

The Scientific Exploration Of Consciousness: Towards An Adequate Epistemology

Willis Harman

The statement below is an outgrowth of a retreat at Tomales Bay, California, December 3–6, 1992, at which fifteen scientists and philosophers attempted to explore the question of an appropriate epistemology for consciousness research. Contributions were made by the scholars listed below and others; the final synthesis was performed by Willis Harman. The statement is submitted to the broader scientific community, and to the concerned public, to stimulate dialogue about a long-standing question, and to foster interest in an ever-deepening scientific study of human consciousness. Basically, the question is: How does it happen that our powerful methods of scientific enquiry appear so ill-suited to the study of consciousness? If understanding our own consciousness is so central to understanding anything else, will we not have to take this question more seriously than has been the case so far?

The scientific exploration of phenomena and experience relating to consciousness¹ has long been hampered by two obstacles. One is that subjective experience does not meet the commonly accepted criteria for data in a scientific analysis, in that it is not public, objective, and replicable. The other is that many consciousness-related phenomena do not appear to fit comfortably into the accepted scientific worldview. For instance, the common-sense assumption that conscious volition is causal — that my desire can cause things to happen — conflicts with the assumption of mainstream science that the universe operates according to causal laws which can be objectively known.

Most scientists have improvised ways of dealing with these two obstacles, so that for much of practical science they don't get in the way. For example, research on the effectiveness of analgesics, such as aspirin, goes on in spite of the fact that pain is basically a subjective experience; similarly, effective research has been accomplished on topics like imagery, emotions, dreams, etc. which depend for data on subjective self-reports. The conscious will of the experimenter would seem at one level to be a causal factor in the findings, in that he/she devises the experiment; nevertheless most scientists share

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¹ We are here using the word “consciousness” to connote the totality of conscious and potentially conscious states of mind, not in the limited sense of “conscious awareness” only. It is meant to include awareness, creative, and volitional aspects of mind, among others. This usage of the word consciousness has been adopted here because it seems in recent years to have become prevalent in popular discourse and because we desire a certain openness to what is being referred to.

a deep faith that volition can, in principle, be explained in terms of scientific laws, implying determinism (at least in a statistical or quantum-mechanical sense). “Paranormal” or anomalous phenomena, in which consciousness-related events appear to contradict both scientific and conventional pictures of reality, are typically explained away on the basis of non-replicability, assumed faulty observation, possible collusion or fraud.

Nevertheless, the situation can hardly be considered satisfactory. “Downward causation,” causation-from-consciousness, is for the most part considered unacceptable as a scientific concept in spite of the fact that it is one of the most impressive facts in our practical experience. Psychic phenomena, near-death experiences and insights of a spiritual or mystical nature have the power to change a person’s life; yet they tend to be explained away or otherwise disposed of when serious scientific investigation is proposed. The attention medical researchers give to the role of unconscious processes in placebo effects, psychoneuroimmunology, or spontaneous remission of life-threatening illness is curiously meagre considering how importantly medical practice might be affected by their thorough understanding.

Two concepts have recently come to light which may help liberate us from this predicament — one new (or at least newly formulated), the other revived from the respected writings of American philosopher William James. The first involves a different model of perception; the second a different criterion for admission of scientific data.

Re-perceiving Perceiving

Consider the conventional model of perception of an object *O* by a subject *S*, as viewed from the standpoint of an external observer *E*. From *E*’s perspective, the object (the stimulus) and *S*’s responses to it (verbal, behavioural, physiological) are public, objective, and observable; *S*’s experience is private and subjective. Thus scientific investigation of the object and the physical phenomena involved in perception (*S*’s neurophysiology) are straightforward. However, scientific research on *S*’s experience is held to be difficult and questionable.²

In a recent paper, Max Velmans³ claims this apparent problem is simply the result of a confusion. In fact, *E*’s perception (despite his scientific training) is no less subjective than *S*’s. Research on spatial localization in various sense modalities, perceptual illusions, and “virtual reality” has demonstrated that the world as experienced (the phenomenal world) is a projection based on clues from “out there.” Representations of external events are actually formed within the subject’s mind, but the mind models the

² The effect of *S*’s perception on the behavior or state of *O* is even more problematic. This point, as well as many of the other points made in this document, are discussed elegantly and more thoroughly in Robert Jahn and Brenda Dunne, *Margins of Reality: The Role of Consciousness in the Physical World* (New York: Harcourt Brace Jovanovich, 1987).

