

# DIVINATION—"ADAPTIVE" FROM WHOSE PERSPECTIVE?<sup>1</sup>

Lothar Georg Vollweiler  
University of Arkansas at Little Rock

Alison B. Sanchez  
Little Rock, Arkansas

Twenty-six years have elapsed since Omar Khayyam Moore's (1957) article "Divination—A New Perspective" appeared in the *American Anthropologist*. It has since been republished many times (Lessa and Vogt 1965; Vayda 1969), and has been extensively discussed in introductory texts (Ember and Ember 1975, 1977, 1981; Harris 1971; Rossman and Rubel 1981) as well as in the literature on ritual and human ecology (Malefijt 1968; Rappaport 1968; Vayda and McCay 1975; Wallace 1966). The article has most recently been singled out by Arensberg (1981:562-581) for his minimal sequence model on shamanism.<sup>2</sup> It apparently has also served as a model for materialist explanations of ritual behaviors and beliefs as resulting from and maintaining ecological/infrastructural adaptations (Vayda, Leeds, and Smith 1961; Rappaport 1966, 1968; Harris 1966, 1974).

Moore suggests that a pattern which would break up hunting habits in a random fashion has survival value (i.e., adaptiveness) because it functions to maintain hunters and caribou in an ecological balance. The Moore hypothesis has remained current in the literature. It has by default become a minor anthropological classic because no anthropological researcher to this date has challenged or explored the hypothesis further and because its path of argument appealed to ecological/infrastructural determinists. It is the purpose of this paper to show that the hypothesis claims to explain behaviors that do not and have not existed, and that it shares with other materialist explanations of ritual the pitfalls of teleology centering primarily around such concepts as function (i.e., consequence) and adaptation (i.e., group survival).

We will show that hunters do not randomize their behavior, that caribou populations do not fluctuate according to human predation, and that scapulimancy apparently is not selected because it is ecologically advantageous. We shall also show that there is no cross-cultural evidence of divinatory random devices producing randomized subsistence behavior, but rather that people manipulate divination with the explicit or implicit intervention of personal choice. We suggest that Naskapi scapulimancy is a decision-making device which is used during ecological crises to re-establish harmony between individual hunters and the supernatural world believed to control the game supply. Beneficial conse-

quences of the ritual do not include a homeostatic balance between hunter and prey.<sup>3</sup>

Scapulimancy may lead to hunting success or other material consequences, but existence of material consequences is no proof of adaptiveness. With or without material consequences, scapulimancy may also lead to sociopsychological consequences by providing the impetus to keep on going in the face of uncertainty (Malinowski 1931) or by denying that life with its ambiguities, puzzles, and paradoxes is unendurable (Geertz 1972:173). In either case, demonstration of beneficial consequences is not proof of adaptation, as adaptation is falsifiable only if the group becomes extinct. Nor is a beneficial consequence proof for the causality of scapulimancy. At best, one can claim that the consequence is caused by scapulimancy and that scapulimancy is used by individuals under empirically falsifiable conditions.

We suggest that materialist strategies should concentrate upon how individuals under varying circumstances manipulate rituals rather than making *a priori* assumptions that infrastructural conditions lead to religious prescriptions, which in turn determine ritual actions that are ecologically adaptive. The question of how cultural adaptation occurs should involve more than merely describing apparent consequences of such rituals and how they supposedly facilitate some harmonious balance between a human way of life and the environment in which it takes place.

The purpose of this article is not to cast a belated rejoinder to Moore's hypothesis. Our purpose is to generate new discussion of a weak theoretical link and its implications for materialist explanations of ritual. As early as 1968, Vayda and Rappaport (1968:487) stressed the necessity of testing hypotheses regarding ways in which supernatural beliefs seem adaptive. Do cultures develop beliefs which impose restrictions on the short-run, self-interested behavior of individuals to maintain ecological adaptations? Without cow love, could Indians balance long and short term interests (Harris 1966)? Do people not move villages, in areas where overcrowding leads to disease, if they do not fear witchcraft (Vayda and Rappaport 1968)? Does ritual slaughter keep people from allowing their animals to overrun them (Rappaport 1966)? Does Naskapi divination prevent hunters from being so successful that they overhunt (Moore 1957)? Hypotheses like these are, first, not falsifiable when the purported behaviors and consequences actually exist. They can only be falsified if the behavior does not exist or has ceased to exist. Second, the type of hypotheses which began with Moore, but are also found in other materialist explanations of ritual, are mentalistic in their implication that individual behavior is controlled by such things as culturally prescribed beliefs, rituals, values, or ideologies. Finally, these hypotheses tend to be static and teleological in so far as populations, rather than individuals, are regarded as responding to their environments, and as developing rituals in order to maintain adaptations and assure survival.

Perhaps the idea of an emic component of culture designed (in a teleological sense) to keep us from ecological disaster stems from a desire to make the future seem less terrifying. The idea of etics (in a mechanistic sense) determining emics is itself terrifying, unless one accepts (as we cannot) that the whole process is somehow occurring to maintain adaptation. Approaching all cultural ideas as demystified consequences of infrastructural processes underestimates the creative potential of humanity to rise above its material condition in order to adjust to projected future ecological problems before, rather than after, it is too late to do so. By focusing on changing behaviors and beliefs, and specific causal relationships rather than system maintenance, the value and purpose of materialist strategies might be seen as helping to make projections of etic processes, instead of naively trying to show how all emic phenomena are merely delayed reactions to underlying etics.

We agree with Erasmus (1977:336) that human groups have habit patterns which make consideration of alternatives unnecessary for each and every decision but that people would not leave important survival matters to the gods in order to maintain an adaptive system. Instead, people are constantly manipulating the supernatural, as well as the natural world, to satisfy immediate needs and wants. Individuals do such things as substitute worthless wild cucumbers for oxen normally required for sacrifice (Nuer) and cheat ancestors for yams when supplies are low (Trobriand Islanders), and do not appear to be so victimized by habits as Moore would have it. Despite numerous ways beliefs and rituals are obviously manipulated by individuals, some materialist anthropologists are fascinated with the way beliefs get individuals to do ecologically beneficial things. One wonders whether such beliefs are really necessary. Would it be possible for humans to maximize their immediate, individual survival without such prescriptions for behavior? Or is it just that while humans can do things to survive in the short run, they need special beliefs and taboos which will help the group survive in the long run? If so, do such beliefs do what they are alleged to do, or are they ascribed functional or adaptive value simply because they are said to exist?

#### MOORE'S DIVINATION HYPOTHESIS

Anthropology has a long history of interest in divination as a form of communication which beckons supernatural powers into giving information, foretelling the future, or explaining past events. Divination persists to this day in cultures with, as well as without, Western scientific traditions. Despite its prevalence, scientific observers agree it to be a highly undependable technique in achieving stated goals. The question of why it has persisted nonetheless is justified. The explanation proffered is that divination persists because it serves its practitioners and cultures eufunctionally. Although the intended consequence is not achieved, the practice has an unintended and unrecognized consequence which is said to be adaptive because it contributes to the survival and/or stability of sociocultural systems and/or individuals (Ottenberg 1958; Dole 1966; Park 1963; Wilson 1949; Vogt 1952; Malefijt 1968; and Wallace 1966).

