

# Experience, Culture and Reality: The Significance of Fisher Information for Understanding the Relationship between Alternative States of Consciousness and the Structures of Reality

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The majority of the world's cultures encourage or require members to enter alternative states of consciousness (ASC) while involved in religious rituals. The question is, why? This paper suggests an explanation for the culturally prescribed ASC from the view of Fisher information. It argues from the position, first put forward by Emile Durkheim in his magnum opus, *The Elementary Forms of the Religious Life*, that all religions are grounded in reality. It suggests that many of the structural elements of cultural cosmologies are similar and that the ritual induction of ASC may help to bring individual experience into greater accord with a pan-human eidetic cosmology, and thus with certain invariant attributes of reality. The necessity of this process is demonstrated by recourse to Fisher information. The paper shows how experiences generated during alternative states of consciousness may help to maintain a minimal level of realism in the interests of adaptation to what is in other respects a transcendental reality.

*Fundamentally, then, there are no religions that are false. All are true after their own fashion: All fulfill given conditions of human existence, though in different ways.*

—Emile Durkheim,  
*The Elementary Forms  
of Religious Life* (1912 [1995])

Anthropologists have long known that alternative states of consciousness (ASC; see Tart, 1975; Zinberg, 1977; Laughlin, McManus & d'Aquili, 1990; Cardena, Lynn & Krippner, 2000) are an important factor in the lives of peoples all over the planet. For instance, during the latter 1960s, Erika Bourguignon (1973; Bourguignon & Evascu, 1977), an anthropologist at Ohio State University, completed a number of holocultural studies of ASC using samples of cultures drawn from George Peter Murdock's *Ethnographic Atlas* (1967). In these studies she found that roughly 90% of the 488 societies sampled exhibit

institutionalized techniques for evoking trance states of various kinds. In virtually all of these cases, alternative states of consciousness were considered by peoples to be both positive and sacred in nature. These data are so impressive that they have led scholars to suggest that our species seems to have an inherent drive to alter its state of consciousness in often extraordinary ways (see e.g., Young & Goulet, 1994; Forman, 1998).

What we want to do here is suggest an explanation for the ubiquity and importance of culturally prescribed ASC and certain common transcultural elements of traditional<sup>1</sup> cosmologies from the viewpoint of Fisher Information. We will argue the notion, first put forward by Emile Durkheim in his magnum opus, *The Elementary Forms of Religious Life*, (1912 [1995]; see also Throop & Laughlin, 2002) that all religions are grounded to some extent in reality. We will show that many structural elements of traditional cosmologies are similar and that the ritual induction of culturally sanctioned ASC is often able to bring individual

experience into greater accord with transculturally shared elements of an eidetic cosmology by way of a sociocultural feedback loop. We will demonstrate the necessity of this process by recourse to Fisher information, and show how experiences generated during alternative states of consciousness may help to maintain a minimal level of realism in the interests of sociophysiological adaptation to what is otherwise a transcendental reality.

## ASC, Eidetic Cosmology, Extramental Reality and the Cycle of Meaning

Alternative states of consciousness may vary enormously, from lucid dreaming and contemplative states to shamanic soul flights and vision quests (Bourguignon, 1973; Winkelman, 2000; Dobkin de Rios, 1984; Dobkin de Rios & Winkelman, 1989; Laughlin, 1989, 1994a, 1994b; Forman, 1998). To induce these states of consciousness, many societies prescribe the use of psychoactive drugs, although such use seems mostly associated with groups having more simple forms of political organization (Winkelman, 2000). It is important to recognize that ASC may be evoked with or without the use of drugs, and may be the result of often complex arrays of neuroendocrine “driving” mechanisms embedded in religious rituals (Laughlin, McManus & d’Aquili, 1990). The important point for the present argument is that socially sanctioned procedures for evoking ASC are a near universal aspect of cultures around the world.

### Cycle of Meaning

With the exception of alcohol and drunkenness, ASC are almost never sought in traditional societies outside the context of socially prescribed and supervised ritual circumstances. The reason for this seems clear enough. Any human experience is open to a multitude of interpretations. The same experience may be seen as negative and destructive in one context and as positive and wholesome in another. Societies that encourage ASC tend to embed these experiences within the context of a cycle of meaning (Laughlin, McManus & d’Aquili, 1990; Laughlin, 1997, 2001) so as to control both the range of experiences that occur, and the interpretation of those experiences as they occur. To this end, interpretations are often couched in terms of the society’s world view in such a

way that the experiences evoked are seen to confirm and enliven that world view.

A society’s world view is for the most part carried around in the minds of people, which of course permeates their bodies by way of their nervous systems. Individuals often experience their world view in the form of stories, songs, aphorisms, and sacred and dramatic scenes, as well as techniques and other patterned responses. In literate societies, these sources may be committed to writing and form a sacred canon and associated actions. Either way, a world view is expressed and enacted in various kinds of mythopoeic forms including art and iconography, ritual, dramatic production, pilgrimage, and so forth. The most powerful expressive aspect is of course ritual performance (d’Aquili, Laughlin & McManus, 1979), and it is within this context that extraordinary states of consciousness are most likely to arise. Rituals may incorporate a variety of neuroendocrine “drivers” such as drumming, hallucinogenic herbs, flickering lights, fasting, fixed concentration, sleep deprivation, painful ordeals, chanting, prolonged dancing, etc. When alternative states of consciousness do occur as a consequence of participation in a ritual, there is almost always a process by which culturally appropriate interpretations are laid on the experiences evoked therein. These interpretations are derived from and tend to reinforce the efficacy of the world view. For instance, Moroccan dream interpreters normally account for the events described to them in terms consistent with the Koran.

In short, we see that the relationship between a particular world view and the varieties of experience evoked in the context of a society’s various rituals is characterized, at least ideally, by a relatively conservative feedback system—a cycle of meaning—in which the world view is expressed symbolically in ways that give rise to ASC, which in turn are interpreted in terms of the world view. Mind you, this kind of system is a living tradition, not a mechanical contrivance, and that means it is far more flexible than it might appear in any simplistic formulation. In fact this pairing of experience and knowledge allows for change within and over generations such that both the experiences that occur and the interpretations associated with them allow for a “revitalization” of the world view in every age (Wallace, 1966). In addition, cultural knowledge is always to some extent refracted through the lens of individual consciousness—a consciousness that

is always patterned according the experiential residues accrued though the course of a particular life trajectory (see Hollan, 2000; Obeyesekere, 1981; Throop, 2003). Indeed, it is often through processes of personalizing cultural knowledge—a process Obeyesekere (1981) has termed “subjectification”—that novel interpretations and experiences are able to arise, which may, given the appropriate circumstances, later serve to transform the existing cultural system.

## Eidetic Cosmology

Elsewhere, we have argued that at the heart of many traditional cosmologies, no matter how divergent they may appear in detail, lies a system of transculturally shared themes and elements we termed an eidetic cosmology (Laughlin, 2001; Laughlin & Throop, 2001). This eidetic cosmology refers to those shared elements underlying the myriad forms of cosmologically informed world views across the planet. We will not take the space here to repeat the arguments we offered in support of this theory. Suffice it to say that the eidetic cosmology derives from the fundamental structures of human consciousness and represents our species-typical neurocognitive adaptation to both physical and social reality (see Boyer, 1999, on the notion of “intuitive ontology”; Count, 1973, on the “human biogram”).

