

COUNTING YOUR BLESSINGS: SACRED NUMBERS AND THE STRUCTURE OF REALITY

by William K. Powers

Abstract. Although numerical systems have been regarded as static models of a symbolic system and treated as mythological behavior, it is postulated that these systems are more profitably analyzed as dynamic models, better understood as ritual behavior. As ritual, numerical systems, limited in number and expressive of rhythmicity, contribute to the biogenetic structuralist's notion of "equilibration" between the central nervous system and the environment.

The relationship between concrete and abstract numeration is also examined, showing that counting behavior, requiring asymmetrical use of the hands, may contribute to understanding the relationships between handedness and brain hemisphericity, as well as enumeration and memorization.

The purpose of this paper is to examine the phenomenon of sacred or mystical numbers, found in all religions of the world. It is examined from the perspective of an anthropologist with a strong conviction that ultimate solutions to problems of human nature reside in laws governing general biological evolutionary principles. My perspective immediately disregards the question, Neurobiology . . . does it matter? unless it is posed in a rhetorical sense, and as long as it implies evolutionary neurobiology since most neurobiologists are probably not interested in evolution per se. I further disregard the question because I further view *culture* as an analytical domain that identifies and describes the particular way humans have adapted to the environment *biologically*. Further implied is the basic biogenetic structuralist position that perceptions of reality are constantly structured and restructured cognitively and affectively through the "functioning of neural structures, which evolved and became progressively elaborated because of

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the adaptive advantage they conferred on their bearers" (d'Aquili 1983, 247. See Fox 1980, chap. 7).

I also examined sacred numbers from the theories of semiotic structuralism on the one hand, and evolutionary biology on the other, all this in the middle of a lifelong infatuation with American Indians, with whom I have had the pleasure to study. A left-brain investment with a right-brained payoff. This ongoing field experience, one lasting 37 years, has taught me that ethnography is still alive and well, and has further enlightened me to the fact that structuralism and evolutionary biology are simply two aspects of the same analytical process and do, in fact, belong on the same hand. It is probably the right one.

This study, then, is an attempt to integrate some of my own studies of religion in various parts of the world and in particular on the Pine Ridge Indian reservation in South Dakota among the Oglala Lakota ("Sioux") with some of the larger questions posed by biosocial anthropology.¹

In keeping with the sacrality inhered in the number three in our own society, this paper is divided into three parts because, as I shall show, it *feels* good to do so. I will begin by examining the sparse literature on the sociology and anthropology of enumeration, or what Claude Lévi-Strauss in his amazingly brief treatment of the subject calls "numerology"² (Lévi-Strauss 1966). What I want to do here is demonstrate that so-called symbolic, structural, or semiotic analysis is much more complementary to bioevolutionary theory than opposed to it. Implicitly, I continue to question the utility of making distinctions between biological evolution and cultural evolution, perhaps the major point of criticism of cultural anthropology by sociobiologists and biogenetic structuralists (although I realize the latter may not all want to be lumped together any more than cultural anthropologists do). Similarly I also want to question whether we should continue to distinguish between "semiotic" structuralism, exemplified by the French sociological tradition and characteristic of the current works of Mary Douglas, Edmund Leach, Victor Turner, and Lévi-Strauss, and the so-called "evolutionary structuralism" which finds its major proponents such as Robin Fox and Eugene d'Aquili, serviced by Amtrak mainly between Cambridge and Philadelphia with one major stop in New Brunswick, New Jersey.³

Second, I will describe particular numerical relationships, sacred numbers from various societies cited in the literature and from my own field research among the Oglala at Pine Ridge. My point of emphasis is that, in the past, social scientists in describing the sacred or mystical numbers of other societies have tended to view numbers, or recurring sets of numbers, as static models of a society's symbolic representations, relegating numerical systems to the field of *mythological* behavior. In

doing so, they have tended to emphasize the importance of single sets of numbers, say three in Christianity, or four among North American Indians. My own perspective is in seeing numerical relationships as dynamic models of symbolic representations, which are equally analyzable from the perspective of *ritual* behavior and which often involve multiple numerical relationships or sets of numbers superimposed upon each other.

Finally, as such, not only may sacred numbers be analyzed from the perspective of semiotics, but as models of process they may be useful to the biogenetic structuralist as another type of equilibration between the central nervous system and the environment.⁴

Another reason sacred numbers may be of some interest to bioevolutionists is that they emerge as both concrete and abstract systems, often making references to parts of the human body in their concrete form. Since numerical systems are counted on the hands and fingers, and by pointing, there is a postulated relationship between handedness and counting. These concrete systems, however, are capable of becoming transformed over time into abstract systems when the names for numbers derived from the concrete system are discarded or otherwise forgotten. Sacred numbers, then, are of interest to the evolutionary neurobiologist particularly from the standpoint of relationships between brain and behavior and to the evolutionists who can profitably view sacred numbers as possible types of mnemonic devices which must have played an important role in human evolution. The point here is that counting may be viewed not only as a means of enumeration, but a form of memorization. Sacred numbers structure reality by inventing it, and recurring sets of numbers preexist for the purpose of structuring reality.⁵

THE SCIENCE OF THE ABSTRACT

In my opinion, the greatest contribution to the study of numeric systems is that of the much maligned and frequently ignored black sheep of French sociology, Lucien Lévy-Bruhl. Despite the fact that Lévy-Bruhl was attacked by his colleagues, an onslaught that continues today, in the evolutionary thinking of the times he did in fact write six volumes on so-called primitive mentality, believing that primitives, although capable of participating in rational thought, did not, at least did not yet. Instead primitives "participated" in their belief systems, were at one with them, which Lévy-Bruhl perceived to be different from our own form of rational or logical thinking. Primitives expressed what he called prelogical mentality.

