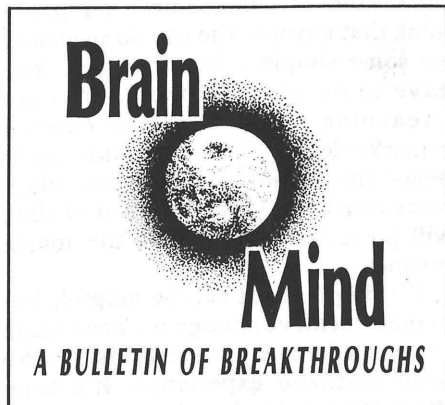


June 1994

'Arrow of time' solution stirs up old issues



June/July 1994

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Ilya Prigogine's new formulation of physics, as reported in our last issue, has generated a strong response—mostly favorable—from many quarters and stimulated a host of questions.

Some of the reaction is summarized in this issue; some is reprinted in the Commentary and a four-page special insert, with additional comments to appear in future issues.

Prigogine's reformulation addresses the question of the "arrow of time," a problem that has made science schizophrenic.

According to physics, time is irrelevant—even reversible—whereas dis-

This issue (June/July) contains 12 pages rather than eight in order to do justice to the torrent of reaction to Ilya Prigogine's recent work (May issue). The August *Brain/Mind* will also be a 12-pager. For extra copies of this issue, call (800) 553-MIND or (213) 223-2500.

ciplines such as biology and geology take time into consideration. Physicists are indeed able to show this "time-symmetry" experimentally, but Prigogine says these are special cases involving isolated points.

An "ensemble of points" behaves differently, however. Resonance among the points creates genuine novelty. After working on the problem for many years, Prigogine expressed mathematically our common-sense experience of a forward movement of events.

This reformulation does not attempt to account for subjective experiences of time, although Prigogine talks about "inner time" (musical time, for example) as well as "external time."

He does not address time anomalies such as precognition, but neither does his model preclude them. (See related story, page 8.)

Ingo Swann, who designed the pivotal "remote viewing" experiments in the 1970's, pointed out that by showing how complex systems produce

More from Tucson

Microtubules link mind, physics

Perhaps the hottest topic of the recent consciousness conference in Tucson (*Brain/Mind*, April) was the potential relationship between consciousness and microtubules, very tiny tubes of protein found in the cellular cytoplasm throughout the body.

Microtubules, which form alongside each other to create bundles averaging one-millionth of an inch thick, behave in distinctive and unusual ways—moving

around cells, dissolving and re-forming in other places.

Microtubule networks serve as a sort of skeleton for a cell, lending it structure and creating pathways for the transport of chemical signals. They appear to serve as "cellular pathfinders," dissolving as cells prepare to divide, then reemerging in perfect position after mitosis.

They may also lie at the heart of a monumental union of physics and consciousness.

Stuart Hameroff, an anesthesiologist at the University of Arizona, became intrigued by microtubules when he learned in the 1970's that they were temporarily immobilized by anesthet-



(With permission from Hirokawa, 1991)

Continued on Page 6

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Sense of well-being tied to 'male,' 'female' traits

Both "masculine" and "feminine" traits can work independently to promote psychological well-being, according to a researcher whose work is bumping up against science's conventional wisdom.

University of Pennsylvania psychologist Melissa Hunt has found that although women are more inclined to depression, traditionally feminine virtues seem to predict a sense of well-being as effectively as characteristics more often linked to men.

Hunt found in a study of 159 students that those strong in "expressive" traits like affection, compassion, understanding and nurturance were as psychologically fit as those long on "instrumental" traits—independence, assertiveness, willingness to take risks. Women tended to be more expressive, men more instrumental.

What's more, the intensity of positive affect—feeling joy, for example, as opposed to contentedness—related only to the expressive traits. Subjects scoring high on both scales were the happiest of all.

Though her findings may not seem a surprise, most previous research has portrayed the instrumental, "male" traits as healthier. Hunt thinks this discrepancy may stem largely from inaccurate methodology in previous studies.

Her latest project investigates the cognitive processes involved in well-being and depression. Though some studies have suggested that focusing on negative feelings makes them worse, Hunt's new research is supporting the notion that consciously exploring one's gloom is the best way to transcend it.

She told *Brain/Mind* that as long as people are mentally prepared to work through painful events toward a new perspective (as opposed to merely brooding), they probably are better off delving right into their feelings. While this emotional processing initially can increase the pain, it may well be the healthiest option for the long run, Hunt said.

The study of traits was reported in *Sex Roles* 29: 147-169. Hunt: Psychology Dept., U.-Pennsylvania, 3815 Walnut St., Philadelphia 19104.

Interview: Huffington sees a 'hunger to reconnect'

Arianna Stassinopolous Huffington, born in Greece, moved to England at age 16 and earned a degree in economics from Cambridge. Along the way she served as president of the university's debating society, the Cambridge Union.

