BIPERSPECTIVISM: AN EVOLUTIONARY SYSTEMS APPROACH TO THE MIND-BODY PROBLEM

by Ervin Laszlo

The evolutionary systems approach to the mind-body problem derives from the general theoretical framework known as systems philosophy.[1] This conceptual framework associates reality with function and organization, and not with matter or substance. It builds on the foundation of contemporary scientific theories and attempts answers to perennial philosophical questions by integrating scientific theories within an internally consistent theory of the nature of reality—physical and human as well as social.

The answers derived from systems philosophy with respect to the mind-body problem differ from traditional answers as well as from attempts to produce satisfactory accounts in reference to commonsense and everyday language. The systems philosophical account does not take the facts of everyday experience and of language as given, although it does take recourse to empirical experience in the testing of the scientific theories upon which it builds. Neither does it acknowledge traditional philosophical or theological doctrines as valid beyond dispute. It starts with a philosophically clean slate and gathers scientific evidence for the most rational and complete explanation of the phenomena regardless of whether the evidence accords with any particular philosophical preconception. Systems philosophy proceeds in this regard as genuine systematic philosophy has always proceeded: by building on the most reliable elements of the contemporaneous knowledge system and thinking through their implications for the problem at hand in an integral fashion.

The Problem

The problem of mind and body can be stated as the problem of accounting for lived or immediate experience consistently with the sometimes elaborate conceptualizations of the nature of reality pro-

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duced *par excellence* by science. Direct experience is qualitative and consists of feelings, sensations, volitions, images, thoughts, and the like. Conceptual constructions, especially of the scientific variety, are usually quantitative and describe the world in terms of abstract constructs such as mass, velocity, temperature, position, relation, entropy, and so on. These constructs are not derived from immediate experience (there does not seem to be any way of deriving quantitative and abstract symbols from qualitative, felt experience), and it is often the case that the meaning attached to a system of constructs actually contradicts the commonsense interpretation of direct experience. (The world, the scientist would say, is neither always the way it appears to our senses nor necessarily the way we would infer it to be from its everyday appearance.)

Thus we face a problem of bifurcation and inconsistency in the accounts given of the nature of reality by science and by ordinary common sense. It does not help to account for science as a logical consequence of everyday experience since, as Bertrand Russell said, if we assume that common sense gives rise to physics and physics shows common sense to be false, then we must conclude that common sense, if true, is false. Therefore it is false. Physics—and all other more rigorous and quantitative conceptualizations of the furnishings of experience—is not simply derived from everyday experience but built "from above" through a relatively unconstrained play of the scientific imagination, and its concepts are tested only with reference to carefully chosen critical factors of experience, often mediated by readings of instruments. Must we admit therefore that we have two disjoined universes: a qualitative sensed universe and a quantitative constructed (even if empirically tested) one? The answers to this question usually involve a recourse to human nature: the human mind, and brain, and the nature of thinking. While it is true that only human beings, in our experience and to our knowledge, conceive of two disjoined kinds of universe, from this it does not follow that to resolve this problem it is sufficient to analyze the nature of human beings. The problem, after all, refers to the nature of reality, regardless of by whom or what it is experienced. The standard formulations of the mind-body problem entail an ontological dualism whether they opt for the epistemological one. The ontological dualism results from the implicit or explicit separation of man from nature: It is almost always man who experiences, man who has a spirit, a mind, a language, a science, a common sense, or whatever. That man could be one, even if highly evolved, instance of a wider pattern recurrent in nature and relevant to the understanding of the unity or duality of reality is very seldom seriously considered.

Yet such ontological dualism becomes less and less warranted in the light of what may be loosely termed the progress of science. If there is one seemingly inexorable trend in science in the twentieth century it is the advance of evolutionary theories which show man to be an emergent product of vast evolutionary trends, not even a final product or an ultimate end but something that arises under specific circumstances and may perish again in time. The human phenomenon exhibits several specificities, such as the use of a highly evolved symbolic language, highly evolved tool-using ability, highly evolved social organization, highly evolved capacity for abstract or conceptual thinking, among others, but these specificities do not imply unique and irreproducible qualities in nature but merely the exceptional development of certain general capacities which exist in potential in all species. Indeed there is increasing evidence that other species, notably the primates, are capable of grasping and using symbols, using tools, making use of abstract concepts, and creating complex forms of social organization (the latter extends over a wide array of species since it can also be genetically programmed).

