

A FOOL'S PARADISE?

The Subtle Assault of the Hard Sciences of Consciousness Upon
Experiential Education

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[ABSTRACT: Advances in artificial intelligence and neuroscience claim to have begun to undermine the assumptions of the arts and educational theory community by explaining consciousness through either a reduction to mathematical functionalism or an ex-crescence of brain biology. I suggest that the worldview behind such reductionism is opposed to the worldview assumed by many educational practitioners and theorists. I then go on to outline a few common positions taken in the burgeoning field of consciousness studies which suggest that—though many attributes of consciousness have been identified and explained—individual consciousness itself remains as much of an enigma to scientists as to the rest of us who experience it. However, I do suggest the necessity of intersubjectivity for conscious evolution.]

“The astonishing hypothesis is that ‘You’, your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behaviour of a vast assembly of nerve cells and their associated molecules. As Lewis Carroll’s Alice might have phrased it: ‘You’re nothing but a pack of neurones!’ ”

(Francis H. C. Crick, *The Astonishing Hypothesis*)¹

“The fool is subversive because she threatens to reveal that existence is a dream, and that the language of the mundane, of the world of everyday consciousness, is a curtain drawn by ‘normal’ people to shield their eyes from the abyss.”

(David Kennedy, “Child and Fool in the
Western Wisdom Tradition”)²

§1. Foundations. Teacher educators in foundations have long realized that education has both instrumental and culturally constructive (or aesthetic) purposes. The educational enterprise seems to have begun amongst our hunting and gathering ancestors for reasons of survival and, secondarily, personal experience. Physical survival skills are found in the rest of the animal kingdom. Much of our verbal exchange and other skills of symbolization associated with cultural elaboration, on the other hand, seem unnecessary enhancements of survival needs. People must learn techniques of survival efficiently and apply them early so we can all continue being fed, sheltered, and protected. But people must also gain experience in the ongoing cultural elaboration we call the arts and humanities so they may participate in further cultural creation and expand the cultural mind—as well as be guided on the personal journey through the stages of life. The deepening of conscious experience through such things as imaginative and narrative productions is brought about by freely and continuously transcending one's immediate contexts. Such experiential education remains a major concern today, usually tolerantly coexisting with the more practical lines of learning centered on survival skills and instrumental training.

Since at least the beginning of this century, schools have expected students to exercise the prerogatives of independent centres of consciousness. Why else would we encourage the teaching of democratic free choice? Why else does the curriculum assume the value of getting students to learn responsible decision-making, to express themselves in writing assignments or through visual or dramatic means? It is only with the assumption of such self-managed minds in each person that the importance of learning history or the great works of literature is understood. This is not even to mention the rewards we give to those who behave properly, work hard, and excel athletically or academically—and the withholding of such rewards from those who do not. More recently, we have been expecting schools to encourage cooperative groupwork, critical thinking, and multicultural viewpoints. We expect our students (and each other) to have minds which can empathize, achieve deeper understanding,

and create socially acceptable goals for themselves. Surely such expectations assume each person has an independent mind which connects readily to other minds and to the world itself.

The study and understanding of the institutions of education, generally seen as a social science, may no longer manage to straddle the chasm between experimental science and experiential humanism. Science and technology's explorations into mind and consciousness are threatening to overrun their territory and throw down assault bridges upon the weak-kneed mediations of social science, overthrowing entirely the fool's paradise of the arts and humanities. It seems only sensible that those of us in educational foundations should become aware of the progress of the hard sciences in this area.

§2. The Hard Sciences. Despite the hard-worked rhetoric of the humanistic, artistic, and literary viewpoints, we *know* that nothing can receive the official stamp of truth or possibility until it has passed through the rigour of scientific analysis. This is the mainstream worldview today. This especially refers to what I am here calling the hard sciences to distinguish them from the softer, more socially oriented sciences.

