolution* edited at Yale University. The ensuing struggle for publication took more than three years — a struggle that made for an instructive case study on the evolution of scientific thought.

As mentioned in the first chapter, the history of science is a history of repeated collisions between old understandings and new evidence. Any such confrontation between old ideas and new facts can take on a poignant human reality. Long-accepted notions about the world are usually deep-seated and emotionally difficult to forego. This emotional commitment is frequently reinforced because many erroneous understandings of nature are based on what seem to be reasonable, common sense observations.

In Galileo's case, for instance, every sighted human being can see with his own eyes that the sun revolves around the earth. It happens every day. This perception makes people feel important because it makes the earth seem the center of creation. When Galileo spoke up for scientific evidence which showed that the sun was the center of the solar system and that the earth revolved around the sun, he thus ran headlong into both common sense perceptions and deep emotional attachments. People simply could not accept the new idea. They locked him up.

A similar collision between preconceptions and scientific evidence occurred in the 19th century. The famous Michelson-Morley experiment attempted to measure changes in the apparent speed of light as the experimental apparatus was moved either toward or away from the source of light. If a football player runs toward his quarterback to catch a pass, the ball hits his hands at a higher rate of speed than it does if he runs away from the quarterback. Relative velocity depends on the motion of both the source and the receiver. But the Michelson-Morley experiment, done to the highest tolerances possible in the 19th century, showed that the speed of light never changed, regardless of motion by the source or the receiver. This was such a radical experimental finding, it so deeply violated every known law of physics, that no scientist was able to do anything with it for a generation. Then Albert Einstein took hold of the idea. Clinging firmly to the experimental finding, he let go of all preconceptions. The result was his theory of relativity, in which the most basic building blocks of the physics of his time, the measurements of distance and time, lost their absolute status.

These collisions between old ideas and new facts are usually personally shocking to most researchers. Theodore Kuhn, who first developed the idea of the paradigm shift, the radical change that periodically occurs in scientific thought, noted that such a shift usually takes about 30 years after the experimental evidence is in. What that means, basically, is that an entire generation of experts, nurtured on the old ideas, has to grow old and retire before the new understandings become widely accepted.

As the struggle at the *Journal of Conflict Resolution* points out, the statistical evidence supporting the Maharishi Effect causes the kind of confrontations and internal conflicts common to all collisions between old beliefs and new evidence. In the case of the International Peace Project, the concept of the Maharishi Effect flouted all accepted scientific understanding, yet the new facts were presented in a particularly rigorous form. Alternate explanations such as weather, holidays, etc., were statistically ruled out and the evidence strongly supported a causal interpretation. The correlation between the Super Radiance attendance and the statistical changes in society was so strong that there was only one chance in ten thousand that the results could have been coincidence. Moreover, changes in the Super Radiance attendance frequently occurred just before the statistical changes while the reverse was never the case, and the statistical changes occurred more readily in the geographical vicinity of the assembly.

Dr. Bruce Russett, professor of political science at Yale, is editor of the journal *Conflict Resolution*. Confronted with what was doubtless the most unconventional study he had ever received, Dr. Russett decided to send it out to four different referees, two more than he usually used. The responses he received were widely various. One granted that the study was "logically and methodologically coherent," but strongly recommended against publication because the idea seemed on its face impossible. Another said, "The fundamental assumptions of a 'unified field' and a 'collective consciousness' are not within the paradigm under which most of us operate. Yet if one will, for the sake of argument, accept these premises as plausible, then the research conforms quite well to scientific standards."

One referee, Dr. Robert Duval, professor of political science at West Virginia University, withheld his recommendation because he had spotted what seemed to him a possible flaw in the statistical design. "One may conjecture," Dr. Duval said, "that instead of TM-Sidhi techniques influencing conflict in Lebanon, the level of conflict led the participants to hurry down to the hotel and meditate at the first sign of violence across the border." His hypothesis was that the warfare in Lebanon tended to be episodic, coming in brief spurts. If a flare-up led meditators to race down to the assembly, the flare-up would then pass of its own accord, making it look like Super Radiance had caused the decline.

The MIU researchers replied that this seemed extremely unlikely. In the first place, the number of daily drop-ins at the assembly was very small. Most participants came from places outside Jerusalem, and they usually came for a week or more at a time. In the second place, assuming that assembly participants did react to news of the war, that still couldn't account for the changes in crime, traffic accidents, fires, and the stock market. Dr. Duval, however, suggested a stringent statistical test — the use of transfer functions to produce cross-correlations, a statistical tool which would indicate whether changes in warfare lagged behind changes in the Super Radiance attendance, or changes in attendance lagged behind changes in the warfare. Obviously, the cause must come first, the effect second. Dr. Duval felt confident that his conjecture was correct and he reported that he "suggested the addition of transfer functions to identify the direction of causation — smug in the belief that a negative lag in the cross-correlations would reveal that the number of participants was the result, riot cause of the activity."

Transfer function analysis, a branch of time series analysis, is a laborious and time-consuming process. Drs. Orme-Johnson and Alexander hadn't thought it necessary, given the strong correlation of the Super Radiance attendance with so many different variables at once. But this type of give and take is common before journal acceptance. They therefore put months into careful transfer function analysis of every individual variable, from war deaths to the stock market, then did the same for composite indices that combined the variables in different ways. The results supported the Super Radiance hypothesis. There was no indication that changes in the Super Radiance attendance lagged behind changes in warfare or any of the other variables. There were frequent indications that warfare and the other variables lagged behind the attendance. "The direction of causation," in Dr. Duval's phrase, pointed from the Super Radiance assembly toward the declines in war deaths, crime, traffic accidents, etc. In all other cases, changes in assembly attendance and changes in the social statistics occurred simultaneously. As Dr. Duval later commented, such simultaneous changes are, logically, "a toss-up, with 'simultaneous causation,'" but "in this case, with daily measures of the dependent variables, the TM proponents win the toss-up. News travels fast, but not, I would think, that fast."

In the end, though still plagued by the doubts that many academic experts would feel if put in his place, Dr. Duval recommended in favor of publication. As he said, "the level of exposition and the application of statistical methods for hypothesis testing are commensurate with this reviewer's standards for scientific research."

The journal's editor, Dr. Russett, now faced with conflicting recommendations, had to make his own choice. He felt ambivalent himself, but could not side with the reviewer

who had simply dismissed the Super Radiance hypothesis with no attempt at scientific or logical argument. Mentioning the example of Galileo's travail, Dr. Russett said, "The practice of censorship in science, as in more overtly political realms, can be very unedifying." The same reviewer had said he would accept research on Super Radiance only if it were done by "an independent, scientific body such as the National Academy of Sciences." But as Russett said, "This is a bit of a catch-22. It is almost impossible to imagine a body like the National Academy of Sciences being willing to fund such a research effort without some prior appearance of evidence for the hypothesis. . . . Most research — at least the presentation of new findings — is performed by scholars who begin with the belief that their hypotheses are plausible. Who else would spend the effort?"

After extensive thought, Dr. Russett decided in favor of publication. In an unusual "Editor's Comment" which he printed with the research paper, Dr. Russett said, "The following article presents and tests a hypothesis that will strike most readers (myself included) as, to say the least, unorthodox.... Yet the hypothesis seems logically derived from the initial premises, and its empirical testing seems competently executed. These are the standards to which manuscripts submitted for publication in this journal are normally subjected."

It was a decision deliberately made in favor of the scientific process, a decision to pay attention to mathematical correlations rather than theoretical constraints or "common sense." It is a scientific commonplace, of course, that "correlation does not imply causation." A robin may arrive the day before spring weather begins, but that does not mean the robin brought the weather with him. It is an unalterable limit of the scientific process that even high correlations cannot be said to prove a causative influence of one upon the other. Nevertheless, researchers routinely make informed deductions from their statistics. If studies show a high correlation between one aspirin a day and reduced heart disease, no scientist puts forward the notion that a healthier heart makes you want to take one aspirin per day. In the International Peace Project, the correlations between Super Radiance and social coherence were far too strong for coincidence. Therefore, researchers were left with three possibilities to choose among: (1) the changes in Super Radiance attendance caused the changes in society; (2) the changes in society caused the changes in Super Radiance attendance; or (3) some unknown third factor caused them both. Statistical analysis ruled the second choice out; the Super Radiance changes happened first. As for the third possibility, that day after day for 60 straight days some unknown factor repeatedly caused war deaths, traffic accidents, and fires to decrease while also causing people to go take part in the Super Radiance assembly — this is an idea even more unusual than Super Radiance. No reviewer of this research has even suggested such a possibility.

The logical conclusion from this data, then, is that Super Radiance caused the changes. One powerfully conceived experiment had advanced the scientific understanding of the Maharishi Effect — and there were many more studies to come.

A TASTE OF UTOPIA WORLDWIDE

By the time the original field work on the International Peace Project was completed in the fall of 1983, though long before the study eventually appeared in print, there was one group in the world convinced of the reality of the Maharishi Effect. That group consisted of the meditation experts who took part in the experiments. First-hand experience, taking part in a Super Radiance assembly and watching the social statistics change, convinced most participants far more thoroughly than a dispassionate perusal of dry statistical data could ever convince a non-participant after the fact.

One type of demonstration had not yet taken place, however. All the experiments so far had been local, with groups typically large enough to affect only cities or nations. Yet

the stated goal of the Super Radiance program was to achieve peace all around the world — to have a positive effect on the quality of life everywhere at once. In mid-November, 1983, Maharishi first expressed the desire for such a global experiment. If the, experience from previous research held true, the number of experts required would be the square root of one percent of the world's population (which stood then at 4.8 billion), or approximately 7000. To gather this number, people would have to come from all over the world. There were only two problems: (1) where would the people come from and (2) where would they go?

Under the leadership of MIU's president, Dr. Bevan Morris, a task force of university administrators spent two days brainstorming the possibility of holding this 7000 assembly on MIU's campus in Fairfield, Iowa. The obstacles were daunting. MIU has only 1700 rooms on campus, so people would have to live three and even four to a small dormitory room. In addition, the hundreds of meditating families who live and work in Fairfield would also have to take in many guests per house. The rough calculations showed that housing would still be 1200 short of the required 7000. The solution suggested: lease 200 mobile homes, truck them in a caravan across three states, and install them on the northern end of campus to house six people each.

The undertaking would be large, but after the two-day session, MIU's leadership decided to offer its services. They made this decision on Thanksgiving Day. The course was set to start on December 17, just three weeks away. The activity in those three weeks was remarkable to see.

The two Golden Domes could accommodate group meditations for the 3000 women expected, but one challenge was to materialize a meeting hall that could hold 7000 people for meetings and 4000 men for group meditation. In the three-week preparation period, therefore, a 60,000 square foot building, a building as wide as a football field wide and two fields long, was designed, manufactured, trucked from Wisconsin, and erected. Even for a state-of-the-art, pre-manufactured metal building, this shattered previous construction records in the industry by a factor of three. Remembers MIU administrator Leonard Goldman, "There were people out there twenty-four hours a day, hanging off the girders with the snow drifting down, working in the light from portable stadium lighting we brought in."

While this Grand Assembly Hall sprouted from the ground, much of the rest of campus was thoroughly recreated. The food services took over the student union and the gymnasium, preparing to feed 6000 per day instead of the customary 1000. Thousands of beds were pulled out of storage, thousands more purchased and installed. The mobile homes arrived in a two-day caravan, and round-the-clock crews dug down through early ice to install plumbing and electricity. The key to any mass maneuver is logistics, and many logistical miracles took place in those three weeks between the decision and the start of the course.

As December 17 approached, the enthusiasm on campus was summed up in the name given to the assembly: A Taste of Utopia. The conference was intended as a global sociological experiment to find whether it was possible to radiate a "taste of more problem-free life" to every part of the planet. At a succession of press conferences, Professors Orme-Johnson, Alexander, and Dillbeck made predictions about the effects they expected, and they also lodged these predictions with a committee of independent scientists around the United States. Many of the predictions concerned public statistics: a worldwide decrease in crime, accidents, and illness, along with a rise in stock markets and patent applications. Other predictions included a decrease in international tension and conflict and an increase in positivity and success by heads of state. In sum, the predictions were simple. The entire world should experience measurable improvement in many areas of life in one specific three-week period.

With workers still driving rivets and connecting wiring, the Taste of Utopia began as scheduled on December 17, 1983. Attendance at the daily Super Radiance assembly increased in a couple of days from the usual average of 1600 to more than 4000. Over the

next week thousands more people arrived, streaming in from every part of the globe, until the human flood at last rose to the required level. On the day that attendance in the group meditations finally reached 7000, people in the Grand Assembly Hall stood and cheered for five minutes.

What everyone wanted to know, of course, was whether there was good statistical reason for the cheering. Only one type of data was immediately available on a day-by-day basis during the assembly, but it was an important one. Each day the Wall Street Journal publishes the World Index, a single measure of stock prices which is a weighted average of the nineteen most important stock markets around the world.

In the past, stock prices had proved a particularly sensitive measure of the Maharishi Effect. Stock prices had gone up with Super Radiance numbers in Washington, England, and Israel. Across 1982 and 1983, furthermore, the United States stock markets, then beginning the long bull market of the 1980s, had shown a clear and very particular connection with the Super Radiance numbers at MIU. Whenever those numbers jumped up sharply and crossed the 1600 threshold, United States markets jumped up. If the Super Radiance numbers declined, the markets ordinarily dropped as well. If the Super Radiance numbers held steady for a while, the markets after a few days began to fluctuate again as usual.

This pattern was consistent with the interpretation that a sudden increase in Super Radiance numbers sends an influence of positivity and confidence through the collective consciousness of the nation. If people who are involved in the stock market feel tense and fearful, they are liable to sell stocks. If they feel confident and optimistic, they are likely to buy stocks. Thus, a sudden wave of positivity results in a sudden wave of stock buying, and an increase in stock prices. In other words, if Super Radiance works, a sudden increase in the numbers should produce a sudden increase in the markets.

When checking for a worldwide effect, this one measure is invaluable. The World Index sums up in one statistic the daily Psychological transformations of millions of people in every part of the world. During the Taste of Utopia assembly, therefore, the World Index was watched at MIU like football scores are watched at other universities. Even for people who expected it, the result was astonishing. The World Index had been trending generally downward for the three weeks prior to the course. On the first Monday after the course opened (on Saturday the 17th), the Index started a strong upward move which continued for the three weeks of the course, then broke and moved erratically lower on the first Monday after the assembly dispersed (on Friday the 6th of January, 1984).

Nor was this any normal rally. In the first place, eight of the 11 largest markets in the world set all-time records during those three weeks, many of them repeatedly. In the second place, the United States market, which was otherwise in the midst of a strong downward trend lasting nearly a year, also rallied for those three weeks, and came within one point of its all-time record on the last day of the course before plummeting precipitously after the course; that was the high point of the American markets for the next six months. Third, and perhaps most striking, nearly all the markets in the world rose simultaneously during those three weeks. Eighteen of the nineteen markets tracked by the World Index went up (only the tiny Spanish market declined), a pattern not found at any time in the five previous years. Ordinarily, there is no clear pattern of correlation between different markets. During the Taste of Utopia assembly, however, virtually all the markets rose at once, and rose dramatically. The theory that Super Radiance would send a wave of optimism and confidence around the world was statistically confirmed.

MIU researchers later analyzed this data thoroughly. They checked first to see if world stock markets usually go up at that time of year. They found that in the five prior years, on the average, exactly one half of the markets went up and one half down during the same three weeks of the year. During the three weeks before and after the Taste of Utopia, the same finding applied — roughly half the markets went up and half down. Then they used time series analysis to see if the markets were headed for a strong rally at

that point in any event. This study was headed by MIU professor of economics Kenneth Cavanaugh, a researcher with a Ph.D. from the University of Washington, who has specialized in time series analysis of stock markets for many years. This analysis showed that no statistical factor in the five-month period immediately prior to the assembly could account for the sudden rally for which, even by the stringent requirements of time series analysis, the probability factor was $p < .000033$. The sudden and dramatic world-wide stock market rally thus proved of strong statistical significance.

As the data became available, the other predictions were also upheld. First, American statistics came in. Traffic fatalities over the Christmas and New Year holidays dropped to an all-time low despite the fact that miles driven were at an all-time high. The fatalities were 41.6% fewer per mile driven than the mean for the prior 16 years (controlling for both miles driven and the effect of the 55 mph speed limit). Infectious diseases, dropped 15% compared to the weeks just before and just after the assembly and 32% compared to the mean of the five previous years during the same three weeks. Patent applications, which are ordinarily within one or two percent of the official predictions made by the United States Patent Office, suddenly increased 15% over these predictions during the weeks of the assembly, then dropped back toward normal values immediately after the assembly (these predictions take into account any seasonal increases that might ordinarily be expected).

International data is always difficult to obtain. The research design adopted was to seek data from Australia, South Africa, and England, countries widely dispersed around the globe which keep good statistical records. Patent applications were available for all three countries; applications went up sharply in all three (when combined with the United States figures the probability is $p < .04$). Traffic fatalities were not available on the needed weekly basis from England, but they declined markedly in both Australia and South Africa — despite, in South Africa, a usual tendency to increase at that time of year ($p < .0001$). Only Australia could supply disease data weekly; compared with a strong upward trend before and after the assembly, infectious disease declined there nearly 15% as compared to the mean of the five previous years. As for decreased crime, the police departments in 167 cities and provinces around the world were asked for weekly crime rate data during the Taste of Utopia period. Only three responded by the time the study was completed: Washington, D.C., the province of Victoria in Australia, and Karachi, Pakistan. In all three crime had declined markedly.

The predictions about international affairs were also upheld by systematic media analysis. This analysis showed that for the three weeks before the assembly, the percentage of positive events worldwide, as compared to the total number of events, was 18.7%. During the assembly this percentage increased by 60% to 31.5%, and after the assembly it declined again to 13.5%.

For the first time there was a clear statistical picture of a global Maharishi Effect, of the quality of life around the world changing for the better dramatically. The Taste of Utopia course had been a measurable success.

GLOBAL SUPER RADIANCE

Two strong statistical studies of such a worldwide influence of harmony and coherence were in time accepted for presentation at the annual convention of the American Political Science Association and published in the proceedings of that convention. One of these studies focused on the three largest Super Radiance assemblies which have yet been held — the Taste of Utopia in Iowa (7000), a World Peace Assembly held in Washington, D.C. (5600) and a second World Peace Assembly held in the Netherlands (6000).

To rigorously test for the global Maharishi Effect, Dr. Orme-Johnson went in search of an unambiguous statistic that would measure disorderliness in the collective

consciousness of the whole world. The most dramatic statistic he could think of was worldwide terrorism. But who kept such a statistic? The Department of Defense said it didn't. The United Nations said it didn't. Finally, one of Dr. Orme-Johnson's calls directed him to the right source. Daily terrorism data had been collected for a number of years by America's best-known think tank, the Rand Corporation.

With statistics in hand, the research paper was simple to complete. The three large assemblies had all taken place within two years of each other. Dr. Orme-Johnson computed the average casualties caused by terrorism in all the weeks of those two years when assemblies were not in session, then the average for the weeks when the assemblies met. The result: a 72% average reduction in terrorism during the Super Radiance assemblies. He also did a systematic analysis of media sources (see the discussion of content analysis below) and found that all forms of international conflict had dropped by one-third during the assemblies. During the same weeks, the World Index of stocks had increased significantly. Three separate types of measurement added up to one conclusion. Large Super Radiance assemblies were accompanied by worldwide waves of statistically measurable positivity.

While Dr. Orme-Johnson worked on this study, Dr. Charles Alexander collaborated with an MIU Ph.D. student in psychology, John Davies, to devise another global study. The idea was to focus once again on the fighting in Lebanon, but to see if this fighting could be affected not just once, from nearby, but repeatedly, and from greater distances. Lebanon, unfortunately, could be the basis for an excellent experiment. Fighting there was almost continuous — had been, indeed, almost continuous for a decade — and the international media had easy access to this endless warfare and provided daily records of the both the battles and the casualties.

This time, however, rather than focusing on the single Super Radiance assembly known as the International Peace Project, the two researchers chose to measure the effects of six more Super Radiance assemblies as well — every assembly that had ever been large enough, in principle, to affect the fighting. One of these assemblies, a tiny gathering of roughly one hundred, had been held in Beirut, in Lebanon itself. Another had gathered in Yugoslavia, north and west of Lebanon around the corner of the Mediterranean; theoretically the 2000 attendance at this course was large enough, by the square root of one percent formula, to radiate its effect as far as Lebanon. The largest and most distant assembly tested was the Taste of Utopia course, with 7000 people gathered nearly half a world away in Iowa.

This time, moreover, the two researchers wanted to remove any question people might have about the way in which the statistical data was gathered. One of the strongest aspects of Super Radiance research is that the statistical evidence is open, public data, collected by governments and other agencies, and available to any reviewer who wishes to double-check the numbers. This contrasts with other sociological research, which is often based on privately produced questionnaires administered by the researchers themselves. Because the Maharishi Effect is such a challenge to the prevailing scientific paradigms, however, Dr. Alexander and Davies wanted to take an extra step to remove any lingering doubts.

To do this, they contacted the Center for International Development and Conflict Management (CIDCM) at the University of Maryland, which is often considered America's leading institution in the field of peace studies. They were looking for a recommendation for an independent expert in the arcane field of media *content analysis*.

Content analysis is a frequently used tool in sociological research. It is a systematic way to measure, for instance, the number of stories in a newspaper, or the number of column inches in those stories, devoted to a particular topic. A researcher might tell a content analyst to use a five-point rating scale, for example. This scale could range from -2 (outright warfare) to +2 (completely peaceful and positive relationships). In a typical content analysis program, the stories in each newspaper are rated independently by two or three different raters. The dates of the newspapers are removed, the papers mixed

chronologically, and the raters kept uninformed as to the purpose of the study or the importance of any particular time periods.

For this study, the CIDCM at the University of Maryland recommended an independent content analysis expert to handle this task. He was assigned ten separate media sources in Lebanon and Israel and told to monitor them on a daily basis for the two and one-quarter year period that included the seven Super Radiance assemblies.

