Chapter 14
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Changed Concepts of Brain and Consciousness: Some Value Implications

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It is a pleasure and privilege to help contribute to the Isthmus effort to explore convergences of science and religion. I take it that we are here gathered to join together in bonds without acrimony two rather distant and sometimes reluctant partners.

Back in 1980 at a meeting sponsored by the National Council of Churches participants from different faiths and denominations united in a general conclusion that what our world needs today is a new religion—specifically, a new theology of a kind that will promote the values of conservation, renewable energy sources, respect for nature, the land, and so on. I too was drawn to a very similar conclusion by a much more roundabout theoretical route, some years ago in trying to follow up the implications of some changed concepts in science regarding consciousness, freewill, and the nature and role of values and their relation to science.

Implied in the foregoing conclusions is an associated logic telling us that society nowadays is on the wrong track when it continues to try to treat global ills with more and more science and technology. We've begun to learn the hard way that a point has been reached already in human numbers and diminishing returns where technological solutions, in the absence of population controls, tend to just make matters worse in the long run rather than better. Most gains are wiped out in time by the ever-growing demands of expanding human numbers. The short term benefits usually serve to get us more enmeshed in a self-feeding, vicious spiral of mounting population, pollution, increased energy demands, resource depletion, poverty, and other worsening world conditions. One thing reinforces another, and we become more and more helplessly entrapped, deeper and deeper, year by year.

The one solution visible to date for breaking these vicious spirals, in a way that would seem at all reasonable and humane, is to somehow achieve a change worldwide in the kinds of values and beliefs we live and govern by. This, of course, is where the need for a new theology or new global ethic comes in.

To halt or reverse the current population and other adverse trends is going to require counter forces of the most powerful kind. Nuclear war might do it, as might also a severe global famine, a large asteroid collision, or some other decimating worldwide catastrophe. The catastrophe from simply allowing present trends to continue should also be effective. A much happier solution is the one mentioned, namely a new value system, theology or global ethic that will bring a fundamental change in human value priorities. It would go a long way, for example, to help treat current world conditions if people generally were to acquire a

deep conviction that it is not just unwise or inexpedient, but is actually immoral and even sacrilegious to pollute our world, to overpopulate, to deplete irreplaceable resources, eradicate other species, or in any other way to despoil, degrade, or desecrate for coming generations the quality of our biosphere. Agreement that developments in this direction represent the logical, most promising key to a better future for our planet is now becoming widespread.

In my own case, the logic seemed to carry further to a deduction that the best way to get the needed new values and social priorities would be to achieve a union of religion and ethics with science. It should perhaps be mentioned that the actual course of events and line of reasoning were the other way around, i.e. developments in science and value theory were seen to call for some revisions in the kinds of values and beliefs upheld by science. These in turn were then perceived to be in a direction obviously suited to counter the adverse social trends.

It will be recognized that to propose a fusion of science with the value disciplines or to claim that developments in science support new social values is in both cases something that flies directly in the face of long established teaching regarding the relationship of science and values. The philosophic doctrine that it is logically impossible to derive values from scientific facts or to infer what logically *ought* to be from descriptions of what *is* has a venerable history extending back through G. E. Moore's *Principia Ethica* to at least Hume and some say to Plato. Attempts to find a basis for moral values in the natural order as described by science are customarily dismissed as examples of the "naturalistic fallacy."

In defense of our present position it is contended that the traditional teaching that would keep facts separate from values and 'is' from 'ought' is itself based on a logical error. The error consists in assuming that values can be separated from brain function which by nature is intrinsically goal oriented and value guided. Human values, properties and products of brain function, cannot be treated with a pencil and paper logic that leaves the constraints of the functioning brain out of the picture. In brain processing, facts inevitably interact with and help to shape values.