With respect to consciousness, the primary hard sciences which threaten to reduce the mind to an "epiphenomenon" as either a biological product or a deterministic function are neuroscience and its technological twin, artificial intelligence—both forms of cognitive science. The realm of artificial intelligence research might prove that consciousness is merely a mathematically predictable function of the brain's electro-chemical interactions which could just as well be a function of the computer's electro-binary circuitry. Neuroscience is closing in on its search for a sort of grand unification theory (GUT) of the brain in which *all* aspects of conscious awareness will be explained through specific biological processes—the situation described by Francis Crick in the epigraph above.

Computer technology continues to make inroads into the educational process but so far, most agree, communication has only been

enhanced. The marvelous manner in which computers input, retain, and calculate data may be highly suggestive of the workings of the conscious mind, but such a model of learning has not yet greatly influenced our fundamental pedagogical worldview. Although some may speak on the one hand of learning as “input,” testing as “output,” remembering as “data storage,” and thinking as “data processing” while on the other hand speaking of the computer’s “intelligence,” “memory,” “thinking,” “knowledge base,” or even its “arousal time,” that doesn’t reflect any change in primary assumptions about the prerequisites for awareness. Or does it?

And even though neuroscience has demonstrated the brain’s once mysterious method of inputting and storing data (now called information), doesn’t our ultimate respect for the individual’s unique learning style remain unquestioned? Neuroscientists have given us images of the brain in action and have pinpointed most of the brain’s centres devoted to particular tasks of processing information. It’s no wonder that a textbook, audiovisual, and seminar industry has arisen to train teachers in “brain-based learning.” For a chunk of those professional development funds, there’s no shortage of educational entrepreneurs who will train teachers to teach “to the brain” or to set up “brain-friendly environments,” as though the person were just extraneous wrapping around the organic CPU.³

Not to be alarmist, but as the AI technicians proclaim the inevitable construction of conscious machines and the neuroscientists seem to move toward a self-contained total explanation of consciousness as a cerebral byproduct, all this educating by interactive facilitation or “learning to learn” will come under severe strain to justify its activity. If the brain or mind works as either of these approaches demonstrate, then the flaming scientific sword of demonstrated proof is about to be raised before the east gateway of paradise and the fools of cultural intersubjectivity will be required to exit forthwith.

§3. Consciousness and the Brain. The brain is the central processor for all our incarnate existence so it is no wonder we are in the midst of what has been declared “the decade of the brain.” Many

popular magazines including *Newsweek*, *Scientific American*, *Discover*, and *National Geographic* have devoted special issues to the wonders of the brain. Publishers' advertising brochures received by education departments extol new books about the bicameral brain, or the brain explained, or the brain's newly discovered secret key to learning. Since the once humble brain is being accepted as *the* complete source of human consciousness, that chunk of pink-grey matter seems to be undergoing a sort of deification to the status of World-Creator. What world would we have without consciousness? Who created our consciousness? El Cerebro, that's who!

But, again, who we are seems to depend on the fundament of the brain's assumed creation. The "fundament" may be functionalism or evolved, self-contained brain biology, neither of which gives us educators any reason to promote interactive, expressive, or experiential education. The fundament of mind may also be a biology so subtle it involves quantum mechanics, or it may be beyond physics in another reality altogether. The latter two choices open the possibility of the mind as either a resident of the implicate,⁴ self-aware⁵ quantum universe or a non-material agent altogether. How these latter types of dualism explain conscious effects on the daily material world is less clear, however.

The mathematician Roger Penrose clarifies these four alternatives to questions about the brain, consciousness, and functionalist computation. This summary may help us to understand the majority positions and to consider the assumptions employed in education. The list is both comprehensive and succinct enough to be cited here:

- A. All thinking is computation; in particular, feelings of conscious awareness are evoked merely by the carrying out of appropriate computations.
- B. Awareness is a feature of the brain's physical action; and whereas any physical action can be simulated computationally, computational simulation cannot by itself evoke awareness.

