

## **PROBLEM SOLVING AMONG NONLITERATE PEOPLE**

*SOLUCIÓN DE PROBLEMAS ENTRE GENTE ILETRADA*

**CHRISTOPHER BOEHM**  
UNIVERSITY OF SOUTHERN CALIFORNIA

### **ABSTRACT**

Although philosophers of pragmatism have emphasized problem solving as a key human attribute, and this insight is readily born out by common sense, behavioral scientists have given inadequate attention to natural problem solving that takes place outside the laboratory. What scientists have done has been to take the analysis halfway, by looking at reified functions, but "functional" approaches have been generally repudiated so often because they make unwarranted assumptions about functionality. It is proposed that by working from the bottom up, looking at decisions that reflect indigenous appreciation of social functions and manipulate social systems in a sophisticated way, a far more effective type of functional analysis could be built, and that this type of analysis would dovetail nicely with evolutionary analyses.

Keywords: problem solving, human behavior, nonliterate people, pragmatism, functionalism, social functions, social systems, evolutionary analyses.

### **RESUMEN**

Aunque los filósofos del pragmatismo han enfatizado la solución de problemas como un atributo humano clave, y esta idea nace del sentido común, los científicos conductuales le han prestado una atención inadecuada a la solución natural de problemas que tiene lugar fuera del laboratorio. Lo que los científicos han hecho ha sido tomar el análisis a mitad de camino, estudiando funciones reificadas, pero las aproximaciones "funcionales" han sido generalmente repudiadas con tanta frecuencia porque adoptan suposiciones injustificadas sobre la funcionalidad. Se propone que trabajando de abajo hacia arriba, estudiando decisiones que reflejan la apreciación indígena de las funciones sociales y manipulan sistemas sociales de una manera sofisticada, se podría construir un tipo de

análisis funcional mucho más efectivo, y este tipo de análisis se podría combinar satisfactoriamente con análisis evolutivos.

Palabras clave: solución de problemas, conducta humana, gente iletrada, pragmatismo, funcionalismo, funciones sociales, sistemas sociales, análisis evolutivos.

It was the philosopher John Dewey, who first took serious note of the pervasiveness of problem solving in human life. In *Art as Experience*, he sought to show that even the highest forms of artistic creation must be understood as the product of a problem-solving animal's behavioral repertoire. Dewey was correct: humans are the ultimate problem-solving animal. Yet anthropologists, whose job it is to study cultural behavior in its broadest dimensions, have barely begun to document this fundamental human capacity.

Among nonliterate people we have studied cognition (e.g., Tyler, 1969) and inventions (e.g., Kroeber, 1948), and we also have studied problems associated with culture change (see Bee, 1974; Bohannan, 1995; Voget, 1975). However, even though anthropologists have engaged with an extremely wide variety of subfields, we have yet to focus directly upon problem-solving processes in their own right. Decisions are the key to problem solving, and field ethnographers have been rather uncertain about how decisions might be placed under the ethnographic microscope for detailed analysis.

#### **PROBLEM SOLVING AND DECISIONS**

One problem is the extreme synchronicity of our theoretical approaches. For decades modern scientific anthropology was dominated by the structural-functional approaches of Radcliffe-Brown and Malinowski, which in essence treated cultures as though they were smoothly working, self-organizing systems analogous to biological cells. Since 1950, there have been a succession of varied but similarly reductionist approaches focused on meaning and symbols (e.g., Geertz, 1973), structures (e.g., Levi-Strauss, 1949), or indigenous taxonomies (e.g., Frake, 1962). Most of anthropology's major "movements" have been synchronic, but even when our approaches become diachronic we attend more to macro-processes than micro ones.

None of these mid-twentieth century theoretical approaches focused on non-literate humans as active problem solvers, for ethnographers had their hands full, identifying and explaining the larger sociocultural patterns they discerned in local groups. For quite different reasons recent cultural anthropologists have done no better, with their concerns about asymmetrical power relations and their preoccupations with ethnographer bias. In spite of a commendable and long standing

desire to give the people we study a "better deal," anthropologists still fail to accord them their due for actively shaping the cultural patterns we study.

If so-called "post-structuralist" approaches had led to unusually accurate and highly detailed descriptive accounts of decision processes, this would have been highly useful. Unfortunately, texts revealing details of decision process remain just as difficult to find in recent ethnographic literatures as in older ones. Over time the main exceptions have been the study of disputes, social control, and certain aspects of ecological and applied anthropology. This widespread neglect of indigenous problem solving should be a cause of embarrassment, for anthropologists otherwise have been advocates for nonliterate people. With our vigorous defense of their mental acumen, it is curious that as ethnographers, we have largely failed to document our claims by closely studying their abilities in action. Radin (1927) was the most notable exception, and his brilliant work remains little cited.

Certain ecological anthropologists, who study contemporary problems associated with environmental perturbations, have been less caught up in ethnological fashions. Sometimes their research is geared to discerning local perceptions of problems, which may differ from those of outsiders. There are a few studies of coping responses to drought (e.g., Campbell, 1984, 1999; McCabe, 1987; Watts, 1983) or other disasters (e.g., Paul, 1984; Schmuck-Widmann, 1996), and they help to demonstrate that indigenous problem solving can be made the focus in a field investigation. Applied anthropologists (e.g., Plattner, 1984), because they usually do not write holistic ethnographies, also seem to be less locked in to the usual holistic-functional-structural synchronic approaches that cause so many ethnographers to lose sight of problem solving in their reports. Their attention to indigenous needs and indigenous approaches to coping leads them to consider problem solving from a commonsensical perspective, but this has not resulted in any wider anthropological movement to study problem solving in its own right.

Solving problems is a matter of psychology, and American anthropology has, in fact experienced several love affairs with the human mind. A major one was the "personality and culture" school that applied psychodynamic theory across cultures (e.g., Du Bois, 1944); there were also limited investigations of basic visual perception on a cross-cultural basis (Segall, Campbell, & Herskovits, 1966). Neither approach had any noteworthy effect on the study of indigenous problem solving. Scientists like Conklin (1955) sought to elicit and analyze indigenous taxonomies, and this approach had some promise. However, the basic ethnoscience focus remained on cognitive structures rather than the actual processes of social or subsistence problem solving that gave rise to these taxonomies. Anthropologists also have entered into discussions about intentionality (see Elster, 1989), but mainly in the context of reading the social intentions of others (e.g., Rosen, 1995), not of intentional problem solving.