It is strange therefore to witness the survival of human-centrism, and indeed anthropochauvinism, in philosophical domains, especially in the debates on body and mind. To consider this problem as applicable to humans alone is a throwback to Cartesian times when animals could be viewed as mere robots. If humans may have minds as well as bodies, may not other species? If minds and bodies are in some sort of correlation, may it not be reasonable to assume that just as the physical-biological organism evolves, diversifies, complexifies and comes to possess a nervous system in the tortuous processes of mutation and natural selection, so mental capacities come to evolve and crystallize in the course of evolution?

In all fairness to philosophers, some did indeed accept such a thesis, perhaps most notably in recent times Pierre Teilhard de Chardin. Other examples exist, from earliest Ionian nature philosophers to Gottfried Wilhelm von Leibnitz and Benedict de Spinoza, but they did not have the scientific evidence of the twentieth century to back them up and orient them. In any case, acceptance of the evolutionary thesis does not entail an acceptance of the physicalist-monistic position often espoused by scientists themselves. Inasmuch as scientists refuse to deal with lived experience (although they may be constrained to do so, as even B. F. Skinner's example shows), they can ignore the intimate universe of immediate sensation and mental activity. But if one builds a philosophical theory based on the integral meaning of contemporary science, with due regard for its evolutionary thrust, one is obliged to integrate the data of immediate experience with the evolutionary evidence and thus to liberate oneself from the anthropochauvinism of assuming that the body-mind problem is solely or even primarily a human problem. It is indeed a problem for all nature, although it may emerge into prominence in certain of its sectors, notably those of the more highly evolved biological and especially biological and sociocultural species of which man is the best but not the only example.

The position advocated here resembles traditional panpsychism but is considerably more sophisticated. It does not attribute mind or spirit to all things indiscriminately; nor does it attribute to the selected class of things the same kind of mind without regard to level of evolution and the function that possession of mental faculties could perform for the entities possessing them. Mind becomes a functional manifestation in certain phases of evolution rather than a rigid phenomenon which either is or is not present. Moreover, it is not something that is created or generated by some external fiat at a given evolutionary moment but something that parallels what we ordinarily conceive as matter or physical events and comes to be specified and evolved much as matter or physical substance is specified and evolved in certain sectors of the universe over certain epochs of time. In this way we preserve the basic unity of man and nature, for which we have good independent reasons, without sacrificing the seriousness of the two-universe phenomenon and the array of questions which constitute the heart of the mind-body problem. A science-based philosophy need not deny the reality of mind to man but on the contrary can assume its reality throughout nature. That this need not imply panpsychism has already been discussed; that it also need not imply a traditional and rigid dualism will become clear subsequently.

Mind in nature? To the person versed in the history of philosophy a number of fallacies come to mind. Panpsychism is only one. The very concept of nature as ascribed to science smacks of materialism. Can we really put mind inside matter without committing the sins of physicalist or materialist reductionism—or, even worse, committing the sin of self-contradiction—for does not the very concept of matter exclude the concept of mind? Such worries prove to be exaggerated, to say the least. We first create a concept and then proceed to defend it as though it were a pillar of reality. The traditional concept of matter is one of the most striking examples. As inert substance (more commonly as dead matter) it has long been discarded by scientists, but this has not been noticed by the majority of philosophers who continue to use it to denote some kind of physical stuff that resembles Isaac Newton's mechanically moving mass and David Hume's billiard balls. Yet the concept of dead matter is itself dead. The current concept of matter has little if any of the traditional attributes of substance and no attribute of deadness or inertness. It comes closest to being grasped as a wave packet or a particle-wave propagation or as a singularity in a dynamic force field. That such esoteric entities can nevertheless produce seemingly solid and enduring material-like bodies may be due more to the organization of our sense organs and conceptual apparatus than to the nature of reality itself. An apparently hard and material body may, in fact, be a highly complex and integrated array of force fields with enduring patterns of which some reflect light (itself a form of wave-particle propagation), and others resist penetration by equally or less strongly integrated force fields (such as our fingers).