Moore's hypothesis is novel because he proposed two contradictory functions to explain the existence and persistence of Naskapi divination. On the one hand, he took issue with the view that divination is notoriously ineffective for attaining the specific ends its practitioners hope to achieve through its use. In other words, he maintained that it does lead to hunting success. However, his explanation is teleological because the success is not immediate. It comes only after the practice of scapulimancy causes the hunters to come home empty-handed so much that overhunting is prevented. The end result of this divination pattern is that hunter and prey survive in ecological balance. This system-maintenance model is superfluous at best. It is well known that animals on the African plains became adjusted to human predation without supernatural beliefs, unconsciously selected through trial and error, maintaining adaptation (Campbell 1979:210-215). The same is true for caribou in Canada (Burch 1972).

Moore's purportedly materialist model is based entirely upon mentalistic variables. There is no mention of ethology, demography, hunting practices, or anything else so mundane. Instead, he based his argument on game theory and asserted that in species-specific, as well as interspecies interaction, advantage is gained by avoiding fixed patterns of behavior. He suggested that if avoidance of behavioral regularity is advantageous in achieving the hunters' aim of continuously successful hunting, divination may well be a directly efficacious technique, in so far as it makes that behavior more random. This presupposes an unjustified displacement capacity in caribou or other prey, because Moore talks of "anticipatory response" in these animals rather than of flight reaction.<sup>4</sup> Game theory works as an explanation for human interaction because sentient humans can anticipate

regularities in behavior and take evasive actions. Hunted caribou will take minimal or no evasive action, no matter what regularities hunters may display in their hunting activities. Caribou and most other animals hunted by the Naskapi lack the capacity for anticipatory response simply because they lack the capacity for displacement. Prey responses are context conditioned. Anticipation, on the other hand, would require thought concerning future eventualities. As such, it has been verified only for apes taught human communication systems.

Moore wondered if hunters would have greater success without intervention of a random device. He suspected that, if based on such preferences, the selection of hunting routes would be unduly influenced by recent successes and failures. The behavioral regularities of the hunter would provoke anticipatory responses by the prey: "Unwitting regularities in behavior provide a basis for anticipatory responses. For instance, animals that are 'overhunted' are likely to become sensitized to human beings and hence quick to take evasive actions" (Moore 1957:71). Ecological adaptation is apparently seen as a mental game humans and animals play as adversaries.

Moore also seems to have made the bold assumption that divination with a random device sends hunters into places where they would not go if their behavior were nonrandomized.<sup>5</sup> Would they attempt to chase caribou at speeds of 40 kilometers per hour over tussocky mudflats if directed by divination to do so? Would they run right off a cliff to unconsciously conserve game? Without being based on the foregoing assumptions, Moore's conclusion would make no sense whatsoever. He concluded that nonrandom hunting behavior leads to eventual depletion of game and that under these circumstances a device which would break up habit patterns in a more or less random fashion might have functional value (Moore 1957:72). Hunters not resorting to random behavior return to places where they have been successful. For purposes of immediate gratification they overhunt the very means on which their life depends. Those using a random device, on the other hand, will be successful because they take their chances at the cost of deferred gratification. The hunters do not outguess the game if they randomize. The eufunctional consequence is that they are prevented from hitting the mark so often that the ecological balance is not threatened. The latent function of the divinatory rite is achieved because of its unintended long-range results; game conservation.<sup>6</sup> The pattern is then selected for on the group level.

#### RANDOM HOCUS-POCUS OR NON-RANDOM DECISIONS?

Moore (1957:73) insists that scapulimancy is of interest beyond the Montagnais-Naskapi and that it is "potentially relevant to all situations in which human beings base their decisions on the outcome of chance mechanisms." This, as well as our concern with the question of whether or not hypotheses regarding adaptive value of prescriptive rituals could actually be falsified, led us to consult the Human Relations Area Files. We drew a random sample of divinatory descriptions to see if the ethnographic record supported Moore's claim that chance-like devices produced randomized behavior. Our sample included 195 cultures encompassing all eight of Murdock's (1963) major world culture areas.<sup>7</sup> Four requirements for determining whether or not genuinely random behavior would be induced by divination were established:

- (1) The divinatory ritual must be noninspirational so that the index event can be observed and examined by nondiviners.
- (2) The variables which control the occurrence of a particular divinatory event have to be extrinsic to the diviner's volition. If the diviner has control over these variables, it can hardly be maintained that the casual nexus is broken between individual preference and decision-making.
- (3) Interpretation of the divinatory event must be prescriptive, or based on rules established before the divinatory event occurs. If no such rules exist,

the scientist has no recourse to testing whether interpretation followed prescribed patterns or the momentary whims of the diviner.

- (4) The divinatory consultant must follow the prescription to the letter to avoid the introduction of personal choice.

The cross-cultural survey revealed that scapulimancy, which Moore (1957:72) claimed to be widespread, is reported for only 4.1 per cent of all cultures in the sample. Furthermore, it is not exclusively used to divine the location of game but to predict general hunting success, happiness, a bright future, money fortunes, dismal weather, cause and nature of illness, prospects of the next harvest, the likelihood of war, the adequacy of prospective brides or grooms, the likelihood of good or bad luck, and so on (see Groot 1912; Needham 1954:84; Honigmann 1947; Halpern 1958:277; Coon 1950:37; Durham 1928:275; Masse 1938:156).

Divination to locate game is rare even in foraging societies, and it is unjustified to assume that where it exists it results in random behavior (Table 1). Only in 7.6 per cent of all cultures in the sample is game-location divined by various means. In 60.0 per cent of these cultures, the divinatory event does not even involve a random device. In these cases, knowledge of the seemingly secret, obscure, or unknowable is sought through inspirational means. A revelation is achieved through a change in the psychology or emotional state of the individual. Various techniques may be employed to induce such a revelation. The Ojibwa and Yucatan Maya gaze into pieces of translucent stone or glass (Landes 1937; Redfield and Villa Rojas 1934), and the Tapirapé believe that the inhalation of tobacco smoke is particularly effective (Wagley 1977, 1943). Whatever its particular manifestation, it can not be maintained that these divinatory practices are extrinsic to the diviner's wishes or that interpretation is at all times prescriptive, preventing the introduction of personal choice.

There are precious few instances in which game location is divined by the use of random devices. Do they support Moore's hypothesis? The cases in question are the Naskapi, the Chuckchee, the Nahane, the Khasi, the Chaingang, the Lapps, and the Vedda. Bogoraz-Tan (1904:379-380, 404, 487-489) describes the use of scapulimancy by the Chuckchee. He remarks that they consult the scapula on infrequent occasions to determine their moves on the hunt. Most importantly, he asserts that the hunters select a certain location and that the diviner, by interpreting the cracks, determines whether the selection is good or bad. Thus, personal choice plays a significant role even when the scapula is used. The hunter does not go in just any direction but uses his head before consulting divine will.