Let us define our terms. To study problem solving, it is necessary to begin with the direct study of decision processes, for problems involve dilemmas and inher-

ent in such dilemmas are competing alternatives for action. It is decisions that resolve dilemmas, and it is by studying cultural micro-processes that decisions become available as an object of ethnographic investigation. While British social anthropologists since Firth (1951) have been friendlier to the inclusion of decisions in ethnographic analysis than have most Americans, too often the preference has still been for synchronic analysis.

Rational choice theory seems to be gaining ground in a number of disciplines (see Ensminger & Knight, 1997), and in anthropology certain essentially synchronic approaches have at least focused on decisions. The earlier work of Barth (1959) on patterns of political decision behavior & Firth (1951) on social decisions led to formalist economic anthropology (e.g., Ortiz, 1967). A decade later another approach, also based on the modeling of decisions, was applied to humans under the label of human behavioral ecology (Smith, 1981, 1987). In both instances, decision models were being used to explain ways in which individual decisions were likely to be responsible for cultural patterns of behavior. With the emphasis on modeling, there was very little systematic research on decisions as they were being made, or on the details of particular problem-solving efforts. The name of the game has been to focus analytically on individual decisions, but to use them essentially as an explanatory device rather than investigating them directly as the subject matter of ethnographic description.

Cultural anthropologists do face a formidable task. With just a year or so in the field, we try to make holistic sense of an entire culture at the same time that a topical investigation is pursued. In publishing our findings, we are lucky to arrive at a synchronic overview of the culture as a whole, and specific processes that underlie the cultural patterns are not dealt with very directly. In this context I suspect there are many data on problem-solving decisions in ethnographers' notebooks, that simply have not found their way into print.

In the wake of Firth's (e.g., 1951, 1959) incisive analyses, a number of British social anthropologists did become less shy about focusing directly on decision processes. However, it was more the political style of decision making that received attention. For instance, the edited collection on *Councils in Action* (Richardson & Kuper, 1971) examined tribal and village decisions in which entire communities were meeting to debate and resolve problems they shared in common. There was valuable insight into consensus process, which is universal in egalitarian societies, but few decisions were actually reported in detail. Another edited volume (Bloch, 1975) investigated the often veiled rhetoric used in such meetings, which results from needs of acephalous societies to debate decision dilemmas without provoking confrontation that becomes politically conflictive. These studies had anthropologists poised to study the actual content of collective decisions, viewing them as corporate efforts to solve practical problems. This next step was seldom taken.

### THE PROMISE OF FORMALIST ECONOMIC ANTHROPOLOGY

By the late 1960s, formalist economic anthropologists in the United States were trying to take that step, and study decisions directly. They chose to focus on individual rather than collective decisions, and unfortunately they were daunted by the problems they encountered at this level. When Ortiz (1967) tried to use normal ethnographic elicitation techniques to debrief Columbian farmers about the kinds of crops they had chosen to plant, she found their decision criteria to be generally inaccessible. So instead of studying decisions, *per se*, she documented the actual behavior that resulted from decision making and then inferred a strategy that made sense. Rather than investing just in lucrative cash crops that were subject to the serious vagaries of world markets, they planted a variety of cash and subsistence crops so that, in a bad year, they would not endure privation because at least one of their crops would succeed and feed them. They were satisfying, rather than maximizing. The only problem with Ortiz's study is that we don't know if the farmers actually had satisfying versus maximizing on their minds. It seems likely that they did, but this could not be fully demonstrated.

Ortiz set a precedent in declaring direct interviewing about decisions to be desirable—but methodologically impracticable. Gladwin and Murtaugh (1980) later supported this verdict. They relegated individual decisions to the realm of the semiconscious: basically, nonliterate people could no more explain their decisions than one can explain exactly what is going on when a person rides a bicycle. In addition to the intuitiveness of decisions, there was the inability or reluctance of informants to communicate whatever they might be aware of, and also the fact that people were prone to rationalize after the fact, deceiving both themselves and anthropologists (see also Bee, 1974).

Elsewhere (Boehm, 1996), I have suggested that this methodological pessimism may have been premature. In one East African culture, when Western and Dunne (1981) repeatedly asked Maasai informants how they chose their camping sites during rainy season, they could get no useful answer. The researchers gave up on querying informants and investigated this on their own, then framed their questions much more specifically. They immediately began to get clear answers from the Maasai—answers consistent with their independent hypotheses.

The Maasai were far from being unable to articulate their goals and choice criteria, and if the questions were not too leading then this seems to provide a way out. However, there is another factor that led formalist economic anthropologists to work with models, rather than trying to directly describe the decision criteria and elicit strategic goals of informants. This was their insistence on considering decisions only at the individual level—a habit of rational choice theorists generally.

### HUMAN BEHAVIORAL ECOLOGY

The very productive field of human behavioral ecology stemmed from optimal foraging theory in animal behavior studies (e.g., Smith, 1981, 1987, 1988). Here, too, "decisions" and "strategies" form an important part of the theoretical vernacular. Methodologically, one examines large patterns of individual coping with environmental problems, then makes evolutionary cost-benefit inferences about how effective the behavior strategies are in dealing with problems of subsistence.

In its original form behavioral ecology was involved with the study of nonhuman animals, so obviously there was no possibility for studying intentions or motives by means of ethnographic interrogation. In directly adapting the approach to humans, a formal modeling technique was continued not because the direct study of decisions was thought to be impossible, but because individual decisions would be difficult to work with even if accessible. Smith (1991) refers to the possibility of asking Inuit informants why they follow the hunting strategies they do, but believes it is more efficient to document what they are doing, discern the patterns, and then assume that the described foraging "strategies" are similar to those in the heads of natives.