For a simple shortcut to this revised fact-value logic consider the relation of values to belief. Most of us will readily agree that our values depend largely on the kinds of beliefs we hold, especially beliefs about the universe, about the nature of reality, of human consciousness, of the self, afterlife possibilities and so on. Most of us will also agree that science itself is a legitimate source of belief about these and other things and is, at the least, competitive with other sources such as intuition, revelation, authority, tradition, etc. In simple form the argument can be reduced to the reasoning that our values are shaped by beliefs and our beliefs are shaped by science among other things. The proposal to fuse science and religion can be viewed largely as a proposal to meld and bring into harmony scientific and religious belief. It is not at all, of course, a proposal to start deriving or treating values directly by experimentation or by other scientific procedures.

In calling for the union of science and religion, however, one meets many difficulties other than just the formal philosophic objection. To many people it seems like calling for a union of fire and water and asking for much the same dampening and squelching outcome. The kinds of conflicting doctrine that have kept science and religion apart for centuries are not trivial. Nor are they easily reconciled (even if one is a liberal and willing to overlook the otherworldly contents). It is not easy, for example, to uphold the evolving spirituality of man on the one hand, and Skinnerian Behaviorism on the other. Nor does one find much spiritual inspiration if one is convinced that the brain or mind of man is no more than just a physiological machine gov-

erned throughout by the inexorable laws of physics and chemistry with no place anywhere in the system for the likes of the conscious inner self, for freedom-of-will or moral responsibility. If science is right what is left for human dignity? If the whole universe (all reality) is nothing but varied collections and compounds of subatomic particles all obeying the value-devoid laws and principles of quantum mechanics, where is any higher meaning?

In what follows I shall be hoping to show that long standing difficulties and incompatibilities of this kind between science and human values generally need no longer apply, that science is changing its way of thinking, has a new outlook and new world view, and that the changes point the way to a much more congenial relationship between religion and science.

In the past, efforts to join these two historical adversaries have generally taken a rather one-sided approach asking in effect that religion mend its ways in order to better conform with the facts and world-view of science, but with no similar request that science, on its side, also mend its doctrine to better meet the joint needs. On our present terms, it becomes a two-way compromise: Religion on the one side gives up dependence on dualistic concepts, while science, on the other, gives up much of its traditional materialistic legacy including decades-old behavioristic, reductionistic, probabilistic, mechanistic, and deterministic principles. These respective "compromises" are not called for, of course, merely to serve the purposes of this merger. They have, in each case, been justified in advance, and apply on their own merit.

The revisions in science I refer to have advanced farthest, and are most clearly manifest in the mind-brain, and behavioral, sciences in what has come to be called the "consciousness" or "mentalist" revolution of the 1970's. A broad shift of conceptual framework or scientific paradigm is involved, a shift in psychology from objective behaviorism to a more subjective cognitivism, from the old reductive materialism to a new more holistic mentalism. The outcome today brings revised concepts of brain and consciousness, of free-will and the inner self, and of the make-up of human nature in general. But the revisions include also changes in basic concepts of causation and of the nature of physical reality and therefore extend beyond the behavioral sciences. They carry relevance for all science. In brief science emerges with a changed image, and a different philosophy and conception of nature. The new scientific beliefs about human nature and reality lead in turn to changes in the kinds of values science can support.

Rather than review these developments as they relate to brain and consciousness as I have repeatedly done in the past (Sperry, 1969-1983), I plan, in what follows, to pursue instead some of the more broad implications of these recent revisions as they pertain to science in general, especially to possible convergence of religion and science.

If One Accepts Science, What's Left to Believe In?

We can start by first considering a more general, preliminary question, one that usually raises the greatest popular concern, namely, what would remain on which to build religious belief if we were to fully accept the world view of science and therefore to exclude everything that science disavows? This would seem to require firstly an exclusion of all dualistic, supernatural and otherworldly forms of existence for which the empirical evidence and scientific progress seem increasingly to disclaim. In other words, if we eliminate ghosts and angels and otherworldly forms of deity, devils and dryads and dualistic spirits of all kinds, myths of heaven, hell, astrology and the hereafter, witchery, the occult, the mystic, the paranormal and everything else that modern science rejects, what would we have left to believe in?