- C. Appropriate physical action of the brain evokes awareness, but this physical action cannot even be properly simulated computationally.
- D. Awareness cannot be explained in physical, computational, or any other scientific terms.⁶

A may be called functionalism or “strong AI” and is the position, for example, of philosopher Daniel Dennett who considers the case closed in his popular *Consciousness Explained*⁷—and of most computer scientists. One immediate implication of the fact that the brain’s complex interactions can in principle be mathematically calculated is that such calculations could just as well take place elsewhere than the “wetware” of the brain. This opens the door for the hardware of computer technology to become another substrate for the complex interactions from which consciousness can emerge. Of course, the second implication of this is that there’s every reason to expect that the silicon substrate—the computer, robot, or android—will achieve more complex processing than is possible for a human brain. The computer’s processing is already more rapid, if still less adaptable.⁸

All these speculations still refer to the distant future. For the time being only the AI worldview need concern us. If such a paradigm were to become widely accepted then the problem for educators would be greatly simplified. Education driven by a sort of mechanistic determinism toward complexity would merely be a matter of acquiescing to the technological imperative. The fool’s paradises of the arts, humanities, and social sciences would no longer serve much purpose. It would be time to stop being so *humanistic*, time get out the tool kits and build the machines which will supersede us. All the sooner to transfer our memory programs into immortality!

B is “weak AI” or generativity and would equate with the view that only the ultra-complex biology of the brain can produce consciousness. The brain’s evolved reflexive understanding makes it impossible for computers to mimic such a history of learning. This

has been called “carbon chauvinism,” meaning only an organic brain can be conscious. This is the position of well-known philosopher John Searle.⁹

As an extension of *B* and edging into *C*, it should be noted that Penrose ignores the groundbreaking work of Gerald Edelman.¹⁰ Edelman suggests that through competition amongst neural assemblies for conscious attention (known as Neural Darwinism) our values and experience affect our cerebral evolution. Penrose is likewise dismissive of the effects of language upon consciousness. This is unfortunate, because it is considered by some authorities like linguist Derek Bickerton¹¹ that language has created intersubjective networks which have done Edelman one better by externalizing synaptic-like connections in the form of cultural intersubjectivity which has led to the evolution of syntactic substructures in the brain. The suggestion is that the brain responds to cultural/conscious evolution.

C is Penrose’s choice. The difference between it and *B*, according to Penrose, is the Gödelian noncomputability of many of the processes of consciousness which implies potential free will. Here consciousness is identified with the *orchestrated* objective reduction of the quantum wave function or space-time selections associated with the electrons in the atoms of brain microtubules.¹² In this view, the quantum mind may act before brain processing begins. Until a quantum computer is built, AI will never be able to duplicate such subtle activity. The problem is that the quantum realm is obscure and, like *A* and *B*, still attempts an objective explanation for subjectivity (conscious experience). How postulated randomness implies free will is another unanswered question.

D is the “spooky”¹³ alternative which believers call spiritual or mystical. It places the mind in a non-material reality and so allows for infinite experience and free will. Sir John Eccles¹⁴ is one Nobel laureate neuroscientist who supports the dualism of *D*.

Both Penrose’s interpretation of the strong AI position of *A* or the neurologic extreme of *B* imply that a great deal of what we have

been doing in schools and universities for thousands of years has been an utter waste of time. First of all, the consciousness we experience would have been shown to play no significant role in our behaviour, just as predicted by Watson, Skinner et al. The causal factor in behaviour, however, would no longer be primarily the environment but the function or generativity of the brain. Secondly, we could now look to improve ourselves by improving such functionalism or generativity. In the case of functionalism, that would mean improving the information processing which causes intelligence—and that may involve the change to a new and improved substrate. In the case of biological generativity, that would mean taking genetic and neurobiological adjustment much more seriously. Ironically, the reductionistic realization opens the potential for expansion of whatever to which consciousness is reduced.