Even by the strongly significant standards that the MIU researchers had come to expect, the statistics returned by this content analyst could rightfully be called spectacular. He had produced daily data on war deaths and injuries and on the overall level of fighting for more than 800 consecutive days. Time series analysis will work beginning with only 40 data points; more than 800 such points makes the statistical analysis extremely powerful. Nearly 80 of those days, almost a tenth, were days on which the seven separate assemblies were meeting. Analysis showed that on the days of the assemblies, as compared to all the other days, war deaths and injuries in Lebanon dropped an average of 71 %. Because there were so many days in the study, the chance of coincidence became subatomically small — less than one chance in 10,000,000,000,000,000,000 (one in ten million trillion).

THE MAHARISHI EFFECT OVER THE YEARS

A large amount of evidence now demonstrated a short-term statistical effect from temporary Super Radiance assemblies. In theory, Super Radiance assemblies should radiate harmony and coherence into the collective consciousness of a society, and this improvement in the collective consciousness should then lead to improvement in thought and behavior throughout the society. The research evidence was consistent with this hypothesis. According to the theory, however, this Maharishi Effect should also last as long as any particular assembly stays together. The collective consciousness should continue to be purified and the thoughts and behaviors of people in the society should continue to be more harmonious and progressive. But this type of research, a longitudinal study of a long-running Super Radiance assembly, had never been attempted.

The possibility first occurred to Dr. Orme-Johnson and another of his co-workers, Dr. Paul Gelderloos, an assistant professor of psychology who had come to MIU from the Netherlands. In the mid-1980s they began discussing the MIU Super Radiance group. Approximately 1600 meditation experts had stayed together much of the time since the middle of 1982 at MIU. The square root of one percent of America's population is roughly 1530. Given the predictions of Maharishi's Vedic Science, and all the experience with Super Radiance up to that point, 1982 should have marked a clear-cut change in social indicators throughout the United States. Not just one indicator here or there should have improved, but a broad range of measures should all have shown improvement simultaneously.

To test the hypothesis, MIU researchers compiled a list of twelve indicators, which they termed the Quality of Life Index, and designed a study which covered the most recent twenty-five years in American history, from 1960 through 1984. The choice of indicators was carefully made. It was intended to cover a broad range of society — crime, justice, health, economic welfare, creativity, education, marital stability, and safety — while utilizing only the most holistic and central indicator in each field. The idea was to cover each area of society, but in the smallest total of indicators possible, in order to generate a statistically parsimonious picture. In economics, for instance, only one statistic was used: gross national product (GNP), adjusted on a per capita basis and allowing for inflation. That one figure is generally thought to give a clearer indication, of the economic health of the nation than any other. It was not necessary to add in unemployment figures, for instance, because when GNP goes up, unemployment ordinarily goes down, and the unemployment statistic is therefore largely redundant. For

this Quality of Life Index, it was also necessary to choose statistics which were available uniformly throughout the twenty-five years of the study. Although drug abuse dropped for the first time in years in 1982, for instance, and Scholastic Aptitude Test scores increased in that year for the first time since they were first publicly reported in 1967, neither statistic was used in the Quality of Life index because neither was available through most of the 1960s.

The twelve indicators finally chosen cover a cross-section of American society:

1. **Crime rate:** A fundamental measure of orderliness in a society.
2. **Percentage of civil cases reaching trial:** A measure of underlying harmoniousness; if cases go to trial, all other means of agreement have failed.
3. **Infectious disease rate:** An obvious measure of health in society.
4. **Infant mortality:** A widely used measure of the overall level of development in a nation.
5. **Suicide rate:** The only mental health variable available continuously from 1960 through 1983.
6. **Cigarette consumption per capita:** One measure of the health-consciousness in a society.
7. **Alcohol consumption per capita:** Another measure of health habits, also important because of the widespread incidence of alcoholism (a societal health problem which is statistically far greater than drug abuse).
8. **GNP per capita:** An encompassing measure of the economic vitality of the nation.
9. **Patent applications:** One of the few ways to measure creativity in the nation.
10. **Number of educational degrees conferred:** The best indicator of the desire a society's citizens have to enhance their knowledge and skills and to improve the quality of their lives.
11. **Divorce rate:** The single statistic that best portrays the stability of the family structure.
12. **Traffic fatalities:** A significant cause of mortality in America and also a simple measure of the alertness and orderliness of people in one of their most common activities.

Choosing such a wide range of variables helps the design of the study act as its own check for reliability, as it did in the International Peace Project. While individual indicators might conceivably change for individual reasons (crime, for instance, could decline for completely different reasons than infectious disease), if all the indicators taken together move strongly downward, it is hard to argue that many different reasons for many different indicators all happened to coincide by accident.

Once the statistics had been chosen and gathered and statistical analysis began, the results of the study were as predicted. From the beginning of the study in 1960, the trend of the Quality of Life Index is steadily downward, worsening rapidly after 1967, until 1975. In that year the bottom is reached, and there is a slight improvement over the next six years until 1982, when the rate of improvement suddenly jumps upward sharply. For the first fifteen years of the study, an average of six of the statistical measures improved in any given year while the other six declined. In one year crime might ease a bit, for instance, but infectious disease worsen, while in the next year the two indicators might exchange roles. This gives an approximate statistical picture of the pessimistic view of human nature: nothing in human life ever really seems to change. After the bottom was reached in 1975, however, there was a slight shift — for the next six years an average of seven indicators improved while five declined. Then, in 1982 the pattern suddenly changed to ten positive and only two negative (only one unambiguous negative).

The study produced several interesting insights. First, in the years 1975 and 1976, there had been a significant increase in the number of people learning the basic TM technique. More than a quarter of a million Americans learned in 1975 alone. It might be expected that such a sudden large increase in the numbers of people practicing TM would

be noticeable in the social statistics, and the 15-year downward trend did bottom out in those years. Although the upward trend was not at first strong, the Quality of Life Index has not declined since that year.

This was also the year that Maharishi, to the surprise of even those closest to him, chose to publicly declare "the dawn of the Age of Enlightenment." He was responding to the first crime rate study mentioned above. If science could prove that a small handful of people could change the trends of a whole city, he said, then the technology for creating a better world was clearly at hand. At the time, with the American political system still recovering from the Presidential impeachment proceedings and the entire Western world afflicted with both inflation and recession, talk of a dawning Age of Enlightenment seemed to most of the world unimaginable. To skeptical questions, Maharishi laughed, saying, "If we are going to be first to proclaim the dawn, then we must do so while it is still dark. 11

Finally, it is clear that in 1982, 1983, and 1984, the first years of common group meditation by 1600 people, the Quality of Life Index moved sharply upward. As Super Radiance attendance markedly increased, so did America's quality of life. This jump in the Index was unprecedented throughout the previous quarter of a century. Using regression analysis, one of the best established statistical techniques, this sudden increase is significant at the $p < .0001$ level.

Did Super Radiance cause the dramatic improvement in the statistical measures? Perhaps an improved quality of life encourages more people to learn meditation, rather than the other way around. This question of causality was addressed statistically through cross correlation analysis. As in the International Peace Project, the analysis showed that the Super Radiance attendance frequently led the statistical changes in time, while the reverse was never the case. Statisticians sometimes express this by saying that the meditator rate could predict the increase in quality of life, while an increase in quality of life could not predict an increase in meditator rate. This statistically significant finding argues for the statistical existence of the Maharishi Effect as a long-term causal factor in the creation of a more ideal society.

Here is a summary of the statistical findings:

1. Crime rate: In 1976 and 1977, after the rapid rise of numbers of practitioners of the basic TM technique, crime fell for two consecutive years — the first time this had ever happened. Then, from 1981 to 1983, crime fell for three consecutive years, decreasing 0.78% in 1981, 4.3% in 1982 and 7.6% in 1983 (both the 1982 and 1983 crime rate totals were lower than in any other year since the beginning of the study). This meant there were 1,300,000 fewer crimes in 1982 and 1983 than there would have been if previous trends had continued. It is sometimes suggested that crime has fallen recently because of a reduction of the percentage of American citizens in the high-crime age group of 15-29, but the size of this group has declined only one or two percent per year and could not account for the larger percentage drops.

2. Percentage of civil cases reaching trial: This percentage dropped 7.58% in 1982 and 11.48% in 1983 to reach an all-time low of 5.4% of all civil cases going to trial.

3. Infectious disease rate: Dropped 4.23% in 1982 and 7.02% in 1983 (the largest drop in 16 years).

4. Infant mortality rate: Decreased 5.88% in 1982 and 2.68% in 1983, continuing a long-standing trend.

5. Suicide rate: The only negative variable to increase in both years, 1.08% in 1982 and 2.3% in 1983.

6. Cigarette consumption per capita: Decreased 1.90% in 1982 and 6.26% in 1983 (the largest decline in the 23 years).

7. Alcohol consumption per capita: Decreased 3.52% in 1982 and 2.64% in 1983, the second and third largest decreases in the 23 years.

8. GNP per capita: Declined 2.81 % in 1982 in the third year of a major recession; however, that recession turned around in the middle of that year (the stock market started a year-long upswing in August) and by the end of the year one of the strongest economic recoveries on record was under way. GNP per capita rose 2.25% in 1983.

9. Patent application rate: Increased 2.51 % in 1982, but then had a anomalous drop of 11.26% in 1983 (the largest decrease by far throughout the period) when the application fee was increased late in 1982. The compensation came in 1984, when patent applications rose more than 12%, the largest rise in the years of the study.

10. Degrees conferred: Rose slightly (0.31 % and 0.98 %) after declining for the previous five years.

11. Divorce rate: Declined 4.46% in 1982 (a decrease three times larger than the previous record set twenty- one years earlier) and then again 0.18% in 1983 (the only time divorce rate declined in two consecutive years).

12. Traffic fatality rate: Declined 10.95 % in 1982 (the largest decrease of any year except 1974, when the 55-mile-an-hour speed limit went into effect) and then again 4.60% in 1983 (the third largest drop in the years of the study). This decrease in traffic fatalities has received a good deal of media attention. A common explanation for the drop is that drivers are drinking less and buckling up more. But this would not contradict the Super Radiance theory, which postulates precisely the sort of increase in social coherence which would lead people to do what they have long known they should.

In 1984, the last year covered in this 25-year study, the statistical improvement continued at a slightly higher pace. The onset of a sufficiently large Super Radiance group should theoretically produce an across-the-board improvement in a country's quality of life. This thorough study of a quarter century of America's statistical history shows just such a holistic statistical improvement. The study was published in the *Social Science Perspectives Journal*.

THE LONG TERM IN FINE FOCUS

Long-run studies that use yearly statistics can give a broad indication of what is happening, but the same type of statistics going week-by-week or month-by-month can produce more detailed information. In such tight-focus studies, short-run fluctuations in the Super Radiance attendance can be matched against short-run fluctuations in the social statistics, and time series analysis can be used to focus the statistical accuracy of data that is moving through time. If the attendance and the social statistics correlate strongly over weeks and months and years of continual fluctuation, the statistical significance can be much stronger.

In recent years, three such fine-grain longitudinal studies have been made of the MIU Super Radiance groups. The first of these was carried out by Dr. Michael Dillbeck. He compared MIU's Super Radiance attendance for four consecutive years, 1982-85, with the three clearest indicators of violence and disorder in the society — homicides, suicides, and traffic fatalities. He compared weeks when MIU's group exceeded the Super Radiance Number (the square root of one percent) in the United States with weeks when it did not, and he used a rigorous form of time series analysis to account for any seasonal or long-term trends in the data that might have confused the results. With extraneous factors controlled, there was a strong, statistically significant correlation between fluctuations in the Super Radiance attendance and fluctuations in the statistics on violence. When attendance went up, violence went down. The Super Radiance changes frequently preceded the changes in violence; the reverse was never the case. Because Dr. Dillbeck had more than 200 weeks of data in his study and because of the meticulous structure of his mathematical analysis, he gained publication for this study in *Social Indicators Research*, a journal which has a daunting statistical reputation and which is

usually cited as the leading journal dealing with social quality of life. Such a detailed, week-by-week analysis adds strength to the statistical likelihood of the Maharishi Effect. In the words of Dr. Dillbeck,

It establishes a causal connection between group practice of Maharishi's Transcendental Meditation program and decreased deaths by violence in a way that is difficult to do with monthly or yearly data. It is highly unlikely that other possible causes of decreased traffic fatalities would coincidentally covary with daily fluctuations in the number of participants in the Technology of the Unified Field.

A second longitudinal study used the same Super Radiance attendance figures to show their effect on a completely different aspect of society. In 1982, the first year that MIU's group meditation attendance began to regularly exceed the Super Radiance number for the United States, the American economy began a steady climb that has lasted more than eight years as this book goes to press, the longest peacetime economic expansion in the nation's history. In that time, the stock market has crashed spectacularly, with no effect on the steady economic growth, and the Federal Reserve Board has engineered its first ever "soft -landing" for the economy, raising interest rates to rein in inflation without slowing the expansion down into recession. The theory of the Maharishi Effect would, of course, explain just such a recession-resistant economy. As we have seen, the statistical evidence shows that Super Radiance groups not only decrease the violence and disorder in a society, but also increase the creativity (patent applications), confidence (stock markets), and economic vitality (GNP) throughout that society. This evidence indicates that as the collective consciousness of a society becomes more orderly and coherent, it also becomes more creative and progressive. The Maharishi Effect seems to work as an engine for economic growth.

To subject this implication to a fine-grain, longitudinal study, MIU economist Dr. Kenneth Cavanaugh examined the relationship between MIU's Super Radiance attendance on the one hand and a dread two-part economic indicator known as the *misery index* — a combination of the inflation rate and the unemployment rate — on the other. The misery index was first tracked in the late 1970s after a decade of stagflation, when the economy lagged in the doldrums but inflation raced upward anyway. A high misery index indicates the worst of both worlds for any economy — sluggish performance and a runaway currency.

Dr. Cavanaugh is another of MIU's statistical experts. He earned his Ph.D. at the University of Washington with a time series analysis of the stock markets, and he has been studying and contributing to time series methodologies since their inception as a statistical tool. For this study he tracked Super Radiance attendance at MIU since the group first formed in 1979, several years before it began to regularly reach the square root of one percent of America's population. He extended the study for nearly nine years, through 1987. He compared this attendance data with the government's monthly reports on unemployment and inflation. Using time series procedures to control for other influences on the economic data, Dr. Cavanaugh showed a strong and statistically significant inverse correlation between the attendance and the misery index. Once again, increases in the Super Radiance attendance led in time the decreases in the misery index. Here was clear statistical evidence that the United States economy had not only experienced an eight-year boom coincident with the MIU Super Radiance assembly, but that month-by-month changes in the nation's economic performance had been influenced by month-by-month changes in the size of the Super Radiance group. This type of evidence is extremely difficult to explain away and, even in the extremely conservative field of economics, this study was accepted and published in the *Proceedings of the American Statistical Association* for 1987.

Discussing these findings, Dr. Cavanaugh refers to one aspect of the theory of collective consciousness Maharishi unfolds in his Vedic Science. Economic performance is often affected by governmental decisions. Decisions by the government, in turn, are strongly influenced by the collective consciousness of the nation. In fact, Maharishi states that any government is just "the innocent mirror of the nation's collective consciousness." Maharishi considers this relationship between collective consciousness and government vital for the rapid progress of any society, and he has frequently discussed it at length:

If the people in the country are disorderly, only the fruit of disorderly action will come to the nation. If the people create chaos in society, then this can only result in chaos in government. Every experienced member of a government knows this from his own experience. A new man in government may have a great desire for accomplishment. The same man, full of enthusiasm and ambitious for his community, when he comes to the legislature and sits there — he finds his whole thinking changes. So many legislators are beautiful people — when you have them to your home for dinner they are so intelligent and full of good will — but when they sit in the legislature, what they do is so different. This has always embarrassed the leaders of governments everywhere. They are not able to think in the halls of government what they are able to think at home. It's because their thinking gets tossed about by the effects produced by all the people in the nation, by the disorder in the collective consciousness of that nation.

In a democracy, governmental leaders do their best to stay in touch with the collective consciousness of the nation, with what is called "the will of the people," if for no other reason than to get re-elected. But Maharishi describes a mechanics subtler than any deliberate attempt by a governmental official to modify his behavior to suit his constituents. Maharishi describes an automatic process, an innocent process. According to this theory, collective consciousness drives government decisions directly; if the nation's collective consciousness is gripped by war fever, then the government goes to war.

At one point in his misery index study, Dr. Cavanaugh touched on this relationship between government and collective consciousness. Governmental actions do affect the economy, but those governmental actions themselves can be understood as reflections of the collective consciousness. Why did the Federal Reserve Board finally engineer a soft landing for the economy? Why, for the first time, did it raise interest rates early enough to slow inflation before the economy overheated, then lower the rates again before the economy slipped down into recession? In the theory of collective consciousness, such effective governmental action is possible only when the collective consciousness of the nation is clear and orderly enough to support such intelligent actions. In Dr. Cavanaugh's words,

In Maharishi's Vedic Science, improved governmental effectiveness is a predicted effect of the purification of national consciousness. Every action of the national government is seen as the expression of national consciousness, just as every action of an individual is seen as an expression of that individual's consciousness. Shortsighted or misguided governmental policies are seen as resulting from the growth of stress, disharmony, and disorder in the collective consciousness of the nation. If the government is suddenly found to be more effective and successful in its undertakings, in other words, one should look to see what has caused an improvement in the quality of the collective consciousness.

This collective consciousness theory of governmental success is both provocative and of great potential importance. It deserves a more thorough study on its own, and it has received one from MIU psychologist Dr. Paul Gelderloos, working in collaboration with Dr. Cavanaugh. Drs. Gelderloos and Cavanaugh studied the effect of MIU's Super Radiance attendance in yet a third and totally new area — not on violent deaths, not on economics, but rather in the crucial arena of international relations.

The world has undergone a dramatic transformation toward peace and freedom. One man, the President of the Soviet Union, Mikhail Gorbachev, has conventionally received a great deal of the credit. For his contributions, he was recently named Time magazine's Man of the Decade. The theory of collective consciousness expounded in Maharishi's Vedic Science, however, would propose a deeper explanation. In this theory, large Super Radiance assemblies, and especially the permanent group maintained at MIU for over a decade, have purified the collective consciousness of the world. With stress and disorder receding in the collective consciousness, governments are left to make more orderly and useful decisions. There has been no large TM group in the Soviet Union, but it is possible that the long-term effects of the Maharishi Effect all around the world have had a cumulative impact in the Soviet Union. In fact, Maharishi has suggested that increases in coherence in America can lead directly to increases in coherence in the Soviet Union. Since these two superpowers have been primary rivals for so long, with a great deal of attention on and influence over one another, changes in one nation's collective consciousness could have a direct effect on the thoughts and actions of leaders in the other.

To investigate such questions, Dr. Gelderloos found an ideal source of monthly data. In Switzerland, the Zurich Project on East-West Relations maintains a continuous content analysis of many news sources to monitor the relationship between the superpowers. The Zurich Project keeps track of both the statements made by heads of state and other key governmental leaders and the overt actions taken by each government toward the other. The statements and actions are both termed events, and the Zurich Project has scored these events as hostile, neutral, or friendly, and kept a running record of the percentages in each category month by month.

Such a data bank is ideal for research on the Maharishi Effect. It is extensive and detailed, and it has been compiled by an independent organization with no preconceptions about the possibilities of Super Radiance assemblies. Drs. Gelderloos and Cavanaugh tracked this data every month from 1979 to 1986, comparing it with monthly fluctuations in MIU's Super Radiance attendance. The results of this analysis showed, first, that contrary to the usual portrayal in the public press, positive statements and actions ordinarily came from the American side first and were then taken up by the Soviet Union (the most famous example was the "Zero Option," the suggestion to remove all intermediate-range missiles from Europe, first proposed by President Reagan in 1982, then revived by President Gorbachev in 1986 and put into treaty form in December 1987). The second finding was that positive American statements and actions were highly correlated with increases in Super Radiance attendance at MIU. As in every experiment to date, attendance increases preceded the positive moves by the American government. The third finding (consistent with the findings of the International Peace Project) was that small increases in attendance would predict positive actions by American leaders, but large increases in attendance would also predict positive actions by Soviet leaders. There was nothing tentative about these correlations; the chance of mere coincidence was less than one in ten thousand.

This was the first statistical definition of *rastri kavach* — the armor of the nation. When the Super Radiance influence became large enough, when the collective consciousness of America had been sufficiently purified of stress and fear, then the statistics showed that the enemy of the nation began to act in a more friendly manner. On a surface inspection of daily events then, it may seem that President Gorbachev has single-handedly produced a more harmonious and peaceful atmosphere in the world. But

a fine-grain analysis of the actual changes that have taken place month by month tells a quite different story. According to these statistics, credit should not go so much to the Soviet Union as to Americans, and in America, credit should go not only to governmental leaders, but also to those who have meditated together for so long.

Taken overall, this cascade of statistical evidence suggests that governments all around the world now have a systematic technology to produce a higher quality of life, both within the nation and around the world. This research shows that governments have a way to reduce crime and traffic accidents and fires, a way to reduce unemployment and inflation while increasing the creativity, confidence, and gross output of their economy, and a way to produce a harmonious, orderly influence in the collective consciousness of the whole world.

The research supports, in fact, a suggestion which Maharishi has often made: governments everywhere would do well to establish a separate department to handle the collective consciousness of the nation. The government already has departments to handle problems of education, labor, economics, and many other specific aspects of national life. Now the results of published studies suggest that a government could establish one department which would help to handle the problems in every other area. The statistics indicate that there are enough trained experts in Maharishi's Transcendental Meditation and TM-Sidhi program to have begun a transformation in the trends of time all over the world, but far from enough to establish an ideal quality of life anywhere in the world. But if nations made creating coherence a profession, and trained large groups to devote their most important hours each day to this important profession, the statistical evidence shows that the quality of life in the world could be changed for the better overnight — according to many of the studies, literally overnight. Those people who have already been involved in this activity, the people who went to Zambia and Rhodesia, to Israel and Lebanon, to the Philippines and the Taste of Utopia, can tell anyone interested how deeply satisfying it is to be involved in such a project, how thrilling it is to gather together and watch once again as the society improves in unmistakably measurable ways.

