Journal of Scientific Exploration, Vol. 15, No. 4, pp. 443–457, 2001 0892-3310/01

The Challenge of Consciousness

ROBERT G. JAHN

Princeton Engineering Anomalies Research
Princeton University

Abstract—Attempts to include consciousness within an architecture of rigorous, quantitative science encounter several formidable difficulties, among them the elusiveness of its definition, the plethora of mental states that can prevail, the intrinsically subjective character of many forms of experience, the wide variance of individual responses to sensory stimuli, and the capacity for anomalous modes of information acquisition and generation. Nowhere are these characteristics more dramatically demonstrated than in research on mind/matter interactions and remote perception, from which have been compounded large bodies of empirical evidence, but little insight regarding viable theoretical models or profitable strategies for superior experiments. The purpose of this paper is to review some of that evidence, and to attempt to glean therefrom a productive model to guide future studies. The essence of this modular model is to set aside the common presumption that anomalous mind/matter effects are achieved by direct attention of the conscious mind to the observable physical processes addressed. Rather, an alternative is proposed wherein unconscious mind and intangible physical mechanisms are invoked to achieve anomalous acquisition of mental information about, or anomalous mental influence upon, otherwise inaccessible material processes. Implications for more effective experiments include subtler feedback schemes that facilitate submission of conscious intention to unconscious mental processing, physical target systems that provide a richness of intangible potentialities, operators who are amenable to such interactions, and an environmental ambience that supports the composite strategy. Theoretical requisites include better understanding of the information dialogue between conscious and unconscious aspects of mind, more pragmatic formulations of the relations between tangible and intangible physical processes, and, most importantly, cogent representation of the merging of mental and material dimensions into indistinguishability at their deepest levels.

Keywords: consciousness — consciousness-related anomalies — engineering anomalies — human/machine anomalies — mind/matter interactions — models of mind/matter interactions — remote perception — unconscious mental processing — intangible physical processes

I. Introduction

This essay is derived from an invited talk at the Society for Scientific Exploration (SSE) Annual Meeting of June, 2001, one purpose of which was to honor its retiring President, Peter Sturrock. In fact, it was Peter who suggested this title, by which I presumed he referred specifically to the "challenge" to es-

tablished science, *i.e.*, to the problems of accommodating the proactive capacities of human consciousness within rigorous, quantitative scientific methodology. There are indeed many such problems, none of which are readily resolvable:

Definition of the Term

First, there is the enduring fundamental problem of establishing a consensus definition of "consciousness" that is sufficiently firm to convey a scientific concept, yet sufficiently flexible to encompass all of its pertinent psychological, physiological, and physical dimensions. Two decades ago, the term consciousness rarely was invoked in any epistemological context; today it enjoys proliferate applications ranging from brain physiology and psychotherapeutic nomenclature on the one hand, to mystical practice and new-age jargon on the other. We have consciousness journals, professional societies, workshops, encounter groups, and television specials, in each context of which the term functions as a popular buzzword, yet remains only vaguely defined. If we are to undertake a serious science of consciousness, more specificity will be required.

One common quick response to this aspect of the "challenge" is simply to propose as a synonym the term "awareness," but this takes us little closer to any resolution. Awareness of what? Awareness of self? Of physical environment? Of other beings? Of cosmic harmony and purpose? I know that I am aware, and I presume that you are also. I believe that my dog is aware, and I notice that all of the "higher" animals act as if they are aware. But what about bacteria and mold spores, trees and rocks? Oceans and icebergs? Planets and stars? Each of these is bombarded with stimuli from its respective environment, and each reacts to them in its appropriate fashion. Are these legitimate forms of consciousness?

I once had the privilege of an interview with the Dalai Lama, during which I asked whether, from his perspective, the devices we employed in our human/machine anomalies experiments were conscious. After some reflection, he responded that if *we* regarded them as conscious, they were conscious. This somewhat enigmatic but probably profound criterion stimulated my subsequent rumination on the rampant anthropomorphism we practice on our childhood toys, our automobiles, and our computers, and led me to the radical proposition that all definable entities could be regarded as possessing some form of consciousness.

Beyond its ambiguity and vagueness, the concept of "awareness" also carries with it a connotation of passivity that falls short of capturing the full essence of a proactive consciousness as we shall need it for incorporation into scientific treatment. As Niels Bohr properly put it, "We are both actors and onlookers in the great drama of existence,"[1] and indeed our definition must carry a more dynamical spin. It must encompass not only what we experience, but what we do, what we say, what we believe, and what we wish. It must entail a purposefulness, and a drive toward that purpose.