Similarly, Honigmann's (1947) description of Nahane scapulimancy does not support Moore's hypothesis. The ethnographer merely states that the scapula is used, and there is nothing to support any claim of random hunting behavior. Ethnographies of the Khasi (Stegmiller 1925, 1924), the Lapps (Scheffer 1704), the Chaingang (Henry 1941), and the Vedda (Seligmann and Seligmann 1911) also fail to verify the claim. Stegmiller explains that the Khasi attempt to locate game through egg-breaking. The position of dropped eggs on a prepared board facilitates a particular prediction. It is possible that the position of the eggs is caused by variables extrinsic to the diviner's volition but it is also possible that he can influence the dropping of an egg onto a particular section of the board. Moreover, it is not certain whether interpretation is based on a set of prescribed rules or if hunters make prior selections of alternate hunting routes.

The Chaingang use a random device to divine game location. They set fire to a heap of charcoal. The place where it "twinkles" indicates where game may be found. The hunter is then dispatched to either the left or right side of the river (Henry 1941:90-91). Lapps divine game location by hanging a hatchet at the roof of their huts. They mutter certain words and wait for the hatchet to become motionless. The corner toward which the hatchet turns is the direction in which game may be encountered (Scheffer 1704:233). Finally, the Vedda spin a pot of

TABLE I  
 FREQUENCY DISTRIBUTION OF DIVINATORY PREDICTIONS

DIVINATORY PREDICTION	% of Total Sample (n=197)	% of Foraging Societies (n=29)
<u>PREDICTIONS CONCERNED WITH FOODQUEST</u>		
<u>SUCCESS IN:</u>		
Hunting, Fishing	19.80	44.82
Agriculture	5.08	-
Other	2.03	-
<u>LOCATION OF:</u>		
Game	7.61	24.13
Village, Camp	3.55	3.45
Garden, Field	1.52	-
Other	2.03	-
<u>TIMING OF:</u>		
Planting	4.06	-
Hunting/Fishing	2.54	3.45
Other	.51	-
<u>OTHERS:</u>	8.15	11.23
<u>SUBTOTAL</u>	56.88	87.08
<u>PREDICTIONS NOT CONCERNED WITH FOOD QUEST</u>	43.12	12.12
<u>TOTAL</u>	100.00	100.00

rice on the ground. The direction the pot dips indicates where game may be found. If the pot does not dip, game may be found all around (Seligmann and Seligmann 1911:233).

In all these cases, interpretation of the index event may be said to be prescriptive. But there are no indications as to whether the hunters follow the advice of their oracle. Nor is there any hint concerning the frequency with which they resort to divination or how many trials are used on given occasions. Although the practices described involve crude random devices, personal choice and nonrandom decisions as likely components of the divinatory rite cannot be ruled out. This is exactly our point. People are not robots. They manipulate religious prescriptions when necessary, whether adaptive or not.

#### DO THE NASKAPI RANDOMIZE OR RATIONALIZE?

We still have to examine scapulimancy as practiced among the Naskapi. There is a large amount of data concerning hunting practices of these people, making it quite remarkable that Moore utilized only the Speck (1935) monograph on Naskapi religion. Speck's singular concern was with the religious ritual connected with hunting. Little insight is to be gained from this description if we need to infer the efficacy of hunting among the Naskapi. Moore failed to consult other ethnographic sources which could have enlightened him about Naskapi hunting practices, or about methods of hunting prevalent among other North American tribes with comparable modes of subsistence, although such descriptions existed at the time. It appears also that he failed to consult voluminous sources on caribou ethology!

The Speck monograph is a marvelous source if one is after descriptions of divinatory practices. It probably is one of the most exhaustive accounts of divinatory practices found in a particular culture. It is from this source that Moore gained insights for his hypothesis. Since Moore chose the Naskapi case as his prototype, we re-examined the data to determine whether accounts of Moore and Speck coincided. We suspected that a people would not allow reason to be negated by such an impersonal chance device when it came to questions of survival. This would be singular indeed and contrary to all we know to be the case among other peoples of the world.

It is a fact that the Naskapi utilize scapulimancy to make predictions concerning future and past events. They expose animal scapula to fire, and the resulting black spots, cracks, and breaks are then interpreted by "the cunning and ingeniousness of the practitioner" (Speck 1935:139). Cracks and burns may be interpreted to represent lakes, mountains, trails and camps but they also may represent such ideas as life, death, success, failure, plenty, sickness, general good luck, and the like. Locating game is indeed one of the purposes for which the scapula is used, but it is not as paramount a concern as Moore would have it. He also conveniently ignores other equally prevalent divinatory practices and their possible latent adaptive functions. Such practices include gazing to predict the success of a hunt, sticking an index finger through the hole of a beaver pelvis to predict weather conditions, breaking of beaver tibia to divine prospects of a beaver hunt, tossing of fish bones in the air to indicate favorable fishing, tossing an otter paw for various purposes, tossing a muskrat skull for amusement, and, finally, otter tail skinning; a divination practice in which the number of hairs left on the meat of a tail indicate the number of pelts one may get during the next hunt (Speck 1935:159-165).

As far as caribou scapulimancy is concerned, it is correct, as Moore maintained, that the appearance of cracks and spots used to infer the location of game is not controlled by the Naskapi, that it is a process extrinsic to the Naskapi's volition and dependent upon "relatively uncontrolled variables such as bone structure, temperature of fire, length of time the bone is exposed to heat, etc." (Moore

1957:71). By no means does this indicate, however, that the entire process is random.

Let us suppose that the Naskapi produce a device that is potentially equivalent to random die. In order to indicate the direction in which game may be found, the diviner must hold the device in a predetermined position with reference to the local topography or the diviner must picture the points of the compass on the scapula so that there is no doubt left to necessitate purely personal interpretation. Moore (1957:70, 72) emphasized that the Naskapi hold the blade in a predetermined position "with reference to the local topography." This is not what Speck maintains. Speck (1935:151) writes that "when burning the shoulder blade, they hold the narrow portion of the bone toward the body, the wide portion away from the body, and then as the burnt spots and cracks appear these indicate the directions and locations to be followed and sought."

Of the 34 cases which Speck discusses, only one approximates what Moore claimed to be general practice (1935:141, 146). In this instance, a pelvic bone was laid upon coals "in alignment with the shape of the hunters' trapping rounds." The hunter wished to learn which river he should follow to have success in obtaining big game. A bifurcated crack appeared which was interpreted to represent two principal rivers in the hunting territory. The sign told the hunter that he would meet with success up the rivers—places at which he usually pursues game. Besides this vague description, there are no other data to support Moore's assertion. It should also be noted that the hunter still had to decide which of the two rivers he should go to first; a decision based on personal choice.