The strengths of these two decision-modeling approaches are obvious. They explain cultural patterns not as "beautified" functional-structural portraits based on systems theory, but as strategies for subsistence that tie in directly with adaptation. With respect to the human capacity for solving problems and our need to understand this better, their weakness is that they do not systematically investigate the actual decision processes that create the patterns.

Obviously, by describing accurately just the actual pattern of subsistence behavior an investigator does at least document the horn of the dilemma that was finally chosen. However, with this limited approach one cannot document the actual choice dilemmas that define the problems being confronted. This would have to include the rejected alternatives, as well as those finally accepted. By definition decisions are about choice among alternatives, so if one does not identify the alternatives, and also, very importantly, the criteria for choice, one cannot really understand the problem solving process (see Bee, 1974). What is needed are detailed and complete descriptions of decision processes.

### WHAT ABOUT GROUP DECISIONS?

One way to avoid all of the problems discussed above is to study group decisions (Boehm, 1996; see also Barth, 1967; Bee, 1974; Bennett, 1969; Boehm, 1978; Erasmus, 1961), and study such decisions in societies that are egalitarian (Fried, 1967; Service, 1975). There, consensual decisions are made routinely because centralized leadership is lacking (see Knauft, 1991). Debate is predictable because there is no authority figure to influence or control the decision process, and

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basically every adult has a voice. Thus, the methodological problem of intuitiveness is resolved because people are actively debating their alternatives and this brings decision dilemmas into full consciousness. The problem of rapport with informants is ameliorated or eliminated, for interviewing is no longer the primary means of acquiring data, while the problem of *ex post facto* rationalization is obviated because the ethnographer can actually observe the ongoing decision process. The awkwardness of having to interview a large number of informants about a myriad of individual decisions also disappears, for basically there is just a single decision process, albeit a complex one, that involves a group bent on arriving at a single coping strategy.

In my own work I have not only examined group decisions as a general factor in evolutionary analysis (e.g., Boehm, 1978), but have investigated case histories of decision making in two ethnohistorical studies (Boehm, 1983, 1986) in which group concerns were expressed respectively in tribal warfare decisions, and in tribal decisions about how to manage feuds between clans. Subsequently, I surveyed a fair portion of the ethnographic literature in search of rare detailed accounts of group problem solving processes that were observed by professional anthropologists (see Boehm, 1996).

The most detailed micro-study was one of pastoralist Mursi tribesmen in East Africa, which included a verbatim account of a lengthy and detailed debate about going to war (Turton, 1977). There was also Meggitt's (1977) comprehensive analysis of the pattern of warfare decisions among highland New Guinea tribesmen, a study that provided critical information for the anthropological explanation of warfare and its motivation. The third study was Firth's (1959) account of Tikopia after its people suffered a devastating hurricane and had to cope, collectively, with conditions that threatened the very survival of the island's population.

I have suggested a general methodology for studying these collective decisions (Boehm, 1996). To summarize, first one must be present when the community meets to observe and record the debate (see Duranti, 1981, 1983). One must subsequently consult with informants, in making certain the meaning of the debate, which is likely to be euphemized for political reasons (Bloch, 1975). It is useful to observe (or investigate through interviewing) the discussions that preceded the debate, particularly if it seems the decision was basically made in advance, with the group "debate" being more of a formality. One must also investigate past decisions that dealt with similar problems, to look for a pattern (Bee 1974; Boehm 1978).

There is also the possibility that a debate takes place over a period of time, at the level of small subgroups within a band or tribe. Even though the community never meets as a whole, a group consensus can be reached by this method. With hunting and pastoral nomads, this small-group decision process has proven susceptible of documentation (e.g., Barth, 1961; see also Silberbauer, 1982). In both instances it is important to agree about the next migration so that the group will not have to fission. When people manage to arrive at a consensus in this way,

an ethnographer has the challenge of trying to be present when some of these piecemeal negotiations are taking place, or to debrief people after the fact. Probably the easiest corporate decisions to study are those described by Meggitt (1977), in which problems of war and peace are faced. The drastic nature of these decisions, and often a very immediate need to adopt a common strategy, militate for all the males of a group meeting and making a decision at one time and place. Sometimes, ecological crises, such as ones induced by hurricanes, may bring a similar emergency nature to decision making.

A collectively-oriented methodology provides an efficient way of studying problem-solving processes as they actually take place, on a case-study basis. Because debate is public the understanding of indigenous strategizing can be advanced significantly because rejected alternatives are identified as well as those finally accepted. This means that one can identify not only an entire array of indigenously perceived competing possibilities, but also the choice criteria that operate when dilemmas are defined and then resolved. I emphasize that one can do this with reasonable ethnographic effort, in comparison with applying a comparably thorough descriptive approach to a host of individual decisions.

This collectivistic methodology goes against pervasive biases that favor methodologically-individualistic approaches. These have tended to dominate social, cultural, economic, and ecological analysis in a variety of disciplines, and the distinction between methodological individualism and collectivism is a very important one (Elster, 1989; Kelly, 1995; Sober & Wilson, 1998; see also Miller, 1997; Pelletier & Msukwa, 1990; Petersen, 1992; Stor, 1985; Wilson & Sober, 1994). In effect, I have argued that a "collectivist" approach will be far more efficient and productive if problem-solving processes are to be investigated directly, as opposed to merely being "modeled."

Obviously, a consensus process could be reduced to the sum of all the individual decisions. But this would be more appropriate in a situation of majority rule, where individuals cast their lonely votes at polling places. By contrast, consensual decision meetings, are directly focused on shared problems, and also they create a special conformity effect: once the group's individuals begin to lean in a certain direction, others realize how important it is to fall in line, and are often pressured to do so. The alternative, in the absence of majority rule or decisive and authoritative leadership, is for the group to be hobbled by indecision or for it to factionalize and split.

Thus, a group decision is likely to compromise the decision preferences of a minority of individuals in the group, who change from one alternative to another because they need to continue with the group—and they realize that some decision needs to be made. In dealing with these important corporate functions and their effect on decision process, a methodologically collectivistic approach is superior to individualistic approaches because it reveals the entire decision process in a context of communal problem solving.

