

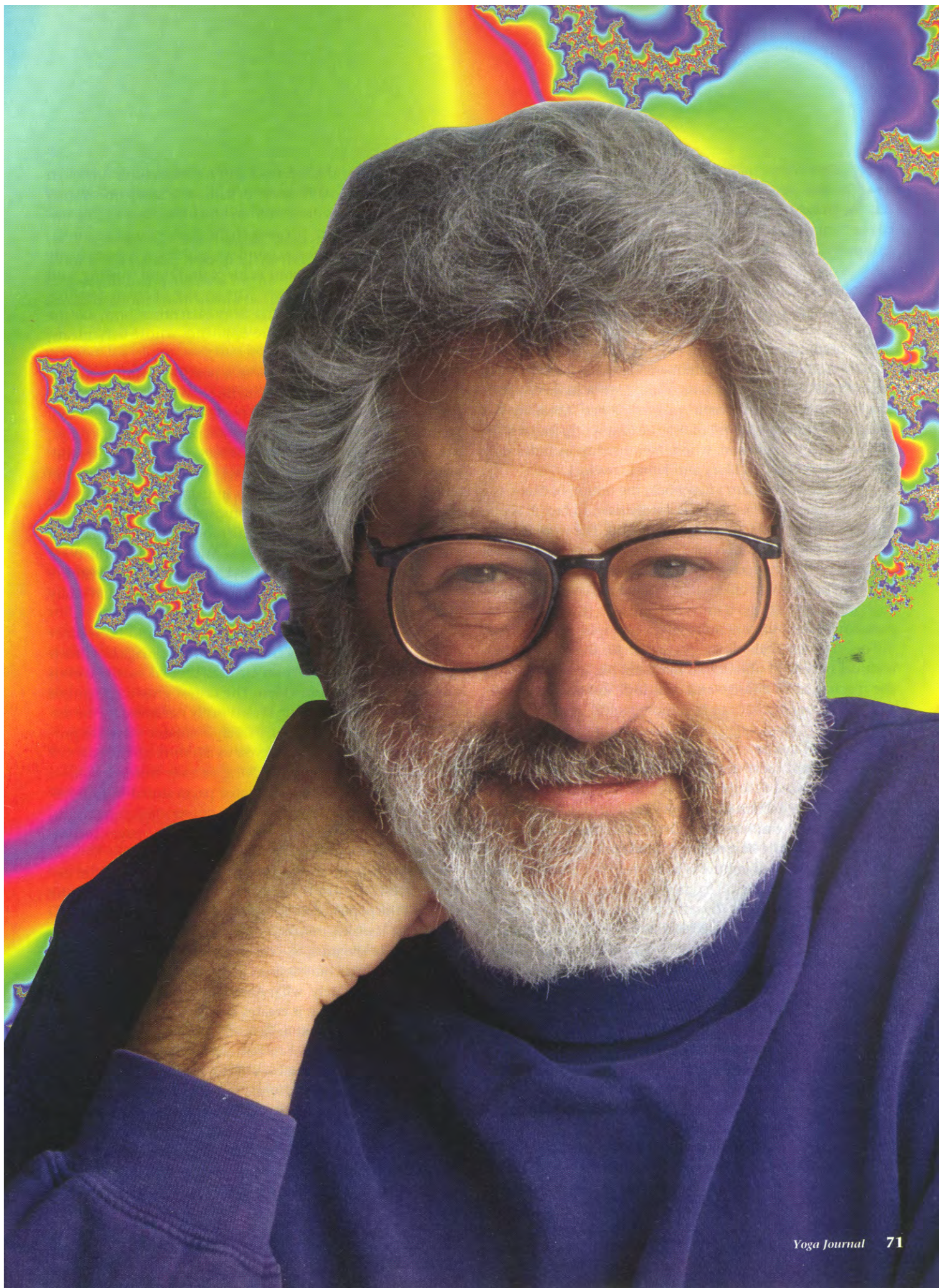
# Chaos and Karma

Mathematician  
and yogi  
Ralph Abraham's  
journey took him  
from a cave in the  
Himalayas to the  
cyberspace  
of chaos theory.