Elaborating somewhat from what we wrote elsewhere, below are some of the elements that would seem to be characteristic of the eidetic cosmology, and hence may each serve in differing degrees to pattern the content of various world views around the globe. It is important to note that in introducing the concept of eidetic cosmology we do not wish to suggest that this cosmology exists as an independent “thing” apart from aggregates of individual minds and bodies. Ultimately, the concept of eidetic cosmology does not refer to a mind-independent “something,” but, more accurately, serves as a place holder for what we argue are basic correspondences between the structures of experience, the structures of consciousness, and the structures of reality. And these correspondences are not limited to peoples dwelling in more “traditional” societies, but are characteristic of cosmological world views across a broad spectrum of societies. Because the elements of eidetic cosmology are inherent in the structure of the human nervous system, they will of course impact the understandings of individuals living in industrial and post-

industrial societies as well, and as a consequence, we find these elements appearing in both scientific and philosophical formulations; for instance, as quantum physicist Harold E. Puthoff (2002) of the Institute of Advanced Study in Austin, Texas, notes, the more we learn about the quantum universe, the closer our scientific picture of reality becomes to that of many traditional cosmologies. The elements of which we are speaking include the following,

1. Reality is energetic. Reality is understood to be a plenum void filled with sacred energies that motivate the world of appearances and that may from time to time be available for people to experience directly and use. This void may be metaphorically associated with “ocean” or “wind.”
2. Perception is limited. People understand that there is more to reality than can be sensed. Sometimes what we call the “waking state” is considered to be limited vis a vis other states in which there is the perception of divine or spiritual events.
3. Invisible domains. Much of reality is invisible and may be made manifest only by way of ritual procedures. Perceived events are linked to invisible forces.
4. Reality is unitary. Reality is seen as a single system—hence a cosmology—in which everything is interconnected.
5. Dependent causation. Everything that occurs is related causally to everything else in reality. Everything that happens is caused to happen.
6. Serial and cyclical time. People will experience time as both a lineal flow and a recurring cycle. Nearly all languages reflect these two types of temporality.
7. Magical causation. Because of number 5, the dependent causation factor, ritual procedures may be used to make things happen, both at a distance, and perhaps backwards in time.
8. Control procedures. People may exercise some measure of control over events in reality by utilizing the correct ritual procedures that tap into systematic interconnection and dependent/magical causation.
9. Multiple realities. Reality is considered to exist on different planes or in different, but mutually interconnected domains (see 4 above).
10. Objects and relations. Whether visible or invisible, reality is understood to be filled with objects and relations between objects, as well as movement among objects.

11. Microcosm-macrocosm. Every object or being in reality is considered to be a microcosm of the whole of reality—both as an energetic entity and in terms of the systemic properties that make things whole.
12. Cardinal directions. Space is considered to be vectored in such an ordered, even geometrical way that entities may be placed within the totality of space relative to each other.
13. Somatocentric. Related to number 11, cosmologies tend to be somatocentric—that is, the human body or being is placed at the very center of things. The body is considered to be the microcosm par excellence.
14. Sense of the divine or god(s). People have a sense of a divine presence which may be manifested in one or more gods, spirits, radiant beings, etc.
15. Syzygistic complementarity. Cosmic energy is divided into the male and female principles, which normally interact in a complementary and unitary way. Often symbolized by male and female deities or other iconic forms interacting in a holistic fashion.

While this is not an exhaustive list of the attributes of eidetic cosmology, it will give the reader a feeling for the elements we are speaking about. It is our contention that interactions between alternative states of consciousness and the eidetic cosmology often operate to bring experience and interpretation into adaptive accord with many of the invariant attributes of an extramental reality (see below).<sup>2</sup> This ASC-eidetic cosmology relationship is indeed comparable to what Durkheim was working toward in his writings on ritual, collective effervescence, and the formations of the categories of thought. What Durkheim failed to grasp, however, was that the ritual procedures that produced “collective effervescence,” produced adherence as much to physical reality as to social reality. He may be forgiven this oversight, for in fact the impact of relativity theory and quantum mechanics had yet to be felt in physics, and the predominant science in his day was a very Newtonian and mechanical view of the world. We are no longer hampered by the Newtonian world view in science, however, and the more we learn about physical reality behind the world of experience, the more it resembles the world depicted in traditional cosmologies worldwide. Of course we realize that physicists’ insights into the world of quantum physics

are also mediated through some sort of experiential/phenomenal datum, even if it is an abstract mathematical formula.

## Extramental Reality

By extramental reality we are referring to both those aspects of reality that effectively transcend our subjective experience and those that serve to limit the range of possible experiences had by any one given experiencer. In terms of the former definition, we are referring to all aspects of reality, including the state of our own being, as they are, apart from our knowledge or perception of them. This definition implies that there are aspects of reality that we as humans do not, and perhaps in principle cannot, know. To this end, extramental reality can be thought to consist of information that is “denied” us either because of limitations inherent in the structure of our sense organs and nervous system, or because of limitations set by the state of our current techniques/technologies. With regard to the latter definition, we are referring to those aspects of reality that conform to what Edmund Husserl characterized as the “objective pole” of experience. According to Husserlian phenomenology, experience is structured according to both subjective and objective poles (see Berger, 1999; Idhe, 1977), where the “objective” varieties of experience are understood to correspond to those aspects of reality that can be grasped by any given experiencer regardless of cultural, historical, or social position. From this perspective, while there are certainly a number of differing ways that extramental reality can be grasped by any one individual experiencer, the “objective” or “obdurate” quality of the extramentally given in experience serves to set a definite limit on the kinds of experiences that any individual can have. Of course it is also true that in the case of the perception of external objects, individuals can shift from perceptual (both in the introspective and extrospective senses) to strictly imaginal modalities and as such be relatively unencumbered by the impediment of the extramentally given.<sup>3</sup>

That said, it is important to note that in introducing the concept of extramental reality we do not wish to fall into the long-standing philosophical trap of postulating a necessary, insurmountable gap between our conscious experience of the world as given and the world-in-itself; a gap that is perhaps most famously recognized in philosophy in the context of Berkeley

and Locke's debate over the distinction between primary and secondary qualities.<sup>4</sup> Following Husserl (and to some extent Berkeley), we argue that extramental reality is not necessarily an absolutely mind-independent "material" or "stuff" forever beyond our experience. Instead, our knowledge of reality is importantly based upon the interpenetration of percept and object, what Husserl described as the potential for a partial confluence between noesis (acts of consciousness), noemata (contents of consciousness), and hyletic data (information derived from extramental reality, aspects of which become the objects of our intentional acts).<sup>5</sup> Of course, our lot as humans is to be perpetually limited by the partial, fragmentary, and perspectival state of our knowledge of the world, and as such, what we might term a horizon of ignorance perpetually ensures the "non-completeness" of correspondences between our systems of knowledge and the realities towards which they intend (Ricoeur, 1991).

### Fisher Information

Now we want to show how the relationship between individual experience and cultural systems of knowledge may be related to extramental reality in a very necessary way. We want to explain why the ASC—eidetic cosmology relationship is not only transculturally common, but, in certain contexts, necessary and sufficient to guarantee an adaptively minimal level of truth value to human knowledge. Before going much further, however, it is important to distinguish the effort after truth from the effort after meaning (see Bartlett, 1932). As we argued elsewhere,

The effort after truth shifts the orientation from attributing meaning to the given to discovering what is novel in the given and then evaluating meaning models by comparison with the given's experienced novelty. In other words, the effort after meaning is a quest for an ordered patterning of experience with a recognition of the correspondence between an experienced given and the instantiation of that given in memory, while the effort after truth is a systematic search for anomaly in our experience of a particular given as it arises in the sensorium (Laughlin & Throop, 2001, p. 714).

Another way to understand this is from the perspective of a formulation that is quite well known in statistics, and to some extent in genetics and physics, but that to our knowledge has never been applied in anthropolo-

gy. That formulation is called *Fisher information*, named for the famous geneticist and statistician R.A. Fisher<sup>6</sup> who first proposed it (Frieden, 1998).

### Fisher Information— On the Technical Side

Fisher information is deceptively simple.<sup>7</sup> According to the *Academic Press Dictionary of Science and Technology*, Fisher information is "a measure of the amount of information about a parameter provided by an experiment with a given probabilistic structure." In other words, Fisher information is a method of estimating how close the information in our description of reality conforms to the information contained in reality itself. Thus Fisher information involves a kind of Kantian epistemology with *I* representing what we know about phenomena, and *J* representing the information clustered in the "neumena" (in Kant's view, the extramental reality behind apperception). While most applications of Fisher information have been in the physical sciences where it has proved invaluable in critiquing experimental designs, the central insights of the theory are applicable to any system of observation and theory construction.