The answer, of course, is: plenty—especially on our revised mentalist terms. No one yet has described another realm of existence, creation or creative forces that even remotely compares in the vastness, complexity, diversity, wonder, and yes, beauty and meaning, with the real world revealed and described by modern science (including the human and social sciences). On our current revised terms that emphasize emergent holistic and transcendent qualities, the insights of science give added, not lessened, reasons for awe, respect, and reverence. Much of what follows is concerned with further explanation, amplification and refinement of this introductory generalization.

Pantheism Made Palatable

Combining the revised worldview of science with some updating, redefining and translating of religious concepts to bring them into harmony, would seem to lead toward what might be classified as a "naturalistic" or "scientific" theology, or, more formally, as a type of "pantheism" defined, not in the old Roman sense, but in modern usage as a theology that equates God with the laws and forces of the universe. What the recent consciousness or mentalist revolution in psychology does in this context, is to make pantheism, or a "scientific theology" as Burkoe (1981) has described it, much more palatable and credible than formerly had been the case.

Equating God with the laws and forces of the universe is not a particularly transporting prospect, so long as our most respected authorities on the nature of these laws and forces continue to teach that the forces in question are blind, impersonal, shaped by chance, insentient, lacking in vitalistic or animistic qualities, without cognition, feeling, or purpose, and that all human nature and the world are best understood in the value-devoid, quality-devoid concepts of quantum physics.

Our new views today would change all that. The nature of the changes can be illustrated with reference to the old discarded doctrine known as *vitalism*, in the life sciences.

Vitalism without Mysticism

Early biologists hoped to find the secret to life in the form of special vital forces that distinguish the living from the non-living or the animate from the inanimate. When they started looking into living things, however, no special vital forces could be discovered. The longer, the harder and deeper they looked, the more firmly biologists became convinced that there are no such things in this world as special vital forces. Instead, we concluded that all living things are nothing but physico-chemical processes in different forms and degrees of complexity, and that all life can be explained, in principle, by the laws of physics and chemistry. The idea that there exist any distinct "vital" forces came to be known as the doctrine of "vitalism" and by the 1930's had already become a subject of scorn and derision among nearly all biologists and remains so to this day.

What happened is that we biologists had been searching in the wrong places. You don't look for vital forces among atoms and molecules; you look instead among *living* things, i.e. among living cells and organisms acting and interacting as entities. You look, for example, among animals responding to each other, breathing, eating, running, flying, swimming, reproducing, nest building, etc., etc. Among such actions and interactions of living things one finds plenty of evidence for vital phenomena, forces, laws and properties that are not to be found anywhere among inanimate objects nor among the molecules of which the living are constituted. In other words, the special vital forces that distinguish living things from the non-living are emergent, holistic properties of the living entities themselves. They are not properties of their physico-chemical components nor can they be fully explained merely in terms of the physics

and chemistry. This does not mean they are in any way supernatural, mystical or dualistic. Those who conceived vital forces in supernatural terms were just as wrong as those who denied their existence. These higher, vital, holistic phenomena and properties of living things are just as real, and just as cause-effective, and deserving of scientific recognition as are the properties and laws of molecules or atoms, or electrons and protons.

When reductionist doctrine tried to tell us that there are no vital forces, just as it also had long taught that there are no mental forces, materialist science was simply wrong. Biological theory in this case was concentrating on the mass-energy or material components of living things and neglecting to appreciate the role of the non-material space-time components which also are critical. In anything living or nonliving, the spacing and timing of the material elements of which it is composed make all the difference in determining what a thing is.

The non-material space-time components, even when recognized, tend to be thrown out and lost in the reduction process, as science aims toward ever more elementary levels of explanation. If we think of things in terms of a mass-energy, space-time manifold, it can be seen that the space-time infrastructure gets short changed in our traditional mass-energy interpretations.

The modern molecular biologist is quite willing to recognize the power of chemical or molecular forces and to grant scientific respectability to the laws that describe their interactions, even recognizing the critical role played by the inner spatial and temporal configurations. When the entities are no longer molecules, however, but living organisms, the reasoning suddenly undergoes a flip-flop change.