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### CAUSAL ANALYSIS

A fascinating question that only a few anthropologists have tackled (see Bohannan, 1995) is, How do cultures work? This began to be asked seriously half a century ago (e.g., Kluckhohn and Kroeber, 1952; Kroeber, 1940, 1948), and it has received further anthropological attention from time to time (e.g., Bee, 1974; Boehm, 1996; Bohannan, 1973, 1995; Durham, 1991). With respect to biological analogies, psychologist Donald T. Campbell (1965) has likened cultural process to gene selection process, and Durham (1991) has suggested use of the "meme" concept (see Dawkins, 1976) as a cultural analog to genes. Biologists Boyd and Richerson (1985) brought formal modeling to the problem of cultural conformity and transmission, and biologists Cavalli-Sforza and Feldman (1981) have actively researched the transmission of values as units of culture.

Most of these more recent evolutionary approaches are heavily influenced by systems theory as this is used in evolutionary biology and ecology, and basically they treat cultural systems as being self-organizing, as did Kroeber much of the time. It would appear to be mainly Bennett (1969, 1976), Boehm (1978, 1983, 1996), and Durham (1991), all anthropologists, who have argued that there is a purposive, anticipatory component, as well. If one is interested in problem solving, it is this purposeful aspect of cultural process that must receive further attention.

In anthropology, the synchronicity of functional systems-theory approaches obviously has tended to obscure purposeful processes of problem solving. Complicating matters is a Darwinian lesson anthropologists have learned very well, namely that teleology must be exorcized from scientific analysis. The result has been a healthy bias against any imputation of inherent "purpose" to the operation of living systems. This denial of purpose is perfectly appropriate in describing the operation of a solar system, or an underwater ecosystem, but when the subject matter is human beings, some special problems arise.

Many cultural patterns do seem to impose themselves without people assuming any control (see Bohannan, 1995), and in many ways our cultural systems do run themselves, as when people are embedded in powerful systems of conformist transmission (Boyd & Richerson, 1985). For example, they learn from their elders that incest (as locally defined) is "taboo." The older generation has learned the same thing from their own elders, who similarly have acquired the belief that this type of sexual behavior will be supernaturally punished. With this model, one is led to believe that the incest taboo is based wholly on self-organization: essentially, the taboo will be kept in place for two reasons. One is simply that people copy the behaviors of others. But second, the first bad luck encountered by an incest offender (or by his community) will be attributed to his having broken the taboo.

There is an alternative way of explaining how many local incest taboos stay in effect. Durham's (1991) investigation of incest avoidance shows that nonliterate people often are consciously aware of the possibility of birth anomalies, and

believe that supernatural forces inflict them punitively on people who have improper intercourse. Given these data, it seems likely that self-organizing properties of a belief system are interacting with intentional properties. Taboos do tend to stay in place because of their own dynamics; but they also can be involved with problem-solving behavior. In this case, actively supporting and proclaiming an incest taboo can be seen as a deliberate way of frightening those who otherwise might commit incest.

In modern society, with our precise knowledge of genetics, the prohibition of incest becomes clearly visible analytically, as an instance of mainly secular practical problem solving that aims to avoid genetic (and psychological) problems. Although religion and superstition may play their parts, we solve the problem basically by making incest against the law. But when we or nonliterate people deliberately anticipate and head off the problem of incest, does this mean that one should read "purpose" into the operation of the social system in question? The answer may well be, yes.

### TYPES OF TELEOLOGY

In normal evolutionary contexts, "teleology" is properly a pejorative term. Elsewhere, in trying to identify the intentional side of cultural process, I have made a distinction between two kinds of causality attributable to "systems" (Boehm, 1978, 1991). The classical scientific usage of "teleology" is: "falsely purposeful." This refers to interpretations that see complex systems as being driven toward goals by imaginary intentional forces, such as divine guidance. Scientists deplore this type of teleological thinking.

Biologist Ernst Mayr (1974) created the term "teleonomic", just to account for biological systems that operate in ways that are suggestive of active problem solving even though in fact they operate through self-organization. Human problem solving in groups is not consistent with teleonomy, for the intentionality of the actors is genuine (i.e., cognitive), rather than imagined by us and therefore spurious, and it does affect larger patterns of behavior that characterize the systems in question, be they social, ecological, or political. Participants in the system are actively helping to organize it, and are doing so in terms of choice behavior which, by definition, involves intentions.

When a species acquires the brainpower to significantly understand its subsistence patterns or social systems, and actively manipulates them in pervasive ways by purposeful decision making, we need a neutral term for what is taking place. I have suggested "lower-level teleology" (Boehm, 1991), which refers to the efforts of nonliterate (or literate) people to solve problems they are able to anticipate (see Bennett, 1976) as they cope with their natural, social, and political environments.

When humans work together as an entire tribe to resolve an internal blood feud, they are able to make their social system work better because the tribe, as an indigenously recognized social unit, has well-appreciated functions (for instance, cooperation in subsistence or self-defense) that are degraded by conflict. Likewise, when hunting nomads strive to make a unanimous decision about their next migration, they are deliberately trying to stay together so that they may cooperate in sharing large game meat.

Two things are clear from these examples. One is that no divine or otherwise overarching set of inherent "intentions" is responsible for these behaviors, which definitely are helping to solve practical problems of political survival or subsistence. The other point, equally important, is that the systems in question are not entirely self-organizing; far from it. The nomadic pattern, for instance, is being organized purposefully and significantly by the nomads themselves, in response to what they realistically know of their environment. It would appear that this knowledge is extensive (see Kelly, 1995), and that most of the time it is put to good use.

When a behavioral ecologist looks at an ant colony to discuss the strategies that lead to optimization in foraging, the entire system can be considered as self-organizing from top to bottom. The "strategies" we recognize are metaphorical because the ant hill's "problem solving" is not only extremely well-routinized, but clearly it is teleonomic. Natural selection hard-wires ants to do their thing, and it would appear that imputing intentions to the insect actors would be strictly a fantasy. The colony, as a functional unit and single vehicle of natural selection, may well have some flexibility to deal with recurrent environmental fluctuations; but this, too, is genetically preprogrammed.