Even such esoteric descriptions as the above do not imply, in a rigorous sense, the presence in nature of anything we could call mind. But they clearly do not exclude it as the inert-substance concept of matter appears to do: A dynamic evolving universe can well have mental qualities. Yet other minds are never accessible to observation, whether by sympathetic humans or by dispassionate physicists. If this is true even with respect to other human beings (a point that will be stressed below), it is clearly true in regard to other species and the so-called inorganic realms of nature. The question of whether there is a mental aspect or correlate in nature is not open to verification by simple inspection. It is one for logical theory construction with due regard for the basic data of the seemingly separate two universes: the qualitative and lived, and the quantitative and constructed.

The philosopher's mind is still dominated by antiquated notions of man and nature, and mind and matter. It still boggles at the suggestion that mind is not the privileged domain of our species. It prefers separating man from nature to assuming that nature could share at least the potential of mind. This choice is emotional, not rational. It is not shared by all philosophers, and it may be that it will be less popular with the next generation of thinkers. In any event it is worth challenging and reexamining the mind-body problem from the viewpoint of a universal systems approach. The attempt that follows constitutes but an early and tentative exploration of this field, which holds vast challenges for philosophical speculation and vast promises of clarification of a traditionally vexing philosophical issue.

The Systems Approach in Natural Science

In order to obtain an integrated view of what the contemporary sciences suggest with regard to the nature of reality, one has to go back at least to the nineteenth century, to two parallel developments: the Darwinian theory of evolution, and the formulation of the laws of thermodynamics. In 1862 Herbert Spencer could argue that there is a fundamental law of matter, called the law of persistence of force, from which it follows that nothing homogeneous can remain as such if it is acted on by external forces because such forces affect different parts of the system differently and hence cause internal differentiation in it. Every force thus tends to bring about increasing variety.

The cosmos develops from an indefinite and incoherent homogeneity to a definite and coherent inhomogeneity, representing the emergence of better and better things. Evolution, said Spencer, can only end in the establishment of perfection and most nearly complete happiness.

Spencer's *First Principles* followed, after an interval of three years, Charles Darwin's *Origin of the Species* (1859). Both placed emphasis on progressive evolution, with complexity and differentiation associated with goodness and value. However, parallel developments in physics came to the fore at about the same time. In 1824 Nicolas Carnot developed the basic principles of what came later to be known as the second law of thermodynamics, and William Thompson stated it more forcefully in 1852 ("On the Universal Tendency in Nature to the Dissipation of Mechanical Energy"). On the continent in 1847 Hermann Helmholtz published his essay on the preservation of force (*Über die Erhaltung der Kraft*), and in 1865 Rudolf Clausius introduced the concept of entropy. A year later Ludwig Boltzmann gave a statistical formulation of the second law and linked it with probability theory and statistical mechanics. The status of the law appeared unquestionable. And its thrust was that, instead of building up, the universe as a whole is inevitably running down. Every process in it dissipates energy and renders it unavailable for performing work. The great arrow of evolution therefore points not toward increasingly differentiated and complex things but toward progressively disorganized, simple, and random aggregates.

The effect of the advent of thermodynamical laws on thinking about the general nature of the universe was profound. Spencer's aforementioned optimistic comment on evolution, included in the first edition of his *First Principles*, is sadly lacking in the sixth.

However, it was nonetheless evident that biological and sociocultural phenomena build up, even if the cosmos as a whole runs down. Moreover, even the chemical elements build up in the course of the chemical evolution of stars and in interstellar processes associated with quasars, pulsars, supernovae, and the gravitational contraction of interstellar dust. Science had to wait for the development of the thermodynamics of irreversible processes, and its applications in astrophysics and biology, to perceive that there is no contradiction between the laws of thermodynamics and the observed direction of the evolution of structures in the universe. Evolution exploits energy flows and "inherent levels of stability" (J. Bronowski) in the configuration of such flows. Evolution takes place in open systems with throughput, whereas the laws of thermodynamics apply to closed systems. Hence the whole universe, as a theoretically closed system, may tend toward entropy and equilibrium; nevertheless within the universe, given large enough flows and suitable energetic conditions, enclaves can form, thereby locally and temporally reversing this trend. They build up structures by using the energies supplied in the flows. They downgrade the organization of the flows, that is, they impoverish their energy environment. In doing so they obey the second law despite exhibiting a direction contrary to its statistical prediction. Hence there is no conflict. But there is no explanation from the second law either. We have to add other laws of nature before that law can be used to predict the evolution of complexity.