Fisher information does two things for a theory of observation:

1. Fisher information is a measure of the ability to estimate a parameter, and
2. Fisher information is a measure of the disorder within a system or phenomenon.

In other words, the information we have about the world is the difference between the amount of information in the world and the amount of information the world is "willing" to let the inquiring mind find out—i.e., the amount of information we can possibly access given the limitations of the our mindbrain and our techniques/technologies. Fisher information is the estimate of this discrepancy—a sort of measure of indeterminacy.

Fisher information is simply labeled "*I*." *I* is the information one can obtain from a system under observation. Suppose a researcher wants to know how many families in Culture X conform to a post-nuptial residence rule (say, virilocality). The researcher applies her field methods and comes up with a statistical measure of percentage—say 85% of families seem to be conforming to virilocality at time *t*. But there is no such thing as a perfect measure. There is always some

room for error due to random disorder, environmental fluctuations, influences from outside the system, effects of doing the measuring, research design, etc.  $I$  then will not actually be 85%, but rather a bell curve that builds-in all these sources of error around your measure of 85%.  $I$  is a kind of uncertainly principle—in fact the method has been used to generate Heisenberg's uncertainty principle (i.e., if you want to know this, you can't know that).

The system we wish to examine, be it a society, an institution, a social dyad, a ritual activity, a performance—whatever—is part of the extramental world we wish to understand, and the world is often seemingly “reluctant” to give up information about itself. From the Fisher information point of view, the world is full of information and it is this information we are trying to obtain by acts of knowing. The information that is bound up in the extramental system we want to understand is labeled “ $J$ ,” and the amount of this information we are able to obtain ( $I$ ) is always only partially isomorphic with  $J$ . Ideally, we want to minimize the discrepancy between the information contained in the system ( $J$ ) and the amount of information we are able to retrieve from the system ( $I$ ); the goal is thus to have  $I$  minus  $J$  be as small as possible.

Fisher information then is a compromise between the subjective process of knowing and our sense of the “out-there-ness” of any given extramental reality (all real systems are “in-formed” and “in-forming”; see Varela, 1979). Also implied by Fisher information is that we in a sense create our own world of  $I$  (from the perspective of cultural neurophenomenology,  $I$  exists as a part of our “cognized environment;” see Laughlin, McManus & d'Aquili, 1990, p. 82) when we observe the world. Paraphrasing Princeton University physicist John A. Wheeler, observation gives rise to information and information gives rise to anthropology (or any other science). Moreover, in a very real sense, we determine the answers we get from the world by the very act of extracting information from the world. Our acts of observation (be they through experimentation, survey research, in-depth interviews, participant observation, or other means.) influence the curve of error that is  $I$ . It is more or less this insight that led philosopher of science Paul Feyerabend (1993) to argue for supporting many competing theories in science, for the more theories we have, the more methodologies—and the closer we will get to the truth.

Put in other words, for every system  $S$  of interest

to us, there is information  $J$  within  $S$  and there is the information  $I$  about  $S$  that we can acquire, given the methods and technologies, etc. available to us. That means that we must be clear about (1) estimating the parameters of  $S$ , and (2) how close to the total information within  $S$  we can come, given the errors and limitations built into our means of observation. Ideally we want to minimize the discrepancy between  $I$  and  $J$  for any and all  $S$ s we wish to understand.

### **Fisher Information— In the Watermelon Patch**

In order to make Fisher information less technical and perhaps a little clearer, let us imagine we are a little kid who has sneaked into his neighbor's watermelon patch and intends to steal a watermelon to eat on a hot, lazy summer afternoon (Laughlin was raised in Arkansas and this scene resonates strongly with his childhood experiences). Our goal is to pick out a watermelon that is ripe and sweet tasting, but we cannot hang around the field for fear of being caught. How do we make sure that the watermelon we pinch is perfect? There are several methods we can use, chief among them being “thumping” and “plugging.” Thumping involves tapping hard on the skin at various places on the melon and listening for a characteristic hollow sound that indicates ripeness. But a ripe melon is not necessarily a tasty melon. So we will want to take out our pocket knife and cut a plug out of the melon and look at, smell it and taste the meat. If it isn't to our liking, we will replace the plug and move on to another fruit. But even if the meat on the plug is ripe and tasty, how sure can we be that the entire melon is in that state? Perhaps we will cut one or more additional plugs, and with each additional sampling of the meat, the more confident we become that we have indeed found the perfect melon.

Now, let us assume that the extramental world is the watermelon and that it contains information  $J$  that we wish to acquire—namely the overall quality of the melon. In order to get at  $J$ , however, we have to make individual observations, and from those observations construct an interpretation  $I$ . Thus each thump or plug is an  $I$ , which is a kind of window onto the  $J$  of the watermelon. The more  $I$ s we obtain, the more confidence we have in our overall knowledge of  $J$ . Still, no  $I$  can equal  $J$ , for in this respect  $J$  is transcendental relative to all possible  $I$ s.  $J$  is transcendental in that it

“withholds” information from us—“withholds” in the sense that the extramental world is too vast, too complex, too dynamic, and largely able to eclipse our senses and technologies. In other words, the watermelon represents the Kantian noumenal world and the information we derive from thumps and plugs represents our observations of the phenomenal world.

### **Trueing, Modeling, and Fisher Information**

Our position is founded upon the assumption that human consciousness is organized according to an inherent drive to minimize the discrepancy between *I* and *J*, that is, to seek out and know the truth of things. We know the truth of things by neurophysiologically modeling extramental reality and by testing our models in the crucible of experience (Laughlin & d’Aquila, 1974; Miller, Galanter & Pribram, 1960; Pribram, 1971; Varela, 1979; Edelman, 1987, 1989; Changeux, 1985). Truth, or more properly the process of trueing, is the natural inclination of any conscious organism to minimize the *I-J* discrepancy—the discrepancy between mindbrain models and reality—in the interests of adaptation (Laughlin & Throop, 2001). At a most basic level, our minds have evolved over countless millions of years to know reality as accurately as possible in order to find food without becoming food. This inherent neurophysiological drive to know reality we have elsewhere termed the “cognitive imperative” (Laughlin & d’Aquila, 1974; Laughlin, McManus & d’Aquila, 1990). According to this framework, any neurocognitive or cultural process that operates to minimize the discrepancy between *I* and *J* may be termed a *truer*.<sup>8</sup>

Of course, in speaking of a neurophysiological drive to know reality we do not wish to imply that cultural and social realities are not equally as important to adaptation as physical realities are. The work of Clifford Geertz (1973) is most helpful here. Geertz’ stance is based on the insight that the products of collective human mentation (artifacts, tools, communicative systems, etc.) and the social processes through which these products are brought into being must be considered part and parcel of the environment in which the human mind evolved. According to Geertz, it is only once we admit the context of an environment tangibly modified by human sociality and creativity that we are able to properly assess how selective pres-

ures could begin to favor those individuals best able to create, acquire, and manipulate such artifacts. It is important to note that for Geertz, “cultural artifacts” include not only such physical products as “tools,” but also the systems of significant symbols and cultural “programs” which serve to direct and control human interaction. In other words, Geertz proposes that it is impossible to understand the evolution of the human psyche without taking into consideration the extent to which the environment, which serves to establish the parameters for natural selection, is thoroughly permeated with the cultural products of an increasingly complex human mind.<sup>9</sup> According to Geertz, we must thus postulate an adaptive complementarity between the structure of the human mind and the historically crystallized forms of collective mentation that mediate our access to extramental reality and resides in extra-somatic systems of significant symbols.<sup>10</sup>

That said, it is also important to recall that the human brain does not begin life, as was once believed by psychologists such as William James, as a “booming, buzzing chaos” or as a “blank slate” upon which the truth of the world is passively written. On the contrary, the neuropsychological structures that develop through childhood to become the adult mindbrain have their beginning in rudimentary, genetically programmed organizations of neural cells (Laughlin, 1991). We call these highly organized, nascent neural structures neurognosis (see Laughlin, McManus & d’Aquila, 1990). To the point of our argument here, it is upon neurognostic models, which actively mediate mental imagery and cognitive and perceptual associations, that a great deal of mythology is grounded.