A world filled with Super Radiance groups: it is a vision of possibilities often discussed by Maharishi, the man who has made these scientific definitions possible.

A very, very beautiful time is coming for the world. Now we have it in our power, through the collective performance of TM and the TM-Sidhi program, to create a glorious new atmosphere in the world, to bring a new sunshine to human existence. When we create the Maharishi Effect on a permanent basis, we will see economies everywhere more successful, politics everywhere more successful, religions everywhere more successful. International relations will be more loving. Negativity in the family of nations will simply disappear. The trends of time are now completely in the hands of every nation. Every government can make use of this simple formula to create a more successful society and bless the world with permanent peace and happiness.

To be able to completely accept this possibility, however, and to have the confidence to act on it, we must understand its mechanics. It is hard to accept a new idea until we can visualize how it works.

MIU researchers refer to a theoretical field nature of consciousness. They argue that like electromagnetism and gravity, consciousness must also have such a field nature to account for the observed effects of Super Radiance. Says MIU's Alexander, speaking of the Maharishi Effect in general,

The immediacy of the effect with the onset of Super Radiance assemblies, regardless of the assembly's distance from the target population, supports

the view that the social improvements are mediated by an underlying field. Only an underlying field, characterized by or interacting with consciousness, could permit such amplification and mediation of social coherence effects over vast distances with no apparent time delay.

Maharishi, giving expression to the ancient Vedic understanding of life, has discussed such a field theory throughout his more than three decades of teaching. He has spoken constantly of one underlying field of life, a field that is *unmanifest*, *infinite*, and *transcendental*. This field, he says, can be directly contacted by any individual mind, and by thus contacting this most basic field of nature the individual in Maharishi's words, "waters the root" of life, bringing "nourishment" to himself and to the society around him. As he says,

When the individual mind identifies itself with that transcendental basis of all the laws of nature, this is nourishing the whole creation from its very basis. That unmanifest field is a field of all possibilities at the basis of nature's functioning, and if we enliven that field we enrich all the expressions of natural law everywhere in our environment. All these beautiful effects we see around us, this powerful influence of coherence and positivity that is radiated from the Super Radiance assemblies, this we see as a measure of our ability to function from that unmanifest field, the unified field of all the laws of nature, from where all the diversity in nature arises.

The Maharishi Effect, from this standpoint, is evidence for a highly specific understanding about nature and human nature. In Maharishi's understanding, human life can be transformed by transforming the collective consciousness of the world. The collective consciousness, in turn, can be purified by a field effect, by the radiating influence from large group meditations. To understand this theory, it is necessary to understand two underlying principles, two of the four basic hypotheses listed in Chapter One. They are (1) that the universe is based on one fundamental unified field, and (2) that the human mind can contact this field in a fourth major state of consciousness.

It is time to further explore these two principles. The place to start is at the deepest levels of nature's functioning. Physics in the twentieth century has plumbed the depths of material creation and exposed the delicate inner workings of nature.

What can these profound explorations tell us about one unified field of all the laws of nature?

CHAPTER THREE

THE UNIFIED FIELD: HOME OF ALL THE LAWS OF NATURE

A central teaching of Maharishi's Vedic Science is that nature is based on one infinite, unbounded field of unmanifest potential. Stars and planets, trees and people all have a common source in one invisible, untouchable essence of existence. The complete Vedic explanation of the Super Radiance effect begins with this one principle. The topic explored in this chapter: how the investigations of modern physics have been able to uncover and precisely define such a hidden basis of the universe.

It's true that such a view of nature does not seem to square with our common sense experience of the world. When we open our eyes and look around, we see specific objects everywhere and a "transcendental field" nowhere. Yet the Vedic literature repeatedly maintains that the surface appearance of nature hides the deeper reality, that deep beneath the surface of creation lies *akshare parama vyoman*, the "imperishable transcendental absolute."

In the Upanishads, a Sanskrit compilation said to contain the essence of the four central Vedas, there is a well-known story that graphically describes this unmanifest field of pure potentiality. The story is cast as a conversation between father and son about the seed of the Banyan tree, a seed which happens to be hollow. It begins with a command by the father.

"Bring me a fruit of the banyan tree."

"Here is one, sir."

"Break it."

"It is broken, sir."

"What do you see there?"

"Some seeds, sir, exceedingly small."

"Break one of these."

"It is broken, sir."

"What do you see there?"

"Nothing at all."

The father said, "My son, that subtle essence which you do not perceive there — in that very essence stands the being of the huge banyan tree. In that which is the subtle essence all that exists has its self. That is the True, That is the Self, and thou, Svetaketu, art That."

This understanding of an unmanifest essence of existence may seem surprising, but we can find it in every tradition and every culture. In China, Lao-Tsu spoke of the *Tao*, "Born before heaven and earth./In silence and the void./Standing alone and unchanging. In Rome, Plotinus spoke of the *One*, "the source of life, the source of intelligence, the origin of being. . . . All these entities emanate from the One without any lessening, for it is not a material mass." In the modern European tradition, theologian Meister Eckhart based his metaphysics on the "nothingness that is beyond existence," an "eternal silent undifferentiated one-ness," and William Wordsworth can serve as an example of many poets and artists,

And I have felt a sense sublime of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean and the living air,
And the blue sky, and the mind of man;
A motion and a spirit, that impels

All thinking things, all objects of all thought,
And rolls through all things.

It is the Vedic tradition, however, which defines this view precisely and which systematically builds the full development of human life on its foundation. Certainly Maharishi has used this concept as the basis of his teaching, and he has taken great care to be detailed and exact in his definition. It is not a poetic feeling he is speaking of, nor a mystical abstraction. Even before modern physics began to glimpse the unified field as a mathematically definable reality, Maharishi spoke of it in a systematic way. Writing more than twenty years ago, and using the phrase "the absolute field" as the label, he said,

The absolute field lies at the root of everything. It is the omnipresent, essential constituent of creation, beyond all relative existence, beyond the realm of time, space, and causation, the boundaries of the ever-changing, phenomenal states of life. It enjoys the status which knows no change, the status of eternal existence. The different aspects of creation, of relative existence, of all the forms and phenomena in the ever-changing states of life in the world are as ripples and waves, having their basis in this vast, transcendent ocean. But in itself it is unlimited, unbounded, unmanifest, unchanging, eternal. It is the absolute state of existence.

If, despite the surface appearance of nature, the world is constructed with such an absolute field at its basis, it should be possible to recognize it. "Beyond the realm of time, space and causation," "the status which knows no change," "unlimited, unbounded, unmanifest" — these phrases are not ambiguous. While they may once have seemed to be pure metaphysics, they have been defined in the past few years with mathematical precision.

Let us retrace the path that modern physics has blazed, moving from the surface level of the world deep into the heart of creation's mechanics — and then remain awhile at that source and explore its mechanics thoroughly. Several books have been devoted to the mysteries of modern physics and their apparent parallels with what is loosely called Eastern thought. None, however, has focused on the simple, central thought emphasized by Maharishi in his Vedic Science: Nature is structured in layers, from gross to subtle, and the gross, surface levels depend upon the finest inner level. The discoveries of the physicists in this century have shown that the levels of nature descend hierarchically inward, from outer, surface aspects of the everyday objects we live with, through the successively finer inward levels represented by molecules and then atoms and then sub-atomic particles — and finally to the abstract level of pure quantum fields. The secrets which physics has uncovered on this inward journey to the heart of physical reality present us with a new understanding of nature's possibilities.

THE JOURNEY TO THE CENTER

Why is it that physics, this one particular discipline, has uncovered such important knowledge about the structure of the world? It is simply due to the nature of physics as a field, to the project which physicists assign to themselves. In the words of E. C. G. Sudarshan, a physicist who first helped define the *weak force*, one of nature's four fundamental forces,

Physics is the uncompromising search for the truth of the world's structure. Unlike other branches of science, it won't stop with partial answers, answers true at only the molecular level — like chemistry, for instance — or even at the atomic level. Physics is searching for the

deepest answers. For this reason it seems far more than coincidental that when physics discovers the basis of physical reality, it parallels in every respect the ancient teaching about an eternal, all-pervasive field of infinite potential. It seems likely that we are witnessing a convergence of investigative paths upon a single truth.

The ancient Greek Archimedes, speaking of the invention of the lever, said, "Give me a place to stand and I will move the world." We are, in a sense, looking for that standpoint, looking for that transcendent "location" from where all the universe could theoretically be moved. And physics has glimpsed such a level. At the heart of nature is an unbounded, unmanifest field of all possibilities, a standpoint for the application of infinite leverage — or, to change the image, a master switchboard for all the laws of nature.

THE DISAPPEARANCE OF MATTER

Through most of the past several centuries, scientists thought of the universe as a huge machine, a clockworks cloned infinitely in every direction. The workings of reality at every level, from the surface appearance of this world outward to the extremes of the universe and inward to the mechanics of the atom, were thought to be just the workings of solid material parts interacting with minute precision.

In the 1600s, Sir Isaac Newton brought these ideas to an ordered and intricate summation. The laws he formulated dominated scientific thinking for the next 300 years, and the core of his thinking was the understandable, common sense conjecture that at its basis the world around him was constructed of solid matter. He envisioned nature's ultimate reality as tiny, hard pellets of indestructible material, called *mass* points in his mathematics.

It seems probable to me that God in the beginning formed matter in solid, massy, hard, impenetrable, movable particles, of such sizes and figures, and with such properties, and in such proportions to space, as most conduced to the end for which he formed them; and that these primitive particles being solids, are incomparably harder than any porous bodies compounded of them; even so very hard, as never to wear or break in pieces; no ordinary power being able to divide what God himself made one in the first creation.

For a few brief years at the beginning of this century, three hundred years after Newton, physicists thought they had found these basic building blocks of nature. The atomic model of nature began to gain general acceptance among physicists at that time, and in the original form of this theory the atom was conceived as a tiny solar system — with the part of the sun played by protons and neutrons coalesced in the nucleus, and planets played by tiny whirling electrons. It was possible to envision these protons, neutrons, and electrons as Newton's "solid, massy, hard, impenetrable, moveable particles." The size of the particles, however, was much smaller than had been previously imagined, and the space between them much greater. The ensuing feelings of perplexed wonder on the part of physicists was well-captured by Sir Arthur Eddington. The man whose stellar measurements during an eclipse of the sun first provided verification of Albert Einstein's theories of relativity, Eddington wrote an influential textbook entitled *The Nature of the Physical World*, published in 1928. In the introduction to that work he describes everyday reality in these words:

I have settled down to the task of writing these lectures and have drawn up my chairs to my two tables. Two tables? Yes; . . . One of them has been familiar to me from earliest years. It is a commonplace object of that environment which I call the world. How shall I describe it? It has extension; it is comparatively permanent; it is colored; above all it is substantial. . . . It is a thing. . . .

Table No. 2 is my scientific table. It is a more recent acquaintance and I do not feel so familiar with it. It does not belong to the world previously mentioned — that world which spontaneously appears around me when I open my eyes. . . . My scientific table is mostly emptiness. Sparsely scattered in the emptiness are numerous electric charges rushing about with great speed, but their combined bulk amounts to less than a billionth of the bulk of the table itself. . . . It makes all the difference in the world whether the paper before me is poised as it were on a swarm of flies and sustained shuttlecock fashion by a series of tiny blows from the swarm underneath, or whether it is supported because there is substance below it; . . . all the difference in conception at least, but no difference to my practical task of writing on the paper.

Even this picture of solid matter as minute chaos was not to last. The tiny sub-atomic “particles” soon began to disappear altogether in the by now well-chronicled development of the theory of quantum mechanics.

One of the first steps was taken by Werner Heisenberg, a physicist with the intellectual daring to accept experimental imprecision as an unwavering postulate of the new physics. Appearing at the same time as Eddington’s book, Heisenberg’s *uncertainly principle* accepts as a definite, unalterable fact the following experimental impasse: when physicists try to pin down one of the sub-atomic particles — such as an electron, for instance — they find they cannot, ever, with any certainty. The sub-atomic world is so delicate that the attempt to *measure* it *changes* it. As Heisenberg first realized, when a physicist intrudes on an electron, he can either determine its position, but then have no clear ideas of its motion; or he can measure the momentum, but then have no precise knowledge of the position, or he can get a statistical approximation of both position and momentum, but not know either one precisely.

When physicists tried to lay hold of one of Newton’s small, massy particles, in other words, they found it evaporating in their grasp. As they pressed forward with their search, penetrating ever deeper layers of nature’s functioning through the newly developing theories of *quantum mechanics*, they found the reason for this evasiveness of the smallest particles. Such small particles, as particles, simply have no real existence.

Though their speciality is still frequently, and anomalously, called *particles physics*, experts in sub-atomic physics no longer picture solid particles floating in empty space. Indeed, they don’t think in terms of empty space at all. Instead their investigations have led them to the idea that space is filled completely by pulsating *fields*. What we think of as material particles moving in that field turn out on closer inspection to be nothing but the field itself. Firtjov Capra, a physicist at the University of California, has written in the *Tao of Physics*,

The quantum field is seen as a fundamental, physical entity; a continuous medium which is present everywhere in space. Particles are merely local condensations of the field; concentrations of energy which come and go, thereby losing their individual character and dissolving into the underlying field.

A wave on the ocean has its own reality; it can be measured, it can be seen to move, it can slap up against the side of your boat. And yet a wave is nothing different from the water around it, nothing but a local fluctuation or excitation in the unbounded ocean.

In just that way, quantum mechanics now describes particles as waves or wave packets (sometimes called *wavicles*), localized fluctuations or excitations in the underlying field. The mathematical formalism they use is known as *wave mechanics*, and the equations that describe any particular wavicle are known as the *wave function*.

In such a theory, the conception of solid matter disappears altogether. Einstein put this plainly: "We may therefore regard matter as being constituted by the regions of space in which the field is extremely intense [T]here is no place in this new kind of physics both for the field and matter, for the field is the only reality."

As of the 1930s, then, physics had clearly discovered that nature is built in layers. It had also discovered something even more important: that the laws of nature are completely different at different layers. On the outer, surface level of life, solid matter does obviously have a real existence; if you are holding a book in your hand, you can be sure that it will continue to exist there, solid and sure, and not dematerialize mid-sentence. At an inner, subtle level, however, where the physicists sought the ultimate reality of solid matter, what they found instead was fields and waves and "no thing" specific.

Which of these realities is true? The simple answer: they both are. The reality depends on which level is taken as the standpoint. Pictures in a news magazine show politicians, entertainers, athletes and the other celebrity personalities of the day. But if you look at any one of those pictures closely, under a lens, you see only colored dots on white paper. The President of the United States or tiny color blotches? It depends on which level is being viewed. Solid matter or immaterial fields? It depends on which level of nature is being investigated.

THE APPEARANCE OF THE TRANSCENDENT

In the fifty years since Heisenberg's discovery, the journey of physics toward the center of creation has passed further milestones. As the fields were discovered and defined, for instance, the fields themselves were found to have a basis, a most fundamental aspect called the *state of least excitation* of a field, the *ground state*, or, more graphically, the *vacuum state*. With this discovery, as the ultimate essence of fields began to be understood, the unmanifest, transcendental basis of nature first began to appear.

The discovery of this most basic level of a particular field was first made in quantum electrodynamics, the sub-atomic theory that defines the electromagnetic field. Quantum electrodynamics explains light, electricity, X rays, and magnetism, among many other natural phenomena. It is such a complete and precise theory that experts have called it the most accurate and successful physical theory ever devised. And in this precisely documented theory the basis of the electromagnetic field is defined, with mathematical exactitude, as infinite, unbounded, eternal, and unmanifest.

This *ground state*, or *state of least excitation*, of the electromagnetic field begins where sub-atomic particles come to an end. Its existence can be explained in terms of *excitation*. An electron, to take an example, exists in different states of excitation; it can be thought of as vibrations or fluctuations or excitations of the underlying field. Research has shown that any one electron can exist in many different, discrete levels, or states, of excitation. It can be very active or relatively sedate. And there is an absolute lower limit to the different states of excitation an electron can experience. When it relaxes below a certain point, it simply drops out of existence altogether.

When a tuning fork has almost stopped vibrating, its musical note ceases to exist. When an electron has almost stopped vibrating, it *itself* ceases to exist. In its state of least

excitation, an electron is not fluctuating enough to have the effect of a particle at all. It relapses into the vacuum state, the ground state of the electromagnetic field, the state of least excitation.

On the one hand, therefore, this vacuum state, as its name suggests, contains nothing; even the sub-atomic particles which structure the universe have not yet begun to have what the physicists now call a *real* existence. But the vacuum state is said to be not only completely empty; it is also said to be infinitely full. Although it has nothing within it, it is the source of sub-atomic particles, the beginning point for the building blocks of nature. The vacuum state is a field of infinite potential. This paradoxical reality has been commented on by E. C. G. Sudarshan. "Physics is considered to be simply the distillation of common sense," he says. "But instead its findings strain our abilities of comprehension. In no case is this more evident than with the vacuum state. The source of 'real' things has no 'real' things within it."

Although the vacuum state has no fluctuations or vibrations large enough or strong enough to appear in the real world, it has been found to contain what the physicists call *virtual* particles (or fluctuations). In the words of John Lewis, a geochemist at the Massachusetts Institute of Technology, "The vacuum state is an unmanifest level containing all possible states of matter and energy in virtual form. These unmanifest states exist as virtual fluctuations in the vacuum field."

Fluctuations within the vacuum state aren't *really* there; they are virtually there, almost there. Given the right conditions, these virtual particles pop out into the real world like popcorn out of a pan. Says the University of California's Capra,

The distinction between matter and empty space finally had to be abandoned when it became evident that virtual particles can come into being spontaneously out of the void, and vanish into the void. . . . The Vacuum is far from empty. on the contrary it contains an unlimited number of particles which come into being and vanish without end.

Here, with the state of least excitation of the electromagnetic field, the parallel with Vedic understanding first becomes compelling. The hollow banyan seed is echoed in the vacuum state; the "subtle essence" of existence, the empty "source" of all creation, seems here to have gained objective definition. When physicists analyze the nature of this state of least excitation in detail, moreover, the parallels with the ancient Vedic predictions become marked. Says the physicist Sudarshan,

The vacuum state is transcendental and unmanifest, yet it is the source of all manifestation. It is omnipresent and all- pervasive, since it underlies all of the various excited (or active) states of the universe. Further, it is non-spatial, non- temporal, immutable, and absolute. According to the quantum field theory, the vacuum state represents perfection — it is the level where orderliness is perfect and entropy (randomness and disorderliness) is zero. In addition, the vacuum state is a field of silence and non-action which is totally unaffected by any level of activity. Though energy and matter propagate from the vacuum state, it itself always remains undiminished — it is a source of infinitely varied manifestation.

This profound level of definition, based on the mathematical formalisms which describe the state of least excitation, can also be understood in relatively simple terms. The vacuum state is *transcendental* (in the sense of *beyond* or *outside of*) because it is beyond even the subtlest fluctuations of the real world; it is *unmanifest* because its fluctuations are not excited enough to become manifest in the *real* world; it is *omnipresent* because it is a continuous, all-pervasive background for all the more excited states of existence; it is *non-spatial* because, as Einstein showed, space has meaning only

as a measure of the distance between objects or events, and there are no objects or events in the vacuum state (it is, to use other words, empty of anything which could give it boundaries or limitations — it is unbounded); it is *non-temporal* because time is a measure of change, but there is nothing in the vacuum state to change (it is therefore *eternal* in the most meaningful sense — not that it exists for a long, long time, but rather that it simply has no connection to time); and it is *absolute* since there is nothing within it to establish relationships — it is prior to all relationships, to all relativity.

At this level of nature, then, the Vedic prediction seems to be accurate. Maharishi's description of the *absolute field* — "beyond the realm of time, space and causation," "the status which knows no change," "unlimited, unbounded, unmanifest" — has now been paralleled by objective understandings. According to the physicists, moreover, the vacuum state exists not only in its own untouchable realm, but it also forms the substance of the solid world we see around us. At the finest levels, every aspect of nature is made up of this field of all possibilities. In other words, when sub-atomic particles go from the virtual to the real world, they do not actually leave the vacuum level. In their real-world form, they are still but fluctuations or vibrations in, or of, the vacuum state. If every wave on the surface of the ocean is but a part of the ocean's water, every electron in the universe is but a wave of the vacuum state. Every particle in the world, and in us, is structured of an unmanifest field of unbounded potential. We are, literally, *made of infinite possibility*.

CULMINATION IN THE UNIFIED FIELD

There is still one more step to be taken. The vacuum state was first defined more than thirty years ago in the theory of quantum electrodynamics — the fundamental theory of electromagnetic interactions which deals with electrons, photons, and certain other related particles or wavicles. At that time, however, there were no theories available that gave one unified picture of the functioning of nature, that could provide a unified understanding of all the forces or fields. Although physics had reduced all of nature to four fundamental forces (or fields), this still meant four separate departments in nature, some of them not yet well understood.

Such a situation was not satisfying to physicists. For the smooth functioning of natural law, from the galactic to the sub-atomic levels, it seemed that all of creation must be one integrated whole. In the words of Heinz Pagels, Director of the New York Academy of Sciences and author of two of the most popular books on quantum physics, *The Cosmic Code* and *Perfect Symmetry*,

The dream of Einstein was the search for a master law of the universe. He sought in vain for one unified picture of nature from which all the other physical laws could be deduced — but in recent years many other physicists have taken up his quest. The goal is to construct a theory that begins with one master law and results in only one logically possible universe. Not that everything in that universe would be determined — not that you or I had to come into existence right from the beginning — but that the master law would generate a universe characterized by the laws of nature as we know them. This is the physicist's dream.

In the past two decades, physics has made tremendous progress in realizing Einstein's dream. Theories which reveal an underlying unity of the four forces of nature have been progressively developed. It is these theories which physicists today look to for the deepest understanding of nature.