Moore (1957:71) committed a serious mistake when he assumed that the occurrence of cracks and spots means "that the final decision about where to hunt, for instance, does not represent a purely personal choice," and that the final decisions "are based on the outcome of a process extrinsic to their volition." Even if a divination event occurs by chance, there is still the crucial process of interpretation. Randomization may be achieved only if interpretation of the index event is based on a set of prescribed rules.

Moore (1957:70) claimed that the Naskapi "have a system for interpreting the cracks and spots." This assertion is not borne out by facts presented in Speck's monograph. Speck (1935:148) conducted an experiment which refutes the notion that there is such a set of prescribed rules. Informants were asked to outline caribou scapula and to make out imaginary burnings to illustrate their ideas of meanings. As individual hunters compared notes, the fact was brought out "that to different hunters the same burnt figures meant somewhat different things." Obviously, there are no agreed upon rules and wherever such rules exist, there are likely to be exceptions to rules, exceptions to exceptions, rules for breaking rules, or outright cheating (see Harris 1979:271-275). If individual variation exists, then there is no randomness and no adaptive cultural pattern leading to randomization.

Is it possible that every interpreter has a consistent and replicable system of interpretation? Although Speck (1935:40) believes that, aside from individual variation, "some general rules for interpreting" the scapula exist, this supposition is not supported by evidence presented. Nothing in Speck's data is evidential for the assumption that the same index event would be interpreted the same way by different individuals or by the same individual on different occasions. Moore (1957:70) paraphrased and quoted Speck when he maintained that the shoulder blade may be utilized "as often as every three or four days" when there is a shortage of food, and that drumming, singing, dreaming, and divination combine as the *modus operandi* of the life-supporting hunt." His reiteration of Speck is essentially correct but leaves the reader with an unwarranted impression. Speck had no opportunity to assess the frequency of divination, but he relied on the testimony of several Naskapi hunters questioned at Seven Islands who said "that



in the interior when there is a dearth of food, the shoulder blade oracle is consulted with great frequency; as often as every three or four days" (Speck 1935:151). If scapulimancy is used only "when there is a dearth of food," it can hardly be maintained that drumming, singing, dreaming, and divination combine as the *modus operandi* of the hunt. The ritual complex is invoked only when the hunt is unsuccessful.<sup>8</sup>

It seems odd to us that the culture would select a time like this to prevent people from overhunting and that such a practice would be unconsciously selected over time. It would be more adaptive for the group if its unconscious conservation techniques were practiced not so close to the starvation level, when the animals were apparently already depleted. This same type of problem is mentioned by Alland (1975:67) regarding more adaptive alternatives to pig feasts, such as keeping the pig population at a more constant level. If scapulimancy is resorted to much more in times of scarcity, it is safe to assume that personal choice or nonrandomized behavior is part of the Naskapi business-as-usual hunting strategy. Moore remarked that the Naskapi ordinarily have information about the location of game and act upon it without the use of scapulimancy. The result of this would be overhunting and success-induced failure according to his hypothesis. If the Naskapi use scapulimancy only at times when the game has anticipated their hunting strategies due to overhunting, how can scapulimancy or a randomized hunting strategy function as a conservation mechanism?

This review of Moore's and Speck's data has exposed significant contradictions. It must now be considered doubtful that Naskapi scapulimancy randomizes hunting behavior, since interpretation of cracks and spots on the scapula introduces the variable of personal choice.

#### NON-RANDOM HUNTING LEADS TO SUCCESS-INDUCED FAILURE?

In discussing caribou behavior and hunting techniques, it is well to keep in mind the following hypothetically assumed consequences of nonrandomized hunting behavior suggested by Moore (1957:71-2): (a) nonrandomness induces the hunter to return to spots where he was previously successful; (b) returning to spots where the hunt was previously successful leads to overhunting, or depletion of game; and (c) the animals become sensitized to hunting behavior regularities and take evasive action.

It should really be unnecessary to point out that decades of anthropological research have shown that hunters and gatherers all over the world are utterly pragmatic in their food quest approaches and that they universally possess impressive knowledge of local fauna and flora. They are familiar with the peculiar habits of the animals they hunt and have developed hunting strategies congruent with these peculiarities. It is therefore safe to extrapolate that the Naskapi and other North American peoples who hunt the caribou are familiar with its behavior. Moore and his followers appear to have overlooked the profound importance of this fact.

Sources regarding the behavior of caribou existed at the time of Moore's study. Potentially enlightening sources included Banfield (1951, 1954a, 1954b), Crisler (1956), Dugmore (1913), Harper (1955) and Murie (1935). Moore did not consult any sources concerning caribou hunting behavior of North American peoples. Admittedly, data concerning the Naskapi caribou hunt were sparse, but he could have consulted Turner (1889-1890) and Leacock (1954). An extensive literature was available for other North American caribou hunters as well (Birket-Smith 1929; Curtis 1930; Gabus 1944; Giddings 1952; Instad 1954).

The Naskapi depend for their subsistence on a variety of animals, such as beaver, moose, bear, and caribou. The last was probably the major resource on

which they relied most of the year (Turner 1889-90; Speck 1935; Leacock 1954; Knight 1965). It is during the summer months, when the caribou migrate north, that the Naskapi are deprived of this prey. They make no attempts to follow migrating animals to summer calving grounds. If this were attempted, the hunters would soon be outdistanced by fast moving caribou herds. Kelsall (1968, 1970), Banfield (1951), Pruitt (1960b), and Makridin (1962) have timed the speed with which these animals may move even over most difficult terrain. They may travel as much as 65 kilometers in a day and may trot at speeds of 40 kilometers per hour over tussoky mudkeg, a surface over which humans have difficulty even walking.

It is during the fall that the Naskapi resume the caribou hunt. At this time the caribou begin their annual southward migration into Naskapi hunting territories. They may be hunted until spring when they again turn northward. One of the major difficulties hunters encounter is predicting the routes animals take in their two seasonal migrations. Since the animals move with some speed and direction during these migrations, the hunters must determine well in advance the route they might take. The hunters' success in making the right choice is not so much dependent either on scapulimancy or skill in outguessing game, but upon speedy decision and population levels of the migrating caribou. Why speedy decision is a crucial factor should be apparent if one considers the migration speed of caribou. Why population levels are so crucial is not immediately apparent.

Burch (1972) has demonstrated that population densities of migrating caribou may fluctuate annually. During one year the animals may come through a certain territory in great numbers, and during another season they may come in such small numbers that their passing may be almost unnoticed. Similar observations were made by Murie (1935), Saario and Kessel (1966), and Kelsall (1968). During seasons of caribou abundance, it is not difficult to predict the right spot. Fair sized bands of stragglers may be found not far from the main concentrations of migrating caribou. But during periods of low caribou population density, the hunter is faced with a serious problem. His chances of missing the right spot are multiplied.

