

SENSES OF REALITY IN SCIENCE AND RELIGION: A NEUROEPISTEMOLOGICAL PERSPECTIVE

by Eugene G. d'Aquili

Abstract. The phenomenology of certain mystical states is contrasted with the sense of "baseline" reality in an exploration of primary senses of reality. Nine theoretical and eight actual primary senses of reality are described. A neurophysiological model is presented to account for these states, and their possible adaptive significance is considered from an evolutionary perspective. Finally the state of absolute unitary being is contrasted with baseline reality, and their competing claims for primacy are evaluated in an epistemological context.

Reality is a concept which probably can never be defined without begging the question. We can state that reality is a very strong sense of what is, but we probably cannot go much further than that. A sense of reality is equivalent to what I call a primary epistemic or knowing state. These states are primary because they are not derived from sense perception but rather define the form of what is perceived. Hence they are *a priori* states. What makes them define reality for a particular person is the individual's sense, when he is in one, that what he is experiencing is fundamentally or ultimately what is, and that any other perception of reality is illusion or deception. In my research, both with psychiatric patients and with nonpatient subjects, attempting to understand what have come to be known as altered states of consciousness, I have developed the following model to help understand the various primary epistemic states or primary senses of reality. I have divided primary senses of reality along three parameters: (1) perceptions of either unitary or multiple discrete being, (2) relationships that are either regular or irregular, and (3) affective valences that are either positive, negative or neutral. Using this system

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one can derive logically nine primary sensory states without involving internal contradiction. These nine states are:

1. multiple discrete reality—regular relationships—neutral affect
2. multiple discrete reality—regular relationships—positive affect
3. multiple discrete reality—regular relationships—negative affect
4. multiple discrete reality—irregular relationships—neutral affect
5. multiple discrete reality—irregular relationships—positive affect
6. multiple discrete reality—irregular relationships—negative affect
7. unitary being . . . —neutral affect
8. unitary being . . . —positive affect
9. unitary being . . . —negative affect

One can see that we have left out of this list the categories of unitary being perceived as having either regular or irregular relationships. This is because such categorization would involve an internal contradiction. Regularity or irregularity of relationships is possible only when relationships exist between multiple beings. If there is a perception of absolute unitary being, there can be in fact no relationship between elements so that all categories based on relationships, whether regular or irregular, fall out as being internally contradictory. In other words, it simply is not possible to perceive either regular or irregular relationships when there are no elements to relate.

Of these nine logically possible primary sensory states it appears that only eight actually exist. I have been able to find no evidence either from the literature or in my practice that the state of unitary being with a negative valence exists. We shall discuss below this curious omission of a logically possible primary sensory state. Of the remaining eight primary sensory states three are stable and three unstable, while the seventh and eighth are unique categories involving absolute unitary being, the characteristics of which I will describe below.

DESCRIPTION OF PRIMARY STATES

The first six states all involve the perception of what I call multiple discrete reality. In each of these states a person perceives through his senses individual entities and relates them to one another in various temporal, spatial, and causal relationships. The first of these states involves the perception of discrete entities that are related to each other in regular ways, for example, in predictable ways. The affective valence in this world perception is neutral. I will refer to this state as the "baseline" state. It is the primary knowing state that most people are in most of the time. I presume it is the state that most readers are in at this moment; for example, most of us are quite certain of the reality of the furniture and people surrounding us. I am sure that very few if any of us would question the fundamental reality of the

state we are in. It is precisely because this state appears certain while one is in it that it is a primary sense of reality. Furthermore, most people would consider this state as the only reality or the only valid epistemic state. However, the fact of the matter is that not only is this sense of reality not unique but there are two other *stable* perceptions of discrete reality which are also primary. These other two states resemble the state most of us are in most of the time in that the regularities of time, space, and causality are the same and in that there is the perception of the same discrete entities. Where they differ is in the affective valence, positive or negative, of the perception of the world.

The second primary sense of reality involves the same discrete entities and regularities as the baseline ordinary state of most people's perception, but it involves as well an elated sense of well being and joy, in which the universe is perceived to be fundamentally good and all its parts are sensed to be related in a unified whole. There is often in this state a sense of purposefulness to the universe and to man's place in the universe. This sense of purposefulness may defy logic and certainly does not arise from logic; nonetheless it is a primary stable perception. The onset of such an exhilarating view of reality is usually sudden and has been described as a conversion experience by a number of people. It has been described over and over again in the religious literature of the world. In the psychiatric literature it was most carefully described by Richard M. Bucke in a remarkable book, *Cosmic Consciousness*.¹ Bucke's great experience occurred in 1872 when he was thirty-five years old, while he was walking home after an exhilarating evening discussing poetry with some of his friends. He was thinking of nothing special when suddenly he felt an overwhelming state of happiness, comprehension, universal understanding and love, accompanied by a sense of being enveloped or illuminated by an extraordinary, rosy light. In his magnum opus, Bucke presented evidence of similar experiences in the lives of a number of people including the Buddha, Socrates, Saint Paul, Francis Bacon, Blaise Pascal, Benedict Spinoza, and William Blake as well as many of his own contemporaries. His whole subsequent life was affected by this experience, and he personally considered it to be a phenomenon of both religious and Darwinian evolutionary significance.

I have either treated or known five people who have had this experience. In each case the individual attests that his life has been transformed. The state is remarkably persistent and enduring over time; I have had only one experience of a person who lapsed from that state into the ordinary baseline perception of the world. The others maintained that perception of purpose, beauty, reason, and sense in the universe for many years; in the literature people who are

described as having had this experience generally have it for the rest of their lives. In fact, in the one case with which I am directly acquainted of a person who relapsed to the baseline state there is some question about whether he did in fact have the full-blown experience.