For many decades, science has been teaching that we and our world are composed of nothing but aggregates of electrons, protons and other subatomic elements. This overlooks the fact that it is the differential non-material spacing and timing of these elements, as much as the material elements themselves, that mainly causes the world to be what it is.

Downward Causation

The point here is not only that new forces and new laws of the universe emerge at higher levels and that the higher cannot be fully explained or understood in terms of the lower, as has frequently been noted in the past—nor even that it is largely the new non-material space-time factors as well as the material components, that determine the nature of reality.

The further point that changed all this story in the past decade, from the status of occasional philosophy and minority science to that of the practicing dominant doctrine in psychology is the new stress on causation, i.e. the idea that in the reciprocal interaction of lower and higher levels the higher laws and forces (once evolved) exert downward causal control over the lower forces. The lower level forces in any entity are enveloped, overwhelmed and overpowered by the higher.

In scientific theory this means that the trajectories through space and time of most of the atoms on our planet are not determined primarily by atomic or subatomic laws and forces, as quantum physics would have it, but rather are determined by the laws and forces of classical physics, of chemistry, of biology, of geology, of meterology, of psychology, even sociology, politics and the like. The molecules of all higher living things, for example, are not moved around in our biosphere so much by molecular laws and forces as they are by the living, vital powers of the particular species in which they are embedded. Such molecules are flown through the air, galloped across the plains, propelled through the water, etc., not by molecular forces (nor by quantum

mechanics) but by the specific holistic vital properties possessed by the organisms in question.

Much of this seemed a matter of common sense and direct observation until science came along and began telling us otherwise. Ever since, there has been a growing conflict of worldview between scientists and the rest of society. The conflict is felt most acutely among the humanities and especially among those disciplines most concerned with moral values. What we are saying here seems to be, in effect, an admission that the humanities and common sense were on the right track all along in these matters while we in science were misled.

The errors are now being corrected, however, and any differences in language, ideas and beliefs that remain between scientists and the rest of society are not different in kind from those between two distant sciences. The profound conflict of worldview disappears.

The New Physics

It must be cautioned at this point that these kinds of worldview changes have to be distinguished from the sometimes similarly described—but actually quite different —renovations brought about by recent developments in theoretical physics, referred to in some places as the "new physics." In contrast to the downward control concepts described here, the main theoretical change in physics adheres to the reductionist approach and is concentrated on the nature of the ultimate particles of matter as cosmic essence, suggesting that these ultimate entities are not so particulate, nor so separate as once thought, and are better described in probabilistic energy terms. These changed views of subatomic events have been very questionably extrapolated to the macroscopic realm as well by some writers, with analogies to Eastern religion and Taoism, inferring that macroscopic phenomena also are less material and machine-like than formerly supposed.

When physicists found that classical Newtonian laws didn't work any more for elementary particles but that a new theory, quantum mechanics, did work, they accordingly abandoned support for the old Newtonian doctrines in favor of the new quantum theory. The new theory was taken to be a more accurate and more comprehensive description of nature. This is rejected in our present thesis on the grounds that the subatomic properties, laws and forces, regardless of their nature, are, anyway superseded by forces operating at higher macroscopic levels. There is no way quantum mechanics could replace classical mechanics for things larger than molecules. Quantum theory cannot handle the pattern factors that the classical laws naturally incorporate. Neither is wrong; we need both. But for different things. If our thinking is correct here, it is not legitimate to extrapolate from the nature of subatomic events to the world at large. The emergent entities at higher levels contain, envelope and control the properties and expression of the elementary particles. So the common world at the macroscopic level is better described in the framework of the old classical Newtonian physics, plus biology, geology and the other sciences. The world is not all dancing energy or "charm" just because the ultimate building blocks seem to be of this nature.

Purposiveness in Natural Law

Materialistic thinking commits similar errors when, in line with reductivist doctrine, it teaches that the forces and laws of the universe are blind, impersonal, purposeless and uncaring. Among all the forces that impinge on mankind affecting our welfare and future, none is of more prominent and critical importance than the forces of human society by which we are surrounded and which, of course, are often personal, caring and replete throughout with purpose. The kinds of forces embodied in society, in family, friends, politics, legislation, urban development and all the rest, including the

expression of ethical, moral, and religious values, are all part of the natural order. Even below man, evolution as it progresses acquires a directionality and a complex self-built design with higher level controls that hardly fit the old mechanistic concept of a blind purposeless machine. Evolution can be viewed as a gradual emergence of increased purposefulness among the forces that move and govern living things.