With such assumptions from which to start, we could begin to plan for a social vision based on a verified reality. If we concluded that only a brain and nervous system can become more consciously intelligent, then we could close the decade of the brain with the apotheosis of the brain itself, and plan for ways to expand the potential of its biological processing. Education could now include biological improvements and direct attachments to more efficiently functioning technological substrates.

The question is, can either one of these positions—as defined by Penrose and excluding notions such as those of Edelman and Bickerton—account for conscious experience? Some researchers, like Dennett, would answer that they can indeed explain conscious experience but most admit the question of consciousness remains absurdly resistant to their methods.¹⁵

Have Penrose's *C* or Eccles' *D* discovered a reason or explanation for consciousness? Here all agree the answer is "no" or "not yet." Even if the "Eccles Gate"¹⁶ or the Penrose/Hameroff microtubule dimer¹⁷—where the proto-conscious quantum wave is said to collapse into measurable physical effects—were unequivocally dis-

covered, a reason or explanation of why quantum physics should produce awareness would still be forthcoming.

§4. Alternatives? This is not the place to develop a theory of consciousness which may be more amenable to the aims of education. However, some of the lacunae of Penrose's four alternatives may be noted and a few directions for further exploration can be suggested.

The question comes round again to the profound difference between the phenomena of the material world—or their functioning—and the phenomenology of conscious experience itself. Although functionalism and generation certainly explain many, perhaps most, aspects of consciousness, neither explains consciousness itself. All the mapping and testing the brain has undergone has revealed no specific location as the source of the conscious mental field. The immediate fact that consciousness exists in and of itself is so primary, so utterly of a different order than our consciousness of anything else that it is likely it will never be reductively explained by AI or neuroscience. All objective researches must deal with the epistemological problem that they are themselves products of conscious experience. To objectify a mind-independent reality, then to look for mind in that mind-independent reality, is a bizarre sort of logic to say the least.

This is the point of philosopher David Chalmers' much ballyhooed recent distinction between the "easy problems" and the "hard problem" of consciousness.¹⁸ The easy problems include explaining all the attributes and data of consciousness. "The really hard problem of consciousness is the problem of *experience*."¹⁹ This difference was adroitly noted as far back as 1879 when psycho-neurologist John Tyndall conceptualized the impossible rift:

The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. Granted that a definite thought and a definite molecular action in the brain occur simultaneously; we do not possess the in-

tellectual organ, nor apparently any rudiment of the organ, which would enable us to pass, by a process of reasoning, from one to the other.²⁰

In all fairness, it should be noted that many hard scientists scoff at what they see as desperate equivocation on the part of those “mystics” who refuse to view themselves objectively. Subjective consciousness is just another objective fact to them and, as such, needs to be studied, classified, and dissected objectively. A common response to the hard problem by researchers is to dismiss it by claiming that consciousness is no more startling an attribute of the brain than wetness is of water. Just as hydrogen and oxygen combine to produce the unexpected quality of wetness, so brain molecules work together to produce the unexpected quality of consciousness. A little reflection, however, will reveal that consciousness is of a qualitatively different order than wetness: It is not objective in any way whatsoever until we objectify it conceptually.

The sciences of consciousness are being forced to reconsider the introspectionism that has virtually disappeared since William James. It seems Searle with his inner quality of “understanding,” Penrose with non-computable “comprehension,” and Chalmers with the “hard problem” have just rediscovered philosophical phenomenology! Phenomenology in general takes for granted that conscious experience can only be explored experientially. To discover its origins, something more than a search for location in a function or area of the brain is clearly required. Phenomenology understands that both subjectivity *and* objectivity are early discriminations made within a primary undiscriminated, unstructured matrix of awareness without experience. Such a negative concept—negative because it contains all dualities and thus cannot be defined or categorized—was called the *apeiron* (meaning “without boundaries” or “beyond experience”)²¹ by Pythagoras and Anaximander, the *pleroma* by alchemists, and *nonbeing* by Martin Heidegger. Experience of something can only begin with the first limitations placed upon such a matrix. Individually, we experience such limitations immediately upon finding our-

selves “thrown into” physical and cultural contexts from the moment of our birth.