This state, which we shall call "cosmic consciousness" after Bucke, is indeed a primary epistemic state, because the individual will often look with a sense of pity at those who have only the baseline perception as if they are living in a state of great ignorance. Persons having cosmic consciousness are not in any way psychotic, do not satisfy the criteria for any serious emotional or mental disorder, and in no way have a sense of living an illusory existence. In fact their perception is that the average person lives an illusory existence. Very often such individuals with cosmic consciousness go through life attempting to help others to have the perception they have had, which has transformed their lives and their view of the world.

We now come to the third primary sense of reality which is also a very stable one. This sense of reality is like the first two in that it deals with the world of multiple discrete beings and has the same high degree of regularity of causal, spatial, and temporal relationships. It differs from the first two in that the basic affective valence toward the perceived universe is profoundly negative. This has been dubbed *Weltschmerz* in the psychiatric literature and consists of a sense of exquisite sadness and futility, as well as the sense of the incredible smallness of man in the universe, the inevitable existential pain of the world, and the suffering inherent in the human condition. Often there is the perception of the whole universe as one vast pointless machine without purpose or meaning. A mild form of this often occurs with high school or college students and other young adults. In its full-blown form, however, it is similar to the cosmic consciousness or illumination described above in that it occurs with a suddenness that leaves the individual totally perplexed. Since 1969 I have treated twelve individuals, who came to me with this as a problem in the full-blown form, and all but two experienced it with sudden onset. Usually the individual wakes up with a profound sense of loss and meaninglessness to the world which never leaves. It is the basic sense of reality which appears to underlie much existentialist thought, particularly in French existentialist literature. It is the sort of perception in which the universe is apprehended not in any way as neutral but as essentially absurd, and often suicide is thought to be the only truly human response.

Interestingly enough, of the five examples of what I have been calling cosmic consciousness that I personally have studied only two were being treated as patients. Of the twelve examples of full-blown *Weltschmerz* all were psychiatric patients. This probably reflects the

fact that this latter epistemic state is profoundly dysphoric, and people seek relief in spite of the fact that they perceive this state to be ultimate reality. In other words, when these people ask for relief they are basically asking to be taught to think in an "illusory" way so that they can survive; they are not asking to be restored to reality. All individuals in this state firmly believe that this negative view represents the inner fundamental nature of reality. They simply come to a psychiatrist in the hope that they can be made to forget it or not attend to what is fundamentally real in order to alleviate their suffering.

Weltschmerz, like the preceding two primary epistemic states, is very stable and usually lasts for many years and perhaps a lifetime as witness a number of existentialist writers and philosophers. However, in my experience it does seem to be somewhat less stable than cosmic consciousness and certainly less stable than the baseline state, because a number of people do revert to the baseline state either spontaneously or else as a result of the process of psychotherapy. In terms of the dimension of stability it is still an open question which must be investigated whether the baseline state and cosmic consciousness differ in their stability, but it does seem true that *Weltschmerz* is somewhat less stable although it can and often has lasted from the time of onset throughout the person's life. In fact in a few sad cases life has been terminated by suicide. So much for the stable primary epistemic states. Let us now turn to those senses of reality which are unstable.

UNSTABLE STATES

There are three unstable primary senses of reality which parallel the three stable ones which we have just mentioned. In all cases their instability arises from the fact that to a greater or lesser extent the temporal, spatial, and causal relationships between the discrete elements of perception are distorted, in other words, these relationships are unpredictable or bizarre. These states usually last minutes to hours and on rare occasions for a few days, but they usually do lapse into one of the stable primary states within a short period of time.

Dreams and various drug experiences can be subsumed under this heading. As with the stable primary states they are differentiated according to affective valence. In everyday experience everyone has had dreams which have been very positive and elating, dreams which have been very negative (such as nightmares), and neutral dreams. The same affective valencing goes along with various drug-induced states. Thus the trip that one has with LSD or other hallucinogenic drugs can either be incredibly elating or profoundly disturbing. Quite literally these states can be described either as heaven or hell and often are so described by people who have had them. More rarely a

drug trip can be neutral in terms of affective valence. Although rare this is not unknown and has been fairly frequently described in the psychiatric literature.

These three states merit the appellation of primary epistemic state because, as with the stable states, the person perceives what he experiences as reality during those states. Of course once an individual lapses into one of the stable primary epistemic states he perceives his experience on the drug as an illusion, delusion, or hallucination. This judgment is consistent with the nature of primary states, for once a person has reverted to a stable state he is in another primary state, and it is the nature of a primary state to perceive as reality what is structured by that state. He would therefore necessarily perceive what he remembers from a drug experience or from a dream as an illusion or a distortion.

ABSOLUTE UNITARY BEING

We now come to the seventh and eighth primary senses of reality, both of which involve what I call absolute unitary being. The seventh sense of reality comprises absolute unitary being marked by neutral affect and the eighth sense of reality is comprised of absolute unitary being suffused with positive affect. Absolute unitary being (AUB) is an extremely rare state during which all perception of multiplicity of being is eradicated. Even the self-other dichotomy becomes obliterated, and reality is perceived directly as one.

I have been fortunate enough to have known three people who have had this experience. It is different from the other experiences in two significant ways. First, absolute unitary being suffused with positive affect (the eighth primary sense of reality) is different from cosmic consciousness in which the ordinary perception of everyday reality is preserved but to which there is attached a profound and intrinsic sense of underlying unity, beauty and goodness. During the eighth state there is not a *sense* of unity but rather the direct apprehension of absolute unity. Second, from the point of view of our everyday experience, this perception of reality would appear to be transient: the person experiencing via meditation or other techniques may achieve this state for minutes or hours but he clearly comes out of it. Nevertheless, it has an extremely unusual property. Unlike the other transient states, when the individual comes out of it he does not perceive it or the memory of it as illusion, hallucination, or delusion. Rather he generally perceives that state as being the fundamental reality which underlies all reality. This property also pertains to the seventh sense of reality which is absolute unitary being marked by neutral affect. Whether suffused with positive or neutral affect AUB

is the only condition of which I know that causes the violation of the rule of primary epistemic states, namely, that one believes firmly that reality is what one perceives when one is in that particular state.