From this perspective, while it is the case that myth frequently takes the form of a narrative, the structure of myth is essentially nonlinguistic—it is neurocognitive, a knowing standpoint, a structure of consciousness. Myths tell a story, but while language is the most common medium for telling stories, myths may be expressed via other mythopoetic forms as well (e.g., drama, pilgrimage, art, and games). All living myth, as Levi-Strauss (1964, 1971) repeatedly emphasized, exists within the minds and bodies of people. From this perspective, individual expressions of myth are understood to be instantiations of the myth’s eidetic form, just as a performance of a symphony is but one iteration of what would otherwise be its “ideal” form in the mind of the composer or conductor.

## Culture As Fisher Information

Because humans are social primates, it is necessary to integrate the role of culture more explicitly into the model we have built here. This requires some discussion, for there exist many definitions of “culture,” not all of which would be appropriate for our purposes (see Kroeber & Kluckhohn, 1952, for a classic study of different definitions of culture). But many anthropologists have found it sensible to view culture as a system of information (e.g. Roberts, 1964; d’Andrade, 1984; Shore, 1996), and this is an orientation that we can use to good effect—as long as we divorce the concept of information from the contemporary, technological sense of the term (see Endnote 5). Information in the sense we are using here derives from the traditional, pretechnological sense of the word—what Varela (1979) referred to as “in-forming”—and involves the internal organization of individuals, cultures, and reality. It is important to note that this pre-technological view of information is far from purely cognitive, since, for the human nervous system, *information includes the organization of structures that mediate meaning, intuition, sensation, emotion, imagery, and thought.*

Perhaps the first to view culture in terms of information was Ward Goodenough (1954, 1971), who took his model of culture by analogy from genetics. As a species consists of a gene pool, so too do societies create “culture pools”—or *information* pools—for their members (Goodenough, 1971). People learn their culture (they become *enculturated*) as individuals, and no one individual learns all the information available within his or her society. Indeed, as Anthony F. C. Wallace (1970, pp.109–120) showed, social adaptation for all peoples requires an organization of cognitive diversity such that the information within each person’s mindbrain becomes functionally integrated with the information located in the mindbrains of others. In other words, members of a society can learn whatever they need to know to be recognized and functioning member of the society, but that does not mean that any one member controls all the information in his or her cultural information pool. As Goodenough (1954, p. 36) wrote,

As I see it, a society’s culture consists of whatever it is one has to know or believe in order to operate in a manner acceptable to its members, and to do so in any role that they accept for any one of themselves. Culture, being what people have to learn as distinct

from their biological heritage, must consist of the end product of learning: knowledge, in a most general, if relative, sense of the term. By this definition, we should note that culture is not a material phenomenon; it does not consist of things, people, behavior, or emotions. It is rather an organization of these things. It is the forms of things that people have in their mind, their models for perceiving, relating, and otherwise interpreting them. As such, the things people say and do, their social arrangements and events, are products or by-products of their culture as they apply it to the task of perceiving and dealing with their circumstances.

In postulating such a strict demarcation between “culture” and “material phenomena,” what Goodenough and most other cultural anthropologists have neglected, of course, is that the organ of culture, the organ of learning, is the human nervous system. Cultural anthropologists have long assumed an unwarranted, ethnocentrically biased mind-body dualism that is no longer tenable in the age of modern neuroscience. It is the mindbrain that mediates learning, and as such the learning of culture begins with inherited neurophysiological structures (neurognosis) that in their turn develop along a growth path that we argue guarantees a minimal veridicality of perception and knowledge relative to extramental reality. Of course, neuroplasticity ensures that the neurognostic makeup of each individual person will vary to an extent, and so too will the course of development of each individual over his or her lifetime. Likewise, the expression and course of development of these shared neurophysiological structures will vary socially depending upon the history and environment of the group’s culture. But it is, we argue, the underlying neurognostic basis of some forms of imagery, structure, and thematic motifs that can be understood as a source of much that is common to cultures—including those elements that constitute the eidetic cosmology. Nonetheless, we may still speak of “culture” as an information pool with considerable utility, for it allows us to integrate socially influenced and shared learning into our view from Fisher information. Again, it is important to keep in mind that we are using the term in the broad traditional sense that includes imagery, sensations, emotions, patterned behaviors and responses, and thought—in speaking of culture as information we do not mean to imply an overly cognitive view of culture, but rather the full range of ways that human beings can come to know.

## Myth As Eidetic Information

The neurognostic underpinnings of eidetic cosmology provide many of the elements that are definitive of myth, and that we recognize to be cross-culturally similar, even when extensively elaborated with locally distinct material. For instance, the changeling in myth may become a tiger, hyena, wolf, bat, or killer whale, depending upon the local fauna and the values of a people, but the structure of the changeling remains the same—a human being changes mysteriously into an animal, usually a carnivore. Some of these ubiquitous qualities of myth have been analyzed and described in the works of anthropologists and mythologists like Clyde Kluckhohn (1959), Claude Levi-Strauss (1978), Carl Jung (1964), and Joseph Campbell (1959)—structural elements like the mytheme, binary opposition, metaphor and metonymy, archetypal images like the Serpent, the Tree of Life, the Trickster, and the Great Mother, and narrative motifs like the hero's quest and the "blackening" have been isolated and identified as cross-culturally recurrent themes (see Thompson, 1955, for an index of often recurrent motifs). And as many of these thinkers have themselves suggested, these recurrent themes provide important windows onto some of the basic structures of experience, culture, and reality.

In this light, we would like to argue that mythical stories are simultaneously the expression of (1) the fundamental neurognostic structure of the human brain, (2) the content appropriate to the varying environmental and cultural exigencies characteristic of a particular society, and (3) an individual's particularized interpretations, which are informed by his or her personal experience and location in a given sociohistorical system. Of these three determinants of the structure of myths cross-culturally, we hold that it is the neurognostic structure of myth that comprises a symbolic representation of the eidetic cosmology. And it is the eidetic cosmology, in part, that assures the trueing of knowledge at the level of the society's information pool. In common parlance, we are "wired" to know reality from a very human, species-typical point of view (d'Aquili & Newberg, 1999)—our very *Homo sapiens*-limited *I* relative to the *J* of extramental reality. But the entire "wired" complement of neurognostic models is never activated in a single individual. With its initial complement of neurognostic models, the developing mindbrain is able to mature in such a way

that it resolves the tension between the need to conserve its own integrity and the need to organize itself relative to the sociocultural and physical environment in which it grows (see Piaget, 1977, 1985). During development there is a great deal of selectivity among the repertoire of neurognostic models, only some of which will mature in the course of any given lifetime (Edelman, 1987, 1989; Changeux, 1985).

From the point of view of Fisher information, extramental reality includes both extrasomatic reality (outer reality), and *our own somatic being* (inner reality). This is a crucial distinction, for the eidetic cosmology is mediated by an organization of neurocognitive cells that represents in its formations both the invariant structures of reality and *the body's own internal nature as part of that reality*. In other words, our own being is *J* relative to any information *I* we attain about our self. The eidetic cosmology is in fact mediated by living cells that organize themselves during neurogenesis so as to reiterate with each generation an ancient system of knowing that has proved to be adaptationally optimal over countless generations. The reality that system of knowledge encompasses includes our own being, as well as our environment. And one of the mechanisms by which this system becomes activated is via its expression in the society's corpus of myth. Returning to the cycle of meaning model, we can see that there is an embedded neurognostic cycle of meaning that, in certain contexts, may help to ensure the trueing of the greater system of knowledge.