She vaulted to prominence in her early 20's with the 1974 publication of her first book, The Female Woman. Later she wrote an exploration of the spiritual roots of Western politics, After Reason, The Gods of Greece and widely reviewed biographies of Maria Callas and Pablo Picasso.

In her new book, The Fourth Instinct, Huffington persuasively argues that we have—yet often deny—a powerful urge to find spirituality and meaning in our lives. It is this force that can elevate and transform the pull of the other three instincts—survival, power and sexuality. The instinct for the spiritual, she maintains, can guide us through our volatile times into a new era of fulfillment.

In addition to lecturing and hosting a TV talk show, "Critical Mass," Huffington is assisting the U.S. Senate campaign of her husband, Michael Huffington. She was interviewed by Brain/Mind editors Marilyn Ferguson and Eric Ferguson.

What is the essence of this fourth instinct?

It's what Blaise Pascal referred to as "the God-shaped vacuum"—the hunger to reconnect with God and live in the recognition that we are spiritual as well as material beings. The theme of the book is that if we try to find happiness solely through the first three instincts, we fail.

The evidence of our failure is unmistakable. When we ignore the spiritual dimensions of ourselves, we fall victim to a triptych of pathologies—depression, aggression and addiction. We've tried to solve social problems by throwing money at them, yet they keep getting worse. I think the fact that we're nearing the year 2000 is giving us a certain psychological expectancy. Various routes of spiritual inquiry are converging: We definitely seem to be arriving at a moment of truth.

The first three instincts are wonderful in their own right. They become corrupted only when we try to make them stand as substitutes for the

fourth. Through the fourth instinct, which is uniquely human, we can make the most of the first three—we can regain our center, we can get past identifying ourselves by our successes and failures, and we can learn to be truly intimate with each other.



Perhaps this instinct has been warped by the cynicism some people feel about religion.

It has been said that the corruption of the best is the worst, and we have to a certain extent allowed what is best about us—our spirituality—to be corrupted. Anytime we talk today about spirituality, there tends to be an immediate assumption of hypocrisy. This assumption is often legitimate, yet it's dangerous. Stephen Carter, the author of *The Culture of Disbelief*, recently commented that if we don't bring God directly into our public discourse, we relegate Him to the status of a marginal hobby.

In *The Fourth Instinct* you give the reader a sense of "traveling" with you.

Yes. Since I see the process of developing the fourth instinct as a lifelong challenge, I wanted to talk about my own journey and my own pain—the things that brought me to these realizations. I wanted to stress that this is a journey and that neither I nor anyone else who talks about these issues has reached some perfected state of being. No one is perfectly realized. After all, even the greatest saints who ever lived continued to be tempted, to stray off course.

You've taken this message to a lot of different audiences. How do people react?

Well, there now seems to be a strong sense of the need to move beyond words. I've been planning to write about the fourth instinct for 17 years, and I worked on it for 10. I finally had to ask myself, How do I live it? How can I become—and help others become—more spiritual? That's why I talked about my own experiences.

As a practical step, I recommended

some kind of "hands-on" service. I think that anyone who can do so should try some simple volunteer work. You have to balance "looking in" with "reaching out." I've seen enough remarkable results to say with confidence that almost anyone who volunteers consistently for a period of time will powerfully experience the fourth instinct.

Writing a check can be helpful, but to really achieve change we need some "compassionate conversions." We need firsthand experience. It's true: We make a living by what we *get*, but we make a life by what we *give*.

This message is that of every spiritual language and tradition; the message is independent of the messenger. You could get it from Viktor Frankl, who described how it felt to be stripped of everything in a concentration camp, or from Alexandr Solzhenitsyn, feeling his essential humanity while lying on rotten straw in the Gulag.

You seem eager to bridge the gap between the practical and the philosophical.

Yes. I want to show that this grand discussion is directly related to the choices we make in ordinary, everyday life. Every time we choose laughter over anger or forgiveness over vindictiveness, we are remembering the Bible verse, "He who is in you is greater than he who is in the world."

I'm particularly encouraged that more and more people seem willing to overcome their reluctance and take the first step. Independent of their personal circumstances, many people are finding that the time is ripe for change.

Huffington: Box 5657, Washington, D.C. 20016.



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Commentary: 'The Moving Finger Writes....'

*The Moving Finger writes and, having writ, moves on. . . .
The bird of time is on the wing. . . .*

Omar Khayyam's English translator, Edward FitzGerald, may have put his own stamp on *The Rubaiyat*, but surely in the most famous lines he caught the spirit of the Persian masterpiece.

Sometimes we feel a sense of urgency, yet at other moments time is flexible, like Dali's wavy clocks, and we seem to have all the time in the world. Still, we experience a certain inexorable movement. G. I. Gurdjieff, who emerged from the Sufi tradition, called time "The Merciless Heropass."