This is because, when one comes out of a state of absolute unitary being (either sense of reality seven or eight), one is usually in a state very similar to what I described as cosmic consciousness: the universe is perceived as a whole, with a sense of wholeness, goodness, and purpose to it. However, it differs from ordinary cosmic consciousness in that the individual, when he is in the state of, let us call it special cosmic consciousness, does not see that state as only representing the totality of reality as perceived; rather he believes that the state he *was* in during the transient state of absolute unitary being was in fact reality, and that his current state of cosmic consciousness is only a reflection, and in some sense a distortion, of that absolute reality. Thus, although from one point of view the senses of absolute unitary being are transient (as are hallucinations, delusions, dreams, and drug trips), from another point of view they are extremely persistent in that they transform the subject's life and are adhered to as being the fundamental reality even when he is not in one of those states. This property is unique to absolute unitary being (either in sense seven or eight) since no other primary state is perceived of as ultimately real once one has moved from it to another primary state.

In analyzing the religious literature of the world's great religions which describe mystical experiences and in comparing these phenomena to my clinical experience, it appears that sense of reality eight (AUB suffused with positive affect) is most often interpreted after the experience as "God" or "union with God." Sense of reality seven (AUB marked by neutral affect) seems most often to be described in nonpersonal terms in the after-the-fact cosmological interpretation of the subject. This sense of reality seems to underlie the Buddhist experience of the Void or Jakob Boehme's concept of the "abyss." In both sense seven and sense eight AUB is perceived as the underlying reality of what is real. In sense eight it is usually theistic and personal, and in sense seven it is usually a nonpersonal "ground of being."

The ninth sense of reality, AUB suffused with negative affect, has only theoretical existence, so far as I can tell. I am not familiar with any examples from traditional religious literature, and I have certainly never come across such an example clinically. If this ninth sense of reality exists it would be the AUB analogue of *Weltschmerz*. But such an intensely negative experience may simply be incompatible with physiological homeostasis. In any case, unless positive evidence can be brought forward to demonstrate the existence of this ninth theoretical sense of reality, I must assume that it is just that, theoretical.

PROPERTIES AND EVOLUTIONARY SIGNIFICANCE OF PRIMARY STATES

The defining property of a primary sense of reality is that, when one is in a particular epistemic state, it appears certain to him as the experiencing subject that that state reflects the underlying nature of whatever exists. A corollary of this defining property is that, when one passes from one primary state to another (whether the passage is from stable to stable state, stable to unstable state or unstable to stable state), the second state is perceived to be reality and the first state an illusion. This corollary is true for all the primary senses of reality except for those involving absolute unitary being. Although these latter senses are primary epistemic states by the defining property (when one is in them they are understood to reflect the nature of whatever is), they nevertheless differ from all the other primary senses in that, once an individual has experienced one of them, he does not perceive it as illusion, delusion, or hallucination after he has passed from it to another primary state.

I must once again emphasize here that a primary sense of reality or primary epistemic state is not arrived at through reasoning, reflection, dialectic, or any other secondary mental process. It is in its totality the substance upon which any form of reasoning, reflection, or thought is based and out of which any such mental activity arises. Thus a primary epistemic state or sense of reality cannot in any way be proved. It simply exists for the person and carries with it the conscious certainty that it embodies and reflects the stuff of reality out of which perceptions, rational thought, reflection, and any other mental activity arises. Consequently no one can be argued into changing from one primary epistemic state to another. The most a person can do is attempt in a very crude and uncertain way to help a person have the sudden perception or insight required to transform one primary epistemic state to another. Of course unstable primary states can often be induced by drugs or other external agencies, but as pointed out before they are transitory and do not provide the basis upon which one's life can be founded. So when we are talking of converting from one state to another, what we are usually talking about is converting from one primary *stable* state to another primary *stable* state. What all this boils down to is a reflection on what is the nature of certainty. It is clear from what we have said above that certainty, especially with regard to the sense of reality, cannot be in any way argued or proven. It simply is in any given individual in whatever form it happens to be.

One might ask what the evolutionary significance of multiple primary senses of reality could possibly be. First of all, it seems that the baseline state (multiple discrete reality—regular relationships—neutral affect) seems to be the optimal state for questioning and problem

solving. One is neither so demoralized by *Weltschmerz* nor so elated by cosmic consciousness that the purpose of investigating, solving problems, and effectively dealing with the external environment is negated. In other words, the powerful affective stable states are not optimally disposed to consistent scanning of the environment with the intent of realizing optimal conditions for survival. In the case of *Weltschmerz* the depression and demoralization arising from this fundamental sense of reality are so great that functioning in the world is minimized and occasionally life even ended in suicide. In the case of cosmic consciousness there is such a sense of ultimate goodness and meaning in the world that disasters and even death are not feared; thus there again is less motivation for problem solving and realizing optimal survival conditions in relation to the environment but for reasons that are the polar opposite of those in *Weltschmerz*. It seems very clear therefore that what we have called the baseline sense of reality is most adaptive for most people most of the time.

However, what is adaptive about the other stable primary states? This is a question easily posed but not so easily answered. In the case of cosmic consciousness one could postulate that the elation and basic sense of goodness characterizing this state generate a feeling that death is in no way to be feared. This may be adaptive to large groups if only a few members of the group experience the freedom from fear of death. Most members of the group can accept as a *belief* that death is not to be feared in response to the convincing witness of those few who do in fact experience freedom from the fear of death in a state of cosmic consciousness. Thus the attenuation of the fear of death in a group can be highly adaptive, encouraging warriors or hunters to risk their lives. But only the attenuation of the fear would be adaptive. A total lack of fear would in fact probably not be adaptive: for all members of a group to experience cosmic consciousness would probably spell the doom of the group. Yet, if a few members experienced this state and bore witness to its implications to the others in the form of religion or other belief systems, this would somewhat diminish the fear of death and probably would result in increasing adaptability of the whole group. Thus maximal adaptive advantage would be present in a group which contained a majority who possessed the baseline, affectively neutral sense of reality but which also possessed a few individuals who could bear witness by their own experience transformed into religious belief that death is not to be feared.