The new model resembles the previous one discussed above, except that it is concerned with the eidetic cosmology and its manifestations in society's mythopoeic system. The eidetic cosmology is expressed within the society's distinct symbolic style in the form of what the German philosopher Wilhelm Dilthey referred to as "objectified mind," lived experience crystalized into intersubjectively accessible and perduring texts, oral histories, art objects, and symbols (see Throop, 2002). Here we can think of the eidetic cosmology as embedded as it were like the figure in one of those stereographic pictures that one must look at in just the right way in order to resolve the hidden image. Through participation in ritual enactments, the recounting of mythic lore, etc., individuals are able to translate the eidetic structure's objectified form back into the dynamic form of lived experience, which in turn allows the eidetic structures to penetrate along with the rest of the symbolism into the depths of the

brain where they are “recognized” by the target constellation of neurognostic (or archetypal) structures. Thus neurognostic pathways becomes *potentiated* for development (a la Joseph Campbell’s “innate releasing mechanisms”) in just the right constellation to true knowledge to the invariant aspects of reality and at the same time to give knowledge that distinctly cultural flavor characteristic of the society’s “local knowledge” (to use Clifford Geertz’s, 1983, apt phrase) as knowledge of self and world matures. The neurognostic structures in each mindbrain that become potentiated may also be involved in generating experiences, so that the eidetic cosmology is not only reiterated in the development of each developing brain, the individual may experience the eidetic elements and relations directly in dreams, visions, or other ASC.<sup>11</sup> As is the case with the culture-level cycle of meaning, the experiences arising relative to the eidetic cosmology act to confirm and reenforce the “truth” of the cosmology and bring it alive in direct experience.

One of the most common reactions people have to the intuition of truth about reality is that it seems *as if they knew it already*. And if we are correct in our assumptions, then in a very real sense they do know the truth before they hear or experience it—when the eidetic structures of myth penetrate to neurognostic networks that are developmentally ready, the experience may be one of recognition—literally of “re-cognizing” or “re-calling” what the species has known throughout the ages within its collective unconscious. For this reason, a society’s mythology may in effect be *poly-developmental*; that is, the mythology may be so organized that it will effectively potentiate neurocognitive structures at various stages of maturation. And, once the constellation of neurognostic structures is on the path of maturation, the mythopoeic system may re-potentiate the developing structures at later junctures—may participate in “initiating” the next stage of development. Anthropologists have reported a number of societies that have mythopoeic systems that are explicitly designed in multiple levels of narrative, each subsequent and more complex level given to initiates when they are developmentally ready to receive it.<sup>12</sup> Of course this has been the initiation strategy of many of the Western mystery schools in their programs of initiation and spiritual development.

Thus we are able to conceptualize eidetic cosmology in terms of Fisher information. We can see that *I* may reside both in the individual mindbrains of soci-

ety’s members, and when shared with others, in the society’s information pool. We may also see that each level of *I* (individual and cultural) interacts as part of a single process (1) by means of which individual mindbrains become penetrated and potentiated by various elements of the eidetic cosmology, and (2) by means of which each society’s information pool remains informed by the living experience of eidetic cosmology. As long as a living eidetic cosmology is reiterated in each generation, this natural neurognostic cycle of meaning will guarantee an adaptively optimal minimization of the discrepancy between *I* and *J*, regardless of what other localized elaborations may attend the more transcultural attributes of knowledge. This system maintains its natural adaptational role and allows local elaboration that may imagine cognized realities having minimal or no existence in extramental reality. In other words, mindbrains may generate, and information pools may perpetuate all sorts of information having little or no isomorphism with *J*, and as long as these do not increase the discrepancy between *I* and *J*, biological adaptation will not be diminished.<sup>13</sup>

### Alternative States, the Information Pool, and Fisher Information

Let us return now to the main theme of this study. The central question is how does this neurognostic cycle of meaning remain intact through the generations? How does it continue to operate to maintain an adaptively optimal range of discrepancy between knowledge and extramental reality? And how does it operate to maintain a balance in knowledge about the inner reality of being and the outer reality of environment?

One of the major, and quite natural ways that these features are maintained through time is by social prescription of ASC in each generation—what might be considered a special case of Durkheim’s “collective effervescence.” There are two fundamental attributes of the kind of ASC in which we are presently interested that need to be underscored. Whether the ASC be lucid dreaming as among the Australian Aborigines, trance states arising in rituals like the Native American Sundance, peyote journeys of Native American Church rituals and Huichol ceremonies, vision quests among plains Indian groups, or *jhana* or “absorption” states among Buddhist or western mysteries meditators, an ineluctable ingredient of these experiences

involves engagement with neurognostic or eidetic structures of the mindbrain (the inner being or inner *J*), and other elements of eidetic cosmology (both inner and outer *J*). Practitioners experience various aspects of eidetic cosmology—perhaps a state of unity with nature, visions of spirits or gods, an enhanced sense of the divine, or dissolution of ego boundaries and enhanced connection, empathy, and compassion for one's fellows. Not all the transculturally shareable ingredients of eidetic cosmology are present in an ASC at any particular time, but some inevitably will be, and these will act to provide numinous evidence of that deeper “mystical” sense of the nature of what is otherwise a normally hidden reality. These elements recorded in the society's information pool, in stories and songs and dramas, take on flesh as it were and become existential realities. The cultural information is now no longer merely received knowledge, but directly experienced knowledge—in other words, very “real.”

A member of the Native American Church once told anthropologist J.S. Slotkin (1958, p. 484), “The White Man talks *about* Jesus, we talk *to* Jesus.” The distinction here is crucial. In those societies that value and encourage or require each member to seek ASC by ritual means, a characteristic balance is struck between knowledge of the world and the knowledge of self—so much so that the cosmologies of these societies frequently place the human body in the center of the universe – and encode a microcosm-macrocosm relationship between being and world.

## Types of Culture

But not all cultures are the same in this respect. Obviously so, for, as the quote from the Native American Church member implies, our own extremely materialistic culture does not fit this picture. The dominant values in Euroamerican culture abjure and even prohibit members from seeking ASC. Indeed, our nations are all but schizoid about psychotropic drugs, using them by the ton for psychiatric purposes and putting people in prison for using them for “entertainment,” alternative healing, or spiritual purposes. There are deep cultural, historical, and political reasons for this attitude toward altering consciousness, having to do with maintaining the range of states of consciousness requisite for the functioning of materialist/capitalist society. Let us examine this issue a bit further so as to better understand the relationship between ASC

and eidetic cosmology.

Cultures privilege modes of knowing in different ways. Some cultures will emphasize knowing in ways that accord with eidetic cosmology, while others will emphasize knowing in the local, empirical sense. And many societies are characterized by systems of knowledge that privilege both modes of knowing to one extent or another. Sociologist Pitirim Sorokin (1957, 1962) has modeled these distinctions in an interesting and dynamic way. Sorokin has shown that what he calls sensate cultures are those that privilege empirical, material ways of knowing external reality over knowing in the spiritual or eidetic cosmological way. Sensate cultures are interested primarily in the material world of the senses, and do not encourage or foster knowing of inner being by way of dreams or other esoteric means. Thus such cultures produce populations that are off-balance in their understanding of the world and the self. Because they are off balance, sensate cultures will tend over the course of generations to compensate by swinging back toward a more balanced view in which knowledge derived from the local material mode becomes integrated with knowledge arising from development of the eidetic cosmological mode (what he termed *idealistic cultures*). This compensatory swing toward a greater balance between sensate and idealistic values seems to be happening in Euroamerican culture at the present time with an increasing tolerance for mysticism, and with the rise of an enormous variety of New Age cults and spiritual movements. The problem, of course, is that cultures never stand still, and the balance struck in one generation between local and transcultural ways of knowing may be lost to subsequent generations in the continued swing of the culture toward the opposite pole of ideational culture in which eidetic, more “mystical” ways of knowing are privileged at the cost of empirical, pragmatic ways of knowing. It is in the balanced idealistic and more mystical ideational cultures in which a corpus of mythological tradition forms a living core of knowledge, and in which ASC are often encouraged and even prescribed. But of course, extremely ideational cultures are equally off balance and the demands of balance eventually require a compensatory swing in the other direction, back toward the middle ground of idealistic culture and thence perhaps back into sensate culture.