"Awareness" also falls short of adequate accommodation of the vast realm of *unconscious* processes that automatically control most of our behavior and functioning, that prompt many of our conscious activities, and that protect us from experiential overloads and traumas. The life we live "out-of-awareness" is at least as crucial to our welfare and effectiveness as that playing on our conscious stage, and therefore must be adequately embraced within any comprehensive definition of consciousness. Indeed, the very term "consciousness" can be ambiguous in this regard. For our purposes, we must regard it to encompass all "unconscious" processes, as well.

Other synonyms may be proposed, but at the end of the day we may be forced to concede some intrinsic ineffability to the concept of consciousness, and take our place in the long line of philosophers, theologians, and mystics who over the ages have waffled in scholarly exasperation over essentially this same problem of specification, *e.g.*: "I Am That I Am"; "I think, therefore I am"; "The Tao that can be named is not the true Tao"; "If you have to ask the question, you cannot comprehend the answer"; *etc.*, *etc.* Consciousness would seem to emerge from this gauntlet of elusiveness as nothing more, but nothing less, than what we *are*, albeit in the particular environment in which we have that *being*. Can science handle such an elusive, intangible, enigmatic concept as one of its primary parameters? That indeed is a major portion of our challenge. But there is more—much more.

Subjectivity

A second aspect of the challenge is that consciousness, however defined, often operates in subjective dimensions, in contrast to modern analytical science for which objectivity is a sacred tenet. In addition to quantifiable objective measurables like distance, time, mass, and electric charge, consciousness persists in bringing to the party such subjective criteria as purpose, value, desire, and satisfaction. It imbues the proceedings with emotional evidence stemming from intuition, inspiration, aesthetics, anger, fear, desire, and various forms of respect and reverence. It is all very well for classical science to eschew any traffic in such spongy properties, but in so doing it surrenders at least one-half of its most rapidly expanding conceptual currency, namely, *information*. Unlike science's other staples of matter and energy, information percolates in our consciousness in both objective and subjective formats, as our hemispheric brain structure confirms even at its most materialistic level. The challenge here, therefore, is how to specify, how to quantify, how to do "information theory" on the universe of subjective properties, in complementary tandem with our objective analyses.

We have mused about this problem at some length in several earlier publications,[2–6] but adequate resolution is far from at hand. As one starting clue we might note that virtually every prevailing objective parameter of contemporary science can be traced, conceptually, epistemologically, and linguistically to some prior form of subjective human impression. For example, our quanti-

tative space/time metric is distilled from the intrinsic capacity of our consciousness to sense subjectively the degree of spatial and temporal separation between elements of our experience. Similarly, the concepts of mass and charge derive from our subjective sensitivities to degrees of heaviness, and to feelings of excitation, as mediated by our neurophysiological sensors. The task here will be to retrace those paths that lead to objective specifications of the corresponding physical properties, to re-generalize the definitions and possibly the criteria for their empirical measurement and quantification to accommodate subjective features.

Spectra of Individual Responses

With the admission of subjectivity into the scientific circumscription of consciousness comes the further complication that individual responses to given stimuli can vary extensively. One of the great benefits of conventional scientific objectivity is its corollary requisite that the outcome of any well-designed experiment should be independent of the individual performing it. Not so with the subjective side of the consciousness household. Each of us has his own forms and degrees of reactions to incoming stimuli, and while we might attempt to specify norms and variances for such distributions of reactions, even they would be extremely sensitive to the specific sample populations and the nature of the particular stimuli. Worse yet, even the individual reactions are not time-invariant, but can vary widely depending on the prevailing mood, the intensity of the stimulus, and a host of other pertinent subjective and environmental factors. In short, cause-and-effect in the subjective universe is a horrendously complex, non-linear, hyper-statistical business for which even the most sophisticated techniques of objective science are not yet well equipped.

Mind/Brain Dichotomy

Without doubt, the single most perplexing aspect of the challenge of consciousness is the deeply set, long-enduring issue of the relationship of the physical construction, states, and dynamical processes of the brain and its associated neurophysiological networks to the subjective experiences of the mind. The most extreme materialist or physicalist views hold that complete specification of the brain electrodynamics and biochemistry is tantamount to identification of the mental experiences. The most radical dualist perspectives insist that the Cartesian cut is impenetrable and the *res cogitans* by their nature do not submit to the mechanics of the *res extensa*. Between these epistemological poles have arisen all manner of hybrid models that attempt to correlate impressionistic experience or intention with corresponding tangible physical events. In a later section of this paper we shall review one such model which proposes an undifferentiated ontic level of reality that serves as a common source for intrinsically correlated, epistemic mental experiences and material events.