Thus, the caribou hunters' success during caribou migrations is largely dependent on the relative density of migrating caribou herds. For the rest of the hunting season, hunters must depend on a thorough knowledge of caribou habits. Such knowledge does not always lead to success because, as Burch (1972:346) points out, caribou movements tend to be erratic except for the broad outlines of the spring and fall migrations. But such knowledge is useful because it reduces the element of chance in locating animals.

It is during the winter season that the Naskapi and other caribou hunters must utilize their knowledge of the influence of snow conditions on caribou movement (Pruitt 1970:91-92). They know that while caribou have to move about to some extent in their search for food, various conditions of snow keep them restricted to certain areas. Pruitt (1960a:18-19) observes that caribou movement during winter is directly influenced by the hardness and density of snow cover. Unfavorable snow conditions may be caused either by prolonged spells of cold weather or by feeding habits of the caribou themselves.

A cold spell will cause caribou to shift feeding grounds more frequently than in warmer weather. Hunters can be fairly sure not to encounter them at recently occupied spots during such spells. Moreover, caribou feeding habits increase the density and hardness of snow to such an extent that after two feedings the snow becomes so hard that the caribou must move on to softer snow (Pruitt 1960a:19). Since snow conditions occur with some regularity from year to year in most areas, and since the hunter is normally familiar with the topographic and climatic conditions of his own hunting territory (Pruitt 1970, 1959, 1960a, 1960b; Kelsall 1968; Burch 1972), the chance of locating wintering caribou populations is

significantly increased. The chances of not locating them is, again, related to caribou population density.

Are the hunters likely to overhunt once they have predicted the caribou's annual route of migration or once they have located a wintering caribou population? If we had to depend solely on Turner's account (1889-1890:251), we would have to agree that the Naskapi hunting pattern would result in overhunting of caribou, for he says that: "As many of the herd as can be speared are quickly dispatched and the entire number secured if possible." This appears at first sight to be in contradiction with what is the case among other caribou hunting tribes. Speck (1935:80) himself pointed out that the Naskapi are acutely aware of the consequences of overhunting and that they act to preserve the caribou as an important food source.

Annual and long-term fluctuations of caribou populations provide a solution to the problem of divergent interpretations regarding overhunting. Saario and Kessel (1966) and Burch (1972) demonstrate that there is an important relationship between the number of caribou present in a given location and the number of caribou killed. During years of scarcity, every animal observed in a given area will be pursued. In years of abundance, the hunters immediately make their insurance kills and subsequently devote attention to hunting other animals and to nonhunting activities. A further major harvest may be made during spring migration when supplies are nearly exhausted and the caribou are about to depart for their summer calving grounds.

Evidence indicates that Canadian caribou herds were approaching an all time low which triggered the excessive hunting described by Turner (Lent 1966; Skoog 1968:209-210, 240-252; Burch 1972:357). Naskapi observation of caribou densities during fall migration makes prediction of spring densities possible and allows hunters to make early adjustments. Apparently, a meager population is a signal not for conservation but for the staging of an all-out effort to kill as many caribou as possible. Since divination is admittedly associated with periods of scarcity, its use correlates more with overhunting than with conservation.

Could the annual and long-term fluctuations of caribou population density be a consequence of human predation? No. Fluctuations of annual caribou movement are related to population size and density of the herds concerned, while the cause of long-term fluctuations is still a mystery (Burch 1972:355). That long-term fluctuations are independent of human predation is evidenced by the fact that Canadian caribou populations have significantly increased since the introduction of firearms. It has been demonstrated that the most significant population increases occur among those caribou herds that are the most heavily hunted (Skoog 1968). In sum, the role of scapulimancy as an unconsciously selected means of game conservation is all the more questionable if human predation cannot even be shown to be a significant factor in fluctuation of game population.

#### ANTICIPATORY RESPONSES?

There still remains the question of whether caribou become sensitized to human predation. The answer is that caribou, although difficult to locate, are easily killed and are almost characterized by their low capacity of anticipatory response (Knight 1965:38; Burch 1972:360-361; Kelsall 1968:44ff; Murie 1935; Pruitt 1960a:5, 9, 13, 34-36). This is because caribou are a gregarious species, are generally not leery creatures, and are endowed with sensory abilities primarily designed to locate food rather than to warn them of approaching predators.

#### CONCLUSION: IS SCAPULIMANCY ADAPTIVE?

Moore's hypothesis suggests that ritual action can produce practical results in the external world. In this respect, he anticipated and provided a model for research and hypotheses with similar aims (Vayda, Leeds, and Smith 1961; Rappaport 1966; Harris 1966). It is therefore important to point out that the

serious shortcomings of Moore's hypothesis and evidence involve more than simply his ignorance of relationships between human cultural behavior and its animate and inanimate environment, and the fact that he extrapolated animal behavior from human behavior and ignored the factual relationships between organisms and their environments. The theoretical problems with such hypotheses are insurmountable because any behavior could be shown to have functional or adaptive consequences. It seems that explanations of this nature cannot be falsified unless, as was the case with Moore's hypothesis, the behavior explained does not in fact exist. Moore explained how a nonexistent behavior, which he claimed to exist, is adaptive in Naskapi ecology and society. Hunters apparently do not randomize their behavior, caribou populations apparently do not fluctuate according to human predation, and divination apparently is not selected because it is ecologically advantageous. Moore himself noted that his teleological hypothesis was so difficult to investigate empirically that it would remain an open question. It is sobering to realize that, as long as it was erroneously believed that Naskapi hunters wandered randomly about in search for food and that they unconsciously conserved caribou, these alleged facts could be cleverly manipulated to make it seem that scapulimancy had been selected by an evolutionary process to maintain some sort of systemic relationship.

It has been pointed out by Alland (1972, 1975), Alland and McCay (1974), Friedman (1974), Vayda and McCay (1975), and Richerson (1977) that materialist research is heir to the theoretical shortcomings attributed to traditional functionalism. Approaches such as Moore (1957), Vayda (1967), Vayda and Rappaport (1968), Harris (1966, 1968), and Rappaport (1966), ostensibly explaining why ritual behaviors exist when and where they do, and how they function to maintain a balance between populations and resources, differ only superficially from traditional functionalism. Thus, while Harris (1968:535) acknowledges the inherently static nature of functionalism with a statement that dinosaurs were eminently functional, he later maintains that cultural materialism is compatible with structural functionalism once a distinction between "system-maintaining" (functional?) and "system-destroying" (dysfunctional?) interdependencies is made (1979:71).

Merely separating those things which seem to be maintaining a system from those things which seem to be changing it, is problematic as an explanation. As Cancian says (1968:31), with a little imagination one can show any social pattern to have adaptive and maladaptive consequences. Logically, Cancian's description of functionalist explanations as vacuous is equally applicable to the teleological explanations which are still found in some materialist approaches to ritual. Moore's divination hypothesis is a good example of such a vacuous explanation. As long as the existence of the practice remained unquestioned, anthropologists had no way of challenging Moore's implication that all was well in Naskapiland because caribou were being conserved by adaptive pattern demanding randomized hunting behavior. Herein lies the rub. If such patterns as cow love, pig hate, witchcraft, and divination actually exist, there is no way to falsify the hypothesis that they are of adaptive value.