The point is that human nature and these higher kinds of controls in nature don't reduce any more to physical and chemical mechanisms, but have to be reckoned with now in their own form, in their own right. Vital, mental, social and other higher forces, once evolved, become just as real as the evolved forces of molecules and atoms and must be given their due, over and above the elementary physical components. It will be evident that Pantheism or any theology that perceives God as equated with, or immanent in, the "laws and forces of the universe" comes out on these terms with a set of values and beliefs very different from those based in the traditional reductionist interpretations of materialist science.

The creative process in evolution involves control variables, forces and pressures operating at many different levels from the submolecular up to the ecologic, metereologic and even astronomic in that the sunlight, seasons, phases of the moon, tides, etc. are all ultimately involved. The whole process depends on genetic mutations at the molecular level and, although the physical chemist might not agree, we can concede with the French biochemist Jacques Monod (1971) that the genetic mutations are a matter of chance at least from biological perspectives. But this does not mean, as Monod and other reductionists infer, that the whole process and course of evolution is governed ultimately by chance.

Most of the 'chance' mutations prove lethal and are disposed of, not at random but according to the way they fit or don't fit into the developmental design of the species in question, itself a complex product of eons of evolution. Among the few mutations that survive the developmental constraints, there are many more 'natural selection' pressures which control the further survival and fate of mutants that also are not matters of chance but products again of eons of acquired evolutionary design.

Among these higher selection pressures that include the competition for mates there are pressures and principles at work that move the creative process toward ever improved, more competent, more attractive and more diverse life forms. Even beauty is selected for, as in mate preferences and in flower preference among pollinating birds and insects, etc. It is these higher laws and forces at the organismic, ecologic, and still higher levels that are in command in the creative process as much as or more than the events at the genetic level. It may all have started initially at the molecular level but as the process evolves, it incorporates space-time design, pattern and form factors at higher levels that, once established, become just as real and causal as those at the molecular level.

One can agree that the scientific evidence speaks against any preplanned purposive design of a supernatural intelligence At the same time the evidence shows that the great bulk of the evolving web of creation is governed by a complex pattern of great intricacy with many mutually reinforcing directive, purposive constraints operating at higher levels, particularly. The 'grand orderly design' is, in a sense, all the more remarkable for having been self developed. To deprecate the higher emergent properties on the basis of their initial elemental building blocks is to further the error of materialistic thinking and another form of the reductive "nothing but" fallacy.

These revisions apply as well to nontheistic efforts to use science as a basis for the social or moral order as in the case of Karl Marx, Jacques Monod, or today's 'secular

Humanists'. Until very recently, the acceptance of science has meant embracing the philosophy of materialism along with the interpretations of human nature and society which this implies. Marxism upholds values and a worldview that are substantially opposed to the ones that would emerge from a system based on science as we here understand it. In Marxism, what counts in shaping the world and human affairs are the actions man takes to fulfill his material needs. But this overlooks the key principle of downward causation. Under the mentalist view, traditional reductionist interpretations emphasizing control from below upward are replaced by revised concepts that emphasize control from above downward, so the higher idealistic properties that have evolved in man and society can supersede and control and take care of the more primitive needs.

The espousal of science by the Marxist, Monod and many others, including the secular Humanists, has usually meant also the rejection of institutional religion. This seems a mistake, especially with world conditions as they are. More than ever there is need today to raise our sights to higher values above those of material self-interest, economic gain, politics, production power, daily needs for personal subsistence, etc. to higher, more long term, more godlike priorities.