The four forces which physicists sought to unify include (1) electromagnetism, which not only accounts for television, lightning, and the functioning of the human nervous

system, but also provides the connecting mechanism that holds atoms together and connects atoms within molecules; (2) gravity, an attractive force that operates over long distances, though relatively weakly; (3) the *strong* force, the force which binds together the nucleus of the atom and which, when released, provides nuclear energy; and (4) the *weak* force, a second subatomic force, responsible for radioactivity and instrumental in the fusion reaction within the sun which provides energy for life on earth.

In the 1960s, beginning with a paper published by Sheldon Glashow and culminating in work done separately by Steven Weinberg and Abdus Salm, two of these four forces were theoretically unified. The *electro-weak* unification showed that electromagnetism and the weak force were, at the most fundamental level, not two separate realities but rather two aspects of the same underlying field. This theory was so beautifully conceived — so elegant and so powerful, to use the two of the words that physicists often employ to define a mathematical picture of nature which seems to them compelling — that Glashow, Weinberg, and Salam received the Nobel Prize for their work even before any experimental evidence proved their theory correct. Such evidence has come in, however: the discovery of three new particles predicted by their theory.

In the 1970s the unification project continued with the creation of so-called Grand Unified Theories by Glashow and others, theories which revealed the underlying unity of the strong force with the weak and electromagnetic forces. With the development of these theories, the three most powerful forces were found to be unified (gravity, though it operates over long distances, is extremely weak when compared to the other three forces; a single atom of hydrogen, one proton circled by one electron, if held together by gravity instead of electromagnetism, would have a radius larger than that of the known universe.)

Finally, through the use of a mathematical formalism known as *supersymmetry*, physicists have succeeded in devising unified field theories which unite all four of the natural forces. These theories define the existence of what is sometimes called the *superfield* — one unified field which contains within it the seeds of all the force and matter fields in nature. This newly defined unified field stands in a parental role to *all* the particles, all the forces, all the fields. With these theories the understanding of nature has reached a completely unified description.

As with many other aspects of quantum physics, this ultimate reality of nature can be imagined in different ways. Daniel Freedman of MIT and Peter Van Nieuwenhuizen of the State University of New York, two leaders in the development of supersymmetric *supergravity* theories, have said that the mechanics for the production of real particles from the unified field,

. . . can also be viewed in terms of a “super particle” with an arrow in an auxiliary space of many dimensions. As the arrow rotates, the particle becomes in turn a graviton, a gravitino, a photon, a quark, and so on. The quanta of all the forces are present in the theory, and they are unified, or derived from a common source.

However this process is imagined, the overall picture is encouraging. With it, every different aspect of nature can be understood as arising from a single, unified field. These *super-unified* theories, moreover, are supported in the two ways most congenial to the mind of the modern physicist. First is simply the mathematical structure of the theories themselves. As Freedman says,

To begin with, the equations in the theories have in themselves a high degree of symmetry, and if there is one thing theoretical physics has learned in the twentieth century it is that symmetry is one of the major principles of successful theories. Another aspect is that, using super unified approaches, when you write down a theory from a general set of ideas, you don't wind up with 100 adjustable parameters. This is important

because physicists in general have a prejudice that, when God created the laws of the universe, he did not randomly choose, for example, the masses arbitrarily. The assumption is that there is a simple set of equations from which everything can be derived, and the super unified approach seems to be providing that.

In recent years, the most successful unified field theories have been known as *superstring* theories. In these theories, what were once considered to be the sub-atomic particles are now considered to be string-like rather than point-like. Instead of a super particle, there is now a super string, elastic and closed end-to-end like a donut. The various rotations and vibrations of this string give rise to the various force and matter fields of nature. At first, physicists were puzzled because such superstrings could only exist in ten dimensions. This meant that six of the ten dimensions would have to roll up like tape measures to leave, functionally, the four-dimensional world we live in. The most successful recent theories, however, are four dimensional intrinsically.

John Hagelin, a Harvard-trained physicist who has worked both at C.E.R.N. and the Stanford Linear Accelerator, the two leading centers of unified field research, has been an important contributor to this search for physical unification. Hagelin has published more than 40 papers on the topic since 1980. His recent formulation of a Grand Unified Theory, sometimes called the Flipped SU(5) model, has been called the leading candidate for a successful Grand Unified approach. A Grand Unified Theory is the last link in the chain of unification before the superunification in the unified field. Hagelin's Flipped SU(S) theory is important because it is the only Grand Unified Theory that can be connected backward or inward to the superstring in the unified field, and also forward our outward to the force and particle fields that actually make up the universe. In 1984, Hagelin accepted the appointment as Chairman of the Physics Department at Maharishi International University, and he is recognized as being the best-informed physicist on the ancient understandings of Vedic Science.

Hagelin frequently makes presentations on the nature and qualities of the unified field at the heart of creation. In his lectures on these superunified theories, Hagelin usually start with a review of the progress made by twentieth century physics in understanding the progressively deeper layers of nature's functioning. He begins by reviewing the "dissolution" of solid particles.

The particle concept goes very deep in the history of science. You can call it "billiard ball mechanics." Since Newton at least it has dominated the conceptual framework of science, and it is in a sense a hangover of three centuries of studying billiard balls and their ilk. Even today most physics students begin their study of physics by analyzing the rolling of balls on inclined planes. But this notion of solid, massy particles, so deeply ingrained in our thinking, is simply inadequate at the quantum mechanical level. This concrete, familiar concept, which was supposed to be the basis of nature, slipped through our fingers in the first part of this century. We were left with something much more abstract — waves in an underlying quantum mechanical field.

As many physicists have pointed out, the physics community did not eagerly embrace such an abstract notion of nature. As a breed of scientists, physicists tend to be highly practical and pragmatic, preferring concrete explanations concretely proven. The impetus toward a solid matter understanding of nature was so strong, in fact, that nearly an entire generation of physicists had to retire from the academic strongholds before the traditional, classical interpretation of nature gave way to the new quantum mechanical viewpoint.

And as Hagelin says, the shift from particles to fields was not the conclusion of this move from the concrete to the abstract.

The wave function is a more abstract, more unlocalized, more expanded concept than the particle. Nevertheless we are familiar with waves, we have an image of waves in a field, such as waves on the surface of a lake. But then at the most abstract level of the field — the state of least excitation, or vacuum state, where the lake has, as it were, settled down completely — in that state the quantum field itself has no definable shape. The vacuum state, in fact, is the coexistence of all possible shapes of the field simultaneously. This can't happen with the surface of a lake. There cannot possibly be the simultaneous superposition of all possible shapes of such a classical field. So we find that even the term "field," as we know it, is inappropriate to describe the quantum mechanical reality. The notion of field also dissolves, and we are left with an abstract, unlocalized something that does not even have a definite shape.

This progression away from the concrete and toward the abstract culminates in recent definitions of the unified field, which is, in a sense, the simultaneous superposition not just of all possible shapes in one field, but of all possible fields. As Hagelin points out, this field is both extremely abstract and very real.

As one's attention is brought to the most fundamental level of nature, there is a transition in the structure of natural law. From this most basic standpoint, it is possible to see that the apparent laws of nature at more superficial levels are the result only of an approximate and fragmented viewpoint. At the level of the unified field, nature is completely abstract but infinitely energetic and dynamic, and within that level of infinite energy all the laws of nature are found united. Out of this most fundamental level of nature's functioning arise all the laws of nature which uphold the functioning of the more superficial and complicated levels. The unified field is thus highly abstract, but very real. From there, all the laws of nature originate.

How can we picture the relationship between the unified field and the surface level of nature? One way to understand it is historically — to consider the origin of the universe. According to the most widely accepted theories, all the laws of nature were lively in a unified state just a billionth of a second after the big bang first began the universe. At that historical moment, cosmologists now theorize, all the mass and energy of the universe was compressed into a radius smaller than the nucleus of an atom. This seed of creation was unimaginably hot, and in this white hot point of essentially infinite energy, the laws of nature existed in one inseparable unity.

The evolution of the universe as we now know it is pictured in terms of the breaking of a perfect symmetry that existed in that seed-point of natural law. Within that unified, unstructured wholeness, symmetry was perfect: along every possible axis, the structure of the field was identical. From the center of a large globe, the view is identical in every direction. From *anywhere* in a supersymmetric field, the view is identical in every direction.

From this field of undifferentiated unity, differences and variety came about in the universe when, as the seed- point of matter and energy expanded and cooled, the perfect symmetry within the unified field began to break down. It has been likened by physicists to a crystallization process, a process reminiscent of amorphous fog hitting a cold window and crystallizing into beautiful, highly specific patterns. As the unified field cooled, there was a process known by theoretical physicists as *spontaneous, sequential,*

dynamical symmetry breaking: one after the other, the four forces of nature crystallized out and began their own independent levels of functioning. Like the petals of a flower opening out one by one from the unity of the bud, the laws of nature opened out one by one from their completely unified state. Heinz Pagels is one of the few physicists who has discussed these latest discoveries in layman's terms. In *Perfect Symmetry*, Pagels imagines the process running backwards, as if a time-lapse film of a budding flower were seen in reverse.

Here, for the first time, we see a remarkable feature of the modern theory of the origin of the universe: the further back in time we go, the hotter the universe becomes, and broken symmetries are restored. The universe and all its particle interactions are becoming more and more symmetrical as we descend deeper into the big bang Conversely, were we to progress forward in time, we would see that as the temperature falls, those perfect symmetries are broken. Now the physical differences between the various interactions — strong, weak and electromagnetic — become apparent. The universe today, with its relatively low temperature, is the frozen remnant of the big bang. Like an ice crystal that has frozen out of a uniform water vapor, it has lots of structure — the galaxies, stars and life itself.

According to these unified theories, moreover, the unified level of nature is not a historical reality only, not something that existed at only the most remote moment in time and has since ceased to take any part in creation. In the deepest understanding, the unified field is everywhere, omnipresent, deep within the structure of nature. Starting at any given point, you can approach the unified field through a series of steps of unification, each step taking place, in John Hagelin's phrase, at "finer and finer time and distance scales" — that is, in areas and time-frames which are smaller and smaller. If we imagine a microscope that focuses in beyond the atomic level, beyond the level of sub-atomic particles, and down to the finest possible level of nature, there we would find the point value of space and time, what is known to physicists as the *Planck scale* of nature's functioning, at which physicists say that the unified field is fully lively.

The steps of this unification process take place at progressively smaller, or shorter, scales of distance. At the sub-atomic level, for instance, the level of protons, electrons, and the other particles, where the four forces of nature are all operating and completely separate, the distance scale amounts to 10^{-14} centimeters — a tiny fraction of a centimeter represented by one over ten followed by 14 zeroes. Moving down to the level of 10^{-16} centimeters, a scale 1/100th as large, the electromagnetic force and the weak force are found to be unified, rather than separate. It is as if our eyesight becomes finer and we can see the smaller details. As our vision adjusts to these finer, more delicate realities, we can see that what appeared on the surface to be separate is, in fact, part of one unified whole. The next jump is a big one, down to 10^{-29} centimeters, one ten-trillionth as large as the level of electro-weak unification. This is the level of Grand Unification, where the strong force is also seen to be unified with both the weak force and electromagnetism. Finally, at 10^{-33} centimeters, the level of the Planck scale, superunification takes place: gravity also comes into the fold, and all four forces of nature are found to be unified in the superfield. At every step of this inward progression, as one moves to finer distance scales (to shorter lengths of measurement), energy and dynamism become greater and the laws of nature more unified. Speaking of Grand Unified Theories (GUTs), and using principles which the supersymmetric unified field theories have extended to include all four forces of nature, Pagels says,

What the theorists found is that if nature is indeed described by a GUT, then quantum interactions, in spite of their different strengths at long distances, would, when viewed at very short distance scales, reveal the

exact underlying GUT symmetry. This meant that at ultrahigh energies, corresponding to those short distances, the strong, weak, and electromagnetic interactions merged into a single unified interaction ... that the underlying symmetries of a spontaneously broken field theory would be restored at very short distances. . . .

Superunification, the union of gravity with the other three forces, takes place at the Planck scale. The Planck scale is the shortest distance conceivable in nature. To give some idea of just how small this scale of nature is, we can imagine that we are about the size of a proton in the nucleus of an atom. At that size, the Planck scale is still as much smaller than we at proton size, as we ourselves are (at ordinary size) smaller than the entire galaxy of which our solar system is a part.

The Planck scale is considered by physicists to be the fundamental scale of physics, the smallest size possible in nature. This is true because at the Planck scale the whole notion of size — and not only size, but all concept of space and time — cease to have any meaningful reality. As Hagelin says,

At the level of the Planck scale, gravity also becomes a quantum reality. This means that the arena of the gravitational field, the four-dimensional manifold of space-time which Einstein first defined, no longer has a definite shape. The four-dimensional geometry of our familiar world assumes the quantum aspect of the simultaneous coexistence of all possible shapes. Thus space and time as concepts to describe nature become inappropriate. If you want to find the distance between two points, you can't find a well-defined answer. If you try to lay down a ruler on the manifold, you find there are an infinite number of manifolds simultaneously. All geometries coexist and there ceases to be any definition of distance.

It is not possible to move to a smaller time or distance scale than the Planck scale because, at the Planck scale, smaller no longer means anything. The geometry of space-time, the backdrop for the other three forces, or fields, of nature, finally itself dissolves into a shape-shifting, indefinite, ever-changing reality. This deepest layer of creation, which is found at every point throughout the universe, is by its very nature a source of infinite potential — a vibrantly dynamic field of unbounded possibilities. At that finest level of nature's functioning, the transition of space-time geometry becomes so dynamic that Hagelin calls it a boiling of that geometry into a *space-time foam*. In the words of Heinz Pagels,

On large-distance scales such as those we experience every day, space-time looks flat and smooth like the ocean surface seen from on high; but up close at the Planck scale it is churning and foaming like the ocean in a storm. If physicists are to describe the microworld of Planck-scale distances, then little remains of the concept of a space-time continuum upon which the description of nature has so far been based.

What is this foam made of? Each bubble is a universe within itself. Says Hagelin, "As we go from grosser levels of nature down to that finest level of the Planck scale, there appears a continuous effervescence, a continuous bubbling up of entirely separate universes." This bubbling is so lively that, in a cubic centimeter of space, *10... black holes* are said to appear every second — each black hole an entire universe turned, as it were, inside out.

Every possible universe, every possible law of nature, every possible combination of particles, forces, and fields — all the possibilities of creation are continually roiling up

from the infinitely creative dynamism of the unified field of all the laws of nature. This is the reality at the basis of existence. Eddington's writing table has a solid layer on the surface, but when we take our attention to the finer and finer levels deep within, we come upon, first, a swarm of sub-atomic particles, and finally a foam of infinite potential.

The latest unified field theories thus give us a penetrating picture into the workings of nature. The particular, solid, material objects which we see around us on the surface level of existence, and even the four fundamental forces of nature, are but varying expressions of one unified field of all the laws of nature. And that unified level of nature's functioning is completely abstract and unmanifest, beyond space and time.

It is true that physicists have not completely fulfilled their quest for a unified understanding of nature's functioning. Supersymmetric theories, however, have the internal symmetries and mathematical elegance that physicists have come to trust. Moreover, all the theories currently being considered have one aspect in common, the aspect central to Vedic Science: in all of them, all aspects of nature are found united at their source. At the fundamental level at the Planck scale, far beyond the familiar surface level of the world, exists this unmanifest realm which is a field of all possibilities — beyond the specific four-dimensional structure of space-time, beyond all the particles and forces of nature.

Summing up his discussion of the progress physics has made in describing the ultimate workings of nature, both microscopically and cosmologically, Heinz Pagels makes his most important point in simple language:

When historians of science look back on the 1970s and '80s, they will report that for the first time scientists constructed rational mathematical models based on the laws of physics which described the creation of the universe out of nothing. And that will mark the beginning of a new outlook on the creation of existence.

FROM MATTER TO MIND

The tale of the hollow banyan seed thus seems an appropriate analogy for the mainstream ideas of modern physics. In the current theories of physics, the source of the universe is beyond any specific manifestations seen in the real universe; it is beyond space, beyond time, transcendental and absolute. Yet that empty field is somehow a field of fullness, a field of infinite potential that can give rise to not just one specific type of creation, but to an infinite foam of universes.

For someone seeking an infinite standpoint for Archimedes' lever, or else a master switchboard — not just for this universe but for all possible universes — quantum physics has uncovered an ideal candidate.

The ancient Vedic wisdom propounded such a basic unified field, and now physics has at least glimpsed its reality. There is only one difficulty with this discovery as it has been made through objective science. It doesn't seem to be practically useful. There is no apparent way for a human being to take up a position at this transcendental level, no way to take advantage of the infinite potentiality, the unbounded creativity which is lively there.

As we have seen, there is certainly no way for anything material to enter this unmanifest realm. At finer and finer time and distance scales, what appears to be solid matter on the surface level of life resolves first into sub-atomic particles, then into non-localized waves, then into fluctuations of the unmanifest vacuum state, and finally into the infinite possibilities of the unified field. Whatever seemed material on the surface has long since disappeared at the infinite, unbounded, timeless level of nature's functioning. Physically, then, there is no entry. The most basic level of nature is untouchable through material means.

And the isolation of nature's most basic level seems even more complete than this. As John Hagelin points out, it is technically not possible even to *think* about the unified field in any reasonable way. This is true because, in his words,

. . . even the sequence of events becomes ill-defined. At the Planck scale of superunification, space and time have no currently viable definition, and there is no way to determine what comes first and what comes second. And when that happens, even causality becomes suspect. Causality is a fundamental aspect of empirical science. Science is involved with questions of why. We assume you can ask why something happened, what caused it, and have that be a reasonable question. But a cause, to be a cause, must precede the effect. Why is this chalk in two pieces in my hands? Because, at some time in the past, I broke the two pieces apart. Sequence in time is fundamental to causality. If you can't define sequence, you can't define a reasonable causality, and if you can't define causality, the whole project of empirical science and logical exploration comes into question.

Thus, the unified field of natural law has its existence where not only space and time have come to an end, but where even the logical, cause-and-effect structure of thinking cannot make an entrance. The unified field, with its promise of infinite possibilities, seems frustratingly out of reach.

The precepts of Maharishi Vedic Science, however, posit another possibility. The ancient Vedic tradition of knowledge maintains that the human mind can directly *experience* the unified field. This is not on the basis of surface-level thinking and logical analysis, but rather on the basis of direct identification with this field. The mind can theoretically settle down deep within itself and, in experiencing its own source, experience the source of all creation.

Thinking about a cool swim on a hot day is one thing; diving directly into the water quite another. Direct experience is beyond thought; it is real, tangible — it gets you wet, it cools you off. This has been one of the main emphases in Maharishi's teaching of Vedic Science; the unified field is not a thought, not a concept, but a reality which can be directly experienced. The experience of the unified field, he says, is an experience beyond all thought, beyond even the finest levels of the thinking process — a direct dive into the unified field, experienced as the pure, unbounded, transcendental essence of one's own consciousness, as the simplest form of one's own awareness.

It will take two more chapters to thoroughly discuss this concept. Before moving on, however, it might be useful to take a quick look back and gauge how thoroughly the Vedic concept of the unified field has been verified. Here again is Maharishi's description of the "absolute field" which he offered more than thirty years ago:

The absolute field lies at the root of everything. It is the omnipresent, essential constituent of creation, beyond all relative existence, beyond the realm of time, space and causation, the boundaries of the ever-changing, phenomenal states of life. It enjoys the status which knows no change, the status of eternal existence. The different aspects of creation, of relative existence, of all the forms and phenomena in the ever-changing states of life in the world are as ripples and waves, having their basis in this vast, transcendent ocean. But it itself is unlimited, unbounded, unmanifest, unchanging, eternal. It is the absolute state of existence.

Can we contact this field? Vedic Science says yes — says, in fact, that it is through contacting this field of infinite potential that the human mind gains the status which allows it to innocently and automatically transform both itself and its surroundings. In the

Vedic understanding, when the human mind comes into tune with the laws of nature at their source, human nature begins to unfold the hidden potentials lying deep within, and gains the ability to innocently and spontaneously generate the Maharishi Effect to recreate the world.

If this is true, however, if mind and matter can really be united at their source, then the relationship between nature and human nature, between creation and consciousness, must be considerably different from the way it seems on the surface level of life. In the everyday world, mind seems to be one thing — immaterial, insubstantial, never localized in any solid object — and matter something else entirely — material, substantial, localized.

But physics has already shown us that solid matter does not, at its basic level, have a solid existence. The sub-atomic particles are in actuality but waves in an underlying field that is completely non-material, completely non-substantial, that is unmanifest, transcendental, timeless, and infinite. If mind is immaterial, found nowhere fixed as specific substance, physics now tells us that matter, at its basis, is no less.

And physics has even more to say on this topic. To a surprising extent, the explorations of quantum physics have uncovered an indissoluble interfusion of mind and "matter." It will prove fruitful to spend one more chapter with some of this century's greatest physicists, finding out what more they can tell us about the nature of nature — and its relationship with consciousness.

CHAPTER FOUR

**CONSCIOUSNESS
AND CREATION:
FROM THE STANDPOINT
OF PHYSICS**

The mysterious intelligence of creation is one essence of childhood awe. The filigreed wonder of snowflakes, the mathematical beauty of coiling seashells, the delicate architecture of spring flowers, all the inherent genius of nature and life seem to speak of a living logic embedded in the world.

Given this orderly, predictable world of nature, it is sometimes difficult to understand how we ever talked ourselves out of the obvious, innocent perception that intelligence is infused in every aspect of creation. It is true that, at a certain stage of the evolution of scientific thinking, many scientists pictured the material aspect of creation as dead and inert, and the constructs of galaxies, planets, and life as simply the chance congregations of material bits piling up randomly. But science has advanced. Distinctions that once seemed obvious, such as that between solid matter and empty space, have dissolved. And quantum mechanics has brought into question even the ultimate distinction upon which science is based — the distinction between the scientist himself and what he is studying, the distinction between the living mind of the observer and the inert matter being observed.

In the world of quantum physics, as we will see in this chapter, mind and matter have become inextricably intertwined.

In the Vedic tradition, such a union between consciousness and creation is the central assertion about the functioning of the world. The unbounded, transcendental field at the basis of nature, now glimpsed by modern physics as the unified field, is seen by Maharishi's Vedic Science as itself *made* of consciousness. Mind and matter are closely intertwined because the unified field, the basis of matter, is itself a field of mind, of awareness, of consciousness.