Anomalous Information Transfer

As a final item on our list of challenges, we should remind ourselves of the unique capacity of consciousness to precipitate anomalous behavior of a variety of physical systems and processes. In the array of experiments on mind/matter or human/machine anomalies that have been regularly reported to this Society we find incontrovertible evidence that consciousness can play a proactive role in the behavior of simple or complex physical devices and processes. In the remote perception genre of experiments, consciousness demonstrates its capacity for the acquisition of *objective* information by *subjective* means. Adding to these systematic studies the more anecdotal evidence of anomalous healing, poltergeist phenomena, reincarnation, and various aspects of UFO interactions clearly deepens and broadens the challenge to science of the incorporation of consciousness into its analytical bailiwick. Yet it is precisely such paradoxes that provide the most valuable clues into the deeper nature of consciousness, and that ultimately will enable its scientific representations for much more extensive applications than just the comprehension of these specific anomalies.

II. Research on Mind/Matter Anomalies

Keeping our eye on those broader purposes, let us review very briefly the large bodies of empirical data that have been accumulated on the anomalous interactions of consciousness with various physical devices, systems, and processes. Here we shall refer primarily to the results obtained by the Princeton Engineering Anomalies Research laboratory and its immediate colleagues, albeit with acknowledgment of the meta-analytical surveys that confirm the ubiquitous and consistent characters of these effects as observed in many other laboratories.[7] From these PEAR studies and meta-analyses we can distill a list of salient properties of such anomalous results:[8]

1. The effects can be produced in forms that allow rigorous scientific study.
2. The anomalous effects are of small size, of the order of one part in 10^4 departure from chance expectations, but, with appropriately broad representations, they display some statistical replicability.
3. Results are largely independent of such objective physical parameters as the details of the target machines and their modes of operation, the physical separation of the operator from the machines, and the temporal separation of the operator efforts from the times of machine operation.[9]
4. In contrast, more subjective correlates associated with the operators' intentions, personality, gender, and mood, and with the ambience of the experiment and laboratory, seem more relevant.
5. The most parsimonious interpretation of the full pattern of results is that the intentions of the operators, whether consciously or unconsciously expressed within some subjective state of resonance with the task,

slightly alter the elemental binary probabilities underlying the physical processes that determine the machine output distributions.[10]

Such a list of empirically established but scientifically strange specifications puts particular conceptual teeth in the challenge of consciousness to established science. Is there any hope of accommodating such rambunctious phenomena within the workshop of science? Not without a viable theoretical model, and a heroic model it must be.

Despite the historical plethora of attempts to deploy psychophysical models invoking a variety of electromagnetic, geographical, quantum mechanical, mathematical, and psychological processes,[11] few of these, if any, have achieved any predictive theoretical power. From this failure we might venture one of three conclusions:

1. The phenomena simply will not submit to a classical experimental/theoretical dialogue;
2. We are not yet smart enough, or we do not yet have sufficient empirical data, to pose such a dialogue in a viable form;
3. Substantial redefinition and/or relaxation of rigid scientific rules, presumptions, and concepts will be needed before such a dialogue will be possible.

The third possibility was explored in a sequence of talks and an article presented to the SSE a few years ago under the title of "Science of the Subjective."[5, 6] In this thesis we proposed possibly productive generalizations of the definition of scientific methodology, in particular of its replicability and falsifiability requirements, and discussed the inclusion of subjectivity, cross-disciplinary metaphor, and teleology within the arsenal of scientific weaponry. Several years earlier, we had postulated a "Quantum Mechanics of Consciousness" wherein many of the basic concepts of quantum theory were redirected by metaphor to illuminate characteristics of the human mind, and various consciousness-related anomalous phenomena could be represented as natural consequences of "molecularly bonded" mind/matter systems.[3] Just last year, at the SSE Annual Convention, we introduced a "Modular Model of Mind/Matter Manifestations" (M^5) that subsequently was published in JSE,[12] wherein the unconscious mind and the intangible material world were given major roles in the achievement of mind/matter anomalies. This particular model, along with its two predecessors, has shown some promise in stimulating a productive empirical/theoretical dialogue in contemporary mind/matter research and a brief reprise may help to illustrate a possible route of response to the "challenge of consciousness."