Convergent Values and Beliefs

What this recently revised outlook in science might mean for a merger with religion, and for the kind of value-belief system, ethic and theology that might emerge has yet to be developed. Concepts of salvation, transcendent meaning, ultimate value and such like would have to be redefined and translated into a reference frame consistent with the worldview of science. The task can be likened in some respects to that of trying to deduce what form religion and the teachings of Christ, Muhammed, Buddha, Confucius, and other founders, might have taken, if Copernicus, Darwin, Einstein, and all the rest had come before their time instead of after. It is something that would take time to develop and many volumes to describe in full, with separate books for each religious view and denominational variation. A long effort over some two decades has been made in this direction for Christianity by Ralph Burhoe and his associates with their journal *Zygon* and the *Institute of Religion in an Era of Science*. But, of course, the general idea of bringing religious belief into harmony with scientific reality is centuries old and widely apparent in liberal theologies.

From the standpoint of science, one can foresee at least a few broad generalities that derive from the constraints set by science, and would seem to apply in common across the board to any value-belief system or theology derived on our current terms. As already mentioned a central requirement imposed by science would seem to be a relinquishment of dualist concepts in conformance with the explanation of mind in monist-mentalist terms. Such a shift from various dualistic, otherworldly beliefs to a monistic, this-world faith, would mean that our planet should no longer be conceived, or treated, as merely a way-station to something better beyond. This present world and life would thus in each case, acquire an added relative value and meaning.

Scientific doctrine regarding evolution, causation, and the current concepts of emergent forces and downward control would also appear to exclude any distinct separation of evolving creation from the intrinsic creative forces or force system. In this sense, science supports Sponoza's contention that the Creator and Creation cannot be separated. The two of necessity become intimately interfused and evolve together in a relation of mutual interdependence. Thus, what destroys, degrades or enhances one does the same to the other.

Creation itself therefore, i.e. all evolving nature including the human brain and human psyche logically takes on a relative degree of sacredness not present in dualistic thinking where the things that are most sacred are set apart in another form of existence.

When we relinquish authoritarian, otherworldly criteria and make values referent to this-world reality in accordance with the worldview of science, values are no longer absolute or infallible, though some aspects of reality are relatively constant. If reality changes, however, as it has in respect to human numbers, ethical and moral values also change. Even the sanctity of human life is not immune, does not fully escape the laws of mathematics or of supply and demand, nor the demeaning effects of excessiveness. Overpopulation becomes doubly immoral, not only because of the effects on the biosphere in general, but also because of the effects on the quality, value and meaning of human life itself. We customarily recognize a kind of beauty and added worth in rarity and vice versa. The growing sense of valuelessness and meaninglessness in modern society can be correlated in no small degree with the very real increased expendability and anonymity of the individual caused by today's overwhelming numbers.

Human nature evolved in small communities where individuals counted, heroic leaders were possible, contrasts were everywhere, and life was in close harmony with nature. When we compare this with today's faceless hordes of massed humanity struggling for what is often a socially meaningless existence in the larger overcrowded cities of our world one has to wonder if something isn't morally very wrong. Trials and degradation in this life may not matter so much if there is an eternal hereafter to look forward to, but in the absence of dualist futures, this-world reality becomes a much greater concern. It is along the foregoing and related lines that the current revisions in the worldview of science, when merged with theology, are seen to lead to value perspectives that make it immoral, even sacrilegious to pollute, to overpopulate, to waste irreplacable resources, to carelessly exterminate other species or in any other way to destroy, degrade, or desecrate the quality of the biosphere for coming generations.

Frequent Misgivings

Many religious believers hold that it is impossible to join religion and science on the terms described above without seriously undermining or destroying religion. To have to give up dualistic beliefs in a personal deity that is omniscient and caring, or belief in an immortal soul that survives bodily death along with the kind of added purpose and life meaning these endorse, seems for some people like having to give up the very essence and central core of religious faith. It is argued that such dualistic beliefs satisfy deep emotional needs in a way that a 'scientific theology' never can and that mankind throughout history has universally in all cultures depended on otherworldly spiritual beliefs of this kind.