One of these volumes, published in 1910 under the title *Les Fonctions mentales dans les sociétés inférieures* and translated into English in 1926 as

How Natives Think, devotes a full chapter to "Prelogical Mentality in Relation to Numeration" (Lévy-Bruhl [1910] 1966). This is a very exciting chapter because Lévy-Bruhl, in his analysis of numerical systems worldwide, comes to some very important conclusions of interest to evolutionary biology.

First, he distinguishes between "concrete" and "abstract" systems of numeration, a distinction which Lévi-Strauss will follow later in *The Savage Mind* (1966). *Concrete systems* are those that make reference mainly to parts of the body. Lévy-Bruhl's contention is that primitive peoples are incapable of expressing higher orders of numbers and simply use parts of their body as mnemonic devices to count. Many of these systems begin with only one or two words actually translatable or glossed as "one," "two," and then proceed by making reference to the little finger, ring finger, middle finger, and so forth, counting up the arm across the chest and down the other arm and so forth in order to enumerate continuously. There are particularly good examples of these systems from Australia and New Guinea.

For example, in British New Guinea we find the following system in use and reported by James Chalmers (Lévy-Bruhl [1910] 1966, 163):

1 = little finger of the left hand	8 = elbow
2 = next finger	9 = shoulder
3 = middle finger	10 = neck
4 = index finger	11 = left breast
5 = thumb	12 = chest
6 = wrist	13 = right breast
7 = between wrist and elbow	14 = right side of the neck

Here it should be noted that in the native tongue there is no verbal distinction between 10 and 14, each uses the term *neck*.

Other types of systems considered by Lévy-Bruhl included the following which he regarded as half-concrete, half-abstract. In the Andaman Islands, a system based on the number five was prevalent. There were glosses for numbers one and two, but three was glossed as "one more," four as "some more," and five as "all." All these were obvious references to the fingers on one hand (Lévy-Bruhl [1910] 1966, 167). In the Torres Straights, a base five principal also obtained but in a more sophisticated way. For example, five was rendered as *nabiget*, ten as *nabiget nabiget*, fifteen as *nabikoko*, and twenty as *nabikoko nabikoko*. In the native language *nabi* means "all" or "entirely," *get* means "hand," and *koko* "foot." Thus five really meant "the entire hand" (fingers; ten, "entire hand (plus) entire hand"; fifteen, "entire foot" (toes); and twenty, "entire foot (plus) entire foot" (Lévy-Bruhl [1910] 1966, 167).

On the other hand, *abstract systems* are capable of using single numbers in a series and of employing combinations, as in our own system,

by assigning each an individual or derivative term. One of the major discoveries by those who have worked in the sociology of enumeration is that many abstract systems are based on once-verbalized forms for not only parts of the body but positions of the fingers and hands in counting. If my analysis of the previous literature is correct, at least some of these systems are asymmetrical, that is, they begin on the left hand, with the right hand pointing to each of the named fingers to begin the counting. Hence the right hand in one case points to the five fingers of the left from one to five, and then it takes over itself from six to ten.⁶

For example, it is customary among the Lakota and other sign-talking tribes to use their hands in counting even when verbalizing these numbers. The Lakota begin enumerating with the little finger of the left hand, bending each subsequent finger down with the right hand until it is time to change hands. Six is formed by placing the right thumb next to the left thumb with the other fingers remaining bent, and subsequently each finger on the right hand is raised, seven falling on the right index finger and so on.⁷

It is my contention that enumerating systems, as a form of numerical systems, certainly must have displayed the same tendency for handedness, with a dominance shown for the right hand as an *active* counter and the left hand as a *passive* one, that other types of handedness studies have demonstrated, linking this behavior directly to the hemispheric functions of the brain.⁸ Of course, this may be premature, but certainly this is a testable hypothesis which can be examined not only in numerical systems but in other systems such as the performance of instrumental music. For example, even where coordination is required, there is frequently an asymmetrical relationship between the use of the hands, say, in playing a piano where generally left hand acuity is notably lacking or in playing the guitar where the right hand actually controls the production of the sound.⁹

I should also add that sign language itself is also worth studying from the perspective of active and passive hand signals. For example, in Plains Indian sign language the signs are either symmetrical or skewed to the right hand, but never the left.¹⁰

Returning to Lévy-Bruhl, second, and related to the first, is the fact that, after comparing literature on numeration in the anthropological literature, he notes that where abstract numbers do not exist numeration systems simply act as an aide to one's memory. He cites the work of Alfred Haddon, who notes that true numerals among the tribes of the Torres Straights do not exist. Of particular concern to him were the facts that the same body part is used to represent more than one number and that it is only the relative position of the body part in the counting system which discriminates one number from another.