This is a startling assertion which has been the basis of Maharishi's teaching for more than three decades. Maharishi comes from the Shankaracharya tradition of teachers in northern India, a line founded twenty-five hundred years ago by the illustrious sage Shankara. Perhaps the most respected intellect in India's history, Shankara expresses this view of creation's essence simply. "That reality pervades the universe," he said, "but no one penetrates it. It alone shines. Its nature is pure consciousness."

Writing in 1963, when even the electro-weak unification was but a gleam in the eyes of physicists and the completely unified field merely a dream, Maharishi gave the definition of the absolute field already quoted, and added this point:

With the rapid pace of development in nuclear physics, the day does not seem far off when some theoretical physicist will succeed in establishing a unified field theory The discovery of this one basis of material existence will mark the ultimate achievement in the history of the development of physical science. This will assist in turning the world of physical science toward the science of mental phenomena. And at the extreme limit of this investigation ... will be found the state of pure consciousness that field of transcendental nature lying beyond all the relative existence. . . .

Twenty years later the unified field has been defined in the most advanced theories of quantum mechanics, and Maharishi brings this point up to date.

Now from the investigations of modern science we have the unified field, the home of all the laws of nature. And from Vedic Science we know this field to be a field of pure awareness, of infinite creativity. It is the field of intelligence pure, of consciousness pure.

In this understanding, the endless creativity exhibited by snowflakes, the mathematical intelligence structured into sea shells — all the orderly and precise manifestations of nature — have their source in one limitless reservoir of creativity and intelligence, a pure field of abstract consciousness.

The surprise is how completely modern physicists agree with this view. The investigations of physics, apparently objective to exclusion, apparently a dry parsing of the mechanics of inert objects, have unintentionally unveiled a mind-matter symbiosis deep within the structure of nature. In the words of the late Eugene Wigner, a Nobel Laureate in physics, "The next revolution in physics will occur when the properties of mind will be included in the equations of quantum physics."

THE OBSERVER IS THE OBSERVED

Why did Wigner believe that mind deserves a place in the equations of physics? Why are many physicists coming to believe that the study of physics must in some way include the study of consciousness? An entry-level answer is provided by Erwin Schroedinger, one of the most influential quantum mechanical pioneers of the first half of this century. Writing in a late-career book entitled *Mind and Matter*, Schroedinger turned to the crucial question about the relationship between consciousness and scientific truth. In the view he propounded, the problem starts where science begins. The fateful first step of scientific investigation is, in Schroedinger's neologism, to *objectivate* the world. "We exclude the subject of cognizance," he says, "from the domain of nature that we endeavor to understand." The scientist, in other words, is excluded from the realm he is studying. This removal of the subject from the object of investigation has the theoretical effect of "objectivating" the world. It becomes subject-less by definition — dead, inert, mere matter. This is a central scientific assumption, of course; it is the basis of the concept of objective investigation. The person doing the study is supposed to have no involvement with what is being studied. To put this simply, mind is supposed to be observing matter.

But this basic assumption leaves us prey, as Schroedinger says, to a "pandemonium of disastrous logical consequences." The inconvenient reality, as Schroedinger takes several chapters to explain, is that much of what is supposedly out there in the world is in reality structured in here in consciousness all along. To make his point, Schroedinger takes the example of light.

If you ask a physicist what is his idea of yellow light, he will tell you that it is transversal electromagnetic waves of wavelength in the neighborhood of 590 millimicrons. If you ask him: But where does yellow come in? he will say: In my picture not at all, but these vibrations, when they hit the retina of a healthy eye, give the person whose eye it is the sensation of yellow.

The electrons and protons in a yellow flower petal are not themselves yellow, nor are the photons of light which come from the petal somehow splashed with yellow paint. Nor, in the eye, is there a yellow chemical created, any more than in the brain yellow electricity moves about. Yellow is nowhere to be found in the objective world at all, which consists only of vibrating energy, or more exactly, fluctuations of the underlying

field. Yellowness is created only in "the subject of cognizance", yellow is in the mind of the perceiver, a response wholly within consciousness.

The locus of this creation can be found nowhere in the "objectivated" picture of the world, as Schroedinger explains. He switches his analysis from sight to hearing and seeks for the place where waves, passing through the air, finally register as sound.

We can follow the pressure changes in the air as they produce vibrations of the ear drum. . . . We may reach an understanding of how [this] sets up an electrical and chemical process of conduction in the nervous fibre with which it is in touch. We may follow this conduction to the cerebral cortex and we may even obtain some knowledge of some of the things that happen there. But nowhere shall we hit on this "registering as sound" which is simply not contained in the scientific picture, but is only in the mind of the person whose ear and brain we are speaking of.

Schroedinger's point is that the world we perceive — as *we perceive it* — is structured in our consciousness. If we imagine ourselves small enough to see them, electrons within a rose would look identical to electrons in the air around the rose. The sub-atomic reality is monotonously the same, a small handful of peas-in-a-pod particles or wave packets, all interchangeable regardless of the large-scale objects of which they are a part. On the surface level of nature, on the other hand, there is infinite variety, from grains of sand to swirling galaxies. Despite the absolute identity of the sub-atomic components, the surface level manifestations can be large or small, hard or soft, sharp or smooth, colorful or dull. And as Schroedinger's analysis makes clear, at this surface level of nature the mind of the observer actually helps create the qualities which it is observing.

This commingling of consciousness and creation is not only true of such everyday sense perceptions as color, shape, texture and smell, but also of the precise mathematical qualities defined and studied by science. In the words of John Kemeny, a Physicist and former President of Dartmouth University, "We tend to say that objects have masses, velocities, energy, etc. Actually these are free creations of the human mind, which have proved useful for the formulation of theories about experience."

Einstein's theory of relativity showed that mass and energy, for example, which we commonly think of as two obviously independent qualities of any object, are actually not separate realities, but rather two different ways of looking at the same thing. $E=mc^2$ means more than that mass can be turned into energy; it means, in truth, that mass and energy are interchangeable views of one reality. Physicists who specialize in quantum mechanics list the mass of sub-atomic particles in units which measure energy. The separateness and specificity of mass and energy are "free creations of the human mind."

Immanuel Kant made this point a centerpiece in his philosophical structure. What we know are the *categories* in our minds, he said. When we see a brick, we know it as a brick because we have a brick category in our mind. If later we need a door stop or a paper weight — if different categories surface in our mind — then we may see the brick totally differently. In Kant's understanding we experience our mental categories, not the reality, and of the *ding-an-sich*, the "thing in itself," we know nothing. In an era of quantum physics we can understand this thoroughly. We know nothing (through our direct sense perception) of the sub-atomic reality in a brick; we see only what is created by our consciousness in response to the photons coming from it. We know nothing of the *ding-an-sich*.

Twentieth-century psychologist Abraham Maslow agreed with this 18th century assessment of Kant. Said Maslow, "We do not so much cognize the nature of the world as it actually is, as we do the organization of our own inner world outlook."

As the primary Vedic text, the Rig Veda, states, "Knowledge is structured in consciousness."

If such simple logic tells us that consciousness is confluent with creation at the surface level of life, the level which our senses directly perceive every day, Albert Einstein in his theories of relativity established a similar truth at the cosmological level, the scale of astronomical distances and extreme speed. As part of his profound reworking of Newton's laws of gravitation, in equations which united, on the one hand, matter with energy and, on the other, space with time, he also showed that the basic elements of physics — the measurements of distance and time — could no longer be absolutely relied upon. Rulers and clocks, which seem so simple and sound, suddenly became suspect.

Through an elegant logic (which Einstein himself best explains for the layman in his book *Relativity*), he proved that knowledge of distance and of time is no longer absolute and invariant, but depends instead upon the motion of the observer. Clocks can speed up or slow down, measuring rods lengthen or shorten, depending on the relative motion of two observers measuring the same phenomenon. The most basic measuring units of physics turn out to be elastic and unreliable unless the exact situation of the physicist himself is known. In the words of MIT's John Lewis,

Most non-scientists and even many scientists are as yet unaware of the profound new perspectives which relativity theory has developed and how much these perspectives alter our "common sense" notion of reality. Whereas classical physics spoke of objective reality independent of the observer, relativity theory posits that we can never separate the two — the observer has become an integral part of any statement about reality.

Both the vast cosmological level of nature and the everyday (surface) level, then, are characterized by a close interconnection between subject and object, between the observer and the observed. The progress of quantum physics has shown, at the sub-atomic level, a similar merging of consciousness with natural phenomena.

A key example is Heisenberg's uncertainty principle. As we have already seen, this principle defines the experimental fact that measuring, for example, the *momentum* of an electron so disturbs the situation that it is impossible any longer to determine exactly the *position* of the electron. The observer, through the process of observation, changes the reality being studied.

On the surface level of nature, we wouldn't expect this to arise. We should be able to take a yardstick and measure off the 100 yards of a football field without changing the yardstick or the field in any important way. At the sub-atomic level, however, reality is structured differently. Here, if you find the exact momentum of a particle, then it simply does not *have* a well defined position — and vice-versa. This is not a failing of the measuring instruments; it is a matter of principle, a quality of nature at this deep inner level.

In the words of John Wheeler, once a student of Erwin Schroedinger, who first helped formulate the concept of black holes, this uncertainty principle "destroys the concept of the world 'sitting out there' with the observer safely separated from it by a 20 centimeter slab of glass." Objective distance — "objectivation" — has been replaced by subjective involvement. Once an electron's momentum has been measured, its situation has forever been altered. As Wheeler says, "The universe will never afterward be the same. To describe what has happened one has to cross out that old word 'observer' and put in its place the new word 'participator.' In some strange sense, the universe is a participatory universe."

Considerations of this participation by the scientist in what he is studying has led many physicists to conclude that mind and matter, consciousness and creation, are fundamentally interfused. In the words of French physicist Bernard D'Espagnat, "The doctrine that the world is made up of objects whose existence is independent of human consciousness turns out to be in conflict with quantum mechanics and with facts

established by experiment." E.C.G. Sudarshan, of the Center for Particle Theory, expresses the point succinctly. In quantum mechanical theory, he says, "consciousness is an integral element of the observed physical field."

John Wheeler has extended this understanding to include an entirely new approach to physics. According to Wheeler, we have gone beyond the *Era of Motion* in physics (that preNewtonian stage when Kepler, Galileo, and others first founded modern physics on the billiard ball basis, the measurement of the motion of solid bodies) and also beyond the *Era of Laws* (the epoch from Newton to, approximately, Heisenburg), and moved on now to an *Era of Meaning*, where the search by physicists to *explain* creation can be seen as, in actuality, an integral part of the *mechanics* of creation. The universe is a participative universe. "Physics, on this view," Wheeler says, "is the child of meaning even as meaning is the child of physics." Consciousness, the generator of meaning, is an integral component of what it itself is studying.

In modern physics, then, the world can no longer be thought of as "objectivated." It is impossible for an observer to step back from nature and be uninvolved. The entire edifice of science, constructed theoretically of objective investigation, is instead infused with subjective experience. Werner Heisenberg summed this up with reference to the sub-atomic world:

The laws of nature which we formulate mathematically in quantum theory deal no longer with the particles themselves but with our knowledge of the elementary particles. . . . The conception of objective reality . . . evaporated into the . . . mathematics that represents no longer the behavior of elementary particles but rather our knowledge of this behavior.

Fritjov Capra makes the point more comprehensively,

Physicists have come to see that all of their theories of natural phenomena, including the laws they describe, are creations of the human mind; properties of our conceptual map of reality, rather than of reality itself.

The laws of nature are structured in consciousness. When consciousness studies these laws of nature, it is studying its own make-up, its own free creations. What we are studying is what we are.

CONSCIOUSNESS AT THE CORE

From the findings of rigorous common sense (*viz.* Schroedinger and Kant), of relativity theory (Einstein), and of quantum mechanics (Heisenberg, Wheeler, Sudarshan, *et al.*) leading physicists have concluded that, in many ways at least, the observer *is* the observed — mind and matter are inextricably unified. There is no way to gainsay this logic. There are no yellow photons, no absolute clocks, no perfectly definable particles. Everywhere the observer, the subject, the mind helps create the world which is being perceived.

Yet there is one problem with this approach. When a tree falls in a forest. . . . Is there no sound if no one hears it? Is there no yellow if no one sees it? Is there no world if no one is paying attention? Discussing his theory of the *Era of Meaning*, John Wheeler asks, "What about all those billions of years in the early universe when there were no communicators around to establish meaning? Were not those galaxies out there as real then as they are now?"

It is at this point that the fullness of Maharishi Vedic Science adds another dimension to our understanding. For in the Vedic view, not only is nature said to be deeply interconnected with the consciousness of any particular observer who is studying it, but

that world itself is said to be *made* of an abstract quality of consciousness, an in-dwelling source of creativity and intelligence not dependent on the awareness of any outside observer. The reason why any individual consciousness can be intertwined with creation, in this view, is the same reason why creation is upheld even in the absence of any particular individual consciousness: creation itself actually is consciousness, actually is abstract intelligence and creativity, from the beginning.

In Shankara's simple formulation, "Its nature is pure consciousness."

This, of course, is a much more far-reaching understanding. It is one thing to realize that our mind interacts with the world around us. It is another to be told that the world around us is, in truth, the same as our mind. Yet certain understandings from physics seem to uphold this view as well. As Sir Arthur Eddington has said, "All through the physical world runs that unknown content which must surely be the stuff of our own consciousness."

As mentioned at the start of this chapter, even superficial inspection of our world — a mere noting of snow flakes and seashells — gives us reason to believe that nature is infused with intelligence. Before the discovery of the unified field, Maharishi based his logic on just such simple observations:

It's just at the level of common sense. It is obvious there is something deep within physical values which is the cause of change and progress. We see order in creation. There is some intelligence working at every level of existence, some orderliness at the atomic level, at the molecular level. And there is obvious orderliness in the sequence and progression of life. Everything is growing, and growing in an orderly way: an apple tree produces apples, a banana tree produces bananas; the apple tree doesn't grow guavas. Some order is there, some intelligence is there.

In addition to this common sense understanding of the connection between consciousness and nature, physicists have also found specific examples of inexplicable awareness or communication deeply imbedded in their quantum mechanical picture of the world. Somehow, certain aspects of sub-atomic reality seem to know things they shouldn't.

One of the most famous of these examples, originally discussed by Einstein and two other physicists, is known as the Einstein-Podolsky-Rosen paradox. It defines a quantum mechanical situation in which two "particles," separated by an arbitrarily large distance, appear to communicate instantly. When one of them changes its orientation, going from spin down to spin up (to choose one possible change and use the phrases physicists apply), the other instantly makes the complementary change, going from *spin up* to *spin down*. How is the information transferred from one particle to another? Since the transfer is instantaneous, it cannot involve the radiation of electro-magnetic energy, which can move only at the speed of light — and fast though light moves, it cannot cover any distance instantaneously. As Einstein pointed out, this paradox shows that quantum mechanical theories alone are not sufficient to describe the workings of nature.

Another example is the famed double slit experiment, perhaps the most often-performed and deeply discussed experiment in the history of physics. In this experiment, a beam of light is sent through two tiny slits to land on a flat wall. Because of the wave nature of light, the two rays of light that manage to go through the two slits *interfere* with each other; they spread out after passing through the slits and, where the high points of the two waves meet together, they build up to a wave even higher (constructive interference), while at those points where the high point of one wave hits the low point of another, they cancel each other out (destructive interference). This results in alternating bands of bright light and complete darkness on the wall behind the slits — a phenomenon known as an *interference pattern*.

The experiment becomes most interesting when the original light source is dialed down in intensity so that the beam of light becomes exceedingly faint. Instruments are employed which emit only one photon of light at a time. What happens when only one photon goes through the apparatus? Obviously, a single photon could go through only a single slit, so there should be no question of an interference pattern appearing on the back wall. Surprisingly, however, if both slits are open, a photon going through one of them will land only as predicted by the interference pattern. In other words, the photon acts as if it were aware of the fact that the other slit is open. If the second slit is closed, on the other hand, the photon will land randomly with no regard for the interference pattern. Few experiments have been so deeply pondered, from so many angles, as this one; it has led some physicists to provocative questions. Says Henry Pierce Stapp, physicist at the Lawrence Berkeley Laboratory,

The central mystery of quantum theory is, How does information get around so quick? How does the particle know that there are two slits? How does the information about what is happening everywhere else get collected to determine what is likely to happen here?

Despite the intimations of sub-atomic awareness manifested in the double slit experiment, the most compelling argument for the interfusion of matter and mind is, to most physicists, a simple one that derives from common sense. In fact, it forms the basis of physics itself. The argument consists in this: mathematical formulas made up in the human mind correspond exactly to the functioning of nature. In other words, the subtle structures of human intelligence codified in these mathematical formulas correspond precisely to the subtle structures of intelligence displayed in nature. $E=mc^2$: this structure of intelligence fits perfectly both in human consciousness and in the mechanics of nature. There is, in Wigner's phrase, an "unreasonable effectiveness of mathematics in the physical sciences," an uncanny fit between mind and matter. As Einstein said, "One may say that the eternal mystery of the world is its comprehensibility."

These various indications — both common sensical and quantum mechanical — that consciousness, or awareness, is deeply infused in nature culminate in the theory of the superfield, the unified field of all the laws of nature. It is a topic which physicist John Hagelin, who is not only a leading expert on the unified field but also a trained teacher of the Transcendental Meditation technique and thus well-versed in Vedic Science, has examined in detail.

The unified field can be defined through mathematical formalisms. John Hagelin has taken such mathematical descriptions and translated them into terms that can be readily understood. He has converted strings of symbols into twentyfive qualities, words and phrases that have immediate meaning to non-scientists. It is not surprising, as the abstraction of the mathematics resolves into understandable qualities, that we find expressions such as, unboundedness, unmanifest, and immortality (eternal non-change) among them. These we would expect from the ideas discussed in the previous chapter. For the current discussion, however, the most striking qualities Hagelin has identified are those such as pure knowledge, infinite organizing power, infinite correlation (or communication), perfect orderliness, and infinite creativity — qualities which ordinarily seem to be associated with consciousness itself.

When discussing the nature of the unified field, moreover, Hagelin frequently discusses its intelligence first:

All the laws of nature are intelligent, orderly principles which govern nature at every level. This doesn't necessarily mean that a law of nature can think, but rather that it expresses intelligence in its functioning. Any law of nature can be written out mathematically. it can be tested

repeatedly and found to be orderly, systematic, invariant. And this quality of orderliness and intelligence expressed by every law of nature is found in its most concentrated form in the unified field. By this I mean that at the level of the unified field, the laws of nature are the most compactified, the most concentrated, the most complete. And though they are simpler and more compact in their expression, they describe a greater wealth of diverse phenomena at the more superficial levels of nature.

In this sense, then, the unified field is the most concentrated field of intelligence in nature. It contains in seed form all the orderliness, all the logical and mathematically measurable relationships which appear in all the laws of nature. The other qualities of consciousness which Hagelin has derived from mathematical descriptions of the unified field, can be understood as follows:

1. Pure knowledge: The unified field expresses the complete structure of all the laws of nature — but in a form yet unmanifest. The laws of nature are completely known in this field, but they are still "pure," unsullied by contact with the everchanging fluctuations of the quantum fields at more superficial levels of nature. This is information in isolation. It is knowledge alone, by itself — pure knowledge.

2. Infinite organizing power: All aspects of the universe, all the beautifully broken symmetries which make up creation, are organized by laws of nature which find their unmanifest home in the unified field. It is a dictum from *information theory* (a branch of mathematics that figures largely in quantum mechanics): knowledge has organizing power. Information leads to organization. Being the field of pure knowledge for the entire creation, the unified field automatically exhibits infinite organizing power.

3. Infinite correlation: All the components of the unified field are correlated in balanced coexistence within the unmanifest structure of the field itself. There is thus a perfect interrelatedness, or coordination, or communication, among all the components in a system that is infinite and unbounded, beyond the boundaries of space and time. (For similar reasons, in Hagelin's analysis, the unified field is a field of perfect balance and complete harmony).

4. Perfect orderliness: Due to this internal symmetry, which expresses the perfect mathematical symmetry within the unmanifest structure of the unified field, and also due to the unitary nature of the unified field, which disallows any randomness or entropy, the unified field is a field of perfect orderliness.

5. Infinite creativity: In Hagelin's words, "The unified field is the fountainhead of natural law. From this unified source all the particles and forces of nature are generated through the process of dynamical symmetry breaking."

There is one more quality of the unified field deducible from the mathematics, a quality which Hagelin emphasizes.

This is the quality of self-interaction or self-referral. The unified field interacts only with itself, the various aspects of the unified field engaging in self-referral transformations within its unmanifest nature, an internal, transcendental mechanics described by Hagelin as "the infinite (non-perturbative) self-interaction which is necessary for the force and matter fields displayed at the level of Grand Unified Theories."

An automobile engine acts only within itself — the pistons move up and down within the cylinders — yet the result is that the wheels turn and the auto moves down the road. Similarly, the unified field interacts with itself alone; it is perfectly self-sufficient,

containing the total potential of natural law; and the infinite dynamism contained within it is expressed only in a self-interacting, or self-referral, way. Yet it is this internal, self-referral activity which, at grosser time and distance scales, appears as the forces and phenomena of nature and generates the entire evolution of the universe.

This self-referral quality of the unified field will become important at the next state of this investigation, the definition of the fourth state of consciousness, which is the experience of a completely self-interacting, self-referral reality.

The unified field can be understood as a field of concentrated intelligence, a self-sufficient field of pure knowledge, of infinite organizing power, a field of infinite creativity. It is the mathematical and theoretical details of this which are compelling to physicists. After a detailed review of the discoveries from quantum mechanics, for instance, E.C.G. Sudarshan said that if physics were to continue in the direction it now takes, “physical theory would become a theory of consciousness. We are approaching this situation as a limit: consciousness creates everything out of nothing.”