The adaptive significance of absolute unitary being would in fact be similar to that of cosmic consciousness. In fact, as we have noted above, those few persons who have experienced one of the states of absolute unitary being generally spend most of their time in the state of cosmic consciousness. For the purpose of biological adaptation to

the environment all these states can be considered equivalent. In terms of their intrinsic content however they are really quite different. There is significant internal distinction among cosmic consciousness, AUB-affect positive or "God," and AUB-affect neutral or the "Void."

What the biological adaptability of *Weltschmerz* might be is a most difficult question to answer. As with cosmic consciousness it is clear with *Weltschmerz*—and perhaps the point is even more strongly made with *Weltschmerz*—that, if all or most members of the group possess it as a primary sense of reality, doom and extinction would soon come upon the group. The major question however is whether there is a more general analogy to the case of cosmic consciousness. As we have seen it is probable that the preservation of a few members of the group with cosmic consciousness is adaptive. Is it possible that a group possessing a few members with *Weltschmerz* is also more adaptive than one without any such individuals? If this is the case it is not at all clear why it should be so. It may be that *Weltschmerz* is the biological price to pay for cosmic consciousness. In other words, the obverse of the positive affect is always going to be a neutral possibility, and if the mechanism exists for the one it is highly probable that the opposite of the mechanism exists for the other. In fact it is probably the same mechanism which subserves both the positive and negative affect, the differentiation between the two probably being only one of relative facilitation and inhibition of certain neurons. What I am saying as an hypothesis is that selection was for the neural mechanisms underlying cosmic consciousness to be maintained with a certain low frequency within any given human population. The price that one pays for this mechanism is the possibility of its running, as it were, in reverse. Of course, it may be that *Weltschmerz* in a small number of persons confers an actual adaptive advantage to the group as does cosmic consciousness. But if this is so we have yet to perceive what mechanisms might be operating to make it adaptive.

As far as the transient primary senses of reality are concerned, they almost certainly represent temporary permutations and perturbations of the functioning of the neural mechanisms responsible for the imposition of the categories of space and time on reality. As temporary perturbations, they probably do not have significant biological adaptive value, and their existence is best accounted for by inappropriate functioning of the machinery underlying the stable states. This inappropriate temporary functioning may result from drugs, sleeping states, hypoxia, hypercapnia, or other transient physiological or pharmacological effects.

NEUROPHYSIOLOGICAL BASES OF THE PRIMARY EPISTEMIC STATES

In the last fifteen or so years there has been a dramatic revolution in our understanding of the neural organization of the brain and particularly of the functions of the left and right hemispheres. Pioneering research by Roger Sperry, E. Zaidel, and D. Zaidel; R. D. Nebes and Sperry; M. S. Gazzaniga; J. E. Bogen; Jerre Levy and Sperry; C. Trevarthen and many others has demonstrated beyond a doubt that the left or dominant hemisphere of the brain is intimately involved both with language functions and sequential analytic thinking.² The nondominant or right side of the brain, on the contrary, has been shown to control gestalt perceptions and generally is responsible for those aspects of mentation which involve the perception or construction of the environment as a whole or a number of wholes. Not only do the left and right hemispheres construct reality differently, but there is evidence that the left and right hemispheres actually handle incoming sensory stimuli in basically different ways.³ Recent work of S. C. Leehey and A. Cahn supports the work of R. D. Hilliard, Sperry, R. Yin, and A. Benton and M. W. Van Allen indicating that the right visual field—left hemisphere—has a clear advantage in the recognition of words whereas the left visual field—right hemisphere—has a clear advantage in the recognition of faces.⁴ The same researchers have demonstrated that the right brain dominates in the area of visual-spatial perceptions. This is of course compatible with the gestalt or holistic properties of the right hemisphere alluded to above.

There is also a considerable body of evidence indicating that there is right lateralization for emotional recognition. E. Ladavas, C. Umiltà, and P. E. Ricci-Bitli have confirmed the findings of R. G. Ley and M. P. Bryden, and M. Suberi and W. McKeever that the right hemisphere predominates in the recognition of emotionally charged stimuli in women.⁵ These researchers have found that the lateralization to the right for emotional recognition is more marked in women than in men, but H. A. Buchtel, E. Campari, C. De Risio, and R. Rota and T. Landes, G. Assal, and E. Perret have found that lateralization to the right hemisphere for emotional recognition seems to be present with men as well.⁶

What is startling from all this research is that not only the left and right hemispheres seem to be somewhat specialized for different tasks but also the highly probable conclusion that we are dealing with two separate consciousnesses within the same head. Bogen and R. Pucetti have presented evidence that the presence of duplex right and left domains of consciousness can be inferred not only after surgical disconnection but also in the intact state.⁷ Speaking of the right or non-dominant hemisphere Sperry and his coauthors note:

Incidental impressions, gained from many kinds of tests applied to the minor hemisphere extending back to the early years of testing, have never given us substantial reason to doubt the existence in this hemisphere of typically human subjective awareness. Behavior after adult dominant hemispherectomy further favors the view that a full-fledged sense of self awareness is present in the right hemisphere and becomes manifest as soon as recovery from the neurosurgical shock and diaschisis allows its functional expression. The observed recognition and identification of material learned years ago in school and of old family photographs, that other members of the family thought it highly doubtful that the subjects had seen since their surgery illustrates further the intactness of long-term memory in both hemispheres. One gains the impression that the memory system of each hemisphere at the behavioral level is more a full than a half or fractional system.⁸