Third, Lévy-Bruhl also underscores the fact that all mystic numbers fall between one and ten; all others are simply combinations. He analyzes a numeric system in which binary and trinary based systems are used to express any given number, but he regards this as an example of “primitive mentality” while today we would consider it as the most complex form. As another example, he discusses a peculiar system of the Yoruba in which a principle of subtraction is used; for example, 11, 12, 13, 14, and 15 are formed by adding 10 plus 1, 2, 3, 4, and 5, but 16, 17, 18, and 19 are formed by subtracting 4, 3, 2, and 1 from 20. In this system, 70 becomes 20 times 4 minus 10, and 130 becomes 20 times 7 minus 10, apparently derived from counting cowrie shells which were arranged previously in parcels of 5, 20, and 200 (Lévy-Bruhl [1910] 1966, 181).

Fourth, and of particular interest in the study of sacred numbers and their relationship to the structuring of reality, Lévy-Bruhl hits upon two ideas, one his own and the other from the works of A. Bergaigne in India.¹¹ In his attempt to see primitive numeration systems as exemplary of prelogical mentality, Lévy-Bruhl associates this form of thinking with animal perception, stating that even among such domesticated animals as dogs and elephants, objects missing from a familiar scenario can be detected. Like animal memory, primitive enumerative operations rely on remembering the sum total rather than constituent parts. He states: “If anything is missing from the sum-total, they instantly perceive it. In the representation so faithfully preserved, the number of persons or things is not differentiated: nothing allows of its being expressed separately. It is none the less perceived qualitatively, or, if you prefer it, *felt*” (Lévy-Bruhl [1910] 1966, 159-60). In a more contemporary analysis, we might want to consider the affective role that numbers play on the central nervous system, that is, the adaptive advantage of human beings being able to bracket life experiences, particularly threatening and fearful ones, in such a way as to predict the outcomes of unknown circumstances.

But it is Bergaigne who somewhat cryptically announces that all numbers are equal and comes to the conclusion that the “numbers three and seven, in the general system of Vedic mythology, should be regarded as frameworks prepared beforehand, independent of the personalities which may be summoned up to occupy them” (Bergaigne, quoted in Lévy-Bruhl [1910] 1966, 196). Lévy-Bruhl is fascinated with this analysis and ultimately concludes that the difference between what he calls mystical numbers and numbers used in arithmetical calculation is that: “Instead of the number depending on the actual plurality of the objects perceived or pictured, it is on the contrary the objects whose plurality is defined by receiving its form from a mystic number decided

upon beforehand. Thus the properties of numbers predetermine, as it were, what the multiplicity will be in the collective representations” (Lévy-Bruhl [1910] 1966, 196). Vladimir Propp also came to the conclusion in his study of Russian folktales, a point on which both Roman Jacobsen in linguistics and Lévi-Strauss in social anthropology rely, resulting in the structuralist’s dictum that form takes primacy over content.¹²

In reexamining these two final points, first, that somehow mystical numbers (although I would have to add that perhaps all numbers, sacred and secular, serve this function or at least potentially are capable of serving this function) have a qualitative attribute—they can be felt—and second, Bergaigne’s point that these numbers are predetermined, one immediately wants to know who—or what—predetermined them.

IT IS THE BRAIN THAT COUNTS

One of the most widely developed ways of structuring the parts of a whole is simply by counting them. Since this is so fundamental, some might say an elementary way of classifying important ideas and things, the process of numerical structuring must have been with humankind for most of its evolution. One might speculate that humans learned to count before they learned to speak and that operationalizing combinations of numbers was a prerequisite for becoming human.

Numbers not only have the capacity to connect important configurations of thought, but they frequently provide a frame within which these fundamental ideas continue for long periods of time. Numbers do not only have digital qualities, but people perceive them as having shapes such as circles to express unity, dyads such as the Chinese symbol for yin and yang, a triangle to express the trinity, a box to symbolize fourness, and so on. It seems to be that, if these numerical configurations can be shaped in specific ways, there is a guarantee that they will become instantly embedded in the mind. As such, they will not only serve as tools by which the meanings behind the shapes will become known, but there will be an additional satisfaction that, if the shapes themselves are somehow simple but meaningful, they will be remembered much more easily.¹³

There is perhaps nothing sacred in numerical structures even though all people of the world count their blessings arithmetically as well as with hope and sometimes relief. But the same holiness of the trinitarian representation of Christian faith can easily be reinterpreted to form a Marxist dialectic; and, of course, the reverse is true. If a dialectical relationship is one that expresses opposites mediated by the presence of both oppositional qualities—plus as opposed to minus with

the mediation of plus/minus—then we can, with little modification of the original Hegelian concept, talk about God the Father opposing God the Son and the mediation between the two by the Holy Ghost. This dialectic is not based on superiority or inferiority of each of the three parts but rather on the belief that God's domain is heaven while the Son's is on earth. The Holy Ghost, of course, mediates between the two locationally; it is capable of occupying both domains.

Three also has been a main unifying factor in the development of the Western intellectual tradition. We are so accustomed to framing ideas into threes that we rarely give it much thought. On the other hand, we are quick to try to understand the same principles as they apply in other cultures using other numerical devices. This foreign unifying system appeals to us and we expect somehow to learn more from exposure to yin and yang than from what is readily available in our own trinitarian society, but with less apparent mysteriousness although with the same force of structural opposition.