In partial answer, one can point to recognized religions that lack a personal deity and to deeply religious persons, including religious leaders, who have conceived of God in nondualistic terms. One can also point to the many 'nonbelievers' of today, to the Communist world, to the secular Humanists, agnostics and adherents of 'liberal' faiths that collectively make up a substantial fraction, if not the majority, of the world population. It has already been mentioned that the scientific view of man's creator, perceived in monistic mentalist terms, need not be strictly impersonal, purposeless and uncaring, as was the case with reductive scientific materialism. From the viewpoint of the human species as a whole one may think of evolving nature in impersonal terms, especially if cultural evolution is omitted, but from the personal standpoint of the in-

dividual the perspectives become quite different. When it comes to the individual personal perspective, the parents and ancestors obviously have to loom very large among the forces of creation. So also do other family members, friends, teachers and the whole community of people by whom the individual is influenced and who thereby help to create the kind of person one becomes. In adulthood, one's mate and other intimate relations have to be included among the important movers and shapers of the human psyche.

In other words, the importance of religion fulfilling personal emotional needs and life meaning of this kind would not need to be deemphasized or lost but only retargeted into this-world reality. With public faith oriented in this direction, one could expect relevant changes in the structure and institutions of religion and society that would make them better suited to handle these kinds of needs. The current success of cults like the Hare Krishna, and the Moonies and others is probably not based so much on anything distinctive about their otherworldly doctrine as upon their this-world practices that use "togetherness," communal effort and related things that help fill unsatisfied psychological needs.

In further reference to a scientivc view of man's creator, one should not forget the cultural components of human nature and that our changed concepts resolve the 'two cultures' conflict and make science continuous with the humanities (Sperry, 1982). Historical and related humanistic truths and concepts may often be as valid and important in creating modern civilized man as are those double-checked by science. Strict separations between science and the humanities, between fact and value, do not hold as they used to in materialist thinking. Valid insights contributed from the humanities have to be included. What counts is validity. Science is emphasized because of its rigorous standards for validation. Also, science, like revelation, takes us beyond the bounds of ordinary experience. Science gives deeper insights into the nature and meaning of things. It helps clear the mystery and show the way. It enables us to get a better and more intimate understanding of the forces that made, move and control the universe and created man.

Along with the higher human factors, the scientific view includes also, of course, the cosmic and the subatomic and everything in between—the grand overall design of the evolving web of creation of which we are each a part, and the whole matrix of multinested inner forces and energies involved. To adequately visualize or conceive something of such enormous complexity in a single image of concept is hardly possible and the tendency to simply personify the whole is understandable. There is nothing wrong with personalizing a difficult concept if we realize what we are doing and do not take it literally, especially in the privacy of one's own belief where it does not affect others.

After-life Alternatives

Doubts about the possibility of joining science and religion are usually strongest in respect to "after-life" concerns. This is where the conflicts are most acute and seemingly irreconcilable and where it is most difficult for science to compete with dualist faiths in fulfilling related emotional and psychological needs. Everything in science to date seems to indicate that conscious awareness is a property of the living functioning brain and inseparable from it. The conclusion from mind-brain science seems inescapable that the conscious self, as we ordinarily experience it, does not survive brain death.

Despite the seemingly discouraging prospects of the scientific position, there are some plusses to consider, a few of which seem appropriate to mention because of relevance to our present argument. As pointed out by Popper (Popper and Eccles, 197) among others, death adds greatly to

the meaning and value of life. What illness does for the appreciation of health, death does for life. Conversely the depreciation of this life and this world by the assumption of a "better beyond" and an "eternal hereafter" leads to a "way-station" perspective on life that in monistic thinking is degrading to the most sacred gift the universe offers. When the many related pros and cons are weighed concerning the alternatives of a world with, and a world without death, the balance appears to come out very heavily in favor of nature's having made the right choice. The prospect of a biosphere without death is to science a contradiction in terms and irreconcilable with evolution and the creation of man.