From the point of view of people in an ideational culture, what we in sensate cultures might consider

“mystical” knowledge or experience is not mystical at all. It is simply “the way things are.” After all, the English word “occult” just means “hidden from view” or “hard to see.” When we experience and comprehend the mysteries, they are no longer hidden, and hence no longer “occult.” As we have argued, the human mindbrain is neurognostically prepared to apprehend the mysteries, but it is perhaps to the extent that we have been enculturated not to do so (for instance, to ignore our dream life) that we must apply effort and exotic techniques to produce mystical experiences (say, learn to apprehend and interpret our dreams, to meditate, or to twirl in Sufi dancing). One of the characteristics of a sensate culture is that it will not exhibit a living mythology, while a society out on the ideational pole will relate everything of importance back to the culture’s mythological tradition and core symbolism. As we have seen, a member of an ideational culture has the opportunity to be enculturated into the eidetic cosmology by way of the group’s corpus of sacred stories, which often involves rituals designed to evoke ASC.

As we say, the mindbrain is born knowing the world in both the unitizing mode of eidetic cosmology and in the particularizing, empirical mode of local adaptation. During its maturation, the mindbrain will strive to establish a resolution of the tension produced by these two ways of knowing. But our brain is a living system of cells, and if the press of environmental and social conditions result in an over-emphasis upon localized adaptational development—which is a condition that seems endemic to sensate cultures—the inherent processes of socio-psycho-somatic integration will tend to reassert their activities wherever possible. Such compensatory activities may be experienced by the individual as spontaneous “mystical” dreams, visions, spirit possession or entity channeling, and other transpersonal phenomena—perhaps as Carl Jung taught, a calling to greater attention to the deeper workings of the psyche (Dourley, 1998). In the absence of a corpus of sacred stories, these experiences may produce confusion and uncertainty for the individual having them. A society that has a sensate culture and which has lost touch with its mythological tradition is awkwardly positioned to guide its people to a way of life in keeping with the more unitary aspects of reality and experience of self. Indeed, spontaneous transpersonal experiences may be greeted by negative sanctions, the individual experiencing these phenomena

being perhaps labeled as “crazy,” “dangerous,” a “kook,” and so forth.

### **Spiritual Movements in Modern Sensate Society: Toward Integration?**

The problem with sensate cultures is that they are relatively *monophasic* in their view—that is, sensate cultures value information attained in only one state of consciousness, namely what we call “normal waking consciousness.” Idealistic and ideational cultures by comparison are relatively *polyphasic* in their evaluation of alternative states of consciousness—they value information from a variety of states of consciousness, and tend to pay close attention to states such as lucid dreams, trance states, possession states, shamanic journeys, etc. Yet modern postindustrial societies are in many ways more variegated than the social systems we have studied in the past. While the dominant values of Euroamerican society are those of sensate culture, one of the great advantages (and in some contexts disadvantages) of living in modern society is that one may opt out of the dominant sensate world view and seek what might be characterized as a path to greater “balance” in self-understanding. In fact many people today follow a variety of spiritual movements ranging from eastern traditions like *tai chi*, Sufism, and Buddhism, and aboriginal paths like neoshamanism and the Medicine Wheel, to western European approaches like Wicca, Rosicrucianism, Jungian analysis and “rave” culture. Some paths are derived from ancient traditions, others from recent innovations, and of course one will find a variety of symbolism and values expressed in each. But one thing that all of these movements have in common is that they espouse a polyphasic orientation—they positively value discrete ASC which are interpreted in the ways we have suggested in this study. They all seek wisdom by way of procedures that are designed to evoke ASC, and when these do occur, they are treated as valued sources of information about the self and the normally hidden aspects of external reality, which in due course are interpreted according to their respective world view. The motive power being facilitated by these social movements is apparent: The inherent drive of the mindbrain to minimize the discrepancy between the knowledge of self and world its structures mediate (*I*), and the nature of extramental being and reality (*J*).

## Conclusion

Our argument is fairly complete and reasonably straightforward. Let us briefly summarize the high points of the theory, and then we can close with some few inferences drawn from it. We have noted the ubiquitous importance of alternative states of consciousness among the world's cultures, and have presented an explanation for this fact. The explanation draws upon Fisher information, which conceives of extramental reality as a repository of information  $J$ , which is in large part unavailable to the human mind-brain. But the mind-brain is designed to model reality in the interests of adaptation and develops a system of information  $I$  about reality. Moreover, consciousness evidences a patterned drive to minimize, as far as possible, the discrepancy between  $I$  and  $J$ . Due to the fact that the mind-brain is a finite information storage and retrieval system in an over-rich information environment ( $J$ ),  $I$  can never equal, but can only remain partially isomorphic with  $J$  (see Scriven, 1977).

Human beings, a species of social primate, derive much of their  $I$  from their society's culture, or information pool, which is in turn filtered through the lens of their personalized interpretive frames. Thus there is an intimate interaction between the adaptational drive of the individual mind-brain, the corpus of information made available by the group's culture, and the knowledge accrued by individuals in the context of their unique personal histories. The world views of many of the world's cultures are informed to some extent by transcultural attributes of an eidetic cosmology—which is to say the inherited, species typical, archetypal knowledge about extramental reality, knowledge that is (so to speak) “wired into” the infant mind-brain, and that includes self-awareness and knowledge of the individual's own being. Moreover, societies commonly encourage or require their members to participate in rituals that are designed to evoke ASC, and the interpretation of these extraordinary experiences is at least partially informed by the society's cosmological world view. Because of certain fundamental attributes of ASC, such experiences may operate to minimize the discrepancy between the society's world view ( $I$ ) and the nature of extramental reality ( $J$ ). In other words, in certain contexts ASC may operate as *truers* of  $I$ , and through a complex social system, the world view. Utilizing ASC, cultures are able to effectively maintain a minimal level of realism in the

interests of adaptation to an ultimately transcendental reality.

We want to quickly point out, however, that not all ASC experiences are necessarily wholesome in this sense. Everything depends upon the social and environmental circumstances attending the experience. There are of course instances where ASC may have the opposite effect—that of decreasing the correspondence between  $I$  and  $J$ . But anthropologists have long known that socially important ASC tend to occur within the context of ritual circumstances in which the group is in control of both the conditions of evocation of extraordinary experiences and the interpretation of such experiences when they do occur, for example, trances occurring during Sundance Religion ceremonies (Jorgensen, 1972). The intent of social control of ASC is to place the socially proper interpretive spin on ASC in the interests of the commonweal—in the interests of completing the cultural cycle of meaning.

There are a number of implications of this theory for the study of culture, religion, social issues, and the anthropology of knowledge. We do not have the space here to explore all of them, but we will suggest one of the more important implications before closing.

### ASC Trueing and The Evolution of Culture

Perhaps one of the most important implications of the present theory pertains to the relationship between culture and extramental reality. We have seen that ASC may operate as *truers* of a culture's world view—an inherent process we may call *ASC trueing*. Of course there are other processes that operate in a similar way to true culture, among them an inherent pragmatism in all social animals with mind-brains that rely upon learning for adaptation (Laughlin & d'Aquili, 1974; Changeux, 1985; Edelman, 1987, 1989). But few of these other mechanisms true knowledge pertaining both to inner and to outer reality, being, and environment. Given what appears to be the ubiquitous presence of ASC trueing, one might suspect, as have Michael Winkelman (2000), Paul Devereux (1992, 1997), and others, that the inherent drive to ASC has been with us a very long time. Indeed, although it would be hard to prove short of owning a time machine, there is reason to suppose that ASC have been important to human society at least back to the beginnings of the Upper Paleolithic, some

35 to 40 thousand years ago. Our suspicion is that the reliance upon ASC truing began to emerge as the human mindbrain reached the point in its evolution when it was capable of generating *I*'s that were sufficiently out of accord with *J* that the mindbrain cognitive functioning could become maladaptive. The trouble with having an advanced mindbrain in an animal that relies heavily on social adaptation strategies is that everyone in the group has to be more or less on the same page in order to facilitate social action. In lower animals, it is neurogenesis, common development, and experience that guarantee an adaptive information pool. But human beings are capable of a great plasticity of views, and more importantly, may imagine realities unconstrained by perceptual experience. Seriously divergent *I*'s would make a socially shared world view and concerted social action difficult to attain. In other words, the more complex the brain,<sup>14</sup> the more it is capable of imagining worlds that do not in fact exist. We argue that in this context, selection would favor mechanisms that allowed for the greater communicative advantages inherent in an advanced, ever more complex mindbrain, while making sure that both individual and socially shared *I*'s remain minimally discrepant from *J* (see Laughlin & d'Aquili, 1974).