When we're the masters of time we say things like "Time is relative." When time masters us we say "Time is money," and so it is in the mindset of our metered culture. So many dollars per hour, so many dollars per gallon to take us just so far in so many minutes.

AND THEN AGAIN there's time as evolution, a spiral rather than a cycle, a flux with periodicities and novelty, and we remember that "you can't step into the same river twice."

Even so a triggering event or an act of imagination can bring yesterday's river to mind so sharply that we can feel the waters past. Imagination, vision and intuition leap ahead at times, sensing the onrushing current and its consequences.

Yet even these powers of mind are a part of evolution; they alter with time.

WHEN EDWARD FITZGERALD'S exquisite translation became the rage in England in the late 1800's it was interpreted as a kind of romantic sensualism, even hedonism. Over the years many Sufis, including the contemporary master Idries Shah, have pointed out the deeper meanings and subtleties of Omar's evocative verse.

Now *The Rubaiyat of Omar Khayyam Explained*, a posthumous volume by Paramahansa Yogananda (Crystal Clarity, Nevada City, Calif., in press) offers the famous yogi's commentary. In Yogananda's view the Moving Finger is cosmic law that governs destiny in both the macrocosm and the microcosm.

But cosmic law "is no irrational tyrant whose judgments are inflicted mindlessly on a cowering and helpless humanity." If we get past our self-pitying, pious egos—if we achieve "soul-consciousness"—higher wisdom prevails over the currents of fate. Sainly acts, he says, "spread outward, like ripples of light, in blessing to all mankind."

It's interesting to compare this view with a *Brain/Mind* reader's dream about determinism and free will (letter from Pondurenga Das, page 4-D).

MORE ON DESCARTES and the 'laws': Ingo Swann (see page 2-A) passed along a passage from *The Encyclopedia of Philosophy*, edited by Paul Edwards (MacMillan, 1967).

In November 1626 Descartes was in Paris, where he distinguished himself in a famous confrontation with Chandous, whose view that science could be founded only on probabilities he eloquently attacked, claiming both that absolute certainty could serve as a basis of human knowledge and that he himself had a method of establishing this basis.

The Moving Finger writes; and, having writ,
Moves on: nor all your Piety nor Wit
Shall lure it back to cancel half a Line,
Nor all your Tears wash out a word of it.
—Rubaiyat of Omar Khayyam

That debate attracted a key supporter, Pierre Cardinal de Berulle, and the die was cast.

Ingo also points out that early scientists used the word *laws* metaphorically when speaking of nature; they didn't mean unalterable principles. (Source: an essay, "The Origins of Scientific 'Laws,'" by Jane Ruby in the *Journal of History of Ideas*.)

Now they tell us!

* * *

And in the meantime, what should ride in over the telephone waves but yet another Big Theory. This one has the curious property of being extremely simple to understand yet powerful enough to accommodate just about any paradox you'd care to think about.

Irving Dardik, a noted heart surgeon, founder of the Olympics Sports Medicine Council, discovered that he could relieve the symptoms of chronic illness in his patients by getting their hearts worked up, then relaxed. While exercising they "catch the wave," thus resetting heart-rhythms that had been shocked out of phase by physical or mental stress.

Dardik's study of electrocardiograms and other wave patterns led him to conclude that matter is only a matter of waves waving. In his own way Dardik paraphrased the great doctrine expressed in many spiritual traditions: The solidity of the material world is an illusion. It's all "waves waving," some more densely than others.

Many of Dardik's patients have experienced remarkable comebacks from chronic disease. Dardik cured himself of a serious disease he had endured for 30 years.

Seeing the wave-like nature of things, he says, he gradually made sense of many concepts he had considered far-out—acupuncture, homeopathy, spiritual healing, near-death experiences and psychedelic experiences.

In our August and September issues we'll explore both Dardik's exercise/rest approach and his wave theory ("The Great Law of the Universe," *Cycles*, July). If this be placebo, let's make the most of it!

* * *

We reprinted the May special issue about Prigogine's new work. If you'd like quantities to give to friends, colleagues or groups, let us know. Call (213) 223-2500 or (800) 553-MIND. We also welcome your comments. Mail them to Box 42211, Los Angeles 90042, or fax to (213) 223-2519.

* * *

WORTHY OF NOTE: research summaries in the July issue of a chock-full little monthly, *Clinical Pearls News* (\$46 yearly from ITS, 3301 Alta Arden #3, Sacramento 95825). Folic acid injections cure such neurological ills as organic brain syndrome, spinal degeneration and psychiatric disorders. . . . A high rate of psychiatric illness was found in patients with irritable bowel syndrome. . . . Anger may double the risk of heart attack.

—M.F.

Books: Education reimagined in 'The Universal Sch

THE UNIVERSAL SCHOOLHOUSE: Spiritual Awakening Through Education by James Moffett (\$25 from Jossey-Bass).