By and large, we can understand the nature of such laws at present, even if we do not have quantitative formulations beyond the first few stages of their operation. The understanding comes from the concept of dissipative structures advanced by workers in irreversible thermodynamics (Ilya Prigogine, Aharon Katchalsky, Lars Onsager, S. R. de Groot *et al.*). The concept defines structures which dissipate energy in the course of their self-maintenance and self-organization. Complex entities cannot arise in nature unless there is a flow mixing the existing elements in random configurations. If all configurations had equal intrinsic stability the probability of their being maintained would be equal and described by the second law in its Boltzmannian formulation. Eventually all configurations would break down, and the average pattern would bunch around the thermodynamic equilibrium state. But it appears that energy flows do have some intrinsic stability in specific configurations. For example, energy packets known as protons and neutrons form enduring, stable nuclei. They can be balanced by shells of electrons, giving stable atoms. A helium atom is stable, but the configuration resulting from the thermal collision of two helium atoms is not. The structure would disintegrate in about a millionth of a microsecond. But if during that time a third helium atom enters the configuration a stable structure results: the nucleus of carbon.

This serves as a simple physical model for the understanding of how increasingly complex structures can come about through the chance rearrangements of components in a flow. Atoms make molecules and crystals, macromolecules are composed of simpler ones and of crystalline elements, and the simplest forms of life are composed of relatively stable configurations of the already established macromolecular aggregates. For example, the base molecules of living things, that is, thymine, adenine, cytosine, and guanine, are stable configurations of macromolecules built into likewise stable configurations of nucleic acids. Nucleic acids in recurrent patterns code the buildup of organic phenotypes. Cells are stable configurations as self-contained units, capable of self-maintenance (metabolism) and continuity (reproduction). But they in turn can be structured into complex multicellular organisms having the basic properties of life on their own level of organization. We can carry the process still further and find that self-contained populations find coordinations of relatively stable sorts in interspecific structures (known as ecosystems) and that local structures of this kind are coordinated in more encompassing ones; this leads us to the concept of the biosphere as a complex interdetermined system. Man is a system on one level of this self-creating hierarchy, and his vital environment is composed of systems on various other levels.

Two general conditions assist in the buildup of systems, notwithstanding the validity of the second law. The first is a flow of energy entering into the system as a whole (in our case, from the sun); the second, the natural selection which, through chance variations, hits upon intrinsically stable configurations and matches one such configuration against and with another. If we allow that there are intrinsically stable configurations of energy flows in the universe awaiting actualization (much as Platonic forms await their reproduction by the Demiurge, or Whiteheadian eternal objects manifest "patience" for actualization in societies of actual occasions), we get a bona fide scientific explanation of the buildup of complexity. The second law becomes a physical law if we add to it the repertory of configurations which, when hit upon, manifest a degree of stability. Such configurations bias the statistics upon which the second law is based: Random fluctuations induced by energy winds will not have thermodynamical equilibrium but the stable configuration as their average. Hence we get a new average to serve as the starting point of statistical processes which entail a nonnegligible probability that further (previously much less probable) configurations of stability, consisting of the existing configurations (established averages) as the stable parts or components, are hit upon. Atoms can build into molecules, and molecules into building blocks of life. Living species can build into ecosystems and ecosystems into the system of the biosphere.

The new vision of nature reconciles thermodynamics with the theory of evolution. It allows that processes described by classical thermodynamics tend toward the random state of disorganization denoted by the concept of maximum entropy but holds that such running-down processes do not adequately characterize the universe. In order to obtain an adequate description of real processes, we have to allow that the universe has hidden or potential strata of stability. (These correspond to the universals of realistic metaphysicians and to the systems invariances of contemporary scientists.) They enter into the description of every existing system that emerges in the course of evolution. Man is a dissipative structure, feeding on entropy in the sun-to-earth-to-space energy flow, and so is the amoeba. So also are the guanine and thymine in the cell and the ecosystem formed by stable patterns of relationships between different populations.