³ This discussion is based on Max Velmans, “Consciousness, brain and the physical world,” *Philosophical Psychology*, 3 (1990); pp. 77–99. His concepts are further developed in “A reflexive science of consciousness,” in *Experimental and Theoretical Studies of Consciousness*, Ciba Foundation Symposium No. 174 (Chichester: Wiley, 1993).

world by projecting experiences to the judged location of the events they represent. With this “reflexive” model of perception, the phenomenal world is *part of* consciousness; it cannot be thought of as *separate* from consciousness. Furthermore, the phenomenal world is only a representation; it cannot be the “thing itself.”

Standard science assumes that the things it studies are perceptually public. The reflexive model reminds us that the individual’s phenomenal world is *private* to each human being. In this model each observation results from the interaction of the observer with the observed; each observation is observer-dependent and unique. If the observation is sufficiently repeatable, intersubjectivity can be established by agreement. (E.g., scientists experience no difficulty in agreeing upon the characteristics of a rainbow, despite the fact that every observer sees a different rainbow, formed by a different set of raindrops. Similarly, it is easily established that persons who have gazed for a period at a red circle tend to see a green circle after-image.) Intersubjective agreement requires merely that their experiences are sufficiently similar to be taken for “tokens” of the same “type.”

Within this model, the phenomena we call “physical” are just a subset of the things we experience. The traditional gulf between first-person and third-person perspectives is narrowed — it is merely the shift of focus of interest from being interested in one’s own experience to being interested in the nature of what is observed. The third-person perspective has dominated reductionist science; this in effect *denies* the legitimacy of S’s experience while *asserting* the legitimacy of E’s experience of S. In the reflexive model the experiences of S and E are equally legitimate. If S’s experiences are to form a database for science, they merely need to be potentially sharable, intersubjectively validated, and in some sense repeatable.

Thus we see that “objective” data and “subjective” experience are not as different as ordinarily assumed. They can be handled in very similar ways. Observed phenomena in natural science are:

- public in the sense that they are “private experiences shared”;
- intersubjectively shared rather than “objective”; and
- repeatable in the sense that successive instances are sufficiently similar to be taken for “tokens of the same type.”

These same criteria can be applied equally well to observations of an external object or to subjective experiences such as dreams, waking mental images, emotions, or apparent perceptions of UFOs or ghosts.

These last two examples remind us that we still have a problem with reports of phenomena that don’t fit with the accepted picture of reality. This second obstacle, which relates to the intractability of the “mind-body problem” and paranormal phenomena, is the subject of a long-neglected contribution by the American philosopher William James.

The “Radical Empiricism” of William James⁴

James’ work has been honoured by intellectual historians, but little noted by empirical scientists. In James’ view, every explanation about reality is undergirded by a metaphysical system, whether overtly stated or simply implied. In his concept of “radical empiricism,” he proposes to substitute for the prevailing metaphysic of physicalism “a metaphysics of experience.” In so doing, he aims at defining an appropriate epistemology for research on human consciousness.

James’ radical empiricism admits data from the senses, and thus includes within its purview the experience of the physical world. But it also encompasses the broad spectrum of inner realities found within the subjective life of the person. In his *Essays in Radical Empiricism* James defines his term thus: “To be radical, an empiricism must neither admit into its constructions any element that is not directly experienced, nor exclude from them any element that is directly experienced.” Nothing within the totality of human experience is excluded from being a potential topic of scientific investigation; although of course, not all claims may be ultimately verified. How widely James meant this to be applied is indicated by the fact that he was involved for 25 years with exploration of psychic phenomena, spiritism, and religious experience. He did not buy into the doctrines of enthusiasts in these areas, but he insisted that the experiences are appropriate data for a complete science.

In James’ view, experiences, ideas, and consequences all contribute to the emerging understanding which comprises science. One person’s phenomenological descriptions may differ from another, so consensus is always partial. Science’s accounting of nature is always incomplete and tentative; scientific models and theories only tell a partial story.

James’ arguments were not persuasive enough to stand up against the enormously successful results of the positivistic mind-set of the first half of this century. He died in 1910 before he could articulate the details of his metaphysical system, and few other scientists took up the same concern. However, his arguments may fall on more receptive minds these days, when the shortcomings of a strictly positivistic view are more apparent.