An interview by  
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Photograph by R.R. Jones







Ralph Abraham is both a yogi and a mathematician, equal parts mystic and rationalist. A recently retired professor of mathematics at the University of California in Santa Cruz, Abraham has also taught at UC Berkeley, Columbia, and Princeton and has held visiting positions at universities in Amsterdam, Paris, and Barcelona. He is one of the leading theoreticians in the mathematics of chaos and has written several books about what mathematicians call "dynamical systems," as well as *Trialogues*—speculations on the nature of mind and spirit with ethnopharmacologist Terence McKenna and plant biologist Rupert Sheldrake—and the just-released cultural history, *Chaos, Gaia, Eros*. A pioneering explorer of the spiritual dimensions of science, Abraham is a member of the prestigious Lindisfarne Fellowship founded by William Irwin Thompson, whose membership includes such luminaries as Wendell Berry and James Lovelock.

According to Abraham's new book, the notion of chaos as a force that shapes the universe is hardly new. In fact, it is one of the oldest concepts in myth and religion. The word first appeared in a book of creation myths called *Theogony* by the Greek poet Hesiod, in which chaos was defined as a cosmic principle that was the source of all creation. Hesiod linked it to the concepts of Gaia (the created universe) and Eros (the creative impulse) in a great trinity of mind, body, and spirit.

Today, chaos theory is the pop name for the study of "dynamical systems," a branch of mathematics that focuses on the mechanics of change and creation. Some scientists regard the theory of chaos to be a more radical departure from classical Newtonian science than the revolutions of relativity and quantum mechanics, in that it provides a new paradigm for personal and social progress. Parallels can easily be drawn between the world according to chaos theorists and the world described by the Eastern philosophies of Zen and Taoism, particularly in their emphasis on change as a constant.

Abraham sees the burgeoning interest in chaos theory as a healthy sign that our culture is in recovery from social institutions with a pathological fixation on order. Traffic lights are not configured for shifts in traffic patterns; crops are monocultured; children are educated assembly-line style at the same fixed pace. Building chaos into our systems, he argues, will enable us to adapt to ever-changing conditions—and to the very idea that conditions are always changing.

One of the great features of this new science is that the complexity of chaos can be made intuitively clear through computer-generated sound and visuals. Powerful computers and sophisticated graphic and sound tools help Abraham and others explore this science in much the same way Columbus's ships helped open up the New World, or that modern spacecraft give us new ways of seeing the universe and ourselves.

The science of chaos studies whole systems and the patterns in the relationship of small and large details within those systems—the animated harmony of riverbeds and snowflakes,

waterfalls and lava, fallen trees and bird skeletons. Although chaos may seem totally unpredictable, it actually obeys strict mathematical rules derived from equations that can be formulated and studied. Because chaos theory helps us understand interactions among complex variables, it is particularly good at integrating disparate fields of study and working with great scales of time and space. The science of chaos describes how order and disorder emerge from each other; how, like the Taoist yin and yang, they are opposites whose very meanings depend on each other.

Abraham sees chaos theory as a possible antidote for the worst tendencies of the rational, linear Western mind. As he sees it, "our culture is on a death track." Our best hope, he says, lies in uniting the most useful features of old traditions (yoga, pagan ritual, and other archaic sciences) with the best of modern science and technology. In fact, Abraham has a new and abiding faith in the prospects for human survival due to the advent of the Internet—an electronic spiderweb of linked computers that spans the globe—which he regards as a material manifestation of the global brain. And it's the World Wide Web, a section of the Internet invented at a physics institute in Switzerland as a tool for collaborative research, that really intrigued Abraham.

The World Wide Web has organized the world's computer networks into something like an electronic magazine, with "pages" that can include color pictures, text, sounds, and even snippets of full-motion video. The fastest growing segment of the Internet, World Wide Web is easily navigated by the use of a "browser"—one of many freely available software programs, like Mosaic, that allow you to flip through the pages of the Internet and, by double clicking on a key word, or link, be instantly connected to other related pages stored in computers around the world. Thousands of universities, companies, and individuals have already constructed home pages and are sharing information and services over the Net.

In his soon-to-be-released book on the Web, Abraham describes it as being just the miracle we might need in order to deal with the population explosion and the environmental crisis, because it makes information directly available to the people who have the most use for it. He predicts that universal data access may become as crucial an issue as universal health care is now. Ultimately, what Abraham finds most vital about the Web is the linkages it creates between individual human beings—connections that he believes yield an intelligence that is greater than the sum of its parts. Asks Abraham, "What is more alive? The swarming bees or the hive itself?"