The Interpretation Concerning Mind

The integrated scientific world picture speaks of an orderly sequence of natural systems arising in varied evolutionary processes from the relatively simple and small to the relatively large and complex. The scientific world view does not, and indeed cannot, say anything directly about the existence or prevalence of mind in nature. Mind is not a scientific observable: It is not something that can be reduced to sense data, or instrument readings, or dependably recurring sequences of sensations—and this despite the strenuous endeavors of existentialist philosophers who seek to assure themselves of the existence of other minds through recourse to such concepts as communication, empathy, and the like. The skeptic, if he presses his case, can always have the last word: In the last analysis we have direct empirical evidence only of our own minds.

This, however, does not stop us from assuming that we are not the only ones in the world to possess a mind. The solipsist may win his logical point, but he cannot (and indeed should not wish to) stop philosophical inquiry into the nature and prevalence of other minds. Such inquiry must proceed then on the basis of assumptions and inferences rather than direct and incontrovertible evidence. Now the most reasonable assumption is one that is based on analogy: Like bodies and behaviors suggest like minds and mental experiences. It is such reasoning which has led to the earlier-noted anthropochauvinism that allows other minds only for humans. The commonsense premise is that only other humans behave as we do; therefore only other humans have minds.

This, however, no longer holds true when viewed in the light of the current scientific evidence. All natural systems, in the entire evolutionary sequence, share some fundamental analogies of function and behavior. These are due to the very conditions of existence of such systems: the need to obtain a constant and dependable supply of negentropy from the environment to replenish the energies used up in irreversible processes within a system, that is, to balance its own inescapable entropy production. The identification and ingestion of sources of negentropy (oxygen, nutrients, etc.) call for some universal functional solutions: sensitivity to certain aspects of the environment, feedback control of one's own behavior vis-à-vis such selected portions of the milieu, the capability of revising mal- or nonfunctioning behavioral routines (whether in the lifetime of the individual by processes of learning or through the evolutionary sequence of genetic mutations and consequent differential reproduction rates), and the constant control of the exchange of information and energy with others of one's species as well as with other species making up the relevant environment. The universal character of these solutions extend the analogies of function and behavior far beyond the members of our own species to the entire realm of the living and, even beyond, to the inorganic but evolutionary realm which has been built up in processes of chemical evolution from physical components and has furnished the template on which biological evolution is based.

In light of the above there are only two acceptable alternatives for the philosophical interpretation of mind. The first is the solipsist's alternative: Only *my* mind exists, and all other minds are but hypothetical constructions of my mind (possibly with the mediation of George Berkeley's universal mind of God). The second alternative is to assume that mind is associated with all entities in the world that exhibit the same basic kinds of functional-behavioristic characteristics that my body does.

The second alternative is the one espoused in the systems philosophical interpretation of the scientific evidence with respect to the mind-body problem. Its logic is simple but far from simple-minded. I am a natural system, and I know from immediate experience that I have a mind. To be a natural system is to satisfy certain criteria (e.g., being a resultant of evolution, being an open system, being a self-maintaining and self-evolving system balancing internal entropy production with the import of negative entropy, and having the necessary functional attributes to persist, namely, sensitivity vis-à-vis the external environment, feedback control over one's critical environmental interactions, and capacity to adapt to, as well as reshape, the immediate and immediately relevant milieu). Thus all entities which qualify for inclusion in the class of natural systems have minds; natural systemicity is the fundamental criterion of the possession of mental characteristics.

This argument cannot satisfy the skeptic, who can always opt for solipsism and the denial, *inter alia*, of other minds. But it is superior to other arguments based on ampliative inferences, for example, arguments using similarity of form or appearance or similarity of substance as a criterion. The systems philosophical criterion is similarity of functional behavior deriving directly from the very nature of the entities in question. It is not "accidental," in an Aristotelian sense, that I am a natural system; it is a basic and essential characteristic. The same can be said of all other systems which satisfy the requirements for inclusion in this class. Thus what unites me with other entities in the world is our belonging to the class of natural systems. Not all entities in the world do, but a significant number and variety qualify. This special class of entities is endowed with mind.