Discussion of teleologies and the unsupported epistemological assumptions of materialist research has had limited effect. To be sure, materialist anthropologists are to be commended for recognizing a rational side to cultural beliefs previously considered to be examples of irrational tradition. Moore and others must be criticized, however, for reducing cultural ideas and practices to epiphenomena of infrastructural conditions. Although Harris (1979:70, 71) rejects that accusation, he nonetheless insists in his discussion of the scope of materialist theories that infrastructure has primacy over individual choice behavior. In effect, Harris denies the role of individuals and replaces the explanation of cultural traditions and change with a functionalism submerged in infrastructural terms. Human

behavior becomes little more than a reflex as adaptive patterns are selected for on the group level with effective or adaptive ones persisting and ineffective or unadaptive ones becoming extinct. As under traditional functionalism, the task for the researchers becomes one of discovering (i.e., describing) whatever practical consequences of behaviors and beliefs can be observed and offering them as reasons for selection on a group level of practices which may demand unreflective and even stupid behavior on the part of individuals. While we do not deny that people do stupid things, we question that cultures prescribe limits on the exercise of short-term rationality in the interest of adaptation. The evidence seems to indicate quite the contrary; people are moving rapidly to make this planet uninhabitable, culture (our alleged "main adaptive mechanism") notwithstanding.

Materialist anthropologists have taken steps which promise to divorce the field from the fallacies of traditional functionalism. Materialist anthropologists now appear to agree with Harris (1979:59) that human beings are not "zombie-like automata whose activities are never under conscious control." The shift in emphasis toward the individual rests on the recognition that dubious models borrowed from ecology commit the fallacy of misplaced teleology by attributing purposive action to higher levels of organization such as ecosystems, populations, and communities (Richerson 1977). Materialist anthropologists now see individuals as decision-makers whose responses to given infrastructural conditions are adaptive and/or rational (see Margolis 1977; Love 1977; Williams 1977; Oliver-Smith 1977; Rutz 1977; Vayda and McCay 1975). Unfortunately, these two concepts are used interchangeably, as if rationality (i.e., a conscious behavior which is sensible, not foolish) were equal to the adaptation of a group.

If adaptation can be defined as ensuring survival, then it would refer to practices that can only be retrodicted to have been rational in the long run. But very few existing cultural practices can be proven not to be adaptive. Certainly there is no direct correlation between rational and adaptive behavior. Whatever adaptation has been necessary through the long haul of human history could in fact be said to be triggered by human behavior which turned out to be foolish in the long run. Whatever adaptability humans have it seems to be in responding to the way in which they have fouled a present niche in an ongoing process of resource depletion. Thus it is clearly mistaken to utilize the concept of rationality as if it were an unconscious reflex response associated with an adaptive process working to assure survival or maintain some present way of life. Furthermore, the way in which these two concepts are confused is yet another vestige of traditional functionalism. Rational behavior somehow becomes adaptive if the anthropologist can see how it fits into a particular way of life. In this sense, it is used synonymously with functional. When short-run rational behavior, such as bovidicide and nonrandom hunting, is seen as jeopardizing an adaptation, however, it becomes the equivalent of maladaptive or dysfunctional and seems to require some sort of pattern to prevent the exercise of rationality. This way of thinking, despite professed emphasis on change, is static and contradictory.

In addition to this conceptual problem in materialist anthropology, the shift toward and emphasis upon individual choice behavior in producing rational responses still seems for some to be only a half-hearted response to the recognized fact that selection operates on the individual level. Harris (1979:61, 62) gives lip service to the fact that "socio-cultural systems survive or not as a consequence of the adaptive [*sic.*] changes in the thought and activities of individual men and women who respond opportunistically to cost-benefit options." He never criticized his explanation of cow love as a pattern which "protects the farmer against calculations that are 'rational' only in the short term" (Harris 1974:21). Instead, with the publication in 1979 of *Cultural Materialism*, all of Harris's statements proclaiming essentially that taboos serve to prevent people

from pursuing short-term goals in the interest of long-run adaptations disappear and are replaced with less frequent and no-where-near-so-bold statements to the effect that certain beliefs "enhance" material well-being (1979:242-243). It is curious that such a comprehensive critique of anthropological theory fails to discuss the theoretical problems associated with its own research strategy, although it is obvious that shifts and changes have occurred.

We are not saying that scapulimancy among the Naskapi is necessarily an irrational and inexplicable tradition. We agree with Harris (1974:5) that even the most bizarre-seeming practices may be based on "ordinary, banal, one might say 'vulgar' conditions, needs, and activities." We disagree, however, that they can be shown adaptive. Rather, the seemingly irrational and inexplicable tradition becomes rational and explicable in this case whenever there is a discrepancy between wants and needs and knowledge and abilities. The Naskapi feel that divination is the answer to their problems. Such rituals are utilized by individuals to satisfy immediate needs for multifarious, including ecologically destructive, reasons. The idea of people doing things against their will or better judgment because of such beliefs is ludicrous. On the contrary, as we have shown in this paper, Naskapi hunting is a conscious, nonrandom process adjusted and readjusted daily to the topographic and climatic variables in the physical environment and the resulting peculiarities of animal behavior. Whenever this knowledge fails due to low caribou population densities, then the ritual complex of sweating, dreaming, singing, and scapulimancy is put into action. This is so because the Naskapi believe that game is controlled by supernatural entities and that nonsuccess in hunting results from the violation of religious proscriptions. The ritual is believed to re-establish a harmonious relationship between the hunter and the supernatural, and hence increase the chances of hunting success. Even a cynical performer may participate in the ritual as a form of low-cost insurance.

This is not to say that there is no practical value, other than a psychological benefit or self fulfilling prophecy, to the scapulimancy ritual; albeit benefit is not necessarily evidence of adaptation. Thus, the etic fact is that caribou scapulimancy is used when the supply of caribou is at its lowest levels. Chances of locating prey are considerably reduced when caribou penetrate hunting territories in small numbers. Decisions must be made to head off swift herds on their annual migratory routes. The problem during times of low caribou population density is to choose the right spot. It is possible that at this point the scapula enters as an important tool and that divine intervention in the decision-making process, mediated through ritual action, facilitates group consensus and reduces indecision. This, unlike randomization, would not lead to an interpretation oblivious of known ecological relationships between organisms and their environments. Rather than sending the hunters off in just any direction, it is possible that the divination event aids in a choice between equally good locations in which caribou is believed likely to appear, and allows for more time to experiment with alternative strategies.