In another place the same authors state: "On the basis of a wide variety of lateralized test performances we have long favored the view that the disconnected hemispheres in both animal and human subjects are separately conscious in parallel at a moderately high and approximately equal level."⁹

The presence of this gestalt oriented and emotionally integrating consciousness side by side with our rational and analytic selves located primarily in the left hemisphere has tremendous implications for senses of reality and religious intuition. We must keep in mind that there are only two ways that the right hemisphere can communicate global or holistic perceptions to the analytic left hemisphere. The first is via the corpus calosum and anterior commissure. In this case, however, the communication from the right hemisphere is presumably broken down by the left into its own verbal and analytic code, and the message perceived by the left hemisphere must necessarily be only an approximation of the original message sent from the right hemisphere. The second way the right hemisphere has of communicating with the consciousness of the left hemisphere is via its rich connections to the limbic system. Thus the right hemisphere can produce a rush of emotion and communicate a powerful sense of the validity of a gestalt perception without the gestalt itself being broken down via a left-hemispheric analytic process, which may distort the original message. An example of how the right brain may confirm what it perceives to be the essential truth of a holistic perception is the experience we all have had of being suddenly and intensely moved by hearing a line of poetry, or seeing a particularly evocative work of art. The sudden chill we experience is probably our right hemisphere of consciousness affirming what it believes to be the essential truth of what was heard or seen to the left hemisphere via a sudden limbic discharge.

I would subsume the "aha" phenomenon under this process. As we all know the "aha" phenomenon usually occurs when a missing bit of evidence or a new attack on a problem yields a sudden and emotion-

ally moving sense that we have finally grasped the whole problem and now understand it. It represents the affirmation of the truth of the wholeness of a line of reasoning once the analytic left hemisphere has struggled through the reasoning process and the evaluating of data sufficiently to put it together into a reasonable whole. Once the analytic left hemisphere receives a final bit of information which permits the reasoning process to close off in a completed form, or else once the left hemisphere analyzes the data in such a way that the solution to the problem becomes evident (which is another way of saying that the reasoning process becomes a closed system in the solution to the problem), then the gestalt right hemisphere confirms to the left what it perceives to be the truth of the new solution via a powerful limbic discharge—the “aha” phenomenon.

Since religious formulations often comprise holistic solutions to existential problems of deepest concern to us, such as good and evil, and life and death, it is not surprising that our right hemisphere consciousness may generate fairly often a powerful limbic discharge upon hearing certain religious formulations. So powerful is the emotional arousal with the presentation of a certain holistic solution that our right hemisphere can often affirm its truth while our left hemisphere may not be able to accede rationally to certain of the propositions inherent in the religious formulation. Of course what may be a powerful religious truth to one man may leave another man unmoved. There is an idiosyncratic quality to each individual's response to certain formulations. But what seems certain is that, when an individual does respond emotionally to a religious formation, it is because that formation represents a holistic solution to an existential problem which the person's right hemisphere is affirming as true.

Obviously the ability of the right hemisphere to generate such powerful emotions must depend on connections between that hemisphere and the limbic system. Although from a theoretical point of view we know this must be the case, the last ten years have provided evidence to support this theoretical conclusion. B. Jones and M. Mishkin, Mishkin, and J. Sunshine and Mishkin present strong evidence that the processing of visual information and the setting down of long-term visual memory involve a sequential hierarchy of neural structures with connections from the striated area to the prestriated area to the inferior temporal area to the ventromedial frontotemporal limbic region.¹⁰ These connections seem to represent the neocortical-limbic pathway for visual-affective association. Since this work was published Mishkin has presented further strong evidence for a similar hierarchical linkage involving tactile perception and learning.¹¹ Further, there is some evidence for similar connections between the auditory association areas, the inferior parietal lobule, and the limbic system.

Of course these neural structures exist bilaterally but are apparently functionally more active on the right side of the brain. Their existence not only permits us to understand how the gestalt perceptions of the right hemisphere can trigger powerful limbic discharges, but, more important to this paper, they provide the physical basis for the ongoing affective charge either positive or negative in certain of the primary epistemic states or senses of reality we discussed in the first part of this paper. If these structures had not evolved, the right hemisphere would be unable directly and powerfully to motivate the left hemisphere via emotional discharges. In such a hypothetical case the right hemisphere could only communicate with the left hemisphere via the corpus calosum and anterior commissure, which would require a breakdown of the right hemisphere global code into the left hemisphere analytic code resulting at least in some distortion of the holistic perception. Thus we can see that the biological basis for the affective components of cosmic consciousness and *Weltschmerz* arises from the evolution of the connection of the sensory association areas and inferior parietal lobule with the limbic system.

Let us now consider the neuroanatomical bases for the regularity or irregularity of relationships in primary epistemic states. Regularity or irregularity in relationships between elements in the environment depends to a great extent upon the imposition of the categories of space and time upon external reality. Immanuel Kant of course considered the categories of space and time to be prior to human experience. It very well may be that they are prior at least in the sense that they shape and constrain human experience and furthermore appear to arise from the functioning of very distinct parts of the brain. L. Mills and G. B. Rollman have demonstrated that the left or analytic hemisphere predominates in the temporal ordering of auditory stimuli.¹² R. Efron has shown the same predominance of the left hemisphere in the temporal ordering of visual and tactile stimuli.¹³ These data have been supported by the research of M. Jeeves and N. Dixon, and L. Swisher and I. Hirsch.¹⁴ Furthermore, A. R. Luria has presented strong evidence that the integration of successive stimuli into what is perceived as a temporal sequence appears to be related to the anterior convexity of the frontal lobes and the frontal-temporal connections.¹⁵ Furthermore, he notes that the perception of simultaneity seems to be related to the functioning of the occipital-parietal region of the brain. Taken together these structures, primarily on the dominant side (left hemisphere), seem to be responsible for the perception of simultaneous and successive events. In a word, our subjective experience of time seems to derive from these areas of the brain processing external reality. In fact lesions of these areas will cause severe distortion in the perception of time. I would contend that the irregularities of the