III. The M^5 Model

Briefly, this model was prompted by re-examination of a large body of existing empirical data in the light of the commonly prevailing presumption that anomalous mind/matter effects were achieved primarily by direct interactions of the conscious mind with tangible physical substances and processes, and

therefore that the experimental equipment, protocols, operator strategies, and feedback modalities should be designed to enable and enhance such direct interactions. Yet the data review did not support such presumptions. For example, in many cases, the more explicit and vivid the feedback in displaying the target processes and the operator achievements, the less pronounced were the anomalous results. In fact, in certain experiments, which by their nature allowed no direct feedback at all, the anomalous effect sizes were among the largest obtained. Most notably, a large array of remote/off-time experiments, wherein the operators were far removed from the experimental equipment, and in some cases were directing their attention to the experimental tasks at times other than those of the machine operations, yielded effect sizes at least as large as those achieved when the same operators were in the laboratory, adjacent to the same equipment at its time of operation.[9]

In support of these counter-intuitive mind/machine results, we also could refer to another large body of anomalous data from our complementary program of remote perception research, wherein human "percipients" attempted to acquire information by other than normal sensory means about distant physical targets at which were stationed secondary participants, or "agents."[13] Here also, no direct or immediate feedback was available to the percipients, yet the anomalous effect sizes were among the largest obtained in any of our experimental programs. And just as in the "off-time" mind/machine studies, temporal separations of the perception effort from the actual time of target visitation by the agent seemed not to compromise the anomalous information process. Perhaps even more pertinent to our forthcoming model, the subjective or impressionistic aspects of the targets tended to be acquired more readily than their tangible objective details.

Returning to our mind/machine databases, this preference for subjective correlates was further underscored by a succession of analyses of variance (ANOVA) and supplemental *ad hoc* analyses[7] that confirmed the relative insensitivity of the results to such tangible parameters as the technical details of the physical noise sources, the number and frequency of test samples acquired, and the spatial and temporal separations, compared to the primary subjective correlate of operator intention, and other operator-specific features such as style of effort, gender, and co-operator categories.

But without a doubt the starkest rejections of the direct conscious mind/tangible matter presumption were displayed in our body of "FieldREG" applications. Here we found that miniaturized random event generator (REG) devices, unobtrusively placed in various group environments, such as theatre and musical performances, professional meetings, sporting events, spiritual rituals, significant social events, and various clinical therapies, frequently yielded anomalous responses that could be correlated with particular characteristics of the venues, or specific portions thereof.[14,15] Without pursuing the details, the most evident generic correlate of such responses was some form of group unity, shared purpose, or coherent resonance of the group which seemed capable of manifesting in the REG electronics as more-ordered sequences of output

bits than would be expected by chance. In contrast, group venues that were more passive or pedestrian in character tended to yield data traces that conformed anomalously closely to the chance mean. Note that in these FieldREG applications there was no ongoing feedback available to the participants, indeed no awareness of the presence of the device, and hence no conscious intention was being exerted.

Finally, there was the pervasive evidence of subordinate or "structural" anomalies in many of these databases. In most of the "successful" experiments, *i.e.*, those where significant correlations have been established between the primary variable of pre-stated operator intentions and the REG responses, one also finds subordinate anomalies in the structure of the database, such as in gender disparities,[16] serial position effects,[17] variance effects,[7] and count population profiles,[10] all of which underscore the departure of the output distributions from strictly chance behaviors. Even more pertinent to our point here, however, is the appearance of such structural anomalies in a number of experiments that were less successful, or even yielded chance results, in the primary correlations. The most notable example of this appeared in the PortREG Replication attempts of the tri-laboratory Mind/Machine Interaction Consortium[18] wherein the desired correlations of output means, although proceeding in the intended directions, failed to achieve statistical significance. Notwithstanding, an impressive array of secondary correlations were apparent, which compounded in ensemble to major statistical departures from chance behavior. Since none of these structural correlations were consciously intended by the participating operators or experimenters, here again we are impelled to turn away from the simple presumptions of conscious influence on the machine behavior and search for a more sophisticated model.

IV. M^5 Conceptual Architecture

Relying for details on the referenced publication,[12] the essence of the M^5 model is sketched in Figure 1, which shows four conceptual modules juxtaposed in a rectangular array, wherein:

Ⓒ denotes all pertinent functions of the conscious mind of the operator, including perception, representation, cognition, memory, volition, activation, *etc.*, as usually treated in the academic formulations of psychology, neurophysiology, and philosophy.

Ⓣ encompasses all of the events and processes of the tangible physical world, as commonly represented in the natural sciences and the technological and medical applications thereof.

Ⓤ subsumes all mental processing commonly termed "unconscious," "subconscious," or "pre-conscious," including both procedural aspects, such as storage of information and experiences, autonomic control of physiological functions, subliminal reactions to stimuli, instinctive behavior and insight, and preparation for conscious attention and action, as well as "dynamic" aspects, such as protection from trauma and other experiential overloads.