In this respect, ants living in colonies and humans living in cooperative groups are very different. Ants by their behavior create organically functioning systems, but they do not understand them, nor can they insightfully meddle with them in order to improve their functioning or adjust them to change. Their course is set by many generations of natural selection. Humans also live in organically functioning systems, but because we are intelligent enough to partly understand them, we sometimes are in a position to manipulate them when we perceive problems with their operation that are perceptually obvious. Such manipulation can be both immediate and inventive, and it defines lower-level teleology.

Between the two poles of teleonomic systems and systems containing an element of lower-level teleology, I believe there to be a continuum along which intentions play an increasingly important part depending on the species. With ants, we should not speak of intentions. A lizard, choosing between two flies as prey, might be considered to be an immediate and limited kind of decision maker (Pulliam & Dunford, 1980). The behavior is relatively hard-wired, and presumably a lizard has no very comprehensive cognitive capacity to make large predictions about the systems it is embedded in. If we move to higher primates, however, things become far more ambiguous. For instance, hamadryas baboons appear to

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make group decisions about the direction of foraging on a given day (Kummer, 1968, 1971)—decisions which, at the level of cognition, seem to involve both insight and foresight (see Boehm, 1978).

All that is needed, for lower-level teleology to operate, is an animal with a brain sufficiently large that at the level of cognition it can figure out certain aspects of how its environments work and modify its behavior on the basis of such intuitions. For comparison with humans, a more logical species might be the chimpanzee, which has a relatively large brain in relation to its body size. This species flexibly intervenes to pacify conflicts within its groups (Boehm, 1994) and, while on patrol, it makes on-the-spot strategic decisions that seem comparable to those of human raiders (Boehm, 1991). Obviously, it does not engage in discussions about the community's social functions or subsistence strategies, as nonliterate people do.

### DISCERNING THE DIVISION OF LABOR

In humans I have argued that the purposive component of cultural patterning can be distinguished analytically from the self-organizing component, even though surely at the level of concrete behavior the two are usually heavily interconnected. We have already seen this with incest avoidance, where the taboo is reinforced by self-fulfilling prophecy but also is socially reinforced to protect people from birth anomalies. The manipulative use of taboos is most clearly seen in cultures in which "bogey-men" are used by parents to keep children away from dangerous situations. Where incest taboos exist in conjunction with awareness of birth anomalies, surely their origin and continuation have a similarly manipulative component.

Often it is not easy to discern the role of problem solving in cultural patterning. Purposeful problem solving will be easiest to identify where an urgent decision is stimulated by a problem that is novel, as with the hurricane that devastated Tikopia (Firth, 1959). Urgency leads to the entire group's meeting, and the novelty of the problem stimulates a detailed debate. Active problem solving will be most difficult to discern where the decisionmaking is heavily routinized or if it takes place at the individual rather than the collective level.

Routinized decisions may become involved with rituals and ceremonies, and as with taboos this gives the appearance that self-organizing cultural forces are responsible for the behavior. However, rituals often control the timing of important practical events such as planting or harvesting, or the initiation of warfare, and in such cases purposeful strategies may be involved, as well. Sometimes, however, rituals do seem to become a substitute for active problem solving. It was Malinowski (1948), who pointed out that people are more likely to appeal to magical forces when the problems they wish to solve involve extreme risk and uncertainty, while less difficult problems are quietly resolved on a secular basis. Malinowski, the arch-functionalism, was actually a pioneer in considering the nature of nonlit-

erate problem solving and in differentiating between "realistic" and "supernatural" methodologies of nonliterate. It is the realistic problem solving that we are interested in, here.

We have not yet developed an adequate methodology for separating purposeful inputs from highly routinized activities that give the impression of being done by rote (see Boehm, 1978). Complicating the methodological task is the fact that the staying power of culture—as a largely self-organizing force—can be tremendous. In this context, Bohannan (1995) has discussed "cultural traps" that all but imprison people as would-be problem solvers. There is another problem, a subtler one, that helps to obscure the division of labor we are talking about. There is a biological metaphor that confounds the separation of these respectively blind and intentional inputs into the operation of biological systems, and also sociocultural ones. This involves treating genes as though they contained information (e.g., Dawkins, 1976), a metaphor that seems to be taken all but literally in many instances. In terms of common sense, the information stored in a human's head is cognitive, real, and immediate, rather than metaphorical and based on the past, and this makes it quite different from genetic "information."

Because some of us are habituated to thinking about natural selection as a blindly-operating system that nevertheless processes "information," and because so many have retained the "holistic" habit of treating cultural systems as though they were organizing and integrating themselves, it is not surprising that so often the human capacity to solve problems has been lost in the shuffle. We regularly acknowledge the unusual flexibility of humans in adaptive adjustments, but we are just beginning to understand the mechanics of how this flexibility operates. In large part, it can be explained in terms of our active problem-solving capacity: we are a flexible species because we are able to identify a wide range of problems and cope with them "extra-genetically," with considerable insight.

Of course, many aspects of culture do seem to operate "on their own." Wissler (see Kroeber, 1931) archaeologically analyzed patterns of diffusion, applying the principle that areal coverage correlated with the age of an invention. Kroeber (1948) studied broader aspects of cultural history, but while he felt that (superorganic) culture was prone to operate in terms of its own dynamics (e.g., Kroeber & Richardson, 1940), he also paid some attention to inventions. More recently, Campbell (1975), Cavalli-Sforza and Feldman (1981), and Boyd and Richerson (1985) have examined conformist cultural transmission on the basis of a partial analogy to biological selection process. These theories followed Campbell (1965) in focusing on culture process as a special instance of "blind variation-and-selective-retention." The key word here is "blind", for none of these approaches tried to incorporate human problem solving into the selection equation.

Both Durham (1991) and Boehm (1982) have referred to "cultural selection" in the context of part of the process being intentional. In his later writings, Campbell (1983), a grand theorist who also was very interested in mechanisms, agreed there should be a purposive component in his analysis. There also have

been a number of detailed major ethnographic treatments that focus on group or individual problem-solving in coping with famine (e.g., Firth, 1959; McLaglan, 1983; Wilbert, 1996), in planning warfare (e.g. Boehm, 1983; Meggitt, 1977), and in other areas (e.g., Bennett, 1969; Goldschmidt, 1959). These studies make it clear that decisions can make very important contributions to cultural patterning, and to the reproductive success of local populations.