temporal elements in *transitory* primary senses of reality result from a functional or structural lesion in these areas. As was pointed out before there is a considerable body of evidence showing that gestalt perception of space arises from the right hemisphere of the brain, particularly the right posterior portion (occipito-parietal region). Not only is this region responsible for spatial thought but G. Ratcliff has indicated that this area of the brain underlies operations of spatial thought, specifically rotation.¹⁶ These data on the visual-spatial characteristics of the posterior portion of the right hemisphere confirm the work of N. Butters, M. Barton and B. A. Brady, G. Cohen and L. Franco and Sperry.¹⁷ Lesions in this area of the brain cause considerable distortion of spatial perception.

Since these areas of the brain are responsible for the subjective perception of space and time in everyday living, one wonders what meaning space and time may have outside of the sense that arises from these neurophysiological operators operating on external reality. Furthermore, it is interesting that M. Grossman has indicated not only that Broca's area (inferior frontal convolution) is necessary for the hierarchical and nesting structures underlying speech, but also that it seems to underlie the ability to organize structures hierarchically in general.¹⁸ If this be true, Broca's area would seem to underlie the hierarchy of nesting structures inherent in the perception of space and time. Whether this is true or not, it seems clear that the imposition of spatial and temporal relationships on reality, which is central to our organizing and understanding reality, arises from the evolution of frontal and frontal-temporal structures in the dominant hemisphere and from the evolution of the parieto-occipital region on the right or nondominant side. The stable or unstable functioning of these parts of the brain therefore provides the basis for the apprehension of reality in the regular or irregular primary epistemic states.

Finally I would like to consider the probable underlying neurophysiological mechanism for generating that unique state I have called absolute unitary being, which is the principle component of two primary senses of reality. As I have mentioned above it is an extremely rare subjective state in which there is no perception of any discrete being and in which even the distinction between self and other is obliterated. All being is apprehended as a unity. In previous papers I have alluded to the curious property that certain parts of the brain (which formally organize reality) have of generating a subjective sense of what they do in a pure form dissociated from their operating on content deriving from the external world.¹⁹ I have called these parts of the brain "operators" in that they ordinarily operate on external reality to generate a specific subjective sense. We have just talked about what I would call the spatial and temporal operators

which ordinarily operate on external reality to create a subjective sensation of space and time. The point I have made in previous papers is that it seems occasionally, under rare circumstances, the individual can have a sense of these operators operating in an absolute fashion, that is, not upon any specific objects but rather in a pure form. I have suggested that those philosophers whose intuition places change as the fundamental reality of the universe base that intuition upon the rare experience of the total functioning of the temporal operator. Likewise, the total functioning of the spatial operator may generate the basic intuition underlying those philosophies which maintain that being *per se* or substance is the underlying reality of the universe. I simply present these two instances as examples of total functioning of a particular neural operator. What I am proposing here is that those areas of the brain responsible for holistic perception of reality (primarily the parietal lobe on the right, nondominant side) can also operate in a total fashion generating a subjective sense of the absolute unity or wholeness of reality. I would propose that this absolute functioning of what I have called in another paper the holistic operator underlies the perception of reality as an absolute unity.²⁰ Since the perception of absolute unitary being represents the epistemic states most dramatically contrasted with baseline neutral regular reality, I would like to devote some space to contrasting these two powerful subjective states and to make some attempt at evaluating the claims of each for representing ultimate reality. For purposes of simplification I shall consider absolute unitary being as a single state, although in fact it is manifested as two primary epistemic states: suffused with positive affect, usually called "God" and suffused with neutral affect, usually called the "Void."

ABSOLUTE UNITARY BEING AND BASELINE REALITY

The sense that is subjectively attained through the absolute operation of the holistic operator yields the subjective perception of absolute and total unity of being without a temporal dimension. This perceived experience of unitary atemporal being is interpreted in most world religions as either a direct perception of God or as the *unio mystica* of the Christian tradition, which is a manifestation of God though not the revelation of his inmost nature. In the Buddhist tradition the experience (with different affective valence) is interpreted as the Void or Nirvana. The existence of this phenomenon of direct experiential perception of unitary atemporal being is attested to not only in the mystical literature of the great world's religions but also in the experience of a few individuals met in our day-to-day living. The experience transcends any perception of multiple discrete being, and the awareness of the subject-object difference is obliterated in this perception.

For those persons who have had it, the experience is ineffable and is frequently interpreted in terms of some wording which usually expresses a union with God or a direct experience of God. Certainly the experience does not have to be theistically labeled, and it can be understood philosophically as an ecstatic experience of the absolute, the ultimate, or the transcendent. In the post hoc description the experience may be translated as a personal God or as a totally nonpersonal experience of total being, but in any case the experience is *always* interpreted as absolutely transcendent or in some sense ultimate or beyond ordinary experience.

Whether or not the phenomenon is interpreted as the experience of God or as the experience of a philosophical absolute tends more or less to depend on the *a priori* conceptual frame of the subject. However, there can be neither doubt as to the reality of the experience nor indeed, and *this* is the most significant point, that the individuals who have that experience are *absolutely certain* of its objective reality. This experience, for those individuals, contains at the very least the same subjective conviction of reality as the subjective conviction that all of us generally have of the reality of the external world. Although it is philosophically true that we cannot prove the existence of the external world as perceived, or even of the external world *at all*, nonetheless each of us carries a subjective and pragmatic certainty of its existence. The experience of absolute unitary being carries to the subject the same or perhaps even a greater degree of certainty of its objective reality.