The epistemology of radical empiricism has important implications for science, especially with regard to the problem of consciousness. As James argued, science and the systems of mathematical laws that allegedly govern causality can hardly have an existence independent of the human mind. Thus it is a *fundamental illusion to think that we can know about the world of matter with a system of science which essentially omits, and seems even to deny, consciousness*. When the conscious awareness of the scientist is conditioned by training to look outward only, the present form of science may seem to offer a reasonable worldview. But when consciousness turns back upon itself and attention turns inward, not only is another realm of experience added to the picture, but a new order

⁴ William James, *Essays in Radical Empiricism* (New York: Longman, Green and Co., 1912). This discussion is based on Eugene Taylor, “Radical Empiricism and the Conduct of Research” in *The Metaphysical Foundations of Modern Science*, ed. Willis Harman with Jane Clark (Sausalito, California: Institute of Noetic Sciences, 1993).

to external reality may be seen. The observer is changed in the process; never again can certainty be placed in the articulation of absolute laws that leave this factor of consciousness disregarded.

New Promise for the Exploration of Consciousness

With these two concepts — (a) recognizing the uniform way of dealing with all experience/ data, whether it be “objective” or “subjective,” and (b) the criterion of “radical empiricism” to govern the data admitted — the main obstacles to a comprehensive exploration of consciousness would appear to have been removed. *The fundamental reason conventional science has been so minimally effective in increasing our understanding of consciousness is that the epistemology of physics, molecular biology, and neuroscience is not suited to the area of consciousness; a new scientific epistemology is needed.*⁵ Cognitive science has thus far been limited in its achievements because it has failed to come to grips with this need.

Objectivity in consciousness research

Traditional science embraces an epistemology which argues that reality can be *confirmed* by matching our inner and outer worlds. That is to say, if the theoretical mental construction accurately describes and predicts the perceived outer world, and no instances can be found which falsify that construction, it is assumed to confirm that the constructed picture of reality is correct. However, to explore the experience and phenomena of consciousness, it is necessary to have an epistemology which takes the personal characteristics of the observer into account.

Modern science has, in the main, attempted to control observer bias by excluding the observer. “Scientific findings” were claimed to be independent of the person who does the scientific work. If findings prove to be replicable, the scientific community concludes that they represent a *discovery* about reality rather than a construction by the observer. However, this term “finding” conceals a metaphysical assumption that things can be found which exist independently of observers. As discussed above, shared agreements among similarly trained observer-scientists may lead to pragmatically useful knowledge, but such agreements do not prove that their sense data are objective, in the sense of being observer-independent.

In considering what kinds of observations could or should be admitted as scientific data, considerable misunderstanding has resulted from the confusing of two meanings of the terms “objective” and “subjective.” One meaning of “objective” is in the sense of *unbiased*. The other meaning is in the sense of external to the person, as contrasted with “subjective” meaning *inner*. The epistemology we seek is “objective” in the first sense, but includes the subjective in the second sense.

Velmans’ concept of experimenter’s and subject’s observations being of identical kind

⁵ It is relevant here that certain physicists have argued that the epistemology of quantum physics is consistent with an idealist philosophy, in which consciousness is held to be, in some sense, prior to the physical world. See, in particular, Amit Goswami, *The Self-Aware Universe* (Putnam, 1993) and Nick Herbert, *Elemental Mind* (D.P. Dutton, 1993).

implies an issue of the degree to which research must be participative. If both “experimenter” and “subject” as described above are in the same position with regard to data — namely that they can only offer up their own private experiencing of their phenomenal worlds, then in any research effort they are collaborators at the same level. In an exploration of consciousness, the persons contributing reports of their experience are partners in every way with the scientific investigator. If they are so considered, this directly challenges the power of the “experimenter” to manipulate or deliberately deceive the “subject,” and it also challenges the validity of the conclusions drawn under conditions of manipulation or deception — including a good proportion of the findings in the social sciences. This issue of the relative powers of the scientific investigator and persons whose experiences may be under scrutiny, is much discussed in the literature on “qualitative methodology” in the social sciences.

This point should not be misunderstood to equate the observation of a naïve bystander with that of a highly trained scientist — which Michael Polanyi⁶ has written about using terms like “art” and “connoisseurship.” But the difference is a subtle one. We are only recently recognizing the special understanding of nature found with what we once called “primitive” peoples or “savages.” Scientists have been slow to recognize the possibility that mystics and trained observers in other cultures such as the Tibetan, which focus more on inner realms of experience, might be capable of observations which are as foreign to Western scientists as the latter’s trained observations are to the man in the street.