But there is more to the argument than this simple statement. Mind is not a fixed quality which either exists or does not exist. It has myriad manifestations and levels of specification and development.

Mind is a correlate of a function: the function of persistence in natural systems. This function calls for an almost constant monitoring of one's own states and conditions vis-à-vis the relevant conditions and events in the environment and for the assuring of access to the necessary types and amounts of free energies to offset the constant and irreversible entropy production within one's system. This constant activity is mirrored in and for the system in mental terms, that is, the sensitivity to the environment is *felt* rather than depicted in terms of electric or chemical discharges and neural transmission patterns. Such primitive feeling (used in its Whiteheadian sense as the primal component of all experience) is how the natural system registers the crucial factors of its environment; and the primitive types of repulsion and attraction are those first specifications of feeling which orient the natural system away from dangerous and nonfunctional and toward beneficial and functional events and energy sources in its milieu (these are the basic tropisms observed already in primitive organisms).

Mental characteristics are built up in complex evolutionary sequences over eons of time; they are the internal aspects of the slow yet occasionally radical transformation and complexification of functions in increasingly large, complex, and hence negentropy-hungry natural systems. The more precise orientation requirement on these evolved systems calls for additional, cybernetic information-processing loops and for higher levels of codes for the storing and evaluation of sense perceptions. The latter take in an always broader spectrum of the environment as more and more things become relevant—though often indirectly—to the persistence of the system in its milieu. In time certain species of natural systems may evolve additional information-processing loops which function to analyze sensations and compare them to codes stored in the system. This gives the system the capacity to reflect on its experience, that is, not only to sense but to *know* that it senses. Higher levels of this kind of loop can always be evolved so that systems that know that they know that they sense, and so on, can emerge. Thus we encounter the phenomenon of consciousness as distinct from the more general phenomenon of feeling the world and reacting to it.

It is fallacious to reduce the entire wealth of human cultural accomplishment associated with the capacity of consciousness to basic functions of natural-system persistence. But this reduction is not necessary to maintain the argument. The genetic origin of a capacity is not to be confused with its existing status and functioning; the contrary would be to commit the genetic fallacy. Consciousness could—and in the light of this argument did—have a persistence-enabling (i.e., survival-oriented) function as it appeared: Natural selection favored those individuals who selectively evolved reflective capacities and could make use of them in perfecting food-gathering, hunting, and social routines. But the capacities, once developed, could serve—and indeed have served—purposes not directly related to physical survival. This self-liberation of humans from the bondage of immediate survival functions was probably a slow process: the cave paintings in Lascaux had most likely elements related to survival (such as rituals connected with hunting), but they also had aesthetic elements. The same goes for the gradual emergence of utilitarian objects with embellishments: Their early forms were more directly associated with survival functions than later forms which occasionally moved entirely into the sphere of the decorative or the artistic (*mutatis mutandis* in the case of language, architecture, social and even moral rules and intercourse, and so on).

The gradual emancipation of culture from the realm of physical survival brought with it the emergence of a culturally specified mind. The latter, endowed with the capacity of consciousness (i.e., having self-monitoring feedback loops), not only could perceive the world but could reflect on it and thus could undertake activities which had other ends than day-to-day survival. Cultural mind in its evolved form may thus be uniquely human (at least on earth), but the kind of mind of which cultural mind is a specification is not. It is possessed by all natural systems, though in variously evolved form. Chimpanzees, for example, duplicate in more primitive form most of the attributes of the human mind, and there is no reason to doubt that if a sequence of apt mutations would evolve their forebrain they would be capable of speech, the appreciation of beauty and form, the mastery of more complex symbols, and the rest. The same capacity cannot be denied in potential to any natural system, whatever its level of evolution. Mind is not an insertion of absolute novelty into the chain of being at a given point in time or at a given level of complexity; it is there in potential on all levels and comes merely to be specified and evolved as the system itself requires more accurate and complex orientation capacities to assure its persistence. (It is thus far from committing a category mistake to speak of feelings with respect to the atoms of the elements and the chemical and organic molecules and compounds which make up the building blocks of life.) It should be possible to identify levels of mental evolution together with physical evolution in reference to the functional requirements posed by the latter. It should also be possible to understand when and how a complex system, endowed with internal monitoring loops (and hence with the capacity for consciousness) can emancipate itself from the bounds and functions of immediate survival and take off into the cultural realm.