In the same vein, the English physicist Sir James Jeans has said,

The stream of knowledge is heading toward a non-mechanical reality. . . . the old dualism of mind and matter . . . seems likely to disappear, not through matter becoming in any way more shadowy or insubstantial than heretofore, or through mind becoming resolved into a function of the working of matter, but through substantial matter resolving itself into a creation and manifestation of mind.

Max Planck, who first discovered the quantum reality at the basis of nature, put this idea bluntly. “I regard consciousness as primary,” Planck said. “I regard matter as derivative from consciousness.” And Sir Arthur Eddington, reflecting on his life’s work, put the same point more poetically. In the same passage in which he identified consciousness as the “unknown content” of the world, he said,

Here is a hint of aspects deep within the world of physics, and yet unattainable by the methods of physics. . . . [W]e have found that where science has progressed the farthest, the mind has regained from nature that which the mind has put into nature. We have found a strange footprint on the shores of the unknown. We have devised profound theories, one after another, to account for its origin. At last, we have succeeded in reconstructing the creature that made the footprint. And lo! It is our own.

FROM MODERN SCIENCE TO VEDIC SCIENCE

The trend of modern physics is converging on the ancient understanding of creation depicted in the ancient Vedic Literature. “Its nature is pure consciousness.”

Moving in this direction, of course, we come to the end of objective science. Even if they are viewed as separate, neither the unified field nor consciousness can be plumbed by objective methods. In the realm of the unified field, at the Planck scale of nature, space, time, and causality come to an end, taking with them the entire mechanics of scientific investigation. No scientific tool can enter the unified field. And the realm of consciousness, is, of course, by definition subjective, the essence of the subject, not the object. No investigative method based on objects can gain access to this immaterial essence of personality, or pass judgments on the realities which inhere in its makeup.

In the Vedic view, of course — a view consonant with the opinions of many of this century’s leading physicists — objective means cannot verify the unified field because that unmanifest, transcendental reality is itself *subjective* — a pure field of consciousness,

of abstract, concentrated awareness or intelligence. At the Planck scale, even the appearance of matter dissolves — and what remains is mind.

This explains why the human mind can contact the most basic field in creation. Consciousness is, like all the other forces or fields evident in nature, an integral part of the natural world at the most basic level. This understanding, now glimpsed by modern science but long understood in Vedic Science, is logically and esthetically satisfying, in the same way that the unification of the four forces of nature is logically and esthetically satisfying. It simply seems more sensible and more elegant if all the naturally appearing phenomena in nature — and consciousness is certainly such a phenomena — can be accounted for in one simple and holistic understanding. But such an understanding is also, simply, more practical; it opens a way to contact the unified field. If it cannot be contacted objectively, it can be subjectively — by consciousness fathoming the depths of consciousness itself.

This is exactly the understanding Maharishi puts forward in his Vedic Science. A subjective technology, a technology of consciousness, is repeatedly discussed, a technology which allows the individual human mind to settle down deep within its own nature and, in arriving at its own most basic level, to arrive at the most basic level of creation, a field of pure, abstract consciousness or intelligence, the unified field of all the laws of nature.

This is the technology Maharishi has sometimes called the Technology of the Unified Field, and in his many talks on the topic he makes the Vedic position clear:

Modern science has been wise to use the objective approach so far. Through the systematic investigations of the objective approach, the physicists have discovered all the different relative levels of nature, all the specific natural laws. But now a different field has been discovered, the unified field of all the laws of nature. It has certainly been located through objective means, and the physicists have been able to gain some glimpse of its transcendental reality. But no measuring tools which measure centimeters or seconds will ever be adequate to examine the unified field. To gain the full experience of this field, now it is time to start to experience it on its own level, on the level of consciousness. Now it is time to bring the subjective approach, to create a laboratory in the field of consciousness through the Transcendental Meditation and TM-Sidhi program. This beautiful technology allows the individual to directly experience the unified field as the finest, most silent level of his own awareness.

In Maharishi's view, this ability to contact the unified field, to experience the unity of consciousness and creation at their common source, is of far more than theoretical interest. Yes, it would be interesting to know that modern science and Vedic Science have converged on one truth of existence. But it would be much more significant to be able to be in direct contact with the infinite energy and intelligence that give rise to creation. In Maharishi's words,

The unified field is that Planck scale level of nature's functioning, from where time is generated, from where space is generated, from where energy is generated, from where all the laws of nature begin to take their specific shapes. When the human mind settles down and becomes identified with that level of infinite orderliness, then it becomes consciously stationed at the basis of the universe. This is how we can gain the support of all the laws of nature for our every thought and action. And this is how we can radiate an influence of peace and coherence throughout

our environment. By enlivening that basic field of infinite orderliness and harmony in one place, we enliven it everywhere.

In Maharishi's understanding, then, the unified field becomes a practical discovery. Physics may tell us that the unified field is a field of infinite intelligence and creativity, a field of unbounded dynamism and all possibilities. But a reservoir is useful only if a pipeline brings the water to your house. The Vedic descriptions of individual evolution, ideal society, and invincible defense can only be actualized if a pipeline can be established to this basic level of infinite potential.

Vedic Science predicts that this is possible. Moreover, it makes this prediction in a way that is open to scientific investigation. According to the Vedic tradition, the human mind comes into union with the unified field during a highly specific fourth state of consciousness. While it is true that science has found no objective means to measure the content of consciousness (what thoughts or feelings a person might have, for instance), yet for years neurophysiologists have been able to precisely define states of consciousness (whether a person is sleeping, dreaming, or waking). By measuring brain waves, metabolic rate and other physiological indicators, researchers have defined the three common states of consciousness experienced by everyone every day. If there actually is a fourth major state of consciousness, it should show up quantifiably through these types of measurements.

To this point, the principles of Vedic science have gained support from the investigations of modern science. Objective investigation has identified one unified field at the basis of creation. Reflections on the findings of modern physics have led many eminent physicists in the world to acknowledge the deep interpenetration of consciousness into the apparently solid material world around us.

Now it is time to find whether there is a pipeline to the field of infinite potential.
Does a fourth state of consciousness exist?

CHAPTER FIVE

THE FOURTH STATE OF CONSCIOUSNESS: PIPELINE TO THE INFINITE

For centuries into the past, the fourth state of consciousness has seemed as elusive as the unicorn — as much a myth, as much a merely storied essence of purity and innocence. Poems have extolled the beauties of this ineffable state, tales have styled this subtle reality the key that unlocks the full potential of life, paintings and statues have shown wise men with crossed legs and closed eyes enjoying its fullness in blissful satisfaction.

Yet what is this fourth state really? In the modern scientific civilizations, this most basic state of consciousness has been so elusive as to essentially disappear altogether. In an objective world the fourth state of consciousness has had no objective status, and thus it has simply dropped out of sight. Until recently it was rarely spoken of, or even thought of, and life has been lived as well as it could be through the recurring cycle of the three common states: waking, sleeping, and dreaming. That which is, according to Maharishi's Vedic Science, the most crucial capability of human consciousness — the faculty of contacting the field of infinite potential at the basis of creation — has been unknown to most and closed to nearly all.

This disappearance of the fourth state of consciousness, however, has set the stage for one of the most intriguing detective stories of modern science. Scientific investigation has been a profound tool for gaining knowledge, a systematic means for inducing nature to yield her deepest mysteries, and its methods and machinery have proved equal to even this most delicate task. Following clues provided by Vedic teachings, bio-medical researchers picked up the trail of pure consciousness early in the 1970s. Some of the early tracking was ambiguous, but with the appearance of more sophisticated equipment and more refined experimental design, the descriptions became precise and the identification increasingly clear. The elusive, quasimythical pipeline to the infinite had been captured objectively at last.

PERSONAL EXPERIENCE

Because of the importance ascribed to this fourth state of consciousness in Maharishi's Vedic Science — because it is said to be the linchpin that connects the individual mind with a field of unbounded possibility — the idea deserves systematic attention. The plan of this chapter will be first, to listen to descriptions of the fourth state from sources both ancient and modern, and second, to survey the scientific research that quantitatively defines this state.

As with the other ancient descriptions discussed in this book, the Vedic description of the fourth state of consciousness has been recorded in simple, straightforward language. It is known in Sanskrit as *samadhi* ("unwavering mind"), or simply as *turiya* ("the fourth"). We can turn to the Upanishads for a definition that places it in the context of the common three states of consciousness, those experienced by every ordinary person every day:

The first is the waking state, the experience of the reality open to everyone;

The attention goes outward, enjoying the world in all its variety.

The second is dreaming, the experience of subjective, inner, imaginative

worlds....

The third is deep sleep, when the mind rests and all

awareness [both inner and outer] is suspended.
The fourth is the pure Self alone....
It is ineffable, beyond thought.
It is indefinable.
It is known only through becoming it.
It is the end of all activity, silent and unchanging.

This definition suggests a new dimension to a concept already mentioned: knowledge is structured in consciousness. As quantum mechanics has made clear, we can only *know* what our consciousness *is*. And from this analysis, we can see an equally important truth: knowledge is different in different states of consciousness.

In the sleeping state of consciousness, for example, the mind is aware of no knowledge at all. The sleep state is a state of total dullness in which "all awareness is suspended," and knowledge of anything whatever, real or imagined, has disappeared altogether.

In the dreaming state, on the other hand, there is knowledge available, but it is unreliable. Dreams are self-created, "subjective, inner, imaginative worlds," without any connection to the real world. The world of dreams evaporates with the morning light.

It is only with the waking state that there is finally knowledge as commonly understood. It is true that the waking state of consciousness is limited in its scope; it yields direct perception of only the outer, surface level of nature — "the attention goes outward, enjoying the world in all its variety" — and the inner, more subtle workings of nature, everything from the molecular level to the unified field, is unavailable, sealed away from the mind's direct perception as if the mind were still asleep. But the mind in the waking state is at least directly aware of nature's surface, and it gains knowledge that is both coherent and useful. If, in a dream, the ground may suddenly dissolve into water or dissipate into air, in the waking state the earth is always solid beneath our feet. Knowledge in the waking state may be incomplete, but it is at least undeniably practical.

Analyzing states of consciousness thus, in terms of the type of knowledge they yield, what could a fourth state of consciousness be? It must be different from lack of awareness (sleep), or awareness of imaginary visions (dream), or awareness of the surface level of nature (waking). Thought about this way, the fourth state of consciousness can first be understood as a seeming paradox, as human awareness becoming aware of itself. In the Vedic understanding of the fourth state, consciousness is said to turn back upon itself and become aware only of its own inner nature — "the pure Self alone."

The ordinary use for a flashlight is to shine it on something outside, on trees or people or the path before us; but it is also possible to take a flashlight and aim it point blank into a mirror, glass to glass, with nothing appearing without and the light within shining only on itself. Consciousness in the waking state usually shines outward through the senses onto particular aspects of the surface level of nature; but it is also theoretically possible for consciousness to turn within, to shine on its own inward functioning, to become aware only of itself, by itself. This is *samadhi*, an experience Maharishi calls *pure consciousness* or *transcendental consciousness* or the state of *pure knowledge*. Tracing the path the mind takes to this most inward experience, Maharishi says,

Once we give the mind the correct angle it will settle down automatically to more refined, inner levels. As the mind experiences finer aspects of the thinking process, it experiences more refined levels of awareness. This makes the mind more and more awake. And when our awareness has gained maximum wakefulness, the next step of refinement allows the mind to transcend the field of thinking. We attain a field of pure awareness, of transcendental consciousness, in which the mind is awake

within itself, but without a thought. This is the state of pure consciousness, a state of least excitation of consciousness, and in this self-referral state, consciousness is its own observer. It is the observer, the observed, and the process of observation — all three values in one — a quality of awareness we can call pure knowledge.

In this description of the fourth state of consciousness, the knowledge gained by the mind is no longer knowledge of the outer world, but knowledge of the mind itself — in its purest, most basic form. And this experience is, in the definition from the Upanishads, "ineffable, beyond thought ... the end of all activity, silent and unchanging."

This is certainly a possible definition of a fourth state of consciousness, unlike the other three. Rather than no awareness at all, as in the sleep state, there is what Maharishi terms "maximum wakefulness." Yet there are no thoughts in that awareness, neither the imaginary creations of dreaming nor the more common thoughts of the waking state. In a definition of this fourth state published in his translation and commentary on the Bhagavad-Gita in 1967, Maharishi says "there is no trace of sensory activity, no trace of mental activity," and that the awareness in this state of *samadhi*, unwavering mind, is like "a lamp which does not flicker in a windless place."

If we are watching a movie, the colorful images on the screen might begin to fade away, becoming lighter and lighter, until we finally transcend the images altogether and confront only the pure white screen. The pure screen would be there without the activity of the movie. In a similar way, the mind can settle down deep within its own nature, experiencing finer and finer aspects of the thinking process, until finally it transcends thoughts altogether and is left only with pure consciousness — the background, or screen, upon which all thoughts and feelings play.

The major limitation to this analogy is that, in a movie, there is duality — the audience is left to watch the white screen — while in the fourth state of consciousness, there is unity — consciousness itself is left aware of its own pure nature. It is, in Maharishi's phrase, a "self-referral mechanics." In the fourth state of consciousness, the observer and the observed have become the same thing.

This self-referral nature of pure consciousness seems to Maharishi an important tie to the quantum mechanical level of creation, and especially to the unified field. As we have seen, the unified field is a completely self-sufficient, self-interacting reality. All the laws of nature on the more superficial levels arise from the self-interacting mechanics deep within the unmanifest unified field — a silent, self-contained conversation deep within the transcendental basis of nature. This selfinteraction, this self-referral mechanics at the Planck-scale level of nature, beyond space and time, then gives rise to all the laws of nature that structure the familiar universe around us.

As we have also seen, quantum mechanics includes consciousness as an integral part of its structure and, for Maharishi, this self-referral nature of the unified field completes the logical connection between consciousness and creation. "The unified field is found by modern physics to be self-referral in its nature," he says, "and this identifies it as a field of consciousness. For only consciousness in its pure state can be fully self-referral." Speaking in 1983 at the Taste of Utopia assembly, Maharishi developed this theme:

We know from the ancient Vedic literature that the world must rise to enjoy the full dignity of life. And if that is to be, it can only be on the basis of the fourth state of consciousness, the experience of consciousness in its self-referral state, which is now coming up in scientific language as the unified field of all the laws of nature. The unified field is a lively field of all possibilities at the basis of creation. It is a transcendental reality. And because the unified field is completely self-referral, then knowledge of it can only be completely self-referral. It can only be gained by the mind within itself in its self-referral state, in pure consciousness, transcendental

consciousness, where the awareness is open to itself alone. In this state, the mind identifies itself with the self-referral reality of the unified field. That level of consciousness alone is a suitable field for directly cognizing the unified field, for completely identifying with the self-referral nature of the unified field, in a state in which consciousness actually has no difference from the unified field. This is how we bring the mind into tune with all the laws of nature at their source, how we gain the support of all the laws of nature for our every thought and action.

As already indicated, there is no direct scientific way to investigate this analysis; both the unified field and the inner content of consciousness are beyond the reach of objective experiment. For someone who has not had the personal experience of such a state of consciousness, intellectual understanding alone cannot provide complete satisfaction. A strawberry can only be fully known by tasting it; pure consciousness can only be known through a direct dive, by immediate personal experience. As Maharishi says,

The glory of pure consciousness can be experienced directly and recognized as the ultimate reality. The mind can be led systematically to the subtlest limit of relative experience and then, transcending this subtlest experience of the excited states of creation, it can reach the field of the ultimate, absolute, unmanifest state of least excitation — the unified field of all the laws of nature. Matter can be glamorous, but this experience is glorious. Its nature is happiness, wisdom, creativity, and strength. It is self-sufficient, self-referral, invincible in its own right.

THE STATE OF LEAST EXCITATION

If this inner experience of the fourth state of consciousness cannot be directly measured, however, the outer, physical parameters certainly can. A fourth state of consciousness, to be understood as more than myth, must make its appearance in the scientific laboratory.

Although the fourth state of consciousness is not a state people ordinarily experience, it is said to be a completely natural state, and it is not uncommon for people to recognize in its description memories of one or two special moments in their lives. It is also not difficult to find, in the writings of artists and poets, descriptions of specific experiences which make new sense in this context. Wordsworth, for instance, has described such an experience:

... that serene and blessed mood,
in which the affections gently lead us on —
and even the motion of our human blood
almost suspended, we are laid asleep
in body, and become a living soul;
while with an eye made quiet by the power
of harmony, and the deep power of joy,
we see into the life of things.

As we will see in a moment, this provides some specific clues for scientific research. one of Wordsworth's successors Alfred, Lord Tennyson describes a related experience in one of his letters:

... out of the intensity of the consciousness of individuality, the individuality itself seemed to dissolve and fade away into boundless being;

and this not a confused state, but the clearest of the clearest, the surest of the surest utterly beyond words.

The German philosopher Georg W.F. Hegel, for whom meditation experience was the touchstone of philosophy, described a similar state of deep inner quiet in which a self-referral experience reveals the deepest being of life. He said,

The condition of ecstasy through which alone that which is true Being comes to be known, is [referred to as] a simplification of the soul, through which it is brought into a state of blissful repose, because its object is itself, simple and at rest.

These and countless other such passages from all cultures and throughout the ages have been largely ignored in recent times. They have been termed *mystical*, a word which has come to mean *vague*, *imaginary*, *impractical*, and *unreal*. And given the varied, unsystematic, and imprecisely poetic way in which these descriptions have usually been stated, such confusion is not hard to understand. To reclaim the fourth state of consciousness from this obscurity, it needs to be defined scientifically. There must be clearly measurable dimensions to pure consciousness.

Fortunately researchers have made rapid progress in this field since the early 1970s. Bio-medical experts have constantly improved in their ability to measure the operations of the body and nervous system that underlie the various states of the human mind. For every major state of consciousness, the human physiology operates in a different way. Two of the most important tests involve the metabolic rate (the amount of oxygen consumed by the body) and the brain wave patterns (the electrical activity of the brain). For more than forty years, researchers have had enough knowledge to measure these two physiological indicators and, in ordinary cases, tell whether a person is awake, asleep, or dreaming. Even if a subject tries to feign sleep, for instance, his metabolic rate and brain wave activity will give him away. Using these and other indicators, waking, sleeping, and dreaming can be defined objectively as three different states of consciousness.

These scientific definitions provide a background for the elusive state of pure consciousness. If such a state exists, it should stand out clearly against the other three, eliciting, at the least, completely different metabolic rate and brain wave activity. Moreover, these physiological dimensions should not only be different, but they should differ in directions that suggest the fourth state of consciousness as it has been so far defined. In the descriptions that we have seen, for instance, the fourth state of consciousness is said to be "the end of all activity," "a state of least excitation," a state in which "even the motion of our human blood almost suspended, we are laid asleep in body." Speaking of this in terms of metabolic rate, we might therefore expect to find the fourth state of consciousness characterized by a decline in metabolic activity — that is, by a deep state of physical rest. Writing in his commentary on the Bhagavad-Gita five years before the appearance of any research on the Transcendental Meditation technique, Maharishi states that "when the mind transcends . . . the metabolism reaches its lowest point; so does the process of breathing, and the nervous system gains a state of restful alertness."

On the other hand, we can say the fourth state of consciousness is said to be a state of "maximum wakefulness," "clearest of the clearest," in which "we see into the life of things," in which the mind attains a state of such refined awareness that it can "see into" the subtlest level of nature and "identify itself with the unified field." If all this is true — if the mind really does become more wakeful and more capable of subtle experience, even though the body is settling down to a deep state of rest — then brain wave measurements (and other relevant physiological tests) should reflect this different style of functioning.

Deep rest for the body, but increased wakefulness for the mind — these are the essential elements of the fourth state of consciousness, a state Maharishi terms “restful alertness.”

To take measurements of such a state, the state itself must first be available. This has been a major contribution of the TM and TM-Sidhi programs. When Maharishi first started his teaching in the late 1950s, even the concept of a fourth state of consciousness was absent from scientific circles. Science deals with empirical data, and the fourth state of consciousness was at that time not empirically verifiable — since essentially no one was experiencing it. Since that time, however, nearly three million people have taken up the practice of the basic Transcendental Meditation technique, over a million of those in America, and tens of thousands have learned the advanced TM-Sidhi program. Twenty years ago experimenters seeking the fourth state of consciousness might have been forced to back-pack equipment to a Himalayan peak, but now they can easily find a population of expert meditators in any American city.

The nature of the actual technology also lends itself to research. In the first place, both the TM program and the TM-Sidhi program are taught through highly systematic procedures which are followed precisely everywhere in the world that the techniques are taught. This means that experimenters can avail themselves of a subject population meditating according to uniform instructions, even to the finest details. Also, because the TM and TM-Sidhi techniques are natural procedures for the human mind and physiology, and therefore extremely easy to practice — requiring no effort or concentration — a broad cross-section of the population can be included in the studies. There are no requirements, no required level of intelligence or educational attainment. Even children, from the age of ten, can easily learn the practice. A random sample of meditators in any city includes people of every age and from every socio-economic class, and thus scientific studies need not become biased due to a narrow range of subject types.

When the experimenting began, the search for a physiological fingerprint of the fourth state seemed at first quite straightforward. Even the first study published on the Transcendental Meditation technique, research done by physiologist r. Keith Wallace at UCLA and published first in *Science* magazine in 1970, and then in variant forms in 1970 and 1972 in the *American Journal of Physiology* and in *Scientific American*, showed an extremely deep state of rest for the body and alterations in the usual brain wave activity. Wallace used these and other indications to define what he tentatively labeled “a fourth major state of consciousness,” or a “wakeful hypometabolic state.”

But the search was not going to be that simple. When other researchers tried to duplicate and enlarge upon these findings, different studies produced contrasting results. It took most of a decade for the reason to become clear. A researcher is only as good as his measuring equipment, much of the equipment being used was not equal to this delicate task.

The first questions concerned metabolic activity. Wallace showed that when people practiced the TM technique, theoretically experiencing the fourth state of consciousness, their metabolic rate (as measured by their oxygen consumption) decreased an average of 16%. This was a significant figure. During a night's sleep, the metabolic rate of an average person will decline only eight percent. Moreover, during sleep the body takes nearly six hours to slow down to its lowest rate of oxygen consumption, while Wallace's tests indicated that during the TM technique it takes only a few minutes to settle down to a level of rest twice as deep. These figures strongly suggested a fourth state of consciousness, since such deep rest is not ordinarily experienced in waking, sleeping, or dreaming.