The Universal Schoolhouse is both a lucid critique of the hidebound U.S. education system and a manifesto for sweeping change, a book that is resoundingly pragmatic yet grounded in the premise that education is first and foremost a journey of the spirit.

The anti-democratic nature of modern American education is a central theme for Moffett, one of the country's leading educational consultants and the author of *Storm in the Mountains* and *Harmonic Learning*. He calls on impressive experience as a long-time teacher of English in high schools and a veteran of reform movements since the 1960's.

Speaking in soaring metaphors and gritty realities with equal ease, Moffett says that to reform education we must first come to grips with the forces that have twisted it—government, big business, powerful interest groups and the public itself.

Much of the book is given over to his sophisticated insider's analysis of the problems: big business influencing curriculum through educational philanthropy, the incentives for state legislators to cooperate with the federal government's desire for control, the fears and pressures that lead schools to graduate students who can't read, the political forces that sabotage experimentation.

Moffett says the most public attempts at reform will fail because they are based on faulty premises:

- That curriculum should be set by the state.
- That schooling's chief purposes are economic and nationalistic.
- That testing and competition are useful engines of renewal.

Instead, we must ask what we really want from education. In Moffett's view, governments have long emphasized two of its aims—instilling social responsibility and training people for employment—at the expense of a

critical third, personal growth.

"Personal development interests legislators less than law and business," he asserts. "But without [it] you cannot hope for the enlightened electorate that democracy requires, nor the maturity and self-fulfillment that make people responsible, nor the development of talent, intellect and social skills that the workplace is crying for."

In Moffett's view, an ever greater focus on the individual is the natural result of the march of human progress, and educational reformers must take this into account. Since America is not likely to renounce its deep-seated freedom of spirit, simply assigning more homework or lengthening the school day is no path to revitalization.

So what is the answer? To Moffett, it is an education grounded in an understanding of "universal learning activities": witnessing, attuning, apprenticing, interacting, collaborating, visiting, game-playing, practicing spiritual disciplines or the arts.

His vision of the "universal schoolhouse" is multi-faceted. At its essence, it will feature a cascade of ever more comprehensive "contexts" for the student, ranging from the personal to the transpersonal and from the level of the individual mind out into wholeness of the cosmos.

It will be philosophically and physically flexible, a metaphorical environment that can be either broad or intimate. It will base learning on meaning and purpose, revamping the teaching of math, English, science and history and elevating the importance of the arts.

It will be a source of unification, imparting relevance by emphasizing the interconnectedness of disciplines. Teachers will be both tutors and counselors, matching learners with their resources, routing them within the "learning network," coaching within their own specialties.

Ideally, different learning methods will be woven into an environment dedicated to a technique Moffett considers the most powerful of all. He calls it "rippling"—an informal state in which everyone is at once learning about a subject from those with greater experience and transmitting it on to those who know less.

Describing a number of quietly radi-

A few decades from now, people will regard the schooling of today with revulsion, as astonishingly primitive, in the same way we now deplore the 18th Century treatment of the mentally ill. Our successors will not be able to understand how citizens dedicated to personal liberty and democracy could have placed learning on a *compulsory* basis, such that citizens had to report to certain buildings every working day of their youth in order to be bossed about by agents of the state.

The very idea of a state compelling people to attend schools contradicts the foundations of modern democracy. . . . Far from creating an enlightened electorate, compulsory state-set education has resulted in a populace that is currently throwing democracy away.

—*The Universal Schoolhouse*

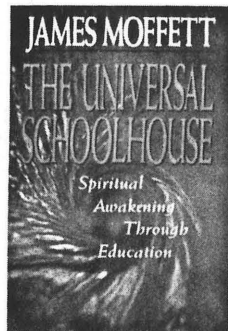
cal reform efforts that are already under way, Moffett expresses optimism that a system based on appropriate principles will ultimately emerge—even if for no greater reason than desperation.

Yet the process of "expanding the learning arena from classroom to community" will necessarily be incremental. As a possible bridge between today's system and tomorrow's, he cites a prototype developed in Wisconsin in partnership with the American Association for the Advancement of Science's Project 2061.

In the McFarland model, as it is known, students ranging across four years in age would be grouped into "clusters" of 12. The educational experience would consist of the pursuit of individual projects intertwined with group activities like music, discussion and physical activity. Once adopted, the model's emphasis on decentralized classrooms and exploration beyond school walls could—over time—set the stage for the "community-wide learning network" that is the universal schoolhouse.

We *must* reimagine education, says Moffett. The stakes are too high to let us settle for the status quo.

"After all, native curiosity itself



'Schoolhouse'; 'Life and Work'; 'The Commanding Self'

most likely represents an innate feeling that we are here to learn," he says. "Suppose growth is the master goal. Then the focus of public education and the purpose of life would be one and the same—inner growth for meaning. . . .