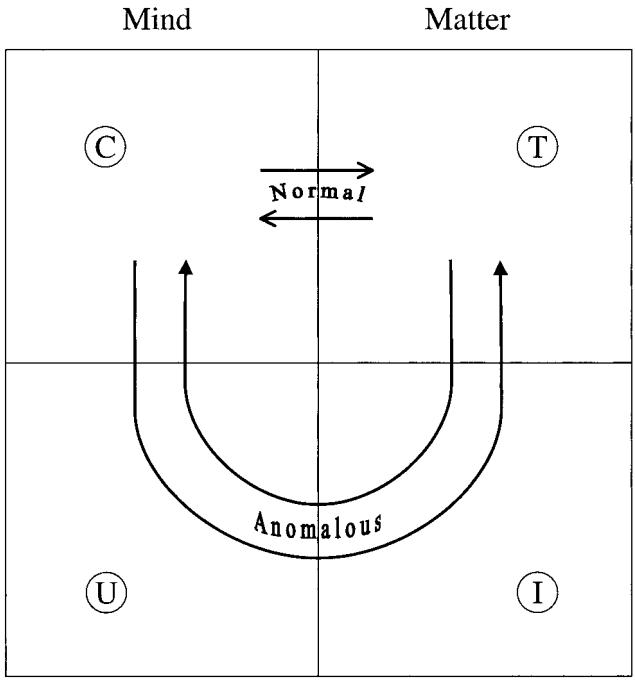

Fig. 1. Modular model of mind/matter manifestations.

(I) refers to an intangible or subtangible level of physical events and processes purported to underlie the tangible or observable phenomena of the natural world. This domain has been conceptualized, labeled, and analyzed in various abstruse theoretical frameworks, *e.g.*, "quantum holism," "implicate order," "ontic level," "string theory," "vacuum or ZPF physics," *etc.*, all of which share the presumption of a pre-manifest basis or source for all tangible phenomena, wherein the common parameters of substance, energy, and information; space and time; and even mind and matter are undiscriminated.

The essential proposition of the M^5 model, then, is that rather than exercising "normal" modes of information transfer directly from (C) to (T), or *vice versa,* mind/matter anomalies are achieved by more circuitous routes, wherein consciousness invokes its unconscious capabilities, and tangible events diffuse into their intangible counterparts, allowing the intrinsic indistinguishability of the mental and material aspects at their deepest levels to provide the bridge that completes the information circuit.

Development of this conceptual architecture into a predictive theoretical model is far from complete, but a number of its subtler features, and some of its experimental and theoretical implications, can be identified and are being pursued. In the former category, it is important to note that although the dis-

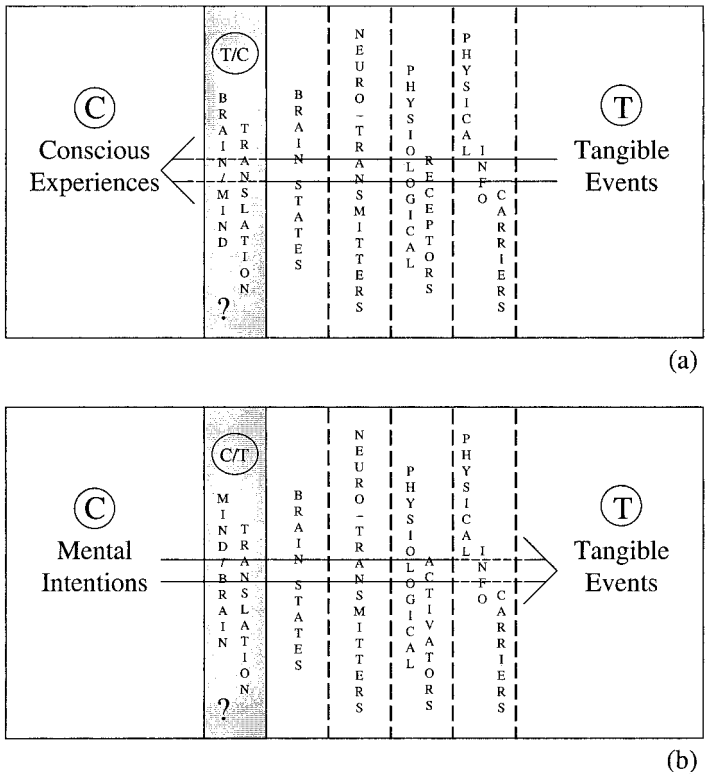

Fig. 2. Interactions of conscious mind with tangible matter (a) acquisition of information from environment (b) insertion of information into environment.