The possession of a mind capable of consciousness, language, and culture does not cut man off from the rest of nature, although it does differentiate him from others along the evolutionary scale. This differentiation, joined with the underlying unity, allows one to assert that the human mind is a specific elaboration of a more universal mental capacity found in all natural systems. For all systems a basic postulate holds true: The mental aspect (i.e., the "feeling" of the world, including on higher levels more differentiated perceptions, emotions, thoughts, introspections, memories, volitions, and abstract concepts and constructs) is an internal readout of the system of some of its critical system-environment interactions, whereas the physical aspect (the energy flows, chemical and biochemical chains and reactions, and the organic and higher homeostatic feedback processes) is an external readout: it is how the system can access itself as well as other systems in its purvue.

Put more simply, natural systems have two aspects or perspectives: one internal and qualitative, the other external and capable of quantification. In human culture the external aspects have become highly abstracted and rigorously conceptualized and thus removed from the intimate experience of the internal readout. Hence the two universes. They are in reality the consequences of the biperspectival nature of all systems, dichotomized in human culture into two seemingly disparate and even opposing spheres.

Conclusions

Much more can be and has been said of the systems philosophical interpretation of mind and the mind-body problem in the literature, but a few observations can now be offered to conclude this overview. The systems approach to the mind-body problem, joined with the heuristic but necessary assumption of dual perspectives, constitutes the simplest and most consistent account of the manifest facts. Its basic premises can be restated in the following terms:

1. Mental events exist; these are indubitable elements of immediate experience.
2. Physical events are assumed to exist; we allow that the qualitative sensations of our immediate experience refer to objective events which may be grasped in nonmental terms, for example, through the constructs of science.
3. Mental and physical events are not identical (in the sense of the stronger version of the identity thesis) since they are qualitatively different at all times and circumstances and cannot be transformed or collapsed into each other.
4. Mental and physical events are not causally correlated; there is no mental component within a causal chain that starts and ends with physical energy or matter propagations (e.g., a soul switched into a network of material events).

5. Mental events and physical events are correlated as two aspects or perspectives of the functions of self-maintaining and evolving natural systems. The physical events are never the same as the mental events; they constitute two distinct perspectives. But the natural system of which they are the perspectives is a single, phsyical-mental, or natural-cognitive system.
6. The correlation of mental and physical events is one to one but not coextensive. The range of physical events is wider: Not all physical events have mental perspectives, although all mental events have physical perspectives. There are organic functions which are not perceived or registered in the form of feelings and sensations, while all perceptions and feelings are assumed to have physical correlates in the organism.
7. Biperspectivism does not reduce or collapse mental events into physical events or vice versa, as physicalist and mentalist versions of monism do; yet it does not separate the mental from the physical as dualism does.
8. Biperspectivism applied to the integration of evolutionary scientific theories in the theory of natural systems does not separate man from nature; nor does it commit the opposite fallacy of reducing man to a mindless organism or robot. It establishes an integral link between theories of man and theories of nature. The mind-body issue is an issue not only for humans but for all entities that arise in the course of evolution in the universe.

Thus, while this paper started with the intent to analyze one specific problem, that of body and mind, it ended by constructing the outlines of a theory of man and nature, more exactly of man in nature. If the basic premise of such a theory is true, namely, that man is not a categorically separate creation but an integral part of nature and product of its evolution, then such expansion of horizons is uneliminably necessary. Suspecting strongly that the man-in-nature thesis is basically justified, we should hope that subsequent discussions of the mind-body problem will break away from the limitations of traditional views of man and will let in the fresh air of the contemporary conception of an evolving universe which contains within its rich domain the potential for all that we experience, the mental as well as the physical.

NOTE

1. See my *Introduction to Systems Philosophy*, rev. ed. (New York: Harper Torchbooks, 1973).