Phenomenologists have pointed out the epistemological impossibility of attempting to explain conscious experience through products of that conscious experience. All thought—all the reality we know, in fact—exists within contexts we have re-cognized and imagined through experience, beginning with extension into three-dimensional space and linear time. This is not to indicate any conscious constructors of conscious experience. Far from it. But experience *of* something can only begin with contextualizations of that experience. And our first context of embodied experience is that of our own bodies. Israel Rosenfield (and other scientists) have stated that identity itself begins when we sense ourselves embodied, sense which parts of the world are ours to control. This proprioception *takes place* before the acquisition of language or even the re-cognition of others. Rosenfield theorizes that perception “is always from a particular point of view, and is only possible when the brain creates a body-image, a self, as a frame of reference.”²² It may be wondered what creates the image of the brain.

The brain itself, it appears, is just the immediate physiological context—and limitation—of experience from an infinite possibility of contexts within space and time. How can such a source for consciousness in unstructured experience ever be reduced to functions or locations in the brain alone? It appears likely that it cannot. None of the neuroscientific research has given any indication of “doorways” from nondifferentiated experience the —*apeiron*— to conscious experience of the world. As indicated, Penrose, Eccles, and others feel such doorways may have been located through the quantum. Still others—Karl Pribram in particular²³—have held out for a neuroscience which reveals that the brain functions wholistically and holonomically.²⁴ Though changes in various individual neurons can be observed to happen as a result of learning, the “information” that is learned does not subsequently exist as “bits of data” recorded in these neurons (the computer paradigm). Rather the memories of the

learning exist as fluctuating dynamic patterns of electrical activity generated by the *entire brain*. Stephen Rose²⁵ would say the *entire organism*. Such fluctuating dynamic patterns of the entire brain strongly suggest holonomic principles.

Still it may be wondered how such holonomic patterns could have any effect on our experiencing of what seems to be a pre-established, pre-experiential world. This is not the place to delve into the further reaches of schema theory or the unconscious processing of habit routines. It may be enough to point out that such notions as the “flow of information” in the brain give an imperfect picture of the brain’s complex functioning. In the visual cycle, for example: If the retina of the eye sends its “visual data” to the thalamus (which has been likened to a relay station for sensory data), which then sends this signal to the primary visual cortex for the first stages in the of visual information, why should the primary visual cortex send a nerve pathway directly back to the same area of the thalamus from which it has just received the data? The backprojection is not insignificant: Recent findings²⁶ indicate in the case of vision that there are *ten times* as many nerve fibers in the “backwards” direction as in the direction in which information is supposed to flow. This indicates the possibility that *the world seen or experienced is as much a product of whole brain projecting as it is from purely outside-in receiving*. The body itself is seen here as the primary context of experience and—through the body—the world we are “thrown into” and create becomes the secondary context.

Instead of being reduced to a point of origin less than itself, the origin of conscious experience is here understood to derive from a larger unbounded *apeiron* or essence. But this sort of panpsychism is more akin to awareness or aliveness than to human consciousness per se. If Chalmers’ hard problem seeks the origin of such awareness/aliveness, he seems more to be asking the Heideggerian question of being: “Why is there anything at all, rather than nothing?”²⁷—a hard problem indeed! Human consciousness in the self-contained manner we ourselves experience it seems to require more

contextualization than brain or world can provide. It requires the mythic perimeters and symbolic interaction of culture.