Refining this early study, however, to generate precise and consistent measurements of the fourth state of consciousness required technological advances. The quiet and delicate state of physical functioning during the fourth state could only be accurately

measured by equipment that was delicate in its measurements and not intrusive on the meditating subject.

The most prevalent means to measure oxygen intake in the early 1970s, for instance, was to strap the subject into something very like a gas mask, and these masks proved too cumbersome to consistently measure a refined level of metabolic activity. They were, first, simply too heavy and uncomfortable. While this would not matter much if the research subject increased his activity, by trotting on a tread mill, for instance, where the goal is exertion and heavy breathing, they presented quite an obstacle for someone who wished to sit quietly and experience delicate inner states of awareness. Their weight tended to pull the head over and down, causing constant interruption of the meditation.

Furthermore, the mechanical operation of the mask was itself inappropriate for experiments investigating decreased rather than increased breathing. There was an enclosed space before the subject's nose and mouth shaped like a muzzle. In order to bring new air into this enclosure, the subject first had to breathe out sufficiently to force air out of this space and through the measuring valve. While this works well enough for a person breathing normally or panting from heavy exertion, it turned out to be self-defeating for people practicing TM. Their breathing would decrease to the point where they were not forcing air out of the mask. No new air would come in, and this would lead to a minor case of oxygen starvation, which would be solved by a temporary increase in the rate of breathing to restore air flow in the mask. This kept people from fainting, but it also destroyed the accuracy of the test. A natural decrease in the rate of breathing during the TM technique was offset by an artificial increase in the rate of breathing caused by the mask.

One of the people who solved this problem was John Farrow, a Ph.D. in neurobiology from Cornell University who has held a research position with the University of California for nearly a decade — first with the Irvine campus in the Los Angeles area and then in San Diego. Farrow undertook a detailed study of possible changes during the fourth state of consciousness, a study published in 1982 in the journal *Psychosomatic Medicine*. To be certain of gaining an accurate picture of oxygen consumption during the fourth state, Farrow used three different measuring technologies, all of them quite new. As he explains,

The most satisfactory system was then the newest and the most sophisticated. We attached a pair of magnetic coils to the subject's sternum and backbone, to measure chest movement, and another pair to the abdomen and lower back to measure movement of the abdomen. Although this doesn't directly measure air flow or oxygen consumption, studies at Harvard had shown what seems obvious from common sense — the movements of the chest and abdomen are accurately related to the volume of air moving in and out. One of the major advantages of this procedure, since it involved nothing attached at the nose or mouth, was that most of the subjects had no idea we were even looking for oxygen consumption or breath rate with this particular test. Our second technique was the use of a sensitive thermocouple attached just below the nostril, which measured temperature changes as air flow changed. The third was an improved mask system, of lightweight plastic, counterweighted at the back, and through which a metered flow of air always moved so as to continually replenish the oxygen supply available to the subject.

Using these more precise and non-invasive technologies, Farrow was able to show that Wallace's original findings were, if anything, conservative. Wallace had reported a sixteen percent average decrease in oxygen consumption during the TM technique. Farrow found, with practiced meditators, much greater decreases than that, averaging in some subjects as much as forty percent over the whole twenty-minute meditation period

and reaching the sixty percent level in the last few minutes. Moreover, in some subjects the physical rest attained such a profound level that occasionally the breath rate would be suspended altogether. For periods ranging from twenty seconds to one minute, these people would simply not breathe at all. Farrow comments,

We were most interested in this breath stoppage phenomenon because we had seen it unexpectedly in earlier research on the TM technique, and we knew that the classic definition of samadhi included such a total suspension of normal physiological activity. What we found in this study was that these breath stoppages definitely did exist in many subjects, usually repeatedly in any one meditation. And remarkably, at the end of each breath stoppage, there was no compensatory overbreathing. The breath would simply stop at the end of an expiration, and then after a period resume again at the same level. This was a strong indication that the breath stoppage was a natural phenomenon and did not involve any oxygen deprivation for the physiology.

Apparently these subjects had attained such a deep state of physiological quiescence that for a short time they simply needed no oxygen whatever. Anyone who artificially holds his breath for twenty seconds to a minute will show a compensatory period of heavy breathing immediately afterward to make up the oxygen debt, but the TM subjects seemed never to be short of necessary oxygen even after the longest stoppages.

Farrow's study was also designed to investigate another aspect of these suspensions in breath rate. Each subject was furnished a small button placed immediately under one thumb. This button was electrically attached to the same equipment that was measuring the breath rate. When the subject pressed the button, a record was made that could later be correlated with the breath stoppages, and the subjects were told to press this button immediately after any experience they had of complete mental quietness (or transcending). In virtually every case, this button was pressed just after a period of breath suspension. The deep state of mental quietness correlated with the deep state of physical rest. "Laid asleep in body ... we see into the life of things" — deepest rest and purest awareness seemed to go together.

This was also important because it showed that the fourth state of consciousness, like waking, sleeping, and dreaming, can be experienced in different levels, or stages. When a person is in the waking state, for instance, he can be very sleepy, or fairly alert, or completely wide awake. Similarly, researchers have identified four separate stages of the sleeping state of consciousness. In the same way, people who practice the TM technique report that they experience many different levels of awareness, a range of alertness that can become progressively more refined and wakeful and which culminates in a pure state of perfect inner clarity. Farrow's study showed that throughout the meditation period the body was resting deeply and that in some subjects this rest culminated in periods of total breath suspension — a physiological indication that accompanied the subject's reports of the experience of pure awareness. Apparently there was a wide range to the fourth state of consciousness, characterized at its most complete by the deepest physical rest and heightened mental alertness.

Since Farrow's work was completed, much more work has been done to analyze the precise nature of the resting process during the fourth state of consciousness. Much of this work has been done by a research team at the University of California (Irvine). This one laboratory has published more than forty journal articles, papers, and abstracts on the physiological indications of the fourth state of consciousness. The result has been to pinpoint many details of the changes which occur during the fourth state. In the words of one of the researchers,

Our main goal has been to do in-depth studies of tissue metabolism, blood flow, individual cell activity, and other specific aspects of physiological functioning. Our findings are not based on the more superficial level of global reduction of oxygen consumption in the whole body, but rather on the precise responses in individual systems within the body. Global changes have origins which are not precisely defined, but in-depth studies are more discriminating, and because the results are consistent from many different levels of the physiology, the results are much more confirmatory.

One of the first results found by this University of California laboratory was that, during the practice of the TM technique, the levels of cortisol in the blood dropped sharply. Cortisol is known popularly as a "stress hormone," a chemical secreted by the body in response to tense or stressful situations. It tends to excite the system and make it ready for intense activity. A decrease in cortisol is thus a chemical measurement of decreased tension and stress and increased relaxation and rest. Further research showed that, in fact, in many subjects cortisol was essentially not produced at all for the twenty minutes of meditation, a unique finding not ordinarily seen in other forms of relaxation or even in sleep.

A companion study isolated red blood cells from the blood stream. Samples were taken not only before and after meditation, but also during the theoretical experience of the fourth state as well (with a sampling tube set up and taped to the subject's forearm before the experiment began). The results showed a marked decrease in metabolic activity in the red blood cells during the meditation period, a decrease which did not appear in people during other types of relaxation or during sleep. Dr. Alaric Arenander, a research physiologist on the faculty at UCLA, has commented on the importance of these two studies together:

What we are seeing is evidence of a completely new hormonal balance during this fourth state. Cortisol decreases, a direct indication of a stress-free style of functioning, and the red blood cell results seem to indicate the presence of a new hormone, as yet unknown. Since red blood cells are not present in the muscle tissue which are connected to nerves, but rather float freely in the circulatory system, the decrease in metabolism cannot be caused simply by less activity in the nervous system. Ordinarily their metabolism does not decrease significantly even in deep sleep. It thus seems likely that the decrease during meditation is chemically induced through hormones released into the blood. The reason such a hormone has not been previously discovered is that most research on hormones has been done by stressing the subject, by scaring him with loud noises, for instance, or causing slight physiological damage, and then seeing what hormones are produced in response. The research has been biased toward excited states of physiological functioning. But now the TM technique has given us a systematic means of de-exciting the system, and we are finding that there is a unique style of physiological functioning produced as a result.

Another finding has been even more surprising. The researchers checked the metabolic activity not of the body as a whole, but rather of specific muscles in the body. In ordinary metabolism, such muscle tissue "burns" oxygen to release energy, and produces carbon dioxide as a waste product, which is excreted into the blood stream and eventually released from the body during breath exhalation. What the researchers found, however, was unprecedented in the scientific literature. Not only did the muscle tissue take up much less oxygen during the period of meditation, it also stopped excreting

carbon dioxide and, in fact, began to reabsorb the carbon dioxide still available. As Arenander has commented,

This finding was completely unexpected. It had not been previously known to occur in any animal system. Since the results of the fourth state of consciousness have been shown to be very positive for overall health, we can only speculate that during this experience the body develops new metabolic pathways. A substance ordinarily regarded as a waste product is taken up and used by the tissue. The fourth state of consciousness appears to be a state in which the physiology becomes markedly more self-sufficient, much less dependent on intake from the environment. Not only does it need much less oxygen but, like an efficient factory that learns to make something useful out of its own waste products, it seems able to use the carbon dioxide it creates. There appears to be a completely different chemical "factory" set up to accompany the fourth state of consciousness.

In quantum physics, the *state of least excitation* for any field (the *vacuum state*) is the most quiet and self-sufficient level of that field, the basis of all the more excited states. In Maharishi's view, the fourth state of consciousness is a parallel reality, the quietest state of human mental and physical functioning, a profound *state of least excitation* at the basis of human consciousness which is characterized by self-sufficiency and self-referral functioning. As we have seen, detailed studies of physiological activity, even at the level of individual cells, show that the body becomes deeply rested, more self-sufficient and self-referral during the TM technique. The findings appear to support the theory.

A COHERENT BRAIN

Metabolic activity is undeniably important in the identification of states of consciousness, but common sense indicates that another type of study may be even more important. The most direct physical correlate of the mind is the brain. To identify the fourth state of consciousness, a clear picture of the brain's functioning is vital.

In this area as well, the search for the fourth state of consciousness turned into a detective story, with elusive clues, ingenious deductions, and the utilization of new research methodologies. Only after fifteen years of work has the identification become solid and well-documented in the scientific journals.

The challenge for the researchers was once again posed by the machinery being used. The basic tool for brain wave research is the electro-encephalograph (EEG). Using this equipment, researchers attach electrodes to several points on the surface of a person's head. The wires lead into a machine that translates the incoming electrical information into back-and-forth motions by automatic pens. Paper is unrolled past these pens, and the electrical activity recorded at each point on the subject's scalp is transformed into a continuous wavy line. By examining these lines, a researcher can see what the brain is doing.

On the one hand, this EEG technology has made a vital contribution to brain research. The irregular lines of a person asleep, for instance, look quite different from those of a person awake. On the other hand, as a true picture of what is occurring inside the brain, this paper record has serious defects; it is, as one researcher has put it, like trying to find out what is happening inside Grand Central Station by putting one ear to an outside wall.

Many of the problems center on the pen-and-paper apparatus. Though the recording pens are light and mounted on the end of slim and flexible arms, still they cannot accurately record all the rapid and delicate fluctuations in the brain's electrical activity. This is especially true when any one part of the brain is active in complex ways, and producing mixed signals rather than simple sine waves. The pen is put to contortions it

cannot execute and the resulting line is blotched and muddled, impossible to read. Furthermore, however accurate one line is, there is no good way to compare two different lines representing two different parts of the brain. The researcher is reduced to the amateur eyeball method, making estimates based on the surface appearance of the two lines.

These inherent limitations of the basic EEG device slowed down the search for the fourth state of consciousness. Although Wallace's original study had found some unusual shifts in the electrical patterning, two later studies reported that people practicing the TM technique often seemed simply drowsy and sometimes fell asleep. These pen-and-ink records had the surface appearance of countless others, records that usually suggest dullness and sleep. The fourth state of consciousness — the subject of rapturous poetry and subtle philosophy for thousands of years — was in danger of being labeled nothing more than a nap.

The first breakthrough in this impasse was produced by a French physiologist, Dr. Jean-Paul Banquet, who performed his research both at the Harvard Medical School and at the French National Institute for Medical Research, and published a half dozen studies in the most respected journals of electroencephalography. Starting his studies, Banquet did not question that people sometimes fell asleep when meditating. All subjects report falling asleep occasionally, and to Banquet that seemed a logical result of the deep rest and relaxation produced by the TM technique any time the subject would begin the practice when excessively tired. But Banquet was puzzled by the finding that people not asleep spent most of their meditation period drowsy. In general, as many previous studies had shown, people don't stay drowsy for fifteen or twenty minutes at a time. They either wake up or fall asleep. Banquet's guess was that the confusion came from the obscure pen-and-ink paper record.

The EEG pattern usually associated with drowsiness is a particularly difficult one to read. When people are relaxed but still awake (usually with eyes closed) their brains often generate an increase in the well-known *alpha waves*. Alpha waves have a frequency (number of oscillations) in the range between eight and twelve per second. When people are in light sleep or dreaming, on the other hand, their brains will usually give off more *theta waves*. These are the next slower group of waves, oscillating between four and seven times per second. By obvious inference, between these two states of relaxed wakefulness and light sleep is the state of drowsiness, a state in which the person is sliding back and forth from the waking state into the sleeping state. In this transition state of drowsiness the brain produces alternating periods of alpha when awake and, when asleep, a confused scramble of a line (including theta) known to EEG experts as *mixed low frequencies*.

This was the pattern that seemed to appear so much with meditators, for periods which Banquet found suspiciously long. He adopted two tests to resolve the confusion. First, he designed his study to allow his subjects to practice the TM technique until the paper record showed the typical pattern of mixed low frequencies. He then had his researchers produce a slight but clearly audible click, a standard test that usually produces what is known as the *orienting reaction*. When a drowsy person hears such a noise, he is startled and wakes up. His brain wave patterns change to alpha alone, or even to the faster *beta* patterns that commonly indicate focused mental activity. It usually takes a few minutes for the brain wave patterns to settle back toward the sleep configuration.

In Banquet's study, however, when the researchers tried to produce the orienting reaction in the meditating subjects, they found they couldn't. The brain wave patterns did jump momentarily, indicating that the subjects heard the noise, but then they immediately returned to the same unusually persistent mixed low frequencies. Apparently these subjects did not go from drowsiness to waking. Whatever state of consciousness they were experiencing, it seemed unaffected by the interruption, a finding consistent with both the ancient description of the fourth state as *samadhi*, unwavering mind, and with

the reports of TM meditators who report that noise does not interfere with their meditations.

This simple test confirmed Banquet's suspicion that he wasn't dealing with subjects drowsy for twenty straight minutes. To analyze the situation further, he adopted a then-new technology. He bypassed the pen-and-ink recording device and ran the electrical brain wave information straight into a computer. To solve his particular problem, moreover, the computer was programmed to perform a *Fourier transform* on the incoming information. A Fourier transform is designed to take any complex electronic signal and analyze it into its component parts, reading out, in this case, what percentage of the signal is theta waves, what percentage alpha, and so on. It was a methodology ideally chosen to resolve the muddle of mixed low frequencies.

The result was an unusual one. Instead of drifting back and forth from alpha waves to theta waves as drowsy people do, Banquet's subjects tended at many points in meditation to produce the two patterns simultaneously and continuously. With more experienced meditators, moreover, a second and deeper period in the meditation was correlated with powerful and continuous trains of rhythmic theta waves, totally unlike the flickering, irregular theta usually found in light sleep and dreaming. Occasionally such a solid train of theta waves was accompanied by a continuous, cohesive pattern of beta waves as well. Beta indicates even greater wakefulness than alpha; it usually predominates in normal daily activity and characterizes the active thinking process. Like theta, beta is also ordinarily random and chaotic in its appearance. Yet the beta train that sometimes appeared in what Banquet termed the third and deepest meditative state was rhythmic and consistent, showing up at about twenty cycles per second with, on occasion, a harmonic overtone at forty cycles per second. The subjects in this study, who were also equipped with a button to press after the deepest experiences of inner transcendence, generally pressed it after the appearance of this third stage of EEG activity.

Taken as a whole, and even without reference to the research on deep physical rest, Banquet's work appeared to define a fourth state of consciousness. As he said,

The main EEG changes we recorded appeared to individualize the meditative state. The strong propensity to slow frequencies in stage 2 of meditation were clearly differentiated from drowsiness and sleep, with the main argument coming from the response to the click stimuli. Also, these second stage patterns showed a morphological difference: theta rhythms in meditation are continuous trains of dominant theta activity at a constant frequency. Stage 3 was delineated by the rhythmic beta frequencies, distinct from the normal activation pattern of waking state in which dominant fast frequencies are without rhythmicity or regularity. These changes during meditation are of special interest inasmuch as they are not produced by other techniques like autosuggestion and hypnosis. It is also noteworthy that the TM subjects displayed the persistence of an alert state of consciousness, being able to answer questions and perform voluntary movement without any noticeable modification of the brain wave pattern of deep meditation.

Although Banquet's studies are noted for their precision, one of Banquet's major contributions was an observation he could not pinpoint exactly. Perusing the paper records produced by his equipment simultaneously with the computer analysis, he detected something remarkable. Not only did traces from one particular region of the brain frequently appear as a consistent, unvarying train, it also seemed that at those times different traces from differing parts of the brain appeared to become unusually synchronous or coherent with one another.

Banquet and other researchers were surprised by this development. The brain usually operates in a highly incoherent and disorderly way. Normally, during mental tasks, each part of the brain changes rapidly in the exact patterns it is producing, and different parts of the brain display little or no harmony in their operations. In a word, during active wakefulness, brain activity is usually scattered. During relaxed wakefulness, especially with eyes closed, the brain settles down to some degree and there is ordinarily some increase in coherence, but Banquet thought he was seeing an increase far beyond the normal range.

This apparent increase of brain wave coherence was also intriguing from the standpoint of the Super Radiance effect. Super Radiance seems to create an increase in social coherence, with all members of a society tending to work together in a more orderly and harmonious way. A finding of increased internal coherence, coherence of the brain, during the fourth state of consciousness helps to explain how social coherence can be generated through Super Radiance.

Once again the search for the fourth state of consciousness demanded an improvement in bio-medical technology. The contribution this time came from an unlikely source. Paul Levine is by training a physicist (his Ph.D. is from Cal Tech), rather than a physiologist. As chief scientist at Megatek Corporation in San Diego, California, he was throughout the 1970s a specialist in problem-solving with space-age equipment. As it happened, his outside expertise was just what neurophysiologists needed to decode the complex brain wave patterns in the fourth state of consciousness.

Levine drew on his extensive background in radar technology. The computer programs used in radar are highly specialized instruments for extracting meaningful information from an incoming signal. These programs must be extremely sophisticated to distinguish the faint traces generated by small aircraft at great distances. Levine used the radar approach to programming in order to sort out the confusing dance of information that comes from the human brain. The target was brain wave coherence, and the goal was to create a program that would rule out all coherence unless it were extremely high. Levine programmed the computer to refuse all patterns that were not at least 95% coherent — 95% in step with one another. The reason was clarity. Such a high threshold for coherence would, he knew, indiscriminately rule out all low end information, ignoring the early stages of true coherence along with random patterns that gave only a surface appearance of coherence, but whatever coherence did remain would be experimentally significant. In addition, the program was written so that this high-level coherence would have to appear persistently. The testing period was broken down into two-and-one-half-second segments. If coherence appeared in one of these brief periods but not the next, the computer was set to reject it. This ruled out even 95% coherence that was isolated and possibly an artifact — the sort of stray finding sometimes caused by random muscle movements.

This was a stringent program, but Levine and his co-workers assumed that if the fourth state of consciousness is a significant phenomenon, it should survive even this tight a test.

Levine's research team worked in conjunction with Maharishi European Research University in Seelisberg, Switzerland, to gain access to highly experienced TM experts. More than fifty subjects were tested altogether, a high number. Published EEG studies not infrequently have as few as five subjects, and fifteen is considered a large sample. In this study, moreover, the subjects included not only the meditation experts, but also new meditators and non-meditator controls. Tests were taken during waking, sleeping, and dreaming, as well as in the meditation period.

With this innovative and conservatively structured test, the results supported Banquet's original surmise. Nearly every TM subject showed, during the meditation period, a marked increase in coherence between widely separated parts of the brain — even subjects who were very new to the practice. During an eyes-closed resting period before the beginning of meditation, some subjects showed an increase in coherence, as

expected, but then, with the beginning of the TM practice, the level of coherence would ordinarily rise sharply from this basal level. The coherence would typically begin in the alpha range, and then in many cases spread to the theta and beta bands. In addition, people who had meditated for a greater number of years had, in general, greater coherence in the brain wave patterning. The strongest coherence, dominant in theta, alpha, and beta, was shown by the longest-term meditator, a woman of twenty-six who had been meditating regularly since the age of ten.

Writing in the paper in which this data was presented, Levine and his co-workers said,

[From these results] it would seem that the Transcendental Meditation technique produces a higher incidence of strong coherence in the alpha/theta band than is experienced in the normally encountered states of wakefulness and sleep, and that this feature in fact provides a unique EEG "signature" of the physiological state reached during the technique It now appears that this characteristic activity tends to occur in a highly coherent form among the central and frontal [regions of the brain].

Through state-of-the-art experimental methodology, the fourth state of consciousness had received another clear definition. Since the time of Levine's study in the mid-1970s, furthermore, several replications of his methodology have produced similar results, and six papers have been published in major international journals. Internal coherence during the fourth state, a possible basis of the coherence radiated outward into the society, is by now a well-documented result.

THE STATE OF PURE CONSCIOUSNESS

The evidence for the fourth state of consciousness already presented is impressive. The body rests deeply throughout the experience, and at times seems to enter a state of extreme quiescence. Simultaneously, the brain functions in a previously unknown manner, responsive to but undisturbed by outside disturbances, persistent in rhythmic patterns, and with increasing orderliness and coherence.