The unconscious mind in science construction

The above implies an intrinsic dilemma with regard to the epistemology of science which is too little noted. In order to have confidence in the scientific view of reality, we have to answer the epistemological question: How do we know that which we believe we know? To answer that, the mind needs to step outside itself, and observe itself at work. Our view of any part or aspect of reality comes inevitably from an interaction between what is “out there” and the mental processes through which we arrived at the view we have. However, to know about those processes we need a prior scientific study of the mind, for which we need a scientific epistemology — which leads us back to the initial question.

This circularity implies that even if the results of generations of scientific inquiry appear to converge toward a particular picture of reality, a profound caution is advisable regarding how much faith is put in that picture. (This point has been made in another way by Thomas Kuhn.)⁷ In any case, this dilemma suggests that as we search for the appropriate epistemology for a comprehensive science, we need to pay particular attention to what is known about unconscious mental processes.

Research on perception, hypnosis, repression, selective attention, mental imagery, sleep and dreams, memory and memory retrieval, acculturation, etc. suggests that the

⁶ Michael Polanyi, *Personal Knowledge* (Chicago: University of Chicago Press, 1958).

⁷ Thomas Kuhn, *The Structure of Scientific Revolutions*, 2nd ed. (Chicago: University of Chicago Press, 1970).

influence of the unconscious on how we experience ourselves and our environment may be far greater than is typically taken into account. Science itself has never been thoroughly re-assessed in the light of this recently discovered pervasive influence of the unconscious.

The unconscious enters importantly into the construction of science in at least two ways:

- the creative/intuitive mind (an aspect of the unconscious) is intimately involved with all the important conceptual advances in science; and
- the contents and processes of the unconscious influence (individually and collectively) perceptions, “rational thinking,” openness to challenging evidence, ability to contemplate alternative conceptual frameworks and metaphors, scientific interests and disinterests, scientific judgment — all to an indeterminate extent. (Placebo and experimenter effects are two familiar examples.)

What is implied, is that we must accept the presence of unconscious processes and contents, not as a minor perturbation, but as *a potentially major factor in the construction of any society’s construction of its particular form of science*. (This consideration opens up the possibility that even logically constructing a science from a rational epistemology may itself be a culturally-biased approach.)

Some precedent exists for taking into account unconscious processes and contents in the training of the researcher. In training to be a psychotherapist, the individual has to go through inner explorations similar to those anticipated in his/her future clients; with these experiences comes learning, and personal change. Similarly, in training to be a cultural anthropologist, the person must learn to experience being of another culture; this too brings personal change. In training for the bench, the future judge — at least ideally — goes through self-examination to uncover personality characteristics which could cause one to be unconsciously biased. In general, learning to be a faithful observer implies inner change — possibly profound inner change. The scientist who would explore the topic of consciousness (in the broad sense we are considering here) must be *willing to risk being transformed* in the process of exploration.

Aiming at a broad scope of enquiry

A word must be said about the tactic which we have discarded, namely that of limiting preliminary enquiry to common everyday consciousness, avoiding areas where the reports and the data are problematical, as for example, profound meditative insight or investigation of the paranormal. Would this not be in accord with much of the history of science, where preliminary enquiry has often and profitably been restricted to simple and limited cases?

We are advising the opposite, namely to seek an epistemology suitable for exploring even questionable areas of human experience. One justification for this comes from an analogy with the origin of the evolutionary hypothesis. There was much to be learned from studying separately the great variety of micro-organisms, plants, and animals with which the planet is populated. But Charles Darwin boldly turned his attention to the synthesizing question: How can we understand *all of these together*? The result was

the concept of evolution, around which practically all of biology is now organized.

That same kind of question is appropriate here. Much can be learned from research on accepted phenomena, and it may seem harmless to ignore or leave to others the study of lesser-recognized (but still persistently reappearing) reports of seemingly anomalous experiences and phenomena. Many of these have a face validity stemming from the fact that they have been reported across cultures, and down through the centuries. However important insight may be gained from asking: What sorts of conceptual frameworks and organizing metaphors can be used to help us understand *all of these together?*

A more careful definition of the present endeavour

The philosophically sophisticated reader will have detected a contradiction in what has already been said. We claim to be seeking an epistemology for the study of consciousness. Since all of our experience is in consciousness, that leaves nothing out. Thus in fact we cannot distance ourselves from the most fundamental question of all — the basic epistemological question of how we know anything. Since many generations of philosophers have been unable to agree on the answer to that question, it might seem unlikely that we would succeed where they have failed.