It is no wonder that we are struck by the systematic way in which the Lakota classify their entire universe by fours and sevens (Powers 1977; Walker 1917), as if our own system cannot live up to the elegance of a quadratic and heptadic system. Of course, ours can, but we are more inspired by the Lakota system because we expect that there is knowledge there that we cannot discover in our own less-than-natural society, one constrained by triplicity.

Perhaps what is appealing about Lakota numerical systems is not simply that everything in the natural and cultural universe can be described and classified according to a relatively simple numerical system but that, rather than there being one system, there are in fact two. One of these systems is based on the number four and generally relates to what is perceptually all persons, places, and objects in nature—the four directions, the four seasons, the four stages of life, four kinds of living things, four phases of a plant, and so forth. The other system is based on the number seven, generally a number related to divisions of what we may call, in a Lévi-Straussian sense, culture. Empirically, the Lakota divide most of their social and political divisions into sevens.

Both the number four and the number seven have the capacity to symbolize a sense of natural and cultural fulfillment. When one "reaches" the end of the ritual line, so to speak, one gets off the ritual bus at either of these arithmetical stops. Both numbers not only establish a sense of fullness or completion; they are statements of *denouement*. They are also statements about the future as well as the past and present. In a sense, there is a hope and safety in numbers that have a definite stop point: the only thing that can happen after four or seven is

reached in the natural and cultural counting system is that the series can start over again at one. There is a comfort that infinity can be controlled; it is cyclical, not ortholinear. In this system, and perhaps in all systems which place a great deal of faith in numbers, the unpredictability of the future is controllable through repetition of the proper rituals and prayers, themselves divided into sets or parts that structure some numerical hope.

I think that these numerical systems, one based on four, the other on seven, should not be seen simply as mutually exclusive categories, one making reference to natural things, the other to cultural things. That would be too simple. The two systems are quite complementary if not mutually dependent on each other. The basic number, of course, is four, and seven is partly derived from the basic numerical foundation to which other numbers have been added.

Ethnohistorians tell us that some early explorers found that the "Sioux" were divided into ten (bands?) and then wonder why I do not use the number ten for my model of Lakota social organization instead of seven. The reason, of course, should be clear to even the novice student of Siouan culture: the model seven is one that the Lakota people employ, despite the claims of the ethnohistorians. The Lakota—all peoples of the world—are not so much interested in the way things are as the way things *should be*, and the way they should be is perceived as a structure which is organized into seven constituent parts in a very predictable way. It is the naive anthropologist and historian who expects to find numerical systems that reflect reality. It is rather reality that is fitted into the numerical system, which preexists as a structuring organizational principle of perceived reality.

Frequently these two numerical systems are imposed upon each other in unusual ways, that is, four and seven coexist with a single ritual performance. In the filling of the pipe and in placing stones in the Sweat Lodge there is a conceptual distinction made between four and seven, and seven itself is further seen as a sum of four, two, and one. In this system, the quadratic structure symbolizes the four directions, the dyadic structure represents the opposition between Above and Mother Earth, and the monadic structure symbolizes a metaphorical bird, the Spotted Eagle. Of course, these structures are symbolic of what Victor Turner would call multivocality (Turner 1969): they are capable of symbolizing a number of concepts independently and/or simultaneously. The quadratic structure can symbolize any natural category, or it can be a metaphor for the constituent parts of these categories such as colors, birds, animals, seasons, and so on, all of which are paradigmatically related and as such stand as metaphors of the four directions. The dyadic structure can serve to symbolize any contrasting set that is

significant in Lakota culture: good and evil, knowledge and ignorance, ancient and modern, left and right, and so forth. The monadic element also symbolizes not only the center of the earth but the place where the individual *is*, and as such it is a metaphor for the individual himself.

The imposition of one numerical system on the other is not unique and is certainly not limited to the Lakota or other American Indian belief systems. In Western thought we also find complementary numerical systems. For example, in baseball (As Alan Dundes has pointed out) we have the prevalence of an ordering system based on the number three, but frequently the number four serves as a perhaps secondary ordering system. We have three strikes but four balls leading to different kinds of denouement, one negative and one positive: You're "out" in the first; you "walk" in the second. This series is repeated, as Dundes tells us in naming the bases as "first," "second," and "third"; but the fourth is "home plate"¹⁴ (Dundes 1968).

Similarly in Christianity, where again the organizing principle is based mainly on a triadic structure, there is an accommodation, one might say, in which the number four is imposed on the number three. In representational art (despite the inaccurate depiction of historical reality) the cross upon which Christ was crucified is depicted as a cross—that is, an icon—that is essentially divided into four parts. The attempt to ritually depict the cross and at the same time indicate its trinitarian importance results in the sign of the cross. Whether inscribed in the air as is true when a priest applies a ritual blessing on a person, place, or object, or whether directed against oneself by placing the tips of the fingers of the *right* hand serially on the forehead, chest, left shoulder, and right shoulder, there is an essential conflation of two numerical systems. For the time being, that is, for the duration of the ritual, the two systems coexist, and in doing so their importance and mutual dependence is emphasized. The process is not unlike the single musician, say a West African drummer, who plays a time signature of 4/4 with his right hand on one drum and at the same time plays "against" it with the left hand on a second drum in 3/4 time. The thrill of hearing such polyrhythm is probably analogous to the religious elation one feels at the point of being exposed to the unconscious tension created by the imposition of four on three in the Christian system, or seven on four in the Lakota system. And again by way of emphasis, I believe that it is useful to view sacred numbers like other symbols, as having the capacity to evoke affective behavior and as such to be *felt*.