Such an approach suggests an alternative to a functionalist or generative reductive explanation of human consciousness. It also narrows the field from the universal consciousness suggested by panpsychism. Some may wonder what else could cause conscious awareness other than either the brain or its functions. C. S. Peirce (and, for that matter, Karl Marx) suggested that consciousness is not an epiphenomenon of the phenomenal brain, but is, instead, the internalization of culture. Consciousness as we know it only came to be when language awoke in us an inner world of representation.²⁸ This is to say that consciousness is not primarily subjective but intersubjective. As suggested earlier by Bickerton, it arises through the active process of cultural interchange we know generically as language. Consciousness is each other.

The processes of human subjective construction and world objective construction from culture and language are well-documented. This is the definitive context of consciousness. We find ourselves thrown also into an intersubjective world of cultural determinants whose very language allows us to objectify our subjective experience. This allows us to imagine experience as “in here” and a product of the very processes we experience as perceptions. We can then proceed to isolate “human conscious experience” and seek out its cause in function or generation. Such an objective reduction only seems possible as the result of a previous reduction of contexts: *apeiron*, body, world, culture. Unfortunately, we can neither prove a “pan-experientialist” *apeiron* nor disprove it objectively; only raw experience can reveal it. In fact, awareness-in-itself only discovers its objects *through* conscious entities. In this view, the brain is more like what William James called “a reducing valve”²⁹ than the ultimate Creator of awareness. Here, El Cerebro is just a combination scribe and errand boy (but one absolutely essential to the existence of information—and one which responds to it accordingly).

Even if the universe had the quality of proto-consciousness or primal awareness, it would be aware *of* nothing until objects were created which could reflect back its awareness onto itself. The same applies to individuals. Unless we can relate to others early in our lives who reflect back to us the objective fact of our own existence we will never become conscious of that existence as an objective fact. We would exist but we would not *know* we exist. In this sense, we would be experiencing but unconscious—aware but not aware of it: *proto-conscious*.

§5. Conclusions. Through a phenomenology of first-person experience which refuses to be reduced to what Dennett has called “third-person absolutism,”³⁰ I have intimated the possibility of the origin of consciousness in a universe with what Einstein called “inner illumination.”³¹ Secondly, I have taken the ideas of Edelman to show how complex experience may alter and overlap synaptic connections in his theory of Neural Darwinism to focus this illumination into consciousness. Thirdly, I employed Bickerton to proclaim that language has irrevocably contributed to the evolution of a unique human brain in which cultural experience and cerebral potential are dynamically intermingled. Fourthly, I skimmed the brain’s imputed holonomic capacity to suggest how it might be physically possible for human worlds of representation and meaning-making to exist as our lived reality. Lastly, I have attempted to point out that our conscious lived reality is ultimately cultural, intersubjective, and creative. The role of experiential education now becomes seen as a fundamental human need.

However, one only has to look at the most recent slew of education articles to see that the worldview of the educational project is slowly being overwhelmed by the proofs and assumptions of hard science. Perhaps it has always seemed this way. My concern is that, with the move to reductively “explain away” consciousness, educators are having a harder time justifying the traditional expressive, contemplative, or experiential emphases of literature, creative writing, social studies, dramatic arts, visual arts, and music. This applies

just as seriously to such endeavours in higher education as curriculum theory, educational philosophy, cultural studies, and all foundational discussions of particular subject areas. Combined with the conservative retrenchment and the push to make schools save the economy, the reduction of consciousness threatens to compel education to a mere functionalism. This suggests a political position in which cultural phenomena are also reduced to functional or biological epiphenomena and all the dystopian fears of science fiction writers become realized.