The ramifications of this view are important to our understanding of the evolution of culture. For, on the present account, culture does not evolve. Culture is an abstraction we anthropologists use to label a pool of shared information carried around in the bodies and brains of a society's members. In point of fact, only bodies evolve. Moreover, what has evolved is the organ of culture, the hominid nervous system, and with it the capacity to generate *I*'s of increasing complexity, no longer constrained by the world of experience in the perceptual "now."

The evolution of culture has been a matter of central concern to anthropologists for well over a century and a half, but heretofore our understanding of culture has been biased toward the socially shared information pertaining to outer reality—the ever-changing physical world to which humans have had to adapt in order to survive, and the social relations obtaining between members of society. Great attention has been given to family and kinship relations, and to the manufacture of tools, shelters, clothing, and other items critical to subsistence and protection from the environment. But extramental reality (*J*) is far vaster than social organization, the local environment, and local knowledge. As

we have seen, the extramental world is the universe and that universe includes our very being. Natural processes of trueing involve both the local environment of social and physical relations, and the rest of reality—including the universe, our body, and its mindbrain.

What the present theory requires us to consider are the social and technological ramifications of trueing to inner reality—the world often referred to in the ethnographic literature as the "world of spirit," or in depth psychology as the "collective unconscious." We do not have the space here to address this issue in the detail it deserves, but we can suggest some directions. As we have reasoned above, the process of trueing very likely has involved socially prescribed ASC for at least the last 40 millennia, and probably longer. This is evident in the shamanic use of ritual, iconography and sometimes psychotropic drugs that has left its mark on cave and rock art for thousands of generations. Methods that used ritually situated symbolism to potentiate and evoke ASC were likely a common feature in these rituals. This raises the interesting question about the origins of psychoactive iconography.

Our good friend and colleague, Paul Devereux (1992, 2000), has thought a lot about this question. He has pointed to the significance of *simulacra* for unlocking some of the sacred experiences had by long dead peoples. According to Devereux, a simulacrum is "the illusory image of a face, castle, animal, human figure or other shape or form seen in the chance configurations of clouds, the coals of fire, the bark of a tree, reflections in water, the cracks, crevices and projections of a rock face, or other surface" (2000, p.157; see also Michell, 1979, for a cross-cultural compendium of simulacra). Cultures all over the planet recognize sacred places that are named for these chance resemblances; for instance, Sleeping Ute Mountain in Colorado, the Paps (meaning breasts in Gaelic) of Jura in the Hebrides, or the Grandfather and Grandmother rocks on Samui Island off Thailand. The neuropsychology of this phenomenon seems clear enough. The human brain is designed to apperceive whole events and objects from partial information. The mindbrain abstracts patterns of sensory information and makes sense of them. We never have all the possible information about anything we identify—indeed, taking Fisher information seriously, we can never have all of the information about anything. A flash of yellow in the grass becomes a lion on the prowl, and everyone

heads for the trees. Whether or not an actual lion is present, the reaction is adaptive, for the brain does not have to take the time for the full presence of the lion before it makes a judgement and takes action.

The implications of these humble beginnings of symbolic cognition are quite significant, for it seems highly likely that the evolution of psychoactive iconography ran something like this: The natural facility of the mindbrain to apperceive whole objects from partial sensory data—a proclivity that among other things allows the evolution of various kinds of imitative adaptations among animals (e.g., moths whose wing patterns look like owls)—eventually led to the recognition in simulacra of forms considered vital to individual development and an adaptive world view of the group. Perhaps individuals began to recognize—literally recognize—or apperceive natural objects as symbols linked to salient emotional, intuitive, imaginative, and cognitive associations associated with psychological and sociocultural concerns. They recognized in natural formations the images of group leaders, archetypal dream figures, or figures encountered after consuming psychoactive plants. Because these images were considered powerful, numinous and sacred (i.e., related to mythic lore), so too were the evocative natural features in the environment. The landscape itself became deeply redolent with symbolic-cosmic meaning, rich with the suggestive power of spiritual significance (Devereux, 1992). Through the evocative power of simulacra, features in the local environment could have operated as a truer to both external and internal reality, bringing both into accord by way of shared symbolism, and perhaps even as ritual drivers producing ASC. By way of ASC, or symbolism associated with ASC-related experiences, such simulacra could accrue the power to actually evoke elements of the eidetic cosmology and attendant numinosity by themselves. For instance, these simulacra might have evoked experiences which brought to mind the existence of such eidetic elements as divine presences, invisible domains, and multiple realities, for in recognizing salient symbolic images in what would otherwise be considered inanimate natural objects, individuals might have come to perceive the mysterious workings of causally efficacious hidden forces and beings. Moreover, that features evident to sensory perception could possibly index extrasensory realms of causality may have given rise not only to the idea that there was more than one reality, but that there was also some sig-

nificant connection between sensory and extrasensory realities. This may well have led to the first pilgrimages in which natural features became associated with powerful beings and events that occurred in mythic times. Thus the landscape became “sacred” and movement in and around simulacra could operate to remind (literally re-mind; reproducing ASC-related experiences) participants of the crucial connection between contemporary and mythic times.

As hominids became technically more advanced and proficient, they became capable of altering and elaborating simulacra and the landscape to enhance the evocative power of the natural features. Perhaps they built additional features—i.e., altered the acoustics of caves and other chambers to enhance the effects of singing and chanting (Jahn, Devereux & Ibison, 1996)—added artistic imagery to cave walls and sacred landmarks for the purposes of initiation, pilgrimage, and so forth. Thus the facility of the simulacra and landscape for evoking ASC within ritual contexts, and as reminders of such experiences, became elaborated and more effective at renewing the associations between individual experience, cosmology, and reality within an emotional context of numinosity (or Durkheim’s “collective effervescence”). Eventually, of course, hominids became so technically proficient that they could produce spiritually significant objects from raw materials, and thus free themselves from necessary dependence upon simulacra—although we are quick to add that simulacra remain with us to the present day—these became sacred icons in the more modern sense. Architecture and iconography came to prevail in human symbolism—in some cultures tied in with notions of a sacred landscape (e.g., Chinese *fung sui*), and in other cultures with little, if any reference to landscape or simulacra.

## Final Remarks

There are other implications of the theory of ASC trueing, among them an exhortation for greater attention being paid during fieldwork to the relationship between extraordinary experience and cultural world view. Also, implications include the indication of a more central role of spiritual art in mediating between culture and experience—especially art and ASC—and the necessity of examining more closely those states of consciousness facilitating contemporary scientific and philosophical insights into the fundamental structures

of reality. But we wish to leave the reader with the submission that focusing upon the aspect of information in experience, culture and reality may be a productive line of inquiry, for it allows us the currency of exchange between various domains of discourse (i.e., between individual experience, the intersubjectivity of sociocultural life, and extramental reality) without creating methodologically paralyzing gaps between mind and body, mental and physical, and individual and social. If all of these domains are seen as repositories of information, and if information may be defined in such a way that each domain is translatable into the others, then there is the possibility of building theories that integrate knowledge of these various domains into a more unified view. From our present perspective, perhaps the best route to follow in building really robust anthropological theory is to ground future research in a cultural neurophenomenology that remains in accord with Fisher information.