It is the more routinized and less insightful contributions of purposeful behavior to cultural patterning that will be more difficult to document in the field. Take, for instance, the work done by Kroeber and Richardson (1940) on women's fashions. Women in European cultures have tended to conform to fashions, and basically every year for centuries designers have manipulated certain variables (such as skirt length or décolletage width) by small increments. The mean oscillations on six such variables were 98 years, which means it took about 100 years for originally "short" skirts to move down to the ankle and back up to the knees again. One immediately purposive element was women's desire to be en vogue, but while the actors surely understood they were subject to the demands of "fashion," they were not likely to understand the system as a whole. Fashion designers may or may not have consciously understood this entire system, for the decision to move to a new cycle was dictated by practical considerations: the lowest hemlines had to permit a woman to walk without tripping, while moral considerations limited how high they could rise. What they did understand, was that to sell new skirts you have to change something every year. (Today, designers understand more of the larger picture—precisely because Kroeber's research report is now in the curriculum of fashion schools!)

This example suggests that human intentions play different roles in different kinds of cultural processes, and that if we wish to discern the division of labor between self-organizing and purposive components of culture process, we must take things on a case by case basis. Kroeber's conclusion is that the role of individuals (hence, individual purposes) is slight with respect to affecting the dynamic variables he measured. However, it is instructive to see what happened in the late 1960s in the United States, which had previously followed the European pattern. Suddenly, the miniskirt broke all prior patterns, and then, rather than very gradually beginning to descend as usual, hemlines plunged radically with the maxi look. This illustrates how purposeful behavior can modify a very well established, largely self-organizing pattern that is heavily determined by conformist transmission.

To effectively study the role of intentionality in human life, it is necessary to pay attention to actual microprocesses that contribute to group traditions, and in some contexts our methodologies would seem to be up to the task. But it will be group decisions, and particularly group decisions that are made on a less routinized basis, that will yield most readily to analysis. This kind of problem solving is readily differentiated from cultural processes that organize or regulate themselves.

### CONFLICT MANAGEMENT

I now provide some prime instances of lower-level teleology at work, examples in which there is little difficulty in identifying intentional problem solving that contributes to cultural patterning and also to group functionality. Conflict management is a particularly good example, and the case-study approach (e.g., Bailey, 1960, 1969, 1971, 1973; Gluckman, 1965; Gulliver, 1969; see also Nader & Yngvesson 1973) is friendly to the investigation of process and purpose. As legal/political anthropology emerged as a small but significant sub-discipline within ethnology, the purposeful nature of conflict management became increasingly apparent. Without any theoretical fanfare, these scholars began to deal in lower-level teleology: in the case studies they analyzed, the obvious and demonstrated purpose was to reduce strife that degraded group functioning as native actors perceived this, and usually indigenous attempts to solve problems in this area were both realistically conceived, and reasonably effective.

Hunter-gatherers deliberately manipulate their conflicts in the interest of improving group harmony and functionality as they perceive this. Although there are no alpha males to make power interventions of the type used by chimpanzees (see Boehm, 1994; de Waal, 1982) or by humans living in politically centralized states, hunting nomads make up for this by trying to manage their conflicts before they become serious. Often, a band community stages some kind of contest in which two disputants are able to discharge their tensions, and the rules of the game are that once they have had a chance to confront each other, they must then set the conflict aside (see Hoebel, 1954).

I believe that in their own way nonliterate people can be viewed as intuitive systems-theorists and functional analysts. First, they actually understand many of the social and political dynamics of their own small groups, and accordingly generate sophisticated social theories (e.g. Radin, 1927). They also have explicit ideals about how the group should function, and they combine these insights and ideals in solving problems. In effect they are applied systems theorists, for they take steps to head off problems that make for obvious dysfunctionality, such as fighting or factional strife that leads to premature fissioning of the group or impairs cooperation.

The study of conflict management by anthropologists provides one of our best examples of lower-level teleology at work, precisely because the problem-solving component is so clearly visible, and because coping often is done on an urgent and collective basis. Bailey (1960) has examined disputes in terms of decisions, demonstrating that individual decisions can be studied processually at the level of ongoing political dilemmas that involve groups. However, he is actually studying dyadic and triadic situations in which disputants (and often mediators) are making interrelated decisions.

Large-group formal decisions, too, can be involved in conflict management. For instance, in historical tribal Montenegro a feud between two clans of a tribe

would be routinely mediated by uninvolved tribal members, a panel of a dozen respected men who acted as mediators in the name of the entire tribe. If one were to focus just on the final composition of the feud, one would merely describe a ritualized ceremony in which the clan with the higher blood score asks the pardon of the other clan, and then, after payment of blood money, the two clans cement the pacification by becoming godfathers to one another's children (see Boehm, 1986). If one examines the entire process, however, there is much more going on than a solemn dyadic ritual: the entire tribe has heavily pressured the fighting clans to desist, and then it actively helps them to resolve the conflict. The fact that these processes are routinized—and formally ritualized—does not detract from their purposefulness.

### **“TELEOLOGY” IN SOCIAL CONTROL**

If we move from conflict management to social control of deviance, purposeful problem solving is apparent there, as well. All human groups have specific moral codes that share some important proscriptions and prescriptions and are capable of moralistic outrage, and all engage in sanctioning that involves manipulative techniques many of which are similar (Boehm, 2000). The latter include criticism, ridicule, ostracism, and also some means of seriously distancing a deviant or eliminating him from group life. These similarities derive not from specific genetic programming, obviously, but from the group's need to cope with innate individual propensities that universally promote dominant, greedy, or lustful behaviors—those widely defined as being antisocial.

The recognized problem is that predators and aggressors within the group damage the interests of others. The potential victims understand that if they stick together, they usually can deal with such deviants. This is an excellent example of group-level problem solving, and, as with other aspects of normative behavior it is partly explainable in terms of individual self interest (e.g., Ensminger & Knight, 1997). However, to fully understand the operation of moral communities as sanctioning bodies one must deal in group dynamics. In effect, the entire group forms a purposeful defensive coalition against internal predators: the result is common safety and more harmonious group living, both being explicit goals.