I had the strong feeling, while listening to Ralph Abraham expound upon current issues, that his unique take on the world is balanced between the poles of scientific fact and spiritual intuition, optimism and pessimism. On a sunny afternoon in Big Sur, California, where Abraham was a visiting scholar at Esalen Institute, we explored his experiences with the yogic

culture of India as well as his discovery of—and high expectations for—the emerging electronic web of digital communication that is encircling the Earth.

**Yoga Journal:** One doesn't usually think of a mathematics professor and a leading theorist in the field of chaos and dynamical systems being inspired by the mysticism of India. Tell us about Ralph Abraham before the Indian pilgrimage.

**Ralph Abraham:** Well, going to India in 1972 was a part of a personal transformation that began with my first acid trip in late 1967. Before this transitional period, we have, I suppose, a fairly typical portrait of a mathematics professor.

I came from a small town in northern Vermont, where there was no real intellectual tradition—although my parents were very supportive. I was plucked out of fairly typical surroundings to follow the call of mathematics at age 15 or so.

**Did you show early signs of having extraordinary talent?**

No. But my performance in school and scores on national exams signaled a degree of special ability. The red carpet of the mathematical community just unrolled effortlessly in front of me. I never gave any thought to what I would be doing next, and in 1960, at age 23, I found myself with a Ph.D. in mathematics and a job at UC Berkeley, which had just become one of the world's centers of pure mathematics. Berkeley was also a center of hippie culture, and I became interested in yoga and turned vegetarian.

I didn't realize it at the time, but these were the golden years of mathematics, and my specialty, dynamics, was one of the hot areas of the frontier. After some time, however, this field and mathematics as a whole went into a period of crisis, a kind of meltdown.

**What kind of crisis?**

Mathematics was really a cult of the young, and we had little or no historical perspective. So when we came upon the beginnings of a paradigm shift, in part due to the discovery of chaotic behavior by mathematical experimentalists, there was a realization that many of our programs and the theories behind them had come to a dead end. Many people in my group were entering into a personal crisis period as well.

**Were you in crisis too?**

Sure! I didn't know where to turn, and no one else seemed to know either. About the same time, in 1968, I began my own experiments with LSD, gradually making it a higher priority in my life. Then I took time off from the university and went to Europe to work with Rene Thom, struggling for a year to integrate chaos theory with applied mathematics.

After the school year in Amsterdam I came across Ram Dass sitting silently in the corner of a coffee shop, meditating. He pointed me to India, suggesting that I visit the ashram of his

guru, Neem Karoli Baba, and saying that if I was lucky, I might actually meet the guru. I intended to return to Paris and the work with Thom, but I made what I thought would be a quick trip to India first.

Visiting India is like a guaranteed bifurcation in one's life. I like Rupert Sheldrake's description of it being a place where unimaginable variety and complexity of cultural forms, extraordinary human warmth, and speculative anarchy coexist effortlessly.

In retrospect, I can see that my journey in India resulted in my discovery of an answer to the problem I was seeking to solve in Paris at the Institute for Advanced Study in Science with Rene Thom. But I didn't know it at the time; I just thought I

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was off track. My interest was in reading English translations of the Vedas and studying Indian classical literature, philosophy, psychology, and cosmology from Sanskrit.

**What happened when you first arrived in India? Did you go right to the ashram in Nainital and tell them Ram Dass sent you?**

No. I didn't like the place at all. There were all these Westerners in fake Indian garb, sitting at the feet of the guru, tending to him in total silence like slaves. I decided to leave immediately and planned to go to south India to make a tour of tantric yoga centers and then return to France. But it didn't quite work out that way.

**Let me guess . . . a mysterious thing happened?**

Well, there is a group of caves in the Himalayas that have been occupied by tantric yogis for thousands of years not far from a village I was passing through. A smiling yogi came up to me and told me there was a vacancy in one of the caves, and that I had been chosen to occupy it. He said to take the bus to a certain stop, and when I got off, I'd be told where to go. I was adventurous, so I did as he told me.