Another important question can be asked, however. Does this state seem to be, in terms of physiological evidence, a state of maximum wakefulness? The answer is yes.

One such indication was presented by Levine's study. Tests of people practicing the TM technique showed an increase of brain wave coherence, while tests of people as they fell asleep, on the other hand, showed a progressive disappearance of any coherence already present. The stage of deep sleep was characterized by extremely low coherence throughout the night. This suggested that there is a continuum of coherence, extending from least coherence corresponding to least wakefulness (deep sleep), through somewhat greater coherence during the waking state, to maximum coherence- corresponding, theoretically, to "maximum wakefulness " — during the fourth state of consciousness.

The validity of this interpretation is supported in another study by Banquet. While again showing the non-interruptable, rhythmic trains in the brain wave patterns, he also analyzed his data using standard ratios known as the wakefulness coefficient and the activation coefficient. The wakefulness coefficient is determined by dividing the percentage of the brain's electrical power in the alpha wave range (ordinarily associated with relaxed wakefulness) by the percentage of the power in the delta range (deep sleep). If the percentage of alpha is higher, the wakefulness coefficient is higher. Similarly, the activation coefficient is the percentage of power in the beta range (associated with normal daily thinking and activity) divided by the percentage in the alpha range (still awake, but more relaxed). If the percentage of beta is higher, the activation coefficient is higher.

By these measures, Banquet showed that people practicing the TM technique have a markedly lower activation coefficient than control subjects do when either resting or asleep, and yet a dramatically higher wakefulness coefficient than controls sitting relaxed with their eyes closed — four times higher. Again the fourth state of consciousness is associated with a state of low activity and, again a physiological measure of increased wakefulness.

Two other studies, performed at the University of California have recently confirmed this understanding. One of these has shown that, during the practice of TM, there is a marked redistribution of blood flow in the body. The muscles maintain a roughly normal flow, but there is a sharp decrease of blood flow to the bodily organs and a matching increase in blood flow to the brain. The increase of blood in the brain is, conservatively estimated, twenty percent more than usual, a particularly impressive finding since blood flow to the brain almost never increases to any large degree. Even a one mile run will ordinarily result in less than a ten percent increase. During the fourth state of consciousness, the brain is exposed to more than the common amount of oxygen and nutrients. Such an increase could easily account for the subjects' report of greater alertness.

The second finding may be even more significant. There is in the body a naturally occurring hormone named arginine vasopressin (AVP). Studies have associated AVP with, on the one hand, regulation of blood pressure and, on the other, direct improvements in learning ability and memory. This latter effect, the increase of mental clarity, has been so well established that AVP is now used as a prescription medicine to decrease the effects of senility. Ordinarily, AVP does not change significantly in the blood stream through the normal 24-hour cycle. With experienced meditators, however, this natural hormone has been shown to increase a remarkable 500% during the regular period in which people meditate each day. This increase in AVP explains in physiological terms the experience of "maximum wakefulness."

THE PURE SELF ALONE

Physiological evidence has thus provided objective indicators of the fourth state of consciousness. In the words of researcher John Farrow, "We have been excited to find indications of quiet, inner mental alertness with a highly quiescent physiological state. Taking the various measurements together, the combination appears clearly unique. It's not surprising that this particular style of physiological functioning should be associated with a unique mental state."

The physiological definition of the fourth state of consciousness is a remarkable parallel for the mental experience of the state as it has been long described. The central indicators:

1. A state of least excitation. During the fourth state of consciousness, the body rests more deeply than in sleep. This deep rest produces a previously unknown style of metabolic functioning.

2. A state of maximum wakefulness. During the fourth state the wakefulness coefficient of brain wave patterns, the increase in blood flow to the brain, and the increase in the hormone AVP all indicate increased wakefulness.

3. Unwavering mind. Rather than the different parts of the brain functioning in different ways, each part itself constantly changing, there is a marked increase in coherence between different parts of the brain, and each part tends to produce continuous, rhythmic, unchanging patterns, patterns which are responsive to but not interrupted by

outside noise. Although brain wave patterns cannot fully establish whether a person is experiencing thoughts or has entered the fullness of the fourth state of consciousness — wide awake but *beyond* all thoughts — it is interesting to note the disappearance of the rapidly changing patterns that usually accompany rapidly changing thoughts.

4. Self-referral and self-sufficiency. The metabolic activity of the body becomes more self-sufficient, requiring less oxygen from the outside and apparently making use of its own waste products, while the mind becomes even more awake than normal without requiring any outside stimulation to maintain this wakefulness.

For Maharishi, this physiological discovery has been an important instance of the interplay between the ancient Vedic Science and the investigations of modern science. He says,

This is why we are fortunate to live in an age of science. The fourth state of consciousness is now no more a fantasy or only a metaphysical reality. Now we have it on the objective basis of modern science. The Transcendental Meditation technique produces its own style of physiology — brain wave patterns are different, the metabolic rate is different — and due to that particular style of activity in the body, the mind experiences a state of least excitation, the fourth state of consciousness. The teachings of Vedic Science have now been verified in the research laboratories of modern science.

The Vedic predictions mentioned in the introduction to this book have thus fared well in examination by science. Physics has glimpsed one unified field of all the laws of nature. Leading physicists have realized there is the connection of consciousness and creation. And physiologists have defined a fourth state of consciousness, with physiological fingerprints as expected.

Taken together, these investigations indicate that there is a way for humanity to avail itself of infinite leverage — the transcendental field of infinite potential does exist and the fourth state of consciousness, said to be the "pipeline to the infinite," the connection to this transcendental field, does exist. Furthermore, one postulated result of this infinite leverage, the Super Radiance effect, has also been statistically validated. Key elements of the Vedic theory of nature and human nature have been extensively supported by objective investigation.

For people of the twentieth century, an age based on the objective approach to knowledge, an age of materialism, such findings can be a great surprise. None of these understandings were widely known in the modern world until Maharishi began his teaching, and none made much sense based on simple observation of the surface level of life and the world. But these profound teachings have now been verified by the objective methods of modern science. The fundamental status of consciousness — the central role of mind, of pure subjectivity — has been found at the ultimate extension of objective investigation. Subjective truth and objective truth have converged; Vedic Science and modern science have shaken hands. At no time in recorded history have we been in such a sound situation for understanding what a few sages and seers have been saying throughout the ages. As Maharishi says,

In the beginning days, we taught this technology purely on the subjective level of the experience people had when they started meditating. But then, when the scientists became interested, their research was helpful. In a modern world, scientific language has proved to be a good way to communicate. But really, this whole knowledge is nothing new. Nothing

useful is new under the sun. We only brushed off the dust deposited on this ancient knowledge and now it is expressed in a more systematic way. Now we know that it is possible for the unified field, the field of all possibilities, to be opened to human contact. This potential of human life, known from past records and hinted at by the scientific discovery of the unified field, is verified by our personal experience.

The most vital contribution of this knowledge for a world still in turmoil is, of course, the Super Radiance effect. As repeated experiments have shown, when large groups all experience the fourth state of consciousness together, a soothing influence of harmony and coherence is spontaneously radiated into the environment. The effect has been repeatedly demonstrated, and by now we have enough scientific validation of the components of Super Radiance to understand Maharishi's Vedic explanation.

Now we are in possession of knowledge that can create Heaven on Earth. This on the basis of the discovery of the fourth state of consciousness. Now we have the means for the human mind to be connected to the unified field, to that level of activity where all action is self-referral, to that self-sufficient level of infinity, immortality, and bliss. Naturally tendencies in the world come out to be more harmonious, because every aspect of life in the world is being nourished from the level of the total potential of natural law.

The central hypotheses in this explanation have been scientifically validated. A new approach to world peace, to the rapid progress and fulfillment of the human race, is now available. Modern science has caught up with ancient wisdom.

It is time now to understand more about the possibilities for human life made available by this historic partnership between the best of humanity's up-to-date, objective means of gaining knowledge, and the essence of humanity's oldest, subjective means of gaining knowledge.

It is time to understand the possibility of Heaven on Earth.

CHAPTER SIX

HEAVEN ON EARTH: AN INTERVIEW WITH MAHARISHI

His Holiness Maharishi Mahesh Yogi has been teaching around the world since 1957. He came out from India in that year, one man traveling alone, carrying with him only knowledge.

His traveling expenses were paid by students he left behind. His accommodations were provided by people he met at his lectures. His goal was simple to state but astonishing in its breadth: "To end suffering in the world in this generation."

Since those earliest days of his work, millions of people have begun the practice of the Transcendental Meditation technique and tens of thousands the TM-Sidhi program. Hundreds of scientific studies have demonstrated the reality of what he teaches. Now the evolution of consciousness enjoyed by many individuals has made possible a mechanism for the rapid transition of the world as a whole — through the group dynamics of consciousness in large Super Radiance assemblies.

Vedic knowledge is once again available to the world, and it is available this time in a form that is systematic, scientifically verifiable, and easily usable. After his years of one-pointed dedication, Maharishi speaks now in terms of great fulfillment.

"This is a very, very beautiful time for the world," he says. "Now we have the knowledge of that collective performance which creates such a beautiful atmosphere everywhere on earth. New trends, new tendencies of life come up, the whole world consciousness gets purified, when large groups practice TM and the TM-Sidhi program together in one spot. A new sunshine is being created for human existence."

Maharishi, physics has glimpsed the unified field and physiology the fourth state of consciousness. But these can seem abstract and difficult to understand for some people. Can you explain Super Radiance in simpler terms?

"How does Super Radiance come about? This 'how' is answered in the performance of a gardener."

What do you mean?

"The gardener waters the root of the tree. Quietly this enlivens the sap, which is the colorless basis of all the brown of the trunk, the green of the leaves, the yellow of the petals. All the leaves and branches and trunk of the tree are just the expression of that colorless sap, and when this sap becomes enlivened deep within, then the whole tree becomes healthier and fresher. It begins to radiate happiness. Radiance outside depends on something that goes on inside. just like that, when 7000 experts in TM and the TM-Sidhi program function from that self-referral level at the basis of natural law — from that source of all the laws of nature — then this enlivens all the laws of nature. 7000 together enliven natural law by functioning at that level which is the fountainhead of natural law. Then, even without making any effort, this gives nourishment to the whole civilization, to all the tendencies in the world. The performance is inner, the performance is completely self-referral. But the effect is global, it is universal."

It seems such a grand possibility for mankind, considering how discouraging human history has been up to now.

"Yes, the idea of Heaven on Earth must seem an unbelievable thing, like telling a dream to someone. Man has lived with problems and suffering throughout the ages. History does not record a time when man was free from suffering, and so life was declared a struggle. 'Life is a struggle' — it's a very common axiom in English. But now a new time has come for the world, and it is a scientific phenomenon we are witnessing. It's not impractical idealism we are talking about, high-sounding moral values with no basis. This is something that has been verified subjectively by millions of people, something that has been verified objectively by all these hundreds of experiments. It is a technology, like the use of a lever, to do something previously found impossible. As long as it was not known, nothing could be done. But now we have it. We have it on the basis of ancient Vedic Science. We have it on the basis of modern science. And we have it on the basis of personal experience.

"The unified field has been glimpsed today even by the field of physics. Physicists know the unified field to be that total potential of natural law which is responsible for the existence and maintenance of the whole creation. Natural law governs life everywhere, and the total potential of natural law is the unified field, that unmanifest, transcendental level of nature which we experience when consciousness settles down to its self-referral state of functioning. Infinite dynamism and intelligence is there. When the mind identifies itself with that dynamism and intelligence in the transcendental state of consciousness, then it enlivens all the laws of nature throughout creation. We nourish all the trends and tendencies of life everywhere. It is this that will allow the whole world to live the best that life has to offer. It is this that will allow us to make obsolete the old understanding that life is a struggle and to end suffering for mankind in this generation."

The pressing need for national defense even now continues as a great challenge. There is much emphasis on disarmament, but still countries need to defend themselves, to feel safe from invasion by their neighbors. Do you really believe that the Maharshi Effect can be used to create effective defense for any nation?

"It is just a matter of using a scientific discovery in favor of man's life here on earth. The old strategy of defense was based on violence. It was based on the willingness to die for one's country. But this is an outmoded concept in today's world. With the weapons available to day, if any nation creates an enemy, no amount of dying can save the country. The super-powers can destroy any other nation, but even they are powerless to defend themselves. Times have changed and old patterns of defense must change. All the mechanical and technical means of destruction, they are capable of destroying, but they have no value of *saving*. This is why the only possibility for any nation today is to make use of that knowledge which will stop the very birth of an enemy."

You believe that a nation can defend itself by making defense unnecessary?

"This is the only possibility in the world today. Through the Super Radiance program, the collective consciousness of a nation can be purified of stress and fear. The entire collective consciousness of the nation can become more positive, more evolutionary, more life-supporting. That means the nation will radiate an influence of harmony and positivity that will create only friends. Any nation now, by using this technology, is capable of losing all of its enemies. Any nation now is capable of changing all enmity to friendliness. And when the intensity of orderliness in the collective consciousness becomes strong enough, then cultural integrity is restored in the nation and the nation becomes invincible to damaging influences from outside. Coherence in collective consciousness leads to invincibility for the nation. And this is not a hope. It is supported by all these studies on coherence-creating groups. The ancient Vedic technology of defense has now been validated by objective science."

But you have said that not every nation needs to adopt this technology.

“This is our great joy. From one spot in the world we can create that beautiful influence of coherence and harmony which radiates around the world. From one spot we can create invincibility for every nation and when the influence of coherence in world consciousness has become strong enough, then people everywhere will not be able to do wrong. They will not be able to do wrong, either for themselves or for others. This is a very great achievement of our time, that a few knowledgeable people should sit together, operate within that field of pure knowledge at the basis of creation, and radiate an influence which motivates people from within to do only good, to do nothing wrong or negative.”

How do you define what is good, what is positive?

“Everything good is evolutionary. Everything good is in tune with all the laws of nature, and lead spontaneously to progress and fulfillment.”

Why do people do things which are wrong?

“This is just due to lack of guidance, lack of proper guidance. Violation of natural law is a crime against creation but people everywhere are found violating the laws of nature. And when they violate any law of nature, then they suffer. If they eat something wrong, they fall sick. The violation of natural law must always create stress, and stress must project itself in problems and failures. And this arises because of a lack in the field of education.”

But how can one live in tune with all the laws of nature? There are so many of them, most of them beyond our ability ever to know directly.

“This is the thing. Hunting the laws of nature one by one, it would not be possible to fathom the full range of natural law and to know all the laws of nature. We can study the isolated values of different laws of nature through the branches of modern science, but these laws of nature do not become a living reality merely by intellectual comprehension. Now, fortunately, a technology has arisen which allows the human mind to come into tune with the full potential of natural law. The unified field is that collectedness of all the laws of nature. Through TM and the TM-Sidhi program the mind is allowed to settle down deep within and *identify* itself with that self-sufficient level, that level which is the total potential of natural law. In this way, even without knowing all the laws of nature intellectually, yet man is able to gain the support of all the laws of nature for his every thought and action. The formula for the individual is: Transcend. Open your awareness to the home of all the laws of nature, and then stabilize the home of all the laws of nature in your awareness. In this way you will spontaneously behave in accordance with all the laws of nature. The laws of nature become a reality of daily life. In Vedic Science this totality is so beautifully understood; not only do the natural laws come to be known, but the totality of natural law could become a living reality for every single individual born on earth. This is the gift of Vedic Science.”

You are speaking here of benefits for the individual?

“Yes, the main effect of TM and the TM-Sidhi program is to culture the individual physiology to act in accord with the laws of nature. We experience the fourth state of consciousness, pure consciousness, and that experience takes the nervous system to a particular style of functioning. As we repeat our meditations, this inspires the nervous system to function in that new style more and more. And this procedure brings a gradual

and systematic culturing of the physical nervous system until all thoughts and all actions come out from the unified field of all the laws of nature. The human physiology has that capacity whereby the whole life can be lived according to the laws of nature — spontaneously right, unmistakably right. This is the technology whereby the glories of the unified field could be brought into daily life."

And individual growth in this way can produce growth for the whole society?

"When we enliven the unified field in one place, we enliven it everywhere. It is that field of infinite correlation, where everything is connected with everything else. Everywhere the laws of nature become more lively and naturally everyone begins to live more in tune with natural law. This is how we can nourish the minds and hearts of all people around the world. This is how we have placed ourselves in a position to think about the welfare of the whole world. We have that technology whereby we can enliven natural law within the hearts and minds, within the emotions and the intelligent thinking of even those people on the far side of the globe. We can remove the thorny edge from their performance. We can remove the negativity from their performance. We will do it for our own benefit, for our own growth to higher states of consciousness, but we will bring human life everywhere into tune with all the laws of nature. And this is how we know we can restructure our society, how we can administer our society on that universal basis, how we can rebuild our nation on the basis of all possibilities, how all governments can function with that high efficiency with which the unified field governs the universe."

Which type of governmental system is best suited to the development of such an ideal society for its citizens?

"It is not the system of government that is important. Every system can rise to fulfillment, every system can bring satisfaction to the aspirations of all the people. The situation today is that all governments have such beautiful constitutions. The constitutions are ideal, but the achievements are not up to the dignity of the constitutions in any part of the world. With all the power, with all the national resources, with all the good will of the people, with all the highly intelligent experts assembled to handle every field, yet no government has been able to create an ideal society."

Haven't some systems of government proved themselves more suitable for the modern world?

"There is enormous possibility for mankind. No child born on earth should go without the knowledge of unfolding his full potential. Every individual should rise to the dignity of life in enlightenment. And no governmental system today is capable of producing such a situation. It is so easy to see around the world that no political system, no economic system is capable of satisfying the desires of all the people and of bringing about an ideal society. This is why we have founded the World Government of the Age of Enlightenment, to help all nations and all governments rise to fulfill the beautiful aspirations contained in their constitutions."

The World Government of the Age of Enlightenment is quite an uncommon form of government, is it not? For instance, the World Government has no territory of its own.

"A World Government could not be on the basis of territory. It would not be welcome. The role of the World Government of the Age of Enlightenment is to nourish every government, to bring fulfillment to the aspirations of every government. Therefore the sovereignty of the World Government is not territorial. Its sovereignty is the domain of consciousness, the prime mover of life. Only from the field of pure consciousness,

which has the infinite organizing power of nature within it, could the World Government nourish the life of every other government. The World Government has at its disposal a simple technology to create and maintain harmony around the world, to allow every nation to rise in cultural integrity and invincibility, and it offers this simple formula to every nation on earth."

And this is the technique of Super Radiance?

"Yes. This is the technology for alliance with the laws of nature, for practically, concretely invoking the infinite organizing power of nature to purify the collective consciousness of any nation. This will make it effortless for the heads of state to do maximum for their people. Every head of state is like a father — he wants to do everything he can to make his family happy. Now all those age-old aspirations of heads of state will be fulfilled with these large groups who learn to operate on the level of the unified field. These groups will radiate an influence of harmony and positivity, and purify all doubt and fear and disorder from the collective consciousness of the entire nation. This is the formula for success for every government. Nations have always been administered by man-made law. Now the technology is available to use the skilled hand of nature to administer society. Any government will be perfect when the society is governed by national law and natural law both simultaneously. It has taken us these long years, but today we stand with that formula in our hand which can bring invincibility and ideal society to every nation. Only a handful of people in any country, through their daily Super Radiance program, can enliven the unified field in that nation. This will enliven the unified field in national consciousness and thereby enable the government to govern with the same silent perfection with which the government of nature governs the universe."

What will be the long-term effects of using this technology?

"The basic problem facing governments is how to successfully integrate the innumerable trends and tendencies in society. A fully integrated national consciousness enjoys alliance with the unified field. This brings the full support of the nourishing, evolutionary power of natural law to fulfill the desires of everyone. It is very easy for anyone with even the slightest intelligence to understand that if the unified field could be accessible to anyone, nothing would be impossible for him. All man could ever want will be there with this support from all the laws of nature. There will be no negativity, no suffering. Life will not have to be a struggle any more. Those days should be forgotten. Children will read in the history books that there was a time when the hospitals were filled, when the jails were filled, when doctors were always worried and lawyers were up late at night unable to rest. They will read this, but it will all be a tale of the past. Now every government can make use of this formula and the World Government is happy to repeatedly announce to every government, Here is the secret of successful society. It does not matter what system of society. It will be a happy, progressive, fulfilled society. Let it go by whatever name it goes, it will be a happy society. It will bring harmony and fulfillment to all of its people and to all the nations around."

You are asking governmental leaders around the world to establish coherence-creating groups in their societies?

"Yes. I invite the leaders of the world to examine this offer of alliance with natural law. Through my Vedic Science and Technology — the science and technology of the unified field — any head of state can have easy access to the unified field and raise the administration of his government to be in perfect alliance with the administration of nature's government. We have in our possession today the knowledge that can set right any disorder that is troubling life in any part of the world. All areas of politics,

economics, religion, social order — every aspect of human concern can be raised to perfection through Vedic Science. We are very proud to say today that the world is going to be a better world, and a better world is going to be the best world. We can't have any expression greater than to say that heaven will be lived on earth."

It seems such a lofty vision.

"But now we have that simple formula to change the trends of time. It is such a fulfilling time now. I remember the first days of teaching more than thirty, ago in India. From the Vedic literature and at the feet of my master, Guru Dev, I had learned that life is bliss, that life is infinity, immortality. But when I looked to the world, I found it completely opposite. And I saw that something was lacking between the field of action and the field of knowledge.

"I started to teach and I had that confidence that this is such a simple, natural, effortless technology whereby everyone could fathom one's own inner genius — that infinite creativity, that pure intelligence — and with this I thought it should be possible to eliminate negativity and suffering from the world. That was the aspiration. And now this ancient Vedic knowledge has been verified by modern science. Now we know that every man, born as a man, has it as a natural birthright to enjoy the support of all the laws of nature. And now we know that 7000 experts in this technology are completely sufficient to influence the far ends of the earth. it is a very, very great joy. That goal which I kept before me all these years, that life should not be a struggle, is now achievable for all mankind. For this we can only say, All glory to Guru Dev. Jai Guru Dev."