"Perhaps we develop ourselves not only because it is the most practical way to live on Earth but because it is how we find out who we really are—which might be more than we think."

Moffett's commanding idealism should make any concerned reader take heart.

—E.F.

* * *

LIFE AND WORK: A Manager's Search for Meaning by James A. Autry (\$21 from Morrow).

Autry, who retired in 1992 as president of the Meredith magazine publishing group, follows up on his 1991 book *Love and Profit* with this eloquent new volume of reflections on business and its place in our lives.

Like the earlier book, *Life and Work* is a stylistic potpourri, consisting of essays in the form of letters, brief notes, straight text and more of Autry's distinctive poetry.

Going beyond his 30-year management career to find insight into compassionate leadership, Autry also draws on the lessons of his rural childhood, military service and family life. The result is an engaging take on such disparate subjects as sexual harassment in the workplace, the future of capitalism, business's responsibility to culture and the concept of quality.

At bottom, *Life and Work* is a reminder that business, like the rest of life, centers on human values and relationships. Describing what he sees as a new corporate willingness to embrace change, Autry says business is discovering that creating a dignified and meaning-oriented work climate is the only real path to renewal.

"Without such an environment, [everything else] is doomed," he asserts. "Within such an environment, a company can achieve the impossible."

MERCHANTS OF VISION: People Bringing New Purpose and Values to Business by James Liebig (\$24.95 from Berrett-Koehler), a collection of interviews and profiles of some 40 influential business visionaries from around

the globe, addresses similar concerns.

Liebig, a former executive and the author of *Business Ethics*, begins with the premise that business, now "the most pervasive and influential institution in world society," must take its full share of socio-cultural responsibility.

His "merchants of vision," most of whom have succeeded without becoming famous, clearly agree. Though of widely varying backgrounds and involved in vastly different endeavors, they speak and act from a basic set of principles.

From a freight executive in India to an Argentine health-food-company founder to a U.S. businesswoman-turned-teacher, Liebig's visionaries tend to promote social progress and environmental protection, to place a high value on creativity and spiritual purpose and to emphasize ethics and personal transformation.

"Over a broad expanse of the world, visionary businesswomen and men see similar things occurring regardless of local conditions," Liebig summarizes. Beyond the natural unifying forces of "globalization" and technology, these men and women sense that "more profound dynamics, at once more fundamental and more transcendental, are at work here."

In **RE-EDUCATING THE CORPORATION: Foundations for the Learning Organization** (\$25 from Omneo, 85 Allen Martin Dr., Essex Junction, Vt. 05452), Daniel Tobin says that it is a lack of a proper "learning environment" for employees that blocks the revolutions promised by such new techniques as Total Quality Management.

Drawing on experience as a consultant and former high-tech executive, Tobin reminds business to "invest in people." He offers a detailed blueprint for a "virtual training organization," in which learning activities are tied directly to company projects and goals.

—E.F.

* * *

THE GREEN SUPERMARKET SHOPPING GUIDE by John F. Wasik (Warner, \$5.99). Which environmental claims on supermarket shelves can you believe? What is the best way to support ecologically conscious business? John Wasik, senior editor for *Consumer's Digest* and founder of the

New Consumer Institute, rates manufacturers, products and supermarket chains for various environmental qualities. Other chapters cover recyclability, labeling, household toxicity and how to become a "green" consumer activist.

* * *

THE COMMANDING SELF by Idries Shah (Octagon Press, \$27). The latest book from the eminent Sufi writer expands upon the familiar format of his previous works. The usual parables and stories alternate with Shah's responses to illustrative questions. Instead of expounding a fixed system, he shows up the assumptions and conditioning that block perception of truth.

"The commanding self" is a term used by Sufis to describe the mixture of crude emotion and automatism that governs much of our thinking and behavior. Shah relates it to the tendency to set oneself up as an authority without the necessary capacity to fulfill the role. He believes the degeneration of many past esoteric teachings can be ascribed to this condition.

Through his deft use of analogy and personal anecdote, Shah helps readers become aware of their blinders even as they search for wisdom.

* * *

The charter issue of **THE ECO-PSYCHOLOGY NEWSLETTER** (Box 7487, Berkeley, Calif. 94707; \$10/three issues) features a lead editorial by Theodore Roszak on "The Greening of Psychology."

Its purpose: to inspire dialogue from all sides on "the convergence of psychological insight and environmental concern." Roszak says: "Ecopsychology is an exciting intellectual challenge, but it may be more than that. Briefly put, an environmentally based definition of 'mental health' could play a significant role in our society's search for measures of ecologically enlightened policy."

"Morsels of Knowledge, Banquets of Ignorance" is an essay in the most recent issue of Richard Heinberg's **MUSELETTER** (1433 Olivet Road, Santa Rosa, Calif. 95401, monthly/\$15). With eloquence and insight, Heinberg scans the history of science to illustrate how much we don't know. *Museletter* offers explorations of myth, deep ecology, primitivism, spirituality and cultural renewal.