**What happened when you got off the bus?**

It was after midnight, and there were no lights and no moon. I stumbled down a path through the jungle following others who also got off the bus. One by one the other people disappeared down collateral paths, and I found myself alone, walking slowly in the pitch black. I came to a fork and stopped there,

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not knowing where to go. Suddenly someone popped up from behind a bush and said, "This way, sahib," pointing to the left. It was almost morning by the time I arrived at the caves.

### What did you find at the caves?

There were three caves, and only two yogis, and they claimed they were expecting me. I was shown to my cave and, figuring that this is where I would find the highest teaching, I decided to stay there for some time.

### Did this feel like a sacred place?

Yes. The caves were a sacred place—that was crystal clear. In a sacred space, you become connected to the spirit of the place and, for me, that connection was very welcome. It answered a yearning and amplified and gave expression to an aspect of my own consciousness which I had only begun to touch under LSD. Marvelous, incredible things were happening every minute. For example, all of my communication with the other two yogis was telepathic—they were silent *munis* [sages]; they never said a word. I'd be in my cave meditating and hear a voice blasting in my head, "Come down to the lower cave, food has arrived!" Sure enough, someone had just brought a generous offering of food for us.

There were a lot of paranormal phenomena, and they were all on a deeply satisfying frequency. That is to say that the field of the place was very soothing, healing, and spiritually fulfilling. This was a place that had seen only jungle yogis and jaguars for 2,000 years. Sometimes the jaguars would come in the night and ask for their place back! I would have been happy to stay there indefinitely.

### What brought about your departure from the caves?

After about 10 days, we were visited by a jungle baba, replete with brass bucket, spear, and all the accessories that a jungle baba has. He sat down next to me and meditated in silence for several hours. Suddenly, in clear English, he said, "Don't you know you are supposed to go now?"

He told me to follow him, and so we went back along the paths to the village. He then told me, in a powerful way, that I must return to the ashram of Neem Karoli Baba in Nainital. So I did, and as I approached the ashram, I heard some people calling, "Where's the professor from California?"

### What did they have in mind for you?

The guru set me up with a house and a huge library filled with translations of Sanskrit classics and everything else I needed to carry on my scholarly assignment. A music teacher gave me lessons on playing the tablas. I had already been studying to play the sitar back in the U.S. I'd been very impressed by the writings of Pir Vilayat Khan, the Sufi master, on the yoga of music, and I believed that spiritual music would be my particular *sadhana* [path].

I became very interested in the notion of vibration, the vibratory metaphor, which is part of the *samkhya* philosophy—one of the six orthodox doctrines of ancient Indian philosophy.

My assignment was to study the literature and the Vedas and then to come back to America and write books about it and so on. That hasn't happened yet, but it's about to! I have actually resumed my studies of the Vedas.

### What was life like in Nainital, in the foothills of the Himalayas?

Nainital is a little like Tahoe, in that it has a vast backdrop of snow-capped mountains reflected in a spectacular lake at about a 6,000-foot elevation. The town straddles the lake, and it barely has electricity or cars, but it serves as a tourist resort, or hill station, for the wealthy people of New Delhi when it is unbearably hot. The ashram is a few miles from the town.

I lived there for six months, and it was like living in the Stone Age. In the winter, you have to keep yourself warm with a *duni*—that's a little box with charcoal burning in it on the floor of the room—which fills the room with black smoke, so that you have to lie down on the floor in order to breathe.

### What was your impression of the guru?

I had virtually no contact with him. During the day, if he was around, he would just smile and throw mangos to people, which was called "giving prasadam." I had a fantasy that every night, while I slept, Neem Karoli Baba gave me instruction (in Hindi, which I don't understand) on the interpretation of these ancient texts, particularly the Rig Veda. The Rig Veda is supposed to have four levels of meaning depending on how advanced you are along the path. In the morning, I would try out the Hindi that I had learned overnight, and it seemed to work!

After checking around, I discovered that just about everyone at the ashram claimed to have this secret telepathic personal relationship with the guru.

This experience turned my thinking completely inside out, radically revising my approach to mathematics and its relationship to consciousness and ordinary reality, although I didn't realize it until many years later.

**How is that? I mean, did the nightly somnolent lectures from Baba somehow unlock the impasse that kept you from fully relating mathematical theory with ordinary reality? How did this experience make such a difference to you, specifically?**

Well, the full impact of it wasn't apparent to me until today, perhaps by the way you put the question. After I was back from India and at the university in 1974, the first thing I did was build a physical laboratory to study vibrating fluids. You see, if you vibrate fluid enough, then you get droplets and chaotic behavior. This enabled me to study space-time patterns of chaos in physical systems, an early phase in the development of chaos theory.