### Author Note

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### End Notes

1. In using the term "traditional" we are referring primarily to peoples who participate in nonindustrial modes of subsistence. It is important to note that by utilizing this adjective we do not wish to imply that these societies are in any sense "timeless" or impervious to historical, political, or social change. Indeed, the "traditions" found in "traditional societies" are just as likely as "traditions" found in industrial and post-industrial societies to undergo processes of transformation. As Obeyesekere (1981) has made clear in his important work on personal symbols, the subjectification of culture that provides a potential basis for ensuing cultural transformation is a process that occurs in all cultures, regardless of the form of their sociopolitical organization.

2. It is not the place to argue for metaphysical realism. Rather, we assume realism, and furthermore contend that any useful science is grounded upon some form of

realism or other (see Devitt, 1991, on this issue).

3. It is important to recall that extramental reality is not limited to "externally" given percepts for it is also the case that aspects of "internal" reality (i.e., the structure of the nervous system) are also "extramental" in the sense given in this paper. Indeed, when we speak of structures of consciousness which place important constraints upon the structures of experience (see for instance Husserl's [1950, 1964] discussion of the protentional and retentional structure of time consciousness), we are referring directly to aspects of the extra-mental nature of this internal reality.

4. According to Locke (1979[1689]), "primary qualities" are those qualities or powers adhering in objects that produce phenomenologically accessible ideas and sensations that reflect the "actual" properties of the object qua object (e.g. extension, solidity, motion, rest, shape, size etc.). In contrast, "secondary qualities" are those qualities or powers that produce phenomenologically accessible ideas and sensations that, while they are ascribed to the object, do not reflect the "actual" properties of the object qua object (e.g. color, taste, smell, heat, cold). Locke argues that these "secondary qualities" are causally produced by the action and interaction of the "primary qualities" adhering in a given object. Locke's distinction between "primary" and "secondary" qualities therefore establishes a logical "gap" between those ideas impressed upon the mind that serve to represent any given "material object" and the indirectly perceived mind-independent "material" that supposedly underlies and gives rise to those impressions.

In his famous defense of his doctrine of immaterialism, Bishop Berkeley is highly critical of Locke on this accord. Indeed, in contrast to this perspective, Berkeley asserts that the "sensible objects" we perceive are not "representations" of imperceptible material objects composed of "primary qualities," but are directly perceived collections of mind-dependent ideas. In other words, Berkeley wanted to advance a "non-representational" understanding of the perception of "things" which corresponds to a "common-sense" rendering of reality as consisting precisely of those qualities and sensations that are immediately perceived through our various sensory modalities (1988 [1710]). Specifically in an attempt to refute Locke's distinction between "primary" and "secondary

qualities,” Berkeley argues that the “ideas we have of these [secondary qualities] they [Locke] acknowledge not to be the resemblances of anything existing without the mind or unperceived; but they will have our ideas of the primary qualities to be patterns or images of things which exist without the mind, in an unthinking substance which they call matter. By matter therefore we are to understand an inert, senseless substance, in which extension, figure, and motion, do actually subsist. But it is evident from what we have already shown, that extension, figure and motion are only ideas existing in the mind, and that an idea can be like nothing but another idea, and that consequently neither they nor their archetypes can exist in an unperceiving substance. Hence it is plain that the very notion of what is called matter or corporeal substance, involves a contradiction in it” (1988 [1710], 56 section 9). Indeed, as Berkeley asserts, “when we do the utmost to conceive the existence of external bodies, we are all the while only contemplating our own ideas. But the mind taking no notice of itself, is deluded to think it can and does conceive bodies existing unthought of or without mind” (1988 [1710], 61 section 23).

5. As Hintikka argues, “It is important to realize what is involved in the Husserlian quest of the immediately given and why it cannot be accommodated by any dichotomy between our consciousness (prominently including its intentional acts) and the intended objects. The idea that something about the actual world is immediately given to me implies that any such sharp dichotomy has to break down. What is immediately given to me will then at the same time be part of the mind-independent reality and an element of my consciousness. There has to be an actual interface or overlap on my consciousness and reality. This is the basic reason why any sharp contrast between the realm of noemata and the world of mind-independent realities ultimately has to be loosened up in Husserl” (1995). “According to Husserl, there is an actual interface of my consciousness and reality, that reality in fact impinges directly on my consciousness” (Hintikka 1995, p. 83).

6. Ronald Aylmer Fisher (1890-1962) was one of the founders of modern statistics—perhaps best known in the social sciences for the Fisher’s Exact Test. He was very interested in experimental design and he pro-

posed the view of information that bears his name in the early 1920s.

7. Fisher information must be considered as distinct from the more common contemporary sense of Shannon information. Claude E. Shannon’s theory of information co-opted the term from common parlance for its own particular purpose. And its purpose was to define information in such a way that: (1) Information could usefully be applied to problems in communication and computation technology, (2) information could be measured independent of the amount or nature of the energy used to produce information, and (3) information is independent of meaning. In his famous 1948 article, “The Mathematical Theory of Communication,” Shannon (reprinted in Shannon & Weaver, 1963), then a Bell Laboratories scientist, defined information in a very special sense. If knowledge may be represented mathematically as a distribution of probabilities—a numerical code if you will that “stands for” knowledge—then information is “anything that causes an adjustment in a probability assignment” (Tribus & McIrvine, 1971, p 179).

8. We are using the terms *trueing* and *truer* in the archaic sense of trueing up a wall or door—making something conform to the way things are. According to the dictionary, the word “true” connotes that one’s statement is consistent with the facts, is in agreement with reality, represents things as they really are, or matches the description of the way things are. In other words, the sense of the root is “telling the truth” in both the sense that what one says is consistent with reality, and that it is consistent with reality as one knows it to be without deceit (i.e., both a subjective and an objective connotation of genuineness). The root also refers to agreement of an act or statement with some standard, rule, or pattern. The connotation is that the statement “is as it should be” or correct.

9. What is subtle about Geertz’ argument is that he manages to maintain an attenuated form of psychic unity in the midst of an attempt to champion the cultural determination of the human mind. The key for Geertz is time-scale. Where most culture theorists have grounded their arguments for the cultural constitution of the psyche in historical periods and in differing cultural settings, Geertz attempts to bring culture in the “back door,” so to speak, by viewing the cultural prod-

ucts of the earliest stages of hominid evolution as central contributing factors to anthropogenesis. This is not to say that Geertz is not also highly sympathetic to the effects of culture on everyday mental contents and processes; he most certainly is. However, Geertz maintains that cultural diversity is, in the end, generated by human minds which share a number of capacities that were culturally influenced in phylogenesis.

10. It is interesting to note here how strongly some of Geertz' ideas on the extra-somatic nature of significant symbols and artifacts seem to resonate with Wilhelm Dilthey's writings on "objectified mind" (see Throop, 2002).

11. There is very likely penetration to unconscious structures as well, and in that case they will not be experienced, at least not at the time of initial penetration. Unconscious structures may potentiate and develop but remain dormant from the point of view of the conscious ego of the developing person.

12. See the literature on the Telefomin of Papua New Guinea (Jorgensen, 1980), the Baktaman of New Guinea (Barth, 1975), the Tamang shamans of Nepal (Peters, 1982), the Tukano of Amazonia (Reichel-Dolmatoff, 1971), the Dogon of Africa (Griaule, 1965), and Tibetan lamas (Beyer, 1973; Given, 1986) for examples of societies with poly-potentiating, developmentally sensitive mythic systems.

13. This is another way of formulating what we earlier termed the "cognitive extension of prehension" (CEP; see Laughlin & d'Aquili, 1974).

14. A complexity that is (perhaps ironically) at least partially the result of an increasing necessity for precision in the service of ensuring mutual intelligibility in the context of intersubjective communication.

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