—J.K.

Scientists theorize about tiny brain structures. . .

Continued from Page 1

ics. Over the years he discovered numerous other curious properties in the tiny structures, including their uncanny ability to act in synchrony and what appeared to be a surprising readiness to carry electrical signals.

As he recounts in the June issue of *Discover*, Hameroff eventually came to suspect that the little bundles were "switches" that helped guide impulses along intricate pathways within and between cells. This could help explain why the brain has powers far beyond what might be predicted solely from the switching capacity of neurons.

Eventually it dawned on him that he might have stumbled on to nothing less than the pathway of consciousness—but he had no accompanying theory of consciousness to tether his idea to.

Meanwhile, Oxford University physicist and mathematician Roger Penrose was exploring the possibility that consciousness relates to quantum mechanical "coherence" in the brain, as he proposed in his 1989 book, *The Emperor's New Mind*. But he was still groping for plausible biological structures to accommodate the theory.

Hameroff chanced to read Penrose's book, and the two eventually met. They quickly realized that they might have unknowingly collaborated on a breakthrough, and their partnership encouraged Hameroff to organize the conference.

Though linking the mind to quantum processes is not new, Penrose, Hameroff and others think an understanding of microtubules will lend considerable new weight to the idea.

Penrose speculated that nerve signals underlying consciousness begin in a quantum mechanical stew so vast that it houses countless billions of different patterns. The question then is how they pass into and through the structure of the brain.

"We must look for aspects of brain structure where the quantum/classical interface has a significant input to brain action if we are to locate a plausible site for the non-computable physical action responsible for consciousness," he told the audience.

Enter the neuronal microtubules, "where large-scale quantum coherence is feasible."

The microtubule debate is entwined with a central question about brain

function. It has been assumed by many researchers that the brain's functions can eventually be replicated by computers—so-called artificial intelligence (AI). An opposing school of thought, which now counts Penrose and Hameroff among its members, holds that many of the brain's mechanisms are not replicable because they do not involve straightforward computation.

In fact, neural networks and artificial intelligence have met with mixed success. Some aspects of mind have been well mimicked; others—those we tend to consider uniquely human, such as appreciating humor or discerning beauty—are elusive.

"Brains are dynamic systems, not information processors," declared molecular biologist Walter Freeman of the University of California, Berkeley. He believes that the past two centuries of brain research have been riddled with invalid assumptions.

"Neuroscientists have drawn heavily on the physical sciences to provide a theoretical framework in which to interpret their results and observations. In the process there has been a strong tendency to attribute the properties of physical variables to neural activity. Many have confused nerve activity with electric current. . . ."

Freeman argued that the concepts of information storage and processing used by AI researchers are "metaphorical and lacking in measurability. Much of the failure of computational neuroscience and AI to simulate biological intelligence can be attributed to the confusion of neural activity with information.

"The problem remains: How to define neural activity? It is not directly observable, and it is not force, energy, electric current or a flow of information."

The view of consciousness as non-computational is disputed even by some quantum physicists. Though he did express some second thoughts late in life, for most of his career the late David Bohm maintained that all such processes are at least *theoretically* computable.

Finnish physicist Paavo Pylkkanen, a student of Bohm's, noted that new interpretations of quantum theory provide "a radically new way of characterizing the mind in nature. . . . The crucial question here is whether the

A surprising number of speakers at Tucson—including some neuroscientists and cognitive psychologists—raised the specter of relationships between consciousness and psi phenomena. While it was not a major conference theme, several contended that no theory of consciousness will be complete until it can account for ESP, psychokinesis, telepathy and other anomalous events.

One of the strongest defenses of psi was made by Mario Varvoglis of France's KAOS Institute. Reporting recent research involving random-number generators, Varvoglis said his and other studies strongly suggest that non-local "exchanges" occur between human beings and other people, organisms and mechanical processes.

"Most contemporary models of mental events are based upon 'classical' views of physical and information exchange," he said.

He added that such models "cannot adequately deal with psi phenomena, which involve 'non-local' exchanges between consciousness and external events."

quantum theory points to some new—that is, holistic—mode of representation."

In addition to their other properties, some evidence now suggests that microtubules are miniature biological "resonators" that amplify ultraviolet light.

Such a discovery could explain numerous phenomena surrounding acupuncture and healing, which suggest that something in the body responds in resonance to outside stimulation. Resonance is also a factor in the fundamentally unpredictable behavior of ensembles of particles (see *Brain/Mind*, May).

Tapes of the Tucson conference are available from Conference Recording Service, 1308 Gilman St., Berkeley, Calif. 94706, (800) 647-1110.

This article is based on contributions by biophysicist Scott Hill (profiled in April). A bibliography of relevant publications is available from Hill at 804 Sydnor St., Ridgecrest, Calif. 93555.