tinct modular structure of Figure 1 offers conceptual simplicity, in fact the interfaces between the modules are not nearly so sharp, but entail more gradual merging of the features and processes of one of the adjacent domains into the other. For example, even the most familiar interface between (C) and (T) actually entails a sequence of information transmission processes that progress from strictly physical to strictly mental, or *vice versa,* as sketched schematically in Figure 2. Likewise, the (C) / (U) interface progresses through strata that entail nearly conscious, deeply unconscious, and totally inaccessible mental processing. Similarly, the (T) / (I) material interface actually extends over a range of physical abstractions from classical mechanics, through waves and fields, on to quantum mechanics and quantum electrodynamics, to virtually ineffable representations such as string theory and quantum holism. But the most inextricable of the interfaces, that between (U) and (I), is clearly the most crucial to the efficacy of the model, and the most difficult to specify. For it is here, at its deepest level, that the common mental and material features surrender their identities to a subliminal indeterminate holism that can be represented only in theoretical abstractions. It is the domain where concept and

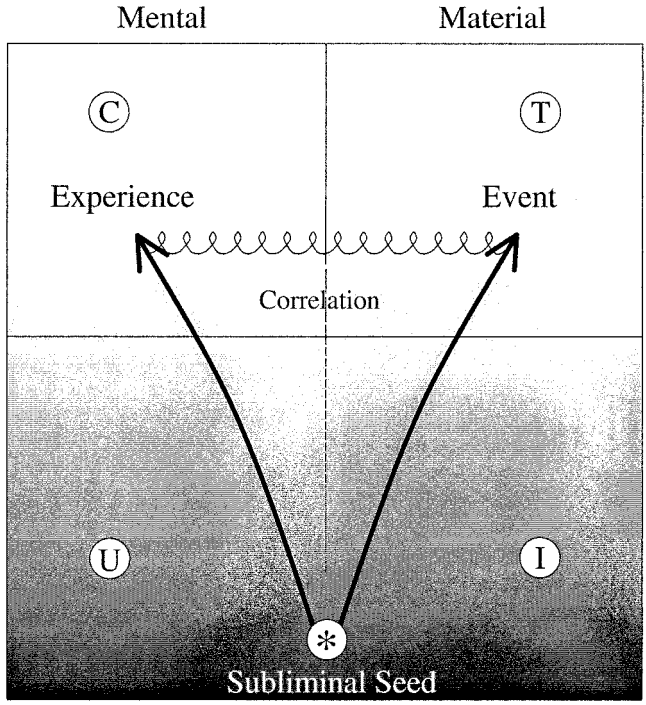

Fig. 3. Correlation of tangible events and conscious experiences via subliminal seeds.

reality, experience and event, mind and matter become indistinguishable and therefore intrinsically correlated when expressed into the conscious and tangible sectors (see Figure 3).

Even with this powerful mechanism for bridging the mind/matter interface available, it still remains to postulate how the conscious (or unconscious) *intention*, *desire*, or *purpose* of the participating mind can find its expression in the tangible outcome of an experiment, or can extract subjective and objective information from a tangible physical target. Here we resort to an intriguing proposition by Harald Atmanspacher[19] and several others that the long-neglected negative-time solutions of the dynamical relations of scientific theory be activated to allow some degree of teleological influence or "final causation" to be imposed on the prevailing physical system. In other words, just as we are accustomed to compute the dynamical evolution of a physical system in terms of its positive-time progression from specified initial conditions, we now would allow further contribution to that evolution to be imposed from the desired *final* state or goal that the mind wishes to achieve. But how can the physical system accommodate both these initial and final causations in a self-consistent behavior? The only mechanical possibility so far suggested is to invoke the intrinsic uncertainties and probabilities of the underlying mental/material systems to provide the requisite flexibilities in their necessarily correlated ex-

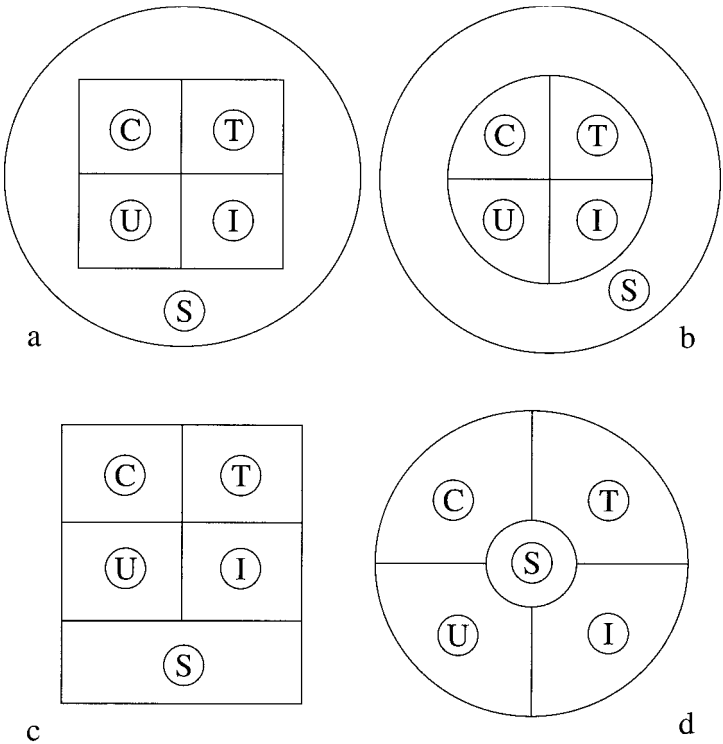

Fig. 4. Modular structures with the Source.