Naskapi clearly use caribou scapulimancy as a decision device in the face of ecological adversity, but not all Naskapi divination follows this rule. The Naskapi use other divinatory rituals for recreation and amusement, none of which can be said to have ecologically beneficial, destructive, or adaptive consequences. Naskapi divination is thus best described as a tool which is manipulated by individuals for multifarious reasons, adaptive or not. The ecological adaptation of the Naskapi clearly does not impose ecologically beneficial modes of divination to keep the group from the temptation of overhunting. The individuals go where they think they will find game, and if that is something which will at some point cause depletion of herds they may either develop some conscious means of controlling predation or cause the degradation of their ecosystem and have to move, change their way of life, or die.

## NOTES

1. We are indebted to our student, Ronnie Lester, for his typing many drafts. We also are grateful for criticisms given by Maxine Margolis, Debra Picchi, and Richard Burchard.
2. Arensberg (1981:572) incorrectly paraphrases Moore concerning the location of the Naskapi. They are not in Alaska but on the interior plateau of the Labradorian peninsula. Further, neither Moore (1957) nor Speck (1935) even mention anything about "pooling of information" or the shaman as the decision-maker.
3. While Moore does not necessarily mention the term homeostasis, it is quite clear that he argues scapulimancy to be a conservation device. Conservation through divination is a homeostatic concept.
4. Moore mentions in his essay that the caribou shoulder blade is used in the caribou hunt, the beaver hip bone or shoulder blade in the beaver hunt, and the fish jaw for fishing. Furthermore Turner (1889-1890), Leacock (1954), Knight (1965), and Speck (1935) mention that caribou is the major subsistence source. The Naskapi hunt other animals such as bear, moose, otter, marten, hare, seal, birds, squirrels, weasels, ants, and worms, but none of these are singled out for scapulimancy.
5. Moore states that the cracks and spots sends the hunters on a different route. Throughout his exposition the point that the random device prevents hunters from returning to places where they were previously successful is stressed.
6. Moore does not use the word, "conservation," but he certainly talks about it when he (1957:72) says: "habitual success in hunting certain areas may lead to depletion of the game supply . . . under these circumstances a device which would break up habit patterns in a more or less random fashion might be of value."
7. Our HRAF random sample includes FA8, FA28, FC7, FE11, FF38, FF62, FR5, FP13, FE12, FF52, FF57, FH9, FJ22, FJ23, FK7, FL10, FL11, FL12, FN4, FN17, FO7, FO32, FO42, FP13, FQ5, FQ6, FT6, FT7, FX10, FX13, FX14, FY8, FQ12 (Africa); EA1, EB1, EF1, EF6, EG1, EH1, EP4, ER6, EZ6 (Europe); NA6, NA12, N? (Copper Eskimo), ND12, NE6, NE11, NG5, NG0, NJ5, NM7, NM9, NQ12, NQ13, NQ17, NQ18, NS18, NS29, NS31, NT8, NT13, NY14, NT18, NT23, NU7, NU28, NT9, NU33, NU34, NV37, NV9, NV10, NW11, NP12, NQ10, NQ12 (North America); RD1, RX2, RY2 (Asian Russia); AA1, AE9, AF1, AF12, AH1, AH7, AJ1, AJ4, AK5, AL1, AM1, AM4, AM8, AM11, AN1, AM7, AF14, AO1, AR7, AU1, AP4, AO7, AR5, AX4, AE5, AV1, AV4, AV7, AW1, AW6, AW11, AW25, AW32, AW37, AW42, AW60, AX5, AZ2, AD5 (Asia); SA15, SA19, SB5, SC7, SC13, SD6, SD9, SE13, SF5, SF24, SG4, SF10, SH5, SH6, SI4, SI7, SK6, SM3, SO9, SP9, SP17, SP22, SQ13, SR8, SR9, ST13, SU1, SV3, SY1 (South America); OA1, OA5, OA14, OA19, OC6, OF5, OG6, OG11, OI8, OI17, OI19, OI20, OJ23, OJ27, OJ29, OL6, OM6, ON6, OR19, OO12, OQ6, OR11, OR21, OR22, OT11, OU8, OX6, OY2, OZ4, OZ11 (Oceania); MA1, MA11, MB1, MD4, MG1, MJ4, MM2, MO4, MP5, MR13, MR14, MS12, MS25, MS30, MS37 (Middle East). We presampled four categories for twenty cultures and reduced these to categories 224 and 787, as they alone produced relevant data.
8. Moore quotes Speck in this case. Obviously then, the latter, and not Moore, is responsible for this distortion.

## BIBLIOGRAPHY

- Alland, A. Jr. 1972. Cultural Evolution: The Darwinian Model. *Social Biology* 19:227-239.
- . 1975. Adaptation. *Annual Reviews in Anthropology* 4:59-73.
- Alland, A. Jr., and B. McCay. 1974. The Concept of Adaptation in Biological and Cultural Evolution. *Handbook of Social and Cultural Anthropology*, ed. J. J. Honigmann, pp. 143-178. Chicago.
- Arensberg, C. 1981. Cultural Holism through Interactional Systems: Presidential Address for 1980. *American Anthropologist* 83:562-581.
- Banfield, A. W. F. 1951. *The Barren-Ground Caribou*. Ottawa.
- Birket-Smith, K. 1929. *The Caribou Eskimos. Material and Social Life and Their Cultural Position. Part 1. Report of the Fifth Thule Expedition, 1921-1924. Volume 5.*
- Bogoraz-Tan, V. F. 1904-1909. *The Chuckchee*. Leiden.
- Burch, E. 1972. The Caribou/Wild Reindeer as a Human Resource. *American Antiquity* 37:339-368.
- Campbell, B. G. 1979. *Humankind Emerging*. (Second Ed.). Boston.
- Cancian, F. M. 1968. Varieties of Functional Analysis. *Encyclopedia of the Social Sciences*, ed. D. L. Sills, pp. 29-43. New York.
- Coon, C. S. 1950. *The Mountains of Giants. A Racial and Cultural Study of North Albanian Mountain Ghegs*. Cambridge.
- Crisler, L. 1956. Observations of Wolves Hunting Caribou. *Journal of Mammology* 37:337-346.
- Curtis, E. C. 1930. *The North American Indian*. New York.
- Dole, G. E. 1966. Endocannibalism Among the Amaluca Indians. *Transactions of the New York Academy of Sciences* 24:567-573.
- Dugmore, A. R. 1913. *The Romance of the Newfoundland Caribou*. Philadelphia.
- Durham, M. E. 1928. *Some Tribal Origins. Laws and Customs of the Balkans*. London.