It seems clear—at this point at any rate—that the language of objective reductionism is completely insufficient for describing the experience of consciousness. Consciousness itself can be understood as ultimately unexplainable because of the epistemological difficulty of explaining experience through an object created through that experience. Our language struggles to exceed itself. Even hard scientist Crick understands that awareness must compare and differentiate to express itself: “The implication is that we can never explain to other people the nature of any conscious experience, only its relation to other ones.”³² Meaning is never reductive or isolated. Consciousness itself is also understood as not being totally reducible to each subject because of the linguistic intersubjectivity which creates its particular manifestation in each of us as cultural beings. We will continue to understand the world through the cultural microcosm into which we’ve found ourselves thrown, although we will also continue to discuss the possibility of nonobjective experience and illuminated awareness.

Education is primarily a cultural phenomenon and since we seem to be both products and creators of culture we need to continue to question and evoke its meaning. At this point we continue to call ourselves a democracy and, as such, the truths by which we live can only be derived through intersubjective participation and personal response. The insights of science can never be ignored, of course, but as long as education takes the experience of life as seriously—and as foolishly—as it takes its explanation, the arts, humanities, and

educational studies should feel secure from incursions from the far shore. Unless our responses can be reduced to computable functions or organic epiphenomena, we will need to continue to interact freely and equally, to explore intelligently the mystery of being, and to perform our existences under the cloud of absolute unknowing. Fools must be subversive, for their onrushing experience refuses to be enclosed in the stasis of totalized reductive explanation. And we can only hope that the wisdom of such “fools” continues to be promoted through educational action.

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ENDNOTES

1. Francis H. C. Crick. *The Astonishing Hypothesis: The Scientific Search for the Soul*. London: Simon & Schuster, 1994, p. 3.
2. David Kennedy, “Child and Fool in the Western Wisdom Tradition.” *Thinking, The Journal of Philosophy for Children 11* (1). 11-21, p. 17.
3. For example: Eric Jensen. *The Brain Store*. Flyer advertising conferences, workshops, inservices, videotapes, audiotapes, posters, books, and kits. Del Mar, CA: Turning Point, Inc., 1997. Jensen sends these pamphlets out yearly. He is but one of many brain-hucksters to educators. Various Accelerated Learning programs do much the same. A more impressive example of academically applied brain research is: Robert Sylwester, *A Celebration of Neurons: An Educator's Guide to the Human Brain*. Alexandria, VA: ASCD Books, 1995.
4. The term is from David Bohm. *Wholeness and the Implicate Order*. London: Routledge & Kegan Paul, 1980.
5. See Amit Goswami, with Richard Reed & Maggie Goswami. *The Self Aware Universe: How Consciousness Creates the Material World*. New York: Putnam, 1994.
6. Roger Penrose, *Shadows of the Mind: A Search for the Missing Science of Consciousness*. Oxford University Press, 1994, p. 12.
7. Daniel C. Dennett. *Consciousness Explained*. Boston: Little, Brown & Co., 1991.
8. Last year, after an initial loss, world chess champion Gary Kasparov defeated IBM's Deep Blue, the most powerful computer chess *network* ever assembled, programmed by masters.