In a sense, social control drastically reduces the need for triadic conflict management (Boehm, 2000). If you suppress types of deviance that predictably lead to conflict, you are, in effect, managing conflict on a long-term, pre-emptive basis. Thus, both social control and the management of conflict are problem-solving behaviors, highly intentional and highly conscious ones, that contribute to positive functioning of groups as native actors see it—and as we see it.

Social control in every human society has two sides. The one detailed above is oriented to the active suppression of antisocial behavior: this involves proscriptions such as those against bullying or cheating, and the use of social pressure or



physical force. The other is positively oriented: it includes calls for generosity and cooperativeness, with positive rewards such as praise or special office or respect. Thus, as "lower-level teleologists" human beings in their groups are insightfully manipulating individual behavior in prosocial directions, using a judicious mix of sticks and carrots (Boehm, 2000).

### NEW USES FOR FUNCTIONAL ANALYSIS

Nonliterate humans universally proscribe antisocial behavior and prescribe prosocial behavior. It may well have been their ardent and manipulative prescriptions—the calls for harmony and cooperation described by Campbell (1975)—that influenced early systems theorists like Durkheim and Malinowski in the direction of functionalist "beautification." Indigenous ideologies promoting harmony surely led investigators to take too literally indigenous idealized statements about how things should be, and simultaneously led them to ignore the problems of dysfunction that nonliterate (and all humans) have to deal with (see Edgerton, 1992).

With these problems of "beautification" corrected, a more realistic functional approach could have a legitimate place in anthropology. However, the new functionalism would need to be oriented heavily to active problem-solving. When such coping is clearly oriented to realizing functional goals such as reducing conflict and making cooperative endeavors run more smoothly or exploiting an environment more efficiently, and when people's assessments and coping behaviors are realistic and effective, we have a special type of causal input that begs for explanation.

Efforts to reduce conflict and enhance cooperation introduce an intentional element into the operation of social systems, one that expresses the problem-solving capacity of indigenous functional theorists. They seem to be sufficiently good at this work that they can shape their social systems to a degree that is highly significant in promoting the functional goals they favor. This is lower-level teleology at work, and there is no other species that approaches operating at this level of insight.

We have seen that different types of anthropological functionalist theory led to serious over-perceptions of social harmony and to naïve assumptions that somehow every cultural behavior, be this social or ecological, must be "adaptive." In sociology, it was necessary for Sorokin (1957) and Coser (1956) to supply antidotes to the functionalist beautifications of Durkheim (1933) and of Parsons (e.g., Parsons & Shils, 1952), who himself was personally influenced by Malinowski. Likewise, it was necessary for Edgerton (1992) to supply an antidote to the anthropological analyses that assumed every human behavior to be socially or economically adaptive (see also Friedman, 1974; Goldschmidt, 1986; Rappaport, 1977): Edgerton provides a litany of examples of people hanging on to

customs that in his opinion anyone, including the people concerned, can see are maladaptive.

Humans obviously are imperfect problem solvers. No one knows this better than modern people living in nations. We have the predictive and analytical benefits of science, yet we face obvious, dangerous, and sometimes quite rapid degradation of our environments. We also cope with an uncertain and largely uncontrolled political future, because we will not commit to a strong or world government—one strong enough to decisively stop conflicts when they are just brewing, or decisively control those who would engage in mass destruction. At the same time, in deliberately shaping our social life through moral sanctioning we are nothing short of phenomenal in comparison with, say, the chimpanzee.

Functional analysis does have an obvious place in explaining the systematic behavior patterns of our own species, but self-organization must not be the sole focus. Major emphasis must be placed on active, realistic problem solving that is aimed at improving the functionality of society or subsistence as natives see this. This active, problem-solving aspect of cultural selection is susceptible of study at the level of microprocesses, and the coping behaviors we can study include not only social control and conflict management, but things like ecological strategizing, intersocietal conflict (as a sometimes very risky means of collectivized self-advancement), and, even deliberate population regulation (Boehm, 1982) in favor of increased or lessened natural increase, depending on the circumstances.

I am proposing that we study culture at the level of microprocesses, to arrive at fundamental mechanisms that keep cultural patterns in place. In spite of the emphasis on lower-level teleology, I do not mean to argue that the self-organizing aspect of cultural process is either causally trivial, or undeserving of study: much (and possibly most) of the operation of cultures is self-organizing, much is beyond human understanding, and still more is beyond any effective manipulation by indigenous actors. Furthermore, much of cultural process involves the blending of causal forces that are self-organizing and those that involve insightful problem-solving.

What I am suggesting is this. If we want to understand the nuts and bolts of how culture works, it is purposeful mechanisms that will be the first to yield to micro-analysis. Once we better understand active problem solving, and how this interacts with self-organizing aspects of culture process, we could be in a better position to investigate and understand these important self-organizing forces in their own right.

### **HUMAN INTENTIONS AND CULTURAL ANALYSIS**

In studying humans anthropologically, a healthy dose of “functional analysis” is necessary, and quite appropriate. It is necessary because the human subjects we study are competent to analyze the social and ecological systems in which they

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are embedded. They appreciate certain functions that are obvious and useful, and they try to cope with certain dysfunctions that are perceptually obvious to them. To an important degree, their cultural and social systems are not self-organizing, but rather are subject to significant intentional guidance. This is true of social and political systems, also of systems of subsistence. Problem solving is endemic in human life.

The main reason for the neglect is the great attention we pay to structures, functions, and symbols as we remain entangled with essentially synchronic or otherwise very generalizing paradigms. We rejected "functionalism" not so much because it was overly synchronic (that is, because the study of processes had been neglected), but because we felt that adaptations and societies, alike, were being beautified in ways that were seriously distorting. This was a valid diagnosis. Now, anthropologists refer pejoratively to attempts to bring back any type of functional interpretation, "neo-functionalism" being the epithet. Usually they have in mind "just-so story" approaches that assume that if a behavior is present, it must automatically have some positive systemic function or adaptive benefit (e.g., Rappaport, 1968).