However, our goal is a more modest one. Science has an accepted epistemology, which has proven inadequate for dealing with various aspects of “ordinary” experience including conscious awareness, intuition, creativity, attention, intention and volition, as well as a wide range of “anomalous” experiences. We seek, not the ultimate epistemology, but an intermediate one, a provisional one — one which will extend the present form of science to include that which it has so far excluded. As we learn more, and as scientists become more adept at exploring the vast realms of inner experience, it may well be that this epistemology will itself have to be set aside in favour of a still more adequate one.

The intrinsic dilemma of science was identified above: in order to have confidence in the scientific view of reality, we need an adequate epistemology. But that implies a prior understanding of the mental processes underlying observation, and for that we already need the scientific epistemology. In our present endeavour we are attempting to break into this circle with a provisional answer to the epistemological question. If we can identify a provisional epistemology which avoids the known limitations of the epistemology presently guiding physics, molecular biology, and neuroscience, and which has the capability of furthering the exploration of consciousness, we may be able to give impetus to that research area. What is learned (including the further development of our “organs of perception” in the sense of Goethe and Rudolf Steiner⁸) may

⁸ For a good modern discussion of the approach to science recommended by Goethe and Steiner see Arthur G. Zajonc, “Facts as Theory: Aspects of Goethe’s Philosophy of Science,” *Teachers College Record*, 85 (1983), pp. 251–74. Steiner’s approach to science is laid out in the two books *Truth and Knowledge*, and *The Philosophy of Spiritual Activity*, originally published in German in 1894 (English translations published by Rudolf Steiner Publications, 5 Garber Hill, Blauvelt, NY 10913.)

result in the discovery that our provisional epistemology is also limited, so that it eventually must be displaced as well.

Present science constitutes a base camp, so to speak. It competently deals with a certain kind of knowledge — that which aims at prediction and control. However, modern society’s mistake was to believe that, with that base camp, the summit was in sight. We now see that a further advance camp — perhaps many — will be needed. Scouting parties have gone ahead, and we know something of what will be encountered. Two very different non-Western epistemologies — that of the inward-looking East and that of the indigenous peoples with their intimate relationship with nature — highlight areas of experience that only fit uneasily in the present scientific worldview, if at all. The enigmas of what the British called “psychical research” remain to be dealt with. Even though our knowledge from these advance scouts may be fragmentary, we get some clues regarding characteristics of the provisional epistemology.

There is a danger in this approach, to be sure. Just as today’s scientists allowed themselves to be deceived by the apparent successes of the objectivist-positivist-reductionist epistemology, so we could be deceived through our attempts to promote a provisional epistemology for consciousness research. What will save us from deception is continual reminding that (a) any science we can share through words, formulas, and images is at best models and metaphors representing certain aspects of experienced reality, and (b) that the best we can do now will undoubtedly seem inadequate as our “organs of perception” are enhanced through personal transformation.

Attributes of an Epistemology of Consciousness

With all of these considerations in mind, we can now propose a number of characteristics of the sought-for epistemology for conducting a comprehensive exploration of consciousness in the broadest sense:

1. The epistemology will be “*radically empirical*” (in William James’ sense) in that it will be *phenomenological* or experiential in a broad sense (that is, it will include subjective experience as primary data, rather than being essentially limited to physical-sense data) and it will address the totality of human experience (in other words, no reported phenomena will be written off because they “violate known scientific laws”). Thus, consciousness is not a “thing” to be studied by an observer who is somehow apart from it; consciousness involves the interaction of the observer and the observed, or if you like, the *experience* of observing.
2. It will aim at being *objective* in the sense of being open and free from hidden bias, while dealing with both “external” and “internal” experience as origins of data.
3. It will insist on *open enquiry* and *public (intersubjective) validation* of knowledge; at the same time, it will recognize that these goals may, at any given time, be met only incompletely, particularly when seeking knowledge that includes deeper understanding of inner experience.
4. It will place *emphasis upon the unity of experience*. It will thus be congenial to a holistic view in which the parts are understood through the whole, while not excluding a reductionist approach that seeks to understand the whole through the parts. Hence

it will recognize the importance of subjective and cultural meanings in all human experience, including experiences — such as some religious or interpersonal experiences — that seem particularly rich in meaning even though they may be ineffable. In a holistic view, such meaningful experiences will not be explained away by reducing them to combinations of simpler experiences or to physiological/biochemical events. Rather, in a holistic approach, the meanings of experiences may be understood by discovering their interconnections with other meaningful experiences.