As a psychiatrist I am often referred by other professionals a number of patients who have difficulty determining whether certain phenomena are manifestations of a psychotic state or represent healthy, if somewhat unusual, experiences. Many older psychiatrists are convinced that any such experience is psychotic. I think that most of the recent research indicates this is absolutely not the case, and an anthropological examination of the nature of these phenomena in other cultures indicates that the healthiest manifestations do not ordinarily represent psychosis. Most shamans and magicians, for example, are not psychotic although some occasionally have been shown to be. The point I am making is that in my own practice and research I have met a number of persons, two of whom were eminent scientists who, after having had such an experience, totally altered their view of the world, one becoming a theist and the other denying materialism as an absolute philosophical tenet but still remaining agnostic as to the nature of the experience. However, even in this latter case, the subjective certainty of the reality of the experience was clear. Although these experiences are not common, when they do occur, they always seem to carry with them an absolute certainty of the objective reality

of the transcendent, the ultimate, or the absolute. This is true even in people whose orientation is materialistic, reductionistic, and often atheistic prior to the experience.

I would contend that this experience arises from what I call the total functioning of the parietal lobe on the nondominant side of the brain, or at least certain parts of that area as I have noted above. In terms of evolutionary theory these parts of the brain may have evolved in part to yield such transcendent experiences, or perhaps such experiences are a by-product of the machinery which evolved for other purposes. In any case the experience, which is well attested to phenomenologically, can be explained in terms of the evolution of the contemporary structure and function of the central nervous system. The point I would like to emphasize, however, is that such an explanation, although it accounts for the experience reductionistically from a scientific perspective, in no way alters the subjective sensation of the *objective* reality of the experience. So strong is that feeling that even such a biological analysis does not alter for most people (at least in my experience) the conviction that something objectively real has been experienced. For those few people who have experienced both realities—the reality of the day-to-day world and objective science on one hand and the reality of transcendent unitary being on the other—the problem is not one of trying to decide which is real, because these individuals say that they *know* both are real; rather the problem is of reconciling these two drastically different perceptions of reality. It is like having to develop a theory for themselves analogous in some ways to wave-particle duality in quantum physics. It is true that light has the properties of wave propagation. It is also true that light has the properties of a stream of particles. Both statements are true and both have to be reconciled somehow although they may appear in certain respects to be contradictory.

In an attempt to reconcile biological reductionism with the certainty of the reality of the transcendent a number of models can be put forward. First of all, one possible approach is that of the Mayavadi Hindus. For the great Mayavadi philosophers and mystics the reality of the transcendent is so great that they deny the reality of our everyday experience, relegating such experience, that is, the world of causality and the world of chance phenomena, to the realm of illusion. For them all the appearances of the external world, all the relationships between discrete entities, all the relationships of causality, in fact, all the laws and inferences of science would simply be illusion. The ultimate reality is the experience of transcendent reality. This ultimate reality is the experience of absolute unitary atemporal being which the Hindu would call Brahman. The position of the Christian mystics is somewhat different. In the Christian view, both realities are equal in

terms of the certainty of their existence. On the one hand the reality of the external world, the world of chance and of causality, the world of objective discrete being is definitely real, but so is the perception of absolute unitary being which the Christian would call God. In the Christian synthesis the priority is given to the experience of God. For the Christian the explanation is as if there were two worlds running parallel to each other, one supporting the other and causing it to be, so that the world of discrete reality, causality, and chance runs parallel to the world of absolute unitary being, or God, but God is regarded as the ultimate ground, foundation, or cause of the world of everyday experience.

I would suggest that a third reconciliation is possible if we are to respect the subjective certainty of the objective reality of absolute unitary being which some people have. Let us take our starting point of analysis from the day-to-day world in which we always live—the world of time, spatial relations, causal relationships, and chance events. In starting our analysis from this world we make certain assumptions. The first is that this external world of discrete beings (of chairs and tables, trees and sun and moon) in fact exists. Of course, from the point of view of strict epistemology this assumption can never be proven, but all of us indeed accept that a world certainly exists external to our consciousness. At least practically we do. Second, we further assume that there is some very real isomorphism between the world as it exists out there and its subjective representation to us, this also being an assumption that can never be strictly proven but that has great practical merit for survival. Third, we assume that any relationships between various elements in the external world perceived to be invariant are, in fact, invariant. This also is an epistemological assumption: what we are saying is that we choose to believe that the laws of science are, at least for the most part, real and that scientific methodology yields valid results.

After making all these assumptions, and I must reiterate that they are indeed assumptions and can never be proven in an absolute sense, we then move to considering certain recent discoveries of science, namely, hemisphericity or the differential functions of the two hemispheres of the brain. This brings us back to a consideration of the functions of the left and right hemispheres. Certainly it is clear that, for the most part at least, the perception of discrete entities (certainly conceptualized discrete entities), the perception of causality, the perception of temporal relationships, and the perception of chance events are related to and arise out of the function of the dominant, usually the left hemisphere. Further, it is probable that the existential perception of God—of absolute, unitary, atemporal being if you will—arises in some way or other from the gestalt or holistic

functioning of the nondominant hemisphere, particularly of parts of the parietal lobe to which I have alluded earlier. Now, if we grant the objective reality of the machinery of the brain and its functioning, all we can say is that something is going into the machinery on both sides of the brain. Under certain conditions what comes out—and I am not talking about motor behavior but about what comes out as subjectively perceived—from the machinery on the dominant side is the world of discrete reality. This is the everyday world with which we are all familiar and the world of science as well. What comes out of the machinery of the nondominant hemisphere under certain very special conditions is the perception of absolute unitary atemporal being, of transcendent reality. Presumably the same data go into both machines, if we look upon both hemispheres as different machines, but what comes out is perceived as *very* different indeed.