Varying dualist versions of what aspect or form of the human psyche can survive brain death are, of course, numerous and tend to be vague and conflicting. If we start from scratch and ask in the light of modern knowledge what aspect of the conscious self would be best to preserve, from the standpoint of cosmic design and all things considered, the possibilities allowable by current mind-brain theory are not all negative. In fact, if the aim is to capture and preserve beyond brain death the conscious Self in its very highest form, then an argument can be made that this is, in a sense, provided for in realistic terms in the new mentalist view of the mind-brain relation. The most important thing about the human psyche in this view is not the atomic, molecular, or physiologic infrastructure but rather the supersedent mental events, forces and properties, per se. When it comes to selecting the best of the mental experiences, in the sense of the most highly evolved, there is reason to think that the best is not represented among the everyday thoughts, feelings, wants, fulfillments and other common experiences associated with bodily subsistence and welfare. One looks rather to the higher special peaks in the mental life, and not to the living neural substrate of these but to the transcendent mental content itself that emerges at the very top of the multinested neuro-molecular-atomic-subatomic brain hierarchy. On such terms one can then infer that perhaps the essence of the very best of the conscious self of Beethoven, of Shakespeare, Michelangelo, etc., are still with us. We can't all be Beethovens, of course, or Leonardos, or Edisons, or Darwins, etc., but there are ways in which the highest aspect or form of the conscious experiences of each individual can realistically be extended in this manner to exist beyond death of the neural substrate that originally sustained it.

The evolving spirituality of man has risen through progressive stages of increased insight and sophistication. Just as abandonment of the belief that the sun was driven across the sky each day by the sun god Apollo subsequently led to more sophisticated, more appealing theology, so also with the called-for abandonment of dualistic concepts on the one side, along with materialistic ideologies on the other hand, one can hope and expect to see our belief systems in the future evolve to higher more sophisticated levels.

In Summary

Prospects for a union of religion and science are much brightened by recently changed views of mind-brain interaction that carry implications for all science. Traditional reductive materialist interpretations of science emphasizing causal control from below upward are replaced by revised concepts that emphasize the control exerted by higher emergent forces from above downward.. Conventional focus in science on the role of material, mass-energy components in determining the nature of man and the universe is countered by an increased emphasis on the crucial causal role played by the non-material space-time, pattern or form factors.

The molecules and atoms of our world are seen to be moved (their space-time trajectories determined) not so much by atomic

and molecular forces, as long predicated in science, nor by quantum mechanics, but rather by higher level forces such as manifest in classical physics, biology, psychology, sociology, etc., that are not reducible in principle to the fundamental forces of physics. Mental and vital forces, long excluded and denounced by materialist philosophy, are reinstated in nonmystical form to their rightful role, further undermining the case for dualist philosophy.

The whole concept of natural law as a foundation for moral judgment is significantly revised. Natural law can no longer be set apart from, or in contrast to social, humanist or positivist frameworks because it now includes these in the upper levels of a continuous hierarchic structure. On these new terms, a naturalistic, scientific, or pantheistic theology is seen to yield a moral framework and outlook that has new credibility, satisfying spiritual and esthetic appeal and at the same time promotes values that would appear to be of the type needed to counter current global trends toward worsening world conditions.

REFERENCES

Burhoe, R. W. *Toward a Scientific Theology*, Ottawa, Christian Journals Limited, 1981.

Monod, Jacques, *Chance and Necessity*, New York, Alfred A. Knopf, 1971.

Popper, K. and Eccles, J., *The Self and Its Brain*, New York, Springer International, 1981 (corrected version of 1977 original).

Sperry, R. W. A Modified Concept of Consciousness, *Psychological Review*, 76, 532-536, 1969.

Sperry, R. W. In Search of Psyche, In F. G. Worden, J. P. Swazey and G. Adelman (Eds.) *The Neurosciences: Paths of Discovery*, Cambridge: MIT Press, pp. 425-434, 1975.

Sperry, R. W. Changing Concepts of Consciousness and Free Will, *Perspectives in Biology and Medicine*, 20: 9-19, 1976.

Sperry, R. W. Some Effects of Disconnecting the Cerebral Hemispheres, *Science*, 217: 1223-1226, 1982.

Sperry, R. W. *Science and Moral Priority*, New York, Columbia University Press, 1983.