5. It will recognize that science deals with *models and metaphors representing certain aspects of experienced reality*, and that any model or metaphor may be permissible if it is useful in helping to order knowledge, even though it may seem to conflict with another model which is also useful. (The classic example is the history of wave and particle models in physics.)
6. It will thus recognize *the partial nature of all scientific concepts of causality*. (For example, the “upward causation” of physiomotor action resulting from a brain state does not necessarily invalidate the “downward causation” implied in the subjective feeling of volition.) In other words, it will implicitly question the assumption that a nomothetic science — one characterized by inviolable “scientific laws” — can in the end adequately deal with causality.
7. It will be *participatory* in recognizing that understanding comes, not alone from being detached, objective, analytical, coldly clinical, but also from cooperating with or identifying with the observed and experiencing it subjectively. This implies a real partnership between the researcher and the phenomenon, individual, or culture being researched; an attitude of “exploring together” and sharing understandings.
8. It will involve recognition of the inescapable role of *the personal characteristics of the observer*, including the processes and contents of the unconscious mind. The corollary follows, that to be a competent investigator, the researcher must be *willing to risk being profoundly changed* through the process of exploration.
9. Because of this potential transformation of observers, an epistemology which is accepted now may in time have to be replaced by another, more satisfactory by new criteria, for which it has laid the intellectual and experiential foundations.

Which worldview? — a crucial question

The question of what worldview is fit to guide personal and societal decisions may well be the most critical question of our generation. What is really at issue here is the modern mind and its creations — from microchips and biotechnology to sophisticated weapons and increasingly menacing global problems. Thus this is a matter deserving the attention of the thinking public as well as the scientist. The scientific exploration of consciousness bears directly on this question. In the exploration of the farther reaches of human consciousness we may at long last resolve the tension between the two kinds of competing worldview in modern society — the scientific worldview which prevails in our powerful institutions, and the humanistic spiritual outlook by which we guide our daily lives. Up to now, research in the consciousness area has been hampered by

failure to agree on a suitable epistemology. It is now time for this issue to assume a central position in the dialogue in and about science.

Partial list of endorsing scholars (August 11, 1993):

Richard A. Blasband, M.D., *Research Director, Center for Functional Research*

Geoffrey F. Chew, Ph.D., *Professor Emeritus of Physics, Lawrence Berkeley Laboratory*

Eleanor Criswell, *Professor, Sonoma State University*

Arthur Deikman, M.D., *Author*

G. William Farthing, Ph.D., *Professor of Psychology, University of Maine*

Amit Goswami, Ph.D., *Professor of Physics, University of Oregon*

Nick Herbert, Ph.D., *Professor Emeritus of Physics & Engineering*

Robert G. Jahn, Ph.D., *Professor of Aerospace Sciences, Princeton University*

Brenda Dunne, M.A., *Manager, P.E.A.R. Laboratory, Princeton University*

Charles Laughlin, Ph.D., *Professor of Anthropology, Carleton University*

Ilja Maso, Ph.D., *Professor of Philosophy of Science, University for Humanistic Studies*

Howard C. Mel, Ph.D., *Professor of Biophysics Emeritus, UC, Berkeley*

Ralph Metzner, Ph.D., *Green Earth Foundation*

Beverly Rubik, Ph.D., *Director, Center for Frontier Sciences, Temple University*

Deane H. Shapiro, Jr., Ph.D., *Professor in Residence of Psychology, UC, Irvine*

Ian Stevenson, M.D., *Carlson Professor of Psychiatry, University of Virginia*

Charles Tart, Ph.D., *Professor of Psychology, University of California, Davis*

Francisco Varela, Ph.D., *Professor of Applied Epistemology, CREA, France*

George Weissmann, Ph.D., *Professor of Physics, University of California, Berkeley*