One could conclude therefore that—even if we do not become embroiled in the knotty epistemological problems of whether the external world exists, how it exists, and how valid are the laws of science but simply accept the reality of the external world, the reality of the laws of science, and the assumptions of science, even if we stand, so to speak, squarely in this world and look at the functioning of the two hemispheres of the brain—something is being manifested in two modes: one mode is the world we all experience and the other mode is the world of absolute unitary being most often interpreted as God. We must conclude furthermore an equal, logical reality for both worlds, since neither world can be systematically reduced to the other. One could attempt to say, of course, that the experience of our everyday world is indeed primary and that these unusual, relatively rare mystical experiences of unitary being are recalled in everyday living and therefore form a subset within the world of discrete reality. In this manner one could try to maintain that the world of discrete everyday reality has primacy. That approach only holds true, however, if you are standing in this world. When you are in the other world there is no question, for absolute unitary being is also a primary epistemic state. There is no scientific thought in that state; there are no philosophical assumptions. There is simply the experience of unitary reality. From that world, the world of discrete reality is not perceived. We are considering what to do with the subjective interpretation of two realities which appear to be at conflict but each of which appears absolutely certain and true when experienced.

One could go a step further and arrive at what certain Buddhist philosophers have postulated. In the terminology we are using today (they would not use this terminology) they look to what it is that goes into both “computers” which in one case comes out as the everyday world and in the other case comes out Nirvana, or the Void and is

absolute and transcendent. They then suggest it is obvious that whatever is going into both "computers" is in fact *no* thing. Yet this is not "nothing" as it is understood in everyday parlance, but "no thing," simply because it cannot be conceptualized outside of the constraints of the mind—and the mind has only two ways of interpreting that "no thing," namely as absolute unitary transcendent being or as the discrete world of everyday living—of chance and causality.

I think it is important to emphasize the inability to resolve this conflict of the certainty of transcendent being versus the certainty of temporal, contingent being. We are here considering the very meaning of what it is to know at all, the nature and consequences of the certainty of reality however reality is perceived, and the limitations and constraints upon knowing anything whatsoever. We are forced into the murky realm of epistemology. Further, we are forced into the heart of *subjective* experience, of which objective reality is a subset and science yet a subset of this subset. I would maintain that it is, in principle, impossible to resolve the conflict between the two realities as experienced. Given the phenomenology of the experience, it is impossible to undercut the certainty of transcendence at least in those individuals in a society who have experienced it. I also would maintain that as much as we, as evolutionary theorists, may point out the adaptive value of the parts of the brain which generate transcendent experience, this cannot detract from the knowledge of its objective reality to the person experiencing it. Again, evolutionary biology, and indeed all of science, is experienced from the world of multiple discrete reality-regular relationships-neutral affect. The scientific viewpoint cannot cut into the certainty of the objective reality of the transcendent or of unitary being to the person who has experienced it, because it is another world—and because the two worlds are essentially cut off from each other experientially.

CONCLUSIONS

After all this what can we state about senses of reality in science and religion? First, it is clear that science as a subset of general human problem solving arises from what I have called the baseline sense of reality, that is the sense of multiple discrete beings with regular relationships permeated by neutral affect. This is the primary epistemic state which provides the impetus to, the constraints upon, and the matrix in which Western science is embedded. Religion, however, arises from other primary states. The state of cosmic consciousness certainly facilitates a religious view of the world. Although it is optimistic and although there is a sense of purpose which can easily be translated into religious systems, the individuals who possess cosmic

consciousness cannot properly be said to have "seen God." Rather, the most fundamental witness out of which springs the faith of believers is the witness of those who have experienced absolute unitary being. This witness, reinforced by the experience of those who have experienced cosmic consciousness, provides the authoritative affirmation to those propositions that most people wish desperately to believe, namely that their lives are purposeful, that the world is purposeful, and that there is no reason to fear death. Out of this state of absolute unitary being, experienced by the very few and affirmed by the slightly more numerous individuals in a state of cosmic consciousness, arise the world's great religions. Those few individuals proclaim to the many the message that almost everyone hopes is true. In the words of Saint Francis of Assisi's "The Canticle of Brother Sun":

Most high, omnipotent, merciful
Lord,
Thine is all praise, the honour and
the glory and every benedic-
tion

To Thee alone are they confined
And no man is worthy to speak Thy
Name.

Praised be Thou, my Lord, with all
Thy creatures,
Especially for Sir Brother Sun.
Through him Thou givest us the
light of day,
And he is fair and radiant with
great splendour,
Of Thee, most High, giving signifi-
cation.

Praised be Thou, my Lord, for Sis-
ter Moon and the stars
Formed in the sky, clear, beautiful
and fair.

Praised be Thou, my Lord, for
Brother Wind,
For air, for weather cloudy and
serene and every weather
By which Thou to Thy creatures
givest sustenance.

Praised be Thou, my Lord, for Sis-
ter Water
Who is very useful and humble,
precious and chaste.

Praised be Thou, my Lord, for
Brother Fire

By whom Thou dost illuminate the
night
Beauteous is he and jocund, robus-
tious and strong.

Praised be Thou, my Lord, for our
Mother Earth
Who sustains and rules us
And brings forth divers fruits and
coloured flowers and herbs.

Praised be Thou, my Lord, for
those who grant forgiveness
through Thy love
And suffer infirmities and tribula-
tion.

Blessed are they who bear them
with resignation.
Because by Thee, most High, they
will be crowned.

Praised be Thou, my Lord, for our
brother bodily Death
From whom no living man can ever
'scape.

Woe unto those who die in mortal
sin.

Blessed those who are found in Thy
most holy will,
To them the second death will
bring no ill.

Praise and bless my Lord, render
thanks to Him
And serve Him with great humili-
ty.²¹

NOTES

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