News: the mystery of meditation; antidote to hate

MEDITATION: One form of meditation appears to produce widely different effects in different practitioners, according to an Indian study that illustrates meditation's complexity.

Shirley Telles and T. Desiraju of the National Institute of Mental Health and Neurosciences in Bangalore found that subjects practicing Brahmakumaris Raja meditation often showed consistent changes in skin response and respiration—but often in opposite directions from each other.

Contrary to patterns seen in other meditative techniques, Brahmakumaris Raja also consistently caused heart rate to increase, rather than to decline.

In BR meditation, practitioners fix their gaze on a meaningful symbol and imagine a bright, peaceful universal force. The findings contrast with previous results for Transcendental, Zen and Tantric meditation, which differ in practice and purpose and have generally been linked to reductions in heart rate and respiration. Telles and Desiraju said the results indicate that meditation's effects are a function of both the practice and the individual.

Meanwhile, a second Indian study offers a new twist: Meditation may be useful for epileptics. K. K. Deepak's group in New Delhi found that drug-resistant epilepsy patients who practiced mantra (word repetition) meditation twice daily for a year showed significant reductions in seizure frequency and duration.

Telles and Desiraju reported in the *International Journal of Psychophysiology* 15: 147-152. The second study appeared in *Biofeedback and Self-Regulation* 19: 25-40. Telles: Vivekenanda Kendra Yoga Research Foundation #9, Appajappa Agrahara, Bangalore 560018, India. Deepak: Physiology Dept., All India Institute of Medical Sciences, New Delhi 110029.

* * *

FAMILIARITY BREEDS ACCEPTANCE: Personal acquaintance with gays and lesbians leads to a powerful decline in prejudicial attitudes, according to a study at the University of California, Davis.

Gregory Herek and Eric Glunt found in a survey of 937 adults that although anti-gay sentiments remain widespread, personal contact was the single

best predictor of acceptance.

In all, subjects who said they knew an openly gay person—about a third of the sample—had an average score of 4.08 on a scale of anti-gay attitudes. Those without contact averaged 6.96. Women and young people tended to have the most tolerant attitudes, rural political and religious conservatives the least. Political conservatives were the only group for whom contact seemed to make little difference.

Herek and Glunt's study was reported in the *Journal of Sex Research* 30: 239-244. Herek: Psychology Dept., U.-California, Davis 95616.

* * *

THE BIBLE AND THE BOTTLE: Whatever way religion may shape social attitudes, faithful church attendance appears linked to one clear aspect of health: a lower incidence of alcoholism.

A group headed by Duke University psychiatrist Harold Koenig found in a survey of 2,969 North Carolinians that those who attended church every week were the least likely to be alcoholics.

Alcohol dependence was somewhat higher than normal among those who tended to watch religious TV broadcasts rather than go to church, suggesting that the social aspects of church services may be as important as the religious message.

Koenig's group found that main-line and conservative Protestants had the lowest overall vulnerability of the six groups studied, but the researchers did not distinguish between denominations that proscribe drinking and those that do not. Pentecostals had the highest lifetime rates. The other groups examined were Catholic/Greek Orthodox, "other" (Jewish, Mormon, etc.) and the unaffiliated.

The findings appeared in *Hospital and Community Psychiatry* 45: 127-132. Koenig: Box 3400, Duke University Medical Center, Durham, N.C. 27710.

* * *

SETBACK FOR RECOVERED MEMORY: In a case with potentially dramatic repercussions for psychotherapy, a California jury has held two therapists liable for negligence in a high-profile "recovered memory" case.

By a 10-2 vote, a superior court jury



in Napa Valley found in May that therapist Marche Isabella and psychiatrist Richard Rose had falsely implanted memories of sexual abuse in a young woman. The woman's father, a former top executive at a winery, was awarded \$500,000 in damages. He had been seeking \$8 million.

Swayed by the testimony of expert witnesses, the jury concluded that Isabella had implanted memories of incest in the woman after she sought help for depression and eating disorders in 1990. The jurors held Rose and Western Medical Center in Anaheim liable for administering the drug sodium amyltal to aid the woman's recollections.

The contentious issue of recovered memory has been much in the news of late (see *Brain/Mind*, April). Describing the verdict as a "wake-up call," one observer said it may spur a search for better ways of identifying and confirming molestation.

* * *

BODILY DEPRESSION: A large-scale study has connected depression to higher risk of numerous physical disorders.

Using data on more than 2,500 subjects gathered as part of an earlier National Institute of Mental Health study, Steven Moldin's group confirmed a previously noted connection between serious depression—treated or untreated—and migraine headache.

His team also linked lifetime incidence of depression to skin infections, respiratory illness, ulcers, low blood pressure and diabetes. The links were generally stronger among women.