perience/event manifestations. Whether these uncertainties all trace to the quantum uncertainty principle and the essential probabilistic character of quantum wave functions, or whether more systemic sources of dynamical uncertainty, as encountered in the behavior of complex and chaotic systems, are involved is not yet clear. But in any form, the pertinence of this flexibility to the ubiquitous and enduring philosophical dichotomy of causality *vs.* free will is quite apparent. (This issue fascinated many of the patriarchs of modern physics, and in our prior paper[12] we reproduce a number of their quotations on the matter.)

Another embellishment on the model which we shall not pursue here is the possible addition of a fifth module to our M^5 configuration, which could subsume all potential influences of some pervasive cosmic agency that creates, energizes, informs, and presides over the interrelation of the other four modules. We have labeled this generically "the Source" (S), and regard its positioning in the modular array as quite arbitrary, although a few alternatives are sketched in Figure 4. The qualities and role of this component of the model are explored to some extent in the prior paper with reference to various cultural and spiritual traditions. Here we would only note that inclusion of this model

potentially elevates its scientific relevance from the already challenging mind/matter interface, to the even more awesome conceptual triad of mind/matter/spirit.

V. Implications, Qualifications, and Applications

If our goal is to formulate a model that can engage in a constructive scientific dialogue with empirical studies, it is imperative that the former contains specific, testable hints of the salient experimental variables, and that the latter allow controlled exploration of the sensitivity of the anomalous yields to these parameters. In this regard, the M^5 model makes a few specific predictions which are developed in detail in the referenced article.[12] Briefly, it suggests that the forms of direct and explicit feedback that conventionally have been provided operators in our experiments are not supportive of, and possibly are detrimental to, the attainment of the unconscious mental processing that better facilitates access to the intangible mechanics of the material world. Rather, the model suggests that subtler types of feedback that distract conscious attention from the task and stimulate unconscious involvement could be more enabling. A number of possibilities for such feedback displays have been conceived, some of them have been implemented, and data now are being accumulated.

In addition to this major revision of feedback strategy, the model suggests criteria for the selection of the experimental devices or remote perception scenes that serve as targets for the operators' intentions to insert or extract specific information. In particular, physical targets that entail complex or chaotic processes, strong dynamical non-linearities, quantum effects, explicitly subjective aspects, or any other sources of probabilistic uncertainty would appear to offer greater possibilities for synergy with corresponding mental states. Some of these features already are implicit in a few of our target devices and scenes, and it may be possible to confirm their efficacy by further *post hoc* analyses of existing data. Design, construction, and experimental applications of new configurations that would be dominated by such features currently are under consideration.

There is also the more implicit suggestion that operators who by nature or strategy are more amenable to this mind/matter merger ethic are more likely to generate larger anomalous effects. While such operator characteristics are more difficult to assess quantitatively and to maintain as a controlled parameter, the importance of these subjective dimensions has been hinted anecdotally in many preceding studies, and now should be explored as systematically as possible.

Along with its experimental validation, the model clearly would benefit from deeper understanding of certain of its theoretical features in their own right. Despite our extensive canonical representations and empirical data regarding modules (C) and (T) and, to a lesser degree, our more abstract and generalized concepts regarding (U) and (I), we need much better understanding of the mechanics of information flow between (C) and (U), and between

Ⓣ and Ⓘ, respectively, if this model is to function effectively. But far more essential will be better comprehension and representation of the deepest levels of the structure where Ⓤ and Ⓘ merge into indistiguishability, where both subjective and objective information, as we know them, are born, and where the observable correlations between material events and mental experiences are spawned. We cannot pursue these sublime aspects of the model here, but the prior article, and the references therein, should provide some primer for interested readers.

Post hoc applications of this model to the full spectrum of PEAR experiments, and to a much broader range of anomalous phenomena reported elsewhere, also is attempted in the preceding paper.[12] The data and lore from such disparate regimes as clairvoyance, telepathy, precognition, psychic healing, poltergeist phenomena, religious and mystical miracles, and survival of bodily death are each found to entail some suggestive correlates with conceptual features of the model. Clearly, any claims of universal relevance are premature, but perhaps the highest form of mind/matter interaction, namely the dialogue between descriptive conceptualization and empirical experience, has been advanced ever so slightly.