9. John Searle. *The Rediscovery of the Mind*. Cambridge: MIT Press, 1992.
10. Gerald M. Edelman. *The Remembered Present: A Biological Theory of Consciousness*. New York: Basic Books, 1989. Gerald M. Edelman. *Bright Air, Brilliant fire: On the Matter of Mind*. New York: Basic Books, 1992.
11. Derek Bickerton. *Language and Species*. University of Chicago Press, 1990. Derek Bickerton. *Language and Human Behavior*. Seattle: University of Washington Press, 1995.
12. Stuart Hameroff & Roger Penrose. "Conscious Events as Orchestrated Space-Time Selections." *Journal of Consciousness Studies* 3 (1). 1996: 36-53. (Must be read to be properly understood, and even then there's some uncertainty.) A less radical overview is Mari Jibu & Kunio Yasue. *Quantum Brain Dynamics and Consciousness: An Introduction*. Amsterdam/Philadelphia: John Benjamins, 1995.
13. The term "spooky" for anything non-material derives from Patricia S. Churchland. *Neurophilosophy*. Cambridge: MIT Press, 1986.
14. See: John C. Eccles. *Evolution of the Brain: Creation of the Self*. New York: Routledge 1989. John C. Eccles. *How the Self Controls Its Brain*. Berlin: Springer Verlag, 1994.
15. At a recent conference—"Tucson II: Toward a Science of Consciousness" (April 8-13, 1996, Tucson, Arizona)—an international panel of noted worthies from consciousness studies all agreed that no science or theory has yet explained the mystery of consciousness—with the sole exception of Dan Dennett.
16. Eccles and his associate Friedreich Beck (e.g., Beck & Eccles. "Quantum Aspects of Brain Activity and the Role of Consciousness." *Proc. Natl. Acad. Sci. USA* 89. December, 1992. 11357-11361) have done intensive research which suggests there is a "gate" which brings about the collapse of nonlocal wave fluctuations of the quantum continuum to create the classically measurable particles of normal, material physics. The collapse is equated with mental decisions (at either the conscious or unconscious levels).
17. Hameroff & Penrose, previously cited.
18. David J. Chalmers. "The Puzzle of Conscious Experience." *Scientific American*. December, 1995: 80-86. David J. Chalmers. "Explaining Consciousness: The 'Hard Problem'." *Journal of Consciousness Studies* 2 (3). 1995: 200-219. David J. Chalmers. *The Conscious Mind: In Search of a Fundamental Theory*. Oxford University Press, 1996.
19. Chalmers, 1995, previously cited, p. 201.

20. John Tyndall. *Fragments of Science: A Series of Detached Essays. Addresses and Reviews*. London: Longmans, 1879. Cited in William Seager. "Consciousness, Information and Panpsychism." *Journal of Consciousness Studies* 2 (3). 1995: 272-288, p. 272.
21. W. K. C. Guthrie. *The Greek Philosophers: From Thales to Aristotle*. New York: Harper Torchbooks, 1950.
22. Israel Rosenfield. *The Strange, Familiar, and Forgotten: An Anatomy of Consciousness*. New York: Vintage Books, 1993, p. 8.
23. Karl H. Pribram. *Languages of the Brain*. New York: Brandon House, 1971 (reissued, 1988). Karl H. Pribram. *Brain and Perception: Holonomy and Structure in Figural Processing*. Lawrence Erlbaum Associates, 1991. Pribram originally conceived of the holographic mind after a suggestion by his mentor, Karl Lashley, in 1942. Mainstream neuroscientists dismiss Pribram, but few appear to have actually studied the research.
24. "Holonomic" is used to indicate a three-dimensional *process*, as differentiated from the static three-dimensional imagery indicated by "holographic." The term was first used by George Leonard in *The Silent Pulse*. New York: Dutton, 1978.
25. Stephen Rose. *The Making of Memory*. London: Bantam Press, 1992.
26. Rose, previously cited.
27. Martin Heidegger. *An Introduction to Metaphysics*. Yale University Press, 1987. Original 1959, p. 1.
28. According to neurobiologist Walter Freeman, the patterns of neural activity we experience are not even representations of the world. To this we must add memory: "That pattern does not 'represent' the stimulus. It constitutes the meaning of the stimulus for the person receiving it. The meaning is different for each person, because it depends on the past experience of the person." In "Happiness Doesn't Come in Bottles." *Journal of Consciousness Studies* 4 (1). 1997: 6770, p. 69.
29. William James. *The Varieties of Religious Experience: A Study in Human Nature*. New York: The Modern Library, 1902.
30. Dennett, previously cited.
31. From a conversation with Einstein reported by Herbert Feigl. *The "Mental" and the "Physical"*. Minneapolis: University of Minnesota Press, 1967 p. 138.
32. Francis H. C. Crick & Christof Koch. "Why Neuroscience May Be Able to Explain Consciousness." *Scientific American*. December, 1995: 84-85, p. 85.