Moldin's group acknowledged that their data do not show whether depression generally predates illness or vice versa.

The findings were reported in *Psychological Medicine* 23: 755-761. Moldin: Psychiatry Dept., Washington University School of Medicine, 4940 Children's Place, St. Louis 63110.

New theory...

Continued from Page 1

uncertainty through resonance, Prigogine offers a paradigm with space for the "transient resonance" postulated by many parapsychologists. (See Commentary, page 3.)

Some readers, including management consultant/artist Jim Channon, saw the new formulation as "a blinding flash of the obvious"; others were relieved to see scientific validation of human experience.

"Generally, when I hear about a new scientific theory, my reaction is 'Wow!'" said Clyde Ford, author of *Where Healing Waters Meet*. "This was different. When I heard about Prigogine's latest, I experienced a deep sense of relief."

In Ford's view the resonance factor in Prigogine's model helps explain the mysterious connectedness between split particles in two physics models—Bell's Theorem and the earlier Einstein-Podolsky-Rosen thought experiment.

"I think it will eventually be shown that this resonance accounts for such phenomena as psychokinesis," he said. "At the deepest level we're connected."

Rupert Sheldrake, who formulated the theory of morphic resonance, said he is sure Prigogine "is right in rejecting the illusion of certainty that has held science in thrall for more than three centuries."

Neuroscientist Karl Pribram, who introduced the holographic model of brain function, said that Prigogine has "clarified for me the 'how' of time-symmetry breaking. . . . As a consequence of taking a path, time symmetry is broken."

Life and mind involve breaking time symmetry, Pribram pointed out. "Biology is about birth, growth, procreation and death. Psychology is about learning and memory, intuition and thought. All these are time-symmetry breaking processes."

Jim Autry, poet and business leader, said that Prigogine's ideas "bring nothing to mind so much as the poem by James Russell Lowell, 'Once to Every Man and Nation,' which contains a line about how ancient truths take on new meanings. This, it seems to me, is true not only of theology but also of every conventional wisdom in the world."

Prigogine: 'Not opinion, it's proofs'; environment counts

"It's not a question of opinion," Ilya Prigogine said recently from his institute in Brussels. "It's proofs."

He acknowledges that the mathematics is challenging. "Any new theory in physics requires a new mathematics. The mathematics is not known to many people."

His main point may not yet have been stated clearly enough, he said. "The information we need to predict the future is more than a point or a wave-function. It is a probability distribution."

"When you have unstable dynamic systems you need to know the environment. This changes both classical dynamics and quantum theory."

Proof of the "arrow of time" does not preclude the existence of time anomalies such as precognition or subjective alterations of time. "I was simply addressing how to include the direction of time in the fundamental laws."

Psychic phenomena and alternative healing therapies such as homeopathy, he says, should be examined via "non-equilibrium macroscopic non-linear dynamics," a field not addressed by his

As an alert reader pointed out, Karl Pribram's comment about the brain and biologists (April) paraphrased not Charles de Gaulle but another French statesman, Georges Clemenceau (1841-1929). Our mistake.

recent work, which looks at the microscopic level. (See also Commentary, page 3.)

Prigogine takes issue with the stance of Nobel physicist Murray Gell-Mann's latest book, *The Quark and the Jaguar*. "As I see it, either quantum physics is not the final science or the arrow of time is an illusion. Gell-Mann takes the point of view that the quantum is final—every theory has to satisfy it."

"Quantum mechanics is not final. You have to find a larger theory for unstable systems that contain irreversibility."

"Too many scientists think science is all but finished and that what is not [readily] explained must be taken away," he said. "A more general science is needed."

And as for anomalies of time, "an arrow can go more or less rapidly. Many things are possible."

UPCOMING

Breath of Life and Light Aug. 13-14, New Lebanon, N.Y., (518) 794-8095. . . . Jung and Creativity Intensive workshop Aug. 12-29, Kusnacht, Switzerland, (408) 427-6620. . . . Turtle Island Bioregional Gathering Aug. 14-21 near Louisville, Ky., (317) 636-3977. . . . UN Prep Committee for World Summit for Social Development Aug. 22-Sept. 2, NYC, (202) 328-6580. . . . Assn. for Transpersonal Psychology Conference: Sex, Gender, Spirit Aug. 25-28, Monterey, Calif., (415) 327-2066. . . . Dreamwork Seminars Aug. 26-Sept. 1, Carpinteria, Calif., (805) 969-3626.

Zen and the Art of Business Sept. 3-5; Holistic Nursing Sept. 8-11, Rhinebeck, N.Y., (800) 944-1001. . . . UN Conference on Population and Development Sept. 5-13, Cairo, (301) 593-4724. . . . Ask Your Angels and Wild Women Gathering Sept. 5-10; Healing Illness With the Mind and Compassionate Touch Oct. 3-6, Cortes Island, B.C., (604) 935-6533.

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