There is another quality in these numerical systems, briefly alluded to above, namely their capacity to express a dynamic. Although the various symbolic representation of these numerical systems are usually

thought of as being static (e.g., the *cangliška wakan* “sacred circle or hoop,” a circle inscribing a cross that is symbolic of the entire universe, as well as, e.g., other paintings or three dimensional representations such as a crucifix or sacred pipe) they are also capable of expressing movement and viability. Numbers that are sacred are generally those that somehow mark the end, the finality of a sacred process expressed in prayer, songs, and in ritual. It is the sacred number that, through its emphasis on the termination of a series, implies the processes that lead up to its termination. The sacred number four is important because of the implicit series that has created it: 1, 2, 3. The number seven is sacred because of the internal constructs and their respective serialization that has given them structure: 4, 2, 1.

Since understanding this *dynamic* attribute of the numerical system is critical to understanding the very concept that is symbolized in the number, let me provide some ethnographic examples.

In the most fundamental sense, there are no people in the world who are not animists, that is, who do not believe there is something that gives rise to the living organism, which contains it, and that somehow survives this organism when it perishes. Animism of course comes from the Latin *anima* and in English this concept is called soul. Despite the ubiquity of the idea of soul, there is no worldwide agreement as to the nature of soul or, numerically speaking, just how many souls a living organism has. There is also no agreement as to just what kind of living organisms are supposed to contain the various numbers of souls or aspects of one soul. As a convention, however, one based on a rigid interpretation of the word, animists are usually depicted as “primitive” people who believe that even rocks, and trees, and animals, and birds have “souls.”

Animism may be contrasted with still another term *animalism*, similarly derived from the Latin, but one which by convention identifies those persons who believe that humans are just another form of animal having *no* spiritual quality, that is, no *anima*. People who are animalists are usually defined as atheists, and sometimes as scientists, but certainly not all of the latter are atheists.

Despite the fact that in English we have a conventional Latin term that gives rise to two quite opposite ideas, the Lakota people, who are usually called animists (by both animalists and people who profess belief in Judeo-Christian religion), do not have the same kind of convention. The Lakota tradition has it that all animate beings (the redundancy is intentional) are born and die and in the process pass through what might be called by analogy four states of individuation. Each individual comes into being as the result of (1) having a potentiality for being, (2) transforming this potentiality through birth into an essence

that is independent of the body, (3) providing continuous evidence that this essence exists, and (4) finally providing evidence that the essence that is independent of the corporeal existence continues to exist after death, thereby freeing its potentiality to inhere in another (potential) organism to begin the process all over, ad infinitum, in what we understand in English to be a system of reincarnation.

When the old Lakota medicine men spoke of this fourfold soul, they named each aspect (1) *šicun*, (2) *tun*, (3) *ni*, and (4) *nagi* respectively. These four states have been variously described as constituting a belief in four souls or at least in four aspects of one soul. Most explanations have come from scholars whose own traditions require that each person have one soul, and every other system is simply regarded as a variation on that theme. If a Lakota were writing a book on Euroamerican souls, he might come to the conclusion that we were somehow deficient because we thought in terms of “one” soul without any reference to process—unreasonable by Lakota standards.

Rather, if we regard these four states as parts of a process, parts that are named and stand as separate but related components in a structural system, then the Lakota concept of soul, as we may continue to call it for purposes of explanation, is much easier to understand. The terms are tied together as parts of a descriptive process that demark stages in the coming-into-being-and-dying process of each individual. I offer a crude, but perhaps telling, analogy (recognizing the danger of analogy as well as its power) which, by way of emphasis, I must state is my own and is not (except perhaps by coincidence) a Lakota concept. The analogy is that of the production of fire. The beginning assumption here is that the source of the production is finite. Let us begin by assuming that in the universe there is a limited but constant supply of *sparks* that will be called upon to begin the ignition process. Who or what calls upon the sparks to begin the process is really not important for this analogy, although subsequently we may want to assign this task to a Lakota concept *taku škanškan*, “that which makes things move, creates energy.”

In addition to this finite amount of sparks, there is a variety of *tinder* waiting to be ignited. For the sake of making the analogy real, let us see this tinder as various kinds of dry leaves, small twigs, and other natural, ignitable substances. We assume that once the spark ignites the tinder there will be a *flame*, and this flame will last for a certain period of time after which the flame will transform itself into *smoke*, the latter being an unequivocal symbol of fire. If we were to name these four stages, or more properly the potentiality of the creation of three stages, by equating them with the Lakota terms, the correspondence would look like this:

FIRE	SOUL
spark	<i>šicun</i>
tinder	<i>tun</i>
flame	<i>ni</i>
smoke	<i>nagi</i>

Continuing the analogy, we might want to name the four separate but related parts of this process simply *fire*, just as we are inclined to name the four separate but related parts of the Lakota concept *soul*. But in reality the Lakota have no general name for soul, except those conventions which have been translated by missionaries, usually *woniya* from *wo* "noun marker"; *ni* "life, breath"; and *ya* causal suffix "to create, make," that is, "that which makes breath, or life." In this case, the missionary convention corresponds with the English word *spirit* whose Latin derivation gives us a wide semantic range, for example, "breath, courage, vigor, the soul, life" itself derived from *spirare* "to breathe, to blow."