VI. Summary

So we must concede that the incorporation of consciousness within the purview of rigorous science indeed presents a huge array of conceptual and methodological problems. As yet we do not really know how to define it, how to characterize it, how to model it, or how to measure its properties. We do not understand its relationships with the physical world, including those with its own physiological mechanics. Its inclusion inevitably will bring with it a universe of subjective experience and expression that does not nestle well into the canons of scientific objectivity, replicability, and quantification, along with a host of mildly and wildly anomalous physical effects. And it will insist in playing only on grossly probabilistic, inherently uncertain terms.

Is the challenge of consciousness worth all of this trouble, or should we continue to exclude it from the tidy workshop of objective science? Although it commits us to an extremely difficult agenda, it is our position that the admission of consciousness into systematic science is possible, desirable, and indeed essential to the ultimate relevance of science to the human condition, and thereby to the survival and evolution of the species. For in studying consciousness, we are doing nothing less than studying our own vital essence: our minds; our spirits; our lives; and our eternal presence and purpose in the cosmic plan.

References

1. Bohr, N. (1961). *Atomic Theory and the Description of Nature.* Cambridge, UK: Cambridge University Press, p. 119.

2. Jahn, R. G., & Dunne, B. J. (1988). *Margins of Reality: The Role of Consciousness in the Physical World*. New York: Harcourt Brace Jovanovich.
3. Jahn, R. G., & Dunne, B. J. (1986). On the quantum mechanics of consciousness, with application to anomalous phenomena. *Foundations of Physics, 16,* 721–772.
4. Jahn, R. G. (1995). "Out of this aboriginal sensible muchness": Consciousness, information, and human health. *Journal of the American Society for Psychical Research, 89,* 301–312.
5. Jahn, R. G. (1996). Information, consciousness, and health. *Alternative Therapies, 2,* 32–38.
6. Jahn, R. G., & Dunne, B. J. (1997). Science of the subjective. *Journal of Scientific Exploration, 11,* 201–224.
7. Nelson, R. D., Jahn, R. G., Dobyns, Y. H., & Dunne, B. J. (2000). Contributions to variance in REG experiments: ANOVA models and specialized subsidiary analyses. *Journal of Scientific Exploration, 14,* 73–89.
8. Jahn, R. G., Dunne, B. J., Nelson, R. D., Dobyns, Y. H., & Bradish, G. J. (1997). Correlations of random binary sequences with pre-stated operator intentions: A review of a 12-year program. *Journal of Scientific Exploration, 11,* 345–367.
9. Dunne, B. J., & Jahn, R. G. (1992). Experiments in remote human/machine interaction. *Journal of Scientific Exploration, 6,* 311–332.
10. Jahn, R. G., Dobyns, Y. H., & Dunne, B. J. (1991). Count population profiles in engineering anomalies experiments. *Journal of Scientific Exploration, 5,* 205–232.
11. Shapin, B., & Coly, L. (1981). *Concepts and Theories of Parapsychology*. New York: Parapsychology Foundation.
12. Jahn, R. G., & Dunne, B. J. (2001). A modular model of mind/matter manifestations (M^5). *Journal of Scientific Exploration, 15*, 299–329.
13. Nelson, R. D., Dunne, B. J., Dobyns, Y. H., & Jahn, R. G. (1996). Precognitive remote perception: Replication of remote viewing. *Journal of Scientific Exploration, 10,* 109–110.
14. Nelson, R. D., Bradish, G. J., Dobyns, Y. H., Dunne, B. J., & Jahn, R. G. (1996). FieldREG anomalies in group situations. *Journal of Scientific Exploration, 10,* 111–141.
15. Nelson, R. D., Jahn, R. G., Dunne, B. J., Dobyns, Y. H., & Bradish, G. J. (1998). FieldREG II: Consciousness field effects: Replications and explorations. *Journal of Scientific Exploration, 12,* 425–454.
16. Dunne, B. J. (1998). Gender differences in human/machine anomalies. *Journal of Scientific Exploration, 12,* 3–55.
17. Dunne, B. J., Dobyns, Y. H., Jahn, R. G., & Nelson, R. D. (1994). Series position effects in random event generator experiments. *Journal of Scientific Exploration, 8,* 197–215.
18. Jahn, R., Dunne, B., Dobyns, Y., Nelson, R., Bradish, G., Lettieri, A., Mischo, J., Boller, E., Bösch, H., Vaitl, D., Houtkooper, J., & Walter, B. (2000). Mind/Machine Interaction Consortium: PortREG replication experiments. *Journal of Scientific Exploration, 14,* 499–555.
19. Atmanspacher, H. (in press). Mind and matter as asymptotically disjoint, inequivalent representations with broken time-reversal symmetry.