The potential comeback I am suggesting, for a functionally-oriented brand of theory, has quite a different basis. If indigenous actors are capable of rationally manipulating at least some of the problems they both face and recognize, and if they succeed significantly in impacting their social life and their subsistence strategies by doing so, they are actively contributing to the functional operation of their own social and adaptive systems—and this needs to be taken into account whether their efforts are helpful or counterproductive.

It is not only important that anthropologists in the field become more attentive to such input; it is critical that we explain it. One very important reason for this is that indigenous systems theorists need to receive their full due, as perspicacious solvers of complex problems. But also we need to explain the complicated workings of culture as a process, rather than engaging in serial love affairs with explanatory modes that are interesting, sometimes quite illuminating, but hopelessly synchronic or generalizing. We need to dissect the mechanisms of cultural process, be they organized by people's decisions (Boehm, 1996) or self-organizing (Boyd & Richerson, 1985).

Basically, I am in agreement with anthropological condemnations of "neo-functionalism" (e.g., Friedman, 1974). However, in concluding it will be useful to let a thoughtful and partly reformed "neo-functionalist" have some say in this matter. Rappaport (1979) refers favorably to Flannery's (1972) archaeological view that the radical correction of "structural anomalies" has been important in the political evolution of civilizations, and commends Marxian emphases on corrective processes that are politically revolutionary. Rappaport also sees Bateson (1972) as going far beyond these political manipulations when he argues that purposefulness is the dominant characteristic of human reason. Rappaport (1994) himself finds this to be plausible:

for purposiveness, encompassing both foresight and concentration, must have been strongly selected for during man's two or three million years on earth (and even earlier among man's prehuman forbears and other animals) (p. 170).

In *Pigs for the Ancestors*, Rappaport (1968) was considered by many to be an arrant neo-functionalism, for he treated ritually-controlled warfare in terms of a mechanically operating homeostatic cultural system. From my perspective, he did not successfully analyze the degree to which the Maring were trying to strategically manipulate their overall eco-political situation, as they coped with problems of carrying capacity that varied locally from group to group. Meggitt (1977) had clearly identified the Mae Enga's conscious political and territorial strategies by the time Rappaport (1979) engaged in this re-analysis, but Meggitt's analysis was not taken into account.

Basically, in considering patterns of tribal warfare Rappaport stays with self-organizing systems theory. However, I would suggest that even if the Maring's attacks on their neighbors do tend to be phased by the natural increase of pigs and resulting feasts, what is taking place is a process heavily guided by conscious political strategies. When accidents of demography, disease, and recent political history cause neighboring tribes to vary significantly in their problems with carrying capacity, it makes sense for a hungry tribe to attack one with surpluses. Meggitt (1977) shows that this is taking place with the Mae Enga, and there is no reason to think the Maring are less adept as strategizers who understand their own ecologies and political situations. Rappaport (1979) explores Maring models of the universe in detail, but somehow he does not conclude that they consciously know what they are doing when they decide to go to war. He is too wrapped up in systems theory.

Thinking of modern society, Rappaport (1979) does say that

The systems in which all men participate are so complex that we cannot now, and probably never shall be able to, analyze them in sufficient detail to predict with precision the outcome of many of our own actions within them. We must, therefore, investigate the possibilities for developing theories of action that, although based upon incomplete knowledge, will permit us to participate in systems without destroying them and ourselves along with them (pp. 169-170).

This forward-looking stricture is consonant with the retrospective case I have been making for lower-level teleology in nonliterate people. Their limited yet sometimes astute understandings of the systems they are embedded in can be put to good adaptive use, for they actively try to improve functions of their social systems that are perceptually obvious to them, and actively try to shape their subsistence activities to make them more effective. They often, but not always, succeed in doing so.

### A LARGER VIEW OF HUMAN PROBLEM SOLVING

In anthropology the direct study of problem solving is already a viable enterprise. Legal anthropologists have been doing this for some time, and most anthropological treatments of social control implicitly do so. In the fields of subsistence and external politics, we have as examples for future analysis a few magnificent instances of field studies that take collective problem-solving events into account and describe and analyze them to good effect; yet from this perspective the great majority of ethnographic treatments continue in a synchronic, reductionist, or otherwise limiting mode. In suggesting a modified approach to cultural analysis, I emphasize that a newer and healthier functionalism should not be limited to synchronics. The operation of lower-level teleology must be documented at the level of problem-solving micro-processes that reveal alternatives, dilemmas, and choice criteria—as well as the final decisions that actually help to shape cultural patterns.

Let us return to John Dewey as a philosopher who remained keenly in touch with his own common sense. Dewey was a pioneer in the movement of American philosophers toward evolutionary contexts, and we truly are, as he says, a problem solving animal. Yet the discipline that studies this very special animal has failed to use its own common sense and key its analyses to the problems that nonliterate solve—and also to those that they try to solve, but cannot. Problems of field methodology have contributed to this neglect, but really it has been our serial paradigmatic love affairs with synchronic-reductionist approaches, ones that lead us to analyze cultures without engaging robustly with process, that have done the damage.

Problem solving is too important a behavior for us to take for granted. It shows indigenous intelligence working at its best; it has a major effect on the functional efficiency of human societies as cooperative enterprises; and it ties human behavior directly to adaptation and, ultimately, to natural selection. Hopefully, a younger generation of evolutionary and cultural anthropologists will take interest in this distinctively potent capability of humans to cope collectively as individuals and as groups—a capacity that is relevant to understanding any group studied by an anthropologist, be it tribal, peasant, or urban. I include applied anthropologists, who often try to work with indigenous problem-solving processes rather than imposing solutions from the outside.

I have outlined some specific methodologies, and also some analytical frameworks in which such an interest might be expressed. But the first step is to realize that many of the “functions” we intuitively perceive are there because indigenous systems theorists are adept at solving certain problems they are able to perceive. We cannot avoid functional theory, for the people we study can be formidable in their role as applied functionalists. They have theories of their own, and it is our job to understand them and evaluate their practical effect.

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