In the past scholars struggled to interpret the parts of the whole independently: *šicun* is "potentiality"; *tun* is "giving birth"; *ni* means "life" or "breath"; and *nagi* means "ghost." These interpretations are only partly convincing when we think of them as static concepts; however, when we look at their interrelationships and dynamic quality, the parts blend neatly into an interpretation which emphasizes the whole *life process* as one in which immortality is achieved through reincarnation. The sacrality of the number four, then, is certainly one based on process rather than on simple categorization.

But one need not turn only to metaphysical concepts to see how the number four implies the unfolding, the development, or the evolution of important events. Take, for example, a more visible form or ritual, dance. There are in Lakota ritual a number of choreographic patterns marked by the number four. In the traditional *Cešohomni wacipi* "dance around the kettle" or "kettle dance," the dancers, after raising their hands to the kettle filled with dog meat in an act of salutation, begin dancing around the kettle four times. After completing this movement they dance in place while several of them, armed with forked sticks, charge the kettle. Three times they charge the kettle; on the fourth time they stab the choice morsels of meat with their spears.

In the *Wiwanyang wacipi* "gaze at the sun" or "sun dance," we find countless references to the number four as an organizing principle for a longer and more complex ritual. When the sacred pole has been found, four virgins each strike the pole four times with axes before it is felled. On the journey back to the sun dance camp, the people carrying the pole stop four times to rest. When the pole is to be erected, those

men in charge do so by resting three times as they raise the pole and, on the fourth time, by heaving the pole into its proper position.

During the actual performance at the sun dance, the sun dance leader directs all the dancers to face each of the four directions during the course of the daily ordeal. During one part of the dance, they dance four times up to the pole and finally grasp onto it to pray. At each rest period, a man or woman, or both, are selected to take a pipe and offer it to the head singer. If the singer accepts the pipe, it means that they will stop singing and that the dancers may rest in the shade. There is a peculiar way in which the dancers present the pipe to the head singer. The dancers dance up to the head singer holding their pipes in both hands in front of their chests. Three times they dance forward and present the pipe to the head singer, who feigns at the pipe but refuses to accept it. At this point, the dancers dance backward and again dance forward to present the pipe. Three times the pipe is refused, but the fourth time it is accepted and the singers immediately stop singing just as soon as the head singer has taken the pipe from the dancers. The dancers then file off the dance ground to rest.

The number of ceremonies and rituals we can use to analyze the significance of the sacred numbers is unending, and this suggests a new sense of meaning. All these variations tell us that numbers are not simply static but that staticity is only one dimension of numbers, which can be viewed just as well from a dynamic perspective. Numbers are at once a statement about time and space, about synchrony and diachrony, about states of movement and motionlessness. Numbers have the capacity to analyze and at the same time to synthesize, and for this reason they serve as one of the greatest of symbolic vehicles: they are singularly powerful messages because of their multidimensionality. They are at once paradigm and syntagm, metaphor and metonym.

In the cosmology as well as in ritual we find exhaustive references to the number four in both static and dynamic representations. For example, if we look at other symbols of the Four Winds, we can see that new modes of analysis can help unlock potential meaning. In the past we would have been likely on "logical" grounds to see the members of the Four Winds—the West, North, East, and South—as constituting a category. At the same time, the relationships between the directions and, say, colors, animals, and birds that symbolize each of the respective directions were syntagmatically related. A syntagmatic chain then hypothetically would be reduced by the association of, say, West wind representing the paradigm "direction," Fall representing the paradigm "season," Black representing the paradigm "color" associated with the direction, Buffalo representing the "animal" symbolizing the direction, and so forth. The entire series may be schematized in the following way:

DIRECTION	SEASON	COLOR	ANIMAL	BIRD
West	Fall	Black	Black-Tail Deer	Swallow
North	Winter	Red	Buffalo	Magpie
East	Spring	Yellow	White-Tail Deer	Crow
South	Summer	White	Elk	Meadowlark

The above schema may be considered the Western inclination to arrange topically and paradigmatically, that is, into things that go together. It produces a group of static categories. However, from the Lakota point of view, the schema makes more sense if we view it in the following way:

1	2	3	4
West	North	East	South
Fall	Winter	Spring	Summer
Black	Red	Yellow	White
Black-Tail Deer	Buffalo	White-Tail Deer	Elk
Swallow	Magpie	Crow	Meadowlark

From this perspective, we see that all members of the Paradigm 1 are interchangeable, that is, in the language of semiotics they are metaphorically related, while the relationships expressed between paradigmatic sets express metonymical relationships. The point is, in the first schema there is a tendency to see each paradigmatic set as static, while in the second schema there is a sense of movement. Both schemas, of course, are two aspects of a singular analytical perspective, one based on the notion of a two-dimensional model rather than a single-dimensional one. One model produces a static or synchronic representation of the number four, the second produces a dynamic or diachronic representation.

The second schema also represents what we might regard as a mechanism for breaking the mythical code. Any reference to a singular member of a paradigmatic set is implicitly (by definition) a reference to all other members of the set as well as a reference to the relationship between all four paradigmatic sets. Hence, when a medicine man sings that he is calling a "red stone friend," he is really making a reference to a totality whose aid may be sought by addressing only one of its parts. "Red stone," then, is really a referential marker that signifies the North, Winter, Buffalo, and so on. Any reference to one member of the set is a reference to all of them. Therefore, a prayer or song that addresses specifically, say, the magpie, a red stone, a white-tail deer, and summer has, in fact, made a general reference to the four directions.