I had no idea if the university would be interested in this work. This fixation on chaotic behavior and vibration stemmed directly from my visit to India. But I didn't fully see until much later, even as we speak, that that change was the essential change—that if I hadn't gone to India, I might never have succeeded in taking the next step in my mathematical career. And when I took that step, I parted company forever with all other mathematicians on the planet. No one could accept that what I was doing was true mathematics, because it had this mystical element. It wasn't kosher!

**I understand that once you returned from India, you could be seen walking on the streets of Santa Cruz in white robes! Tell us about your reintegration to the Western world.**

It was very difficult. It took many years, and maybe, in some ways, the process is incomplete. After I left Nainital, my girlfriend, a few other friends, and I moved to a village outside of Kathmandu. We decided to do a short trek and then return to California. But on this trek in the Himalaya we became even more estranged from Western culture. We went native to an extreme degree, dressed in Tibetan gear, and spoke Nepali to the local people in the villages along the way.

After six months in Nainital, and then Nepal, I became accustomed to wearing pajamas [*dhotis*] and shawls. In fact, when we finally prepared to leave Nepal, they wouldn't let us on the airplane to Bangkok—we weren't dressed right! We had to repeatedly go back to the city and, because we were out of funds, trade more of our things for Western clothing.

I wasn't sure what I wanted to do back in California, but I knew it wasn't teaching. I made a list of all known professions and rated them by my personal criteria of desirability—traveling, etcetera. I settled on professional blackjack and went to live in Tahoe to gamble in the casinos.

Once I returned to Santa Cruz, and before I was able to raise any money, I lived in a VW bus with my girlfriend and wore the Indian and Tibetan-style clothing that we brought back with us. During my three year absence from California, the hippie culture that had been thriving when I left had almost completely vanished.

**In your book *Dialogues* you state that the most important task for humanity is a "resacralization of the Earth." Did your journey to India influence your coming to that conclusion?**

Yes, but this was clear before India. To me, the hippie culture was a big breakthrough. I was very at home in that culture. When I moved from Princeton to UC Santa Cruz in 1968, I felt as though I was coming home. When it existed, the hippie culture was a complete culture, and part of that culture was the understanding that we were bringing the sacred back into life—we were vegetarians, we were peace-loving, and we were spiritual. A lot of social switches were thrown to their opposite positions in that culture.

**What did you learn about your own culture from being immersed in an Asian one?**

That the culture we live in is very impoverished and has been diminishing in stages over a long period of time. Our culture is on a death track. More and more intellectuals, religious people, and other spiritually minded people agree; there is a huge emerging consensus on this idea. The "Western" mind, the mechanical paradigm, is not only destroying the environment—that would be enough reason to give it up—but it is destroying the quality of life by denial of the sacred. All kinds of inner experience is denied—the paranormal, or anything that doesn't fit the dominant paradigm—and it's reduced to nothingness. All that our culture says we can believe has been reduced to what fits on the head of a pin. Everyone, from chil-

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dren in school to the academic elite, is in revolt, but the old habitual ways of thinking are stubborn and persist.

Perhaps even more important than resacralization is deconstruction. If we could shed the dominant ideas of this culture—just take them off like old clothes and put them in the fire—our intelligence and intuition would guide us to the sacred.

**What did you discover about the role of ritual in guiding us to the sacred?**

I'm not absolutely sure that ritual practice is an essential part of spiritual tradition, but throughout history ancient cultures were supported and maintained by rituals.

Use of ritual may, however, be useful in the process of shedding this culture. How will we get out of these habit patterns that are so deep? We need help; we need strategies to help us out of the mental straightjacket that this civilization is. Ritual may help to provide the space, the liberty, the flexibility, the possibility of adaptation to a larger reality.

**Are you optimistic or pessimistic about our ability to do that?**

I have not been too optimistic in the past. Actually, I've been really pessimistic, although I don't like to share my pessimism. And I don't like having a negative reaction to someone else's optimism. But there is a certain habit of optimism, epitomized by *The Aquarian Conspiracy* by Marilyn Ferguson, that I will admit to having been averse to. While it's true that there are many

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