We should not be so dazzled by analysis, however, that we should overlook the quality of fulfillment in sacred numbers—that, in fact, a

recitation of the numerical components of the series *leads* somewhere. For example, in the creation story we find metaphorical references to personified gods who through their actions result in the creation of a viable universe out of a static matrix. The investment of movement into static objects ultimately causes the creation of the universe as the Lakota now see it. During the process, a quadripartite plan unfolds in which (1) days and nights are distinguished, (2) the month is established, (3) the year and the seasons (that is, space) are established, leading up to (4) the present "time" period, the fourth generation.

Another symbol, in the form of an eschatological story, underscores the sense of fulfillment inherent in the number four, even though the symbol itself is a highly negative one. In it the old Lakota envision the state of affairs of the current universe as symbolized by a buffalo who is literally on its last leg. In the story, the buffalo starts out with four legs and thick hair. Over time the buffalo begins to lose its hair and, ultimately, three of its legs. When the buffalo is totally bald and has lost its fourth leg, the world as we know it will come to an end. There is some sense of optimism, though, because the demise of the buffalo will lead to a spiritual reincarnation and the universe will start all over again—the next time being, it is hoped, more favorable for the Lakota than the last has been.

The number four also should be seen as a means of classifying *contemporary* ideas relevant to Lakota culture as well as old traditions. This is perhaps proof that it is the system of classification that is important rather than the things that are classified, that is, it is the relationship between persons, places, and things that are deemed important rather than the persons, places, and things themselves. As one example of the viability of the system, we need only look at certain relationships that have been made between the directional color system and the concept of "race."

Currently, younger Lakota see a relationship between West=Black, North=Red, East=Yellow, and South=White; this leads to a rather arbitrary classification of human "races" based on old-fashioned scientific and folk notions of "great races of mankind," a scientific position no longer acceptable. In this new use of the sacred colors Black is equated with Black people, Red with Indians, White with Europeans, and Yellow with undifferentiated Orientals.

Now whether scientifically acceptable, which it is not, or even acceptable to traditional religion, which old Lakota claim it is not, it is a clear demonstration that the numerical system takes precedence over the objects which it seeks to classify and therefore explain. It is simply an elegant way of explicating a very complex system of relationships. It is, of course, conjectural whether all things in nature may be *inherently* divided into components of four. But from the Lakota viewpoint, all

things in culture may be classified by the Lakota's *natural* proclivity to confine, constrain, even squeeze things that are meaningful to them into units of four.

One would ask, in a culture where even the most significant concepts of the universe are governed by forces like spirits that enjoy a good laugh, what is the consequence of playing what must seem to people outside Lakota culture to be a frivolous game of numbers. The answer to outsiders must be that it is perhaps an habitual, albeit one that has lasted over a very long period of time, means of explaining the universe and in the process adding a sense of cogency and predictability to an otherwise unknowable environment. It is a tradition no less significant than others based on other numerals. For the Western analyst, the system of classification precedes the means of classification. For the Lakota, they are one and the same.

SAFETY IN NUMBERS

Judging from the previous statements from the ethnographic field, it might be concluded that sacred numbers provide a framework for symbolizing all that is moral in a society. It is not so much what is said or what is acted, but rather it is the predictable number of times that something occurs or recurs that makes humans feel good, feel appropriate, and have some sense of control over the very environment that often intimidates them while "the human brain strives to remove as much uncertainty as possible" (d'Aquili, Laughlin & McManus 1979, 12). Here, where the human ability to experience the world without being able to understand its causes, the so-called zone of uncertainty, and where religion has been invented by the human brain in interaction with the environment to account for these disparities, abstract systems such as numbers, which serve as perhaps the best example of a structuring principle simply because they are devoid of content, must have arisen as a *sine qua non* of evolutionary adaptation.

Hence, in American society it is not only the blessed trinity that is a statement about particular morality; the mere mention of these triadic relationships is understood as a moral statement leading people into affective action. The Three Bears may well serve as a secular version of this morality. It is not the fact that they are three *bears*—any animal would suffice. It is not the fact that things are hot, cold, hard, soft: they are *just right* because each scenario is set up in an anticipated sequence of events that is *felt* to be right, *felt* to be appropriate, *felt* to be final by those brought up in the system. There is something immoral about jokes told about Catholics and Jews, or Catholics and Protestants; but jokes which include a Catholic, a Protestant, and a Jew are not only appropriate—they are funny.

Finally, the idea that all numbers between one and ten are capable of being mystic and Bergaigne's remarkable discovery that all numbers are equal bring us to the possibility of viewing numbers—or rather numerical categories—as dynamic, structuring principles rather than as static, discrete categories. Hence, out of a minimal—one is tempted to say finite—number of integers an infinite number of meaningful combinations can be formed. The parallel with linguistics is striking. In linguistics the relationship is between phonemes, minimal units of sound which are held to be of a finite number in any natural language, and the utterances of speech, which are seen to be infinite. One is tempted, further, to see a broad parallel between the structuring principle of numerical categories and other biosocial phenomena such as kinship terminological systems, which also can be seen as structuring principles; these kinship principles or models also have been reduced from a countless number of systems known worldwide to a relative few (see Fox 1967, chap. 9). The idea, then, of reducing these principles to a common point of mediation, a common point of origin, a common cause, does receive wide and favorable acceptance by both the structuralist who follows Lévi-Strauss in attributing the causation of the structuring principles to the structure and function of the brain and mind, in a process leading one might say from the top down, and by the evolutionary neurobiologist who views the same relationships between brain and behavior, whether it be mythological or ritual, from the bottom up. They both meet head on, so to speak, in the middle of the brain. The question becomes which came first, the brain or the dialectic?

Although there is a perfect logic in separating the two kinds of structuralisms—semiotic on the one hand, and evolutionary on the other—we should not fall into the trap that our antecedents have—to wit, separating nature from nurture or, in anthropological terms, biological evolution from cultural evolution. The difference between synchrony and diachrony, after all, is never that sharp; and we should heed the semioticians, beginning with Ferdinand de Saussure ([1906-11] 1959), that synchrony and diachrony can be seen as two aspects of the same phenomenon differentiated by theoretical interests rather than empirical reality. We also should see diachrony and synchrony as being mutually interdependent categories rather than mutually exclusive ones.

It would seem, however, that the study of numbers, the process of numeration, and numerical categories which I have called sacred numbers, are quite capable of being analyzed not so much as categories but as processes. As I have shown in my data, sacred numbers are acted out as well as spoken about. Sacred numbers, then, may be viewed from the perspective of ritual as much as from the more usual viewpoint of myth. If this is the case, then any semiotic, structural, or symbolic study

of numbers should greatly assist the biogenetic structuralist. Sacred numbers, or any generally recognized combinations of numbers that prevail in a given culture over long periods of time, certainly can be viewed as a form of *ritual behavior* that somehow mediates between the environment and the individual. In particular, the idea of *equilibration* to describe this interaction between the central nervous system and the environment seems appropriate.

I will end on a note of emphasis. My contention is that it is possible to understand numerical systems as essentially one type of system which has the capacity to transform in structuralist terms a finite number of building blocks, analogous to phonemes in language, into an infinite number of numerical sets and derivations of these sets. As we have seen, sacred numbers are limited—from one to ten—and these limited numbers are probably themselves formed from constructs based on binary oppositions formed by contrasting one set with another (rather than one integer with another). I would think that these numerical systems would be of interest to brain and behavior researchers since our old, often-ignored, and much-maligned friend Lévy-Bruhl has shown (although in different times and under different circumstances, all quite respectable in his times) that numerical systems often correlate with brainedness.

We have certainly reached, in Thomas Kuhn's sense, a new paradigm in biosocial thinking, although it has been a long and arduous fight, and we must continue to be mindful of the danger in celebrating pyrrhic victories. The question, Neurobiology—does it matter? becomes superfluous. The real question is: Can we continue to discuss the analytical category called culture in any meaningful way without accepting *a priori* the relationship between human brain and human behavior?

NOTES

1. A structural analysis of Oglala myth and ritual appears in Powers (1977; 1982).
2. However, it should be recognized that the basic numbers, i.e., the constituent parts of a binary opposition, lie at the very foundation of structural analysis, particularly Lévi-Straussian.
3. The semiotic/evolutionary distinction is made by d'Aquili, Laughlin, and McManus (1979, 3-4).
4. D'Aquili, Laughlin, and McManus (1979, 5-6) select the term *equilibration* over equilibrium because the former imparts the notion of "process, as opposed to equilibrium which is a state of balance."
5. I have presented this idea elsewhere with specific reference to the evolution of music (Powers 1979; 1980).
6. It should be emphasized that no cross-cultural studies have yet been made.
7. There are reports that in Plains Indian sign language counting begins on the right hand. However, a distinction should be made between enumeration, an often unconscious motor response employed to aid verbal discourse, and counting proper, a conscious response applied to particular quantities. The preeminence of the right hand is

correct when speaking of counting (in sign language), but my example is typical of what might be called mnemonic signing, i.e., enumerating things on one's fingers so as not to lose count. Interestingly, even in sign language, earlier researchers note that the sign for "hundred" is formed by extending the left hand and stroking each finger of the left hand with the right index finger, each finger of the left counting as one hundred. After reaching 500, the hands are reversed. Nevertheless, the process begins with an active right hand. The authority here is Tomkins (1969).

8. Solomon H. Katz, department of anthropology, University of Pennsylvania, has conducted a number of these studies which are not yet published.

9. Illustrations of these signs may be found in Tomkins (1969). Also see Clark (1881) and Mallery (1880).

10. I would like to thank Colwyn Trevarthen, department of psychology, University of Edinburgh, for sharing with me his insights on the relationship between handedness and the production of sound in instrumental music. As far as I know, no study has been made of this fascinating subject.

11. Lévy-Bruhl owes much of his insights to the work of A. Bergaigne (1878-97).

12. An excellent discussion on the relationship between form and content from a structuralist position may be found in Lane (1970).

13. I have raised this issue briefly in Powers (1981, 443).

14. We might also consider that there are four infielders, three outfielders, and the pitcher/catcher dyad which forms a third part of the playing field. This arrangement is not unlike the tripartite division of gothic cathedrals and is not different in principle from the Lakota system.

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