- Ember, C. R., and M. Ember. 1981, 1977, and 1975. *Cultural Anthropology*. Englewood Cliffs.
- Erasmus, C. J. 1977. *In Search of the Common Good. Utopian Experiments Past and Future*. New York.
- Friedman, J. 1974. Marxism, Structuralism, and Vulgar Materialism. *Man* 9:444-469.
- Gabus, J. 1944. *Iglous. Vie des Esquimaux-Caribou*. Neuchatel.
- Geertz, C. 1972. Religion as a Cultural System. Reader in Comparative Religion. An Anthropological Approach, eds. W. A. Lessa and E. Z. Vogt, pp. 167-178. New York.
- Giddings, J. L. 1952. *The Arctic Woodland Culture of the Kobuk River*. Philadelphia.
- Groot, J. de. 1912. *Religion in China*. New York.
- Halpern, J. M. 1958. *A Serbian Village*. New York.
- Harper, F. 1955. *The Barren-Ground Caribou of Keewatin*. University of Kansas Museum of Natural History. Miscellaneous Publications, 6.
- Harris, M. 1966. The Cultural Ecology of India's Sacred Cow. *Current Anthropology* 7:51-60.
- 1968. *The Rise of Anthropological Theory: A History of Theories of Culture*. New York.
- 1971. Culture, Man, Nature. Introduction to General Anthropology. New York.
- 1974. Cows, Pigs, Wars, and Witches. The Riddles of Culture. New York.
- 1979. *Cultural Materialism: The Struggle for a Science of Culture*. New York.
- Henry, J. 1941. *Jungle People: A Kaingang Tribe of the Highlands of Brazil*. New York.
- Honigmann, J. J. 1947. A Kaska Oracle. *Man* 47:139-140.
- Instad, H. 1954. *Nunamuit: Among Alaska's Inland Eskimos*. London.
- Kelsall, J. P. 1968. *The Caribou*. Ottawa. Department of Indian Affairs and Northern Development. Canadian Wildlife Service.
- 1970. The Migration of the Barren-Ground Caribou. *Natural History* 39:98-106.
- Knight, R. 1965. A Re-examination of Hunting, Trapping, and Territoriality Among Northeastern Algonkian Tribes. *Man, Culture, and Animals. The Role of Animals in Human Ecological Adjustments*, eds. A. Leeds and A. P. Vayda. Publication No. 78: pp. 27-42. Washington.
- Landes, R. 1937. *Ojibwa Sociology*, New York.
- Leacock, E. 1954. The Montagnais "Hunting Territory" and the Fur Trade. *American Anthropologist*. Memoir 78, Vol. 56, No. 5, Part 2.
- Lent, P. 1966. The Caribou of Northwestern Alaska. *Environment of the Cape Thompson Region, Alaska*, eds. N. Wilimovsky and J. N. Wolfe, pp. 481-517. Oak Ridge.
- Lessa, W. A., and E. Z. Vogt. 1965. Reader in Comparative Religion. An Anthropological Approach. New York.
- Love, T. F. 1977. Ecological Niche Theory in Socio-Cultural Anthropology: A Conceptual Framework and an Application. *American Ethnologist* 4:27-41.
- Makridin, V. P. 1962. The Routes and Timing of the Migration of Wild Reindeer in the Taimyr National Territory. *Zoologischeskii Zhurnal* 41:927-934.
- Malefijt, A. 1968. *Religion and Culture. An Introduction to Anthropology of Religion*. New York.
- Malinowski, B. 1931. Culture. *Encyclopedia of the Social Sciences*, eds. Seligmann and Johnson. Volume IV: pp. 634-642. New York.
- Margolis, M. 1977. Historical Perspectives on Frontier Agriculture as an Adaptive Strategy. *American Ethnologist* 4:42-64.
- Massé, H. 1938. *Croyances et Coutumes Persanes*. Paris.
- Moore, O. K. 1957. Divination—A New Perspective. *American Anthropologist* 59:69-74.
- Murdock, G. P. 1963. *Outline of World Cultures*. (Third edition, revised). New Haven.
- Murie, O. J. 1935. *Alaska-Yukon Caribou*. Department of Agriculture. Bureau of Biological Survey, North American Fauna, No. 54. Washington.
- Needham, J. 1954. *Science and Civilization in China*. (Vol. 1). Cambridge.
- Oliver-Smith, A. 1977. Traditional Agriculture, Central Places, and Postdisaster Urban Relocation in Peru. *American Ethnologist* 4:102-116.
- Ottenberg, S. 1958. Ibo Oracles and Intergroup Relations. *Southwestern Journal of Anthropology* 14:295-317.
- Park, G. K. 1963. Divination and Its Social Contexts. *Journal of the Royal Anthropological Institute of Great Britain and Ireland* 93:195-209.
- Pruitt, W. O. 1959. Snow as a Factor in the Winter Ecology of the Barren-Ground Caribou. *Arctic* 12:158-179.
- 1960a. Behavior of the Barren-Ground Caribou. Alaska University. Biological Papers, No. 3.
- 1960b. Locomotor Speeds of Some Large Northern Mammals. *Journal of Mammalogy* 41:112.
- 1970. Some Ecological Aspects of Snow. *Ecology and Conservation*, 1. UNESCO: pp. 83-99. Paris.



- Rappaport, R. A. 1966. Ritual in the Ecology of a New Guinea People. (unpublished dissertation). Columbia University.
- 1968. Pigs for the Ancestors. Ritual in the Ecology of a New Guinea People. New Haven.
- Richerson, P. J. 1977. Ecology and Human Ecology: A Comparison of Theories in the Biological and Social Sciences. *American Ethnologist* 4:1-26.
- Redfield, R., and A. Villa Rojas. 1934. Chan Kom. A Mayan Village. Chicago.
- Rossman, A., and P. G. Rubel. 1981. The Tapestry of Culture. Glenview.
- Rutz, H. J. 1977. Individual Decisions and Functional Systems: Economic Rationality and Environmental Adaptation. *American Ethnologist* 4:156-174.
- Saario, D., and B. Kessel. 1966. Human Ecological Investigations at Kivalina. Environment of the Cape Thompson Region, Alaska, eds. N. Wilomvsky and J. N. Wolfe, pp. 969-1039. Oak Ridge.
- Scheffer, J. 1704. The History of Laplands: Containing a Geographical Description and a Natural History of that Country, etc. London.
- Seligmann, C., and B. Z. Seligmann. 1911. The Veddas. Cambridge.
- Skoog, R. O. 1968. Ecology of the Caribou (*Rangifer tarandus granti*) in Alaska. (unpublished dissertation). Department of Zoology, University of California, Berkeley.
- Speck, F. G. 1935. Naskapi. The Savage Hunters of the Labrador Peninsula. Norman.
- Stegmiller, P. F. 1924. Opfer und Opfergebräuche der Khasi. *Mitteilungen der Anthropologischen Gesellschaft in Wien* 54:211-231.
- 1925. Pfeilschiessen und Jagdgebraeuche der Khasi. *Antropos* 20:607-623.
- Turner, L. M. 1889-1890. Ethnology of the Ungava District. 111th. Annual Report of the Bureau of Ethnology: pp. 167-360.
- Vayda, A. P. 1967. On the Anthropological Study of Economics. *Journal of Economic Issues* 1:86-90.
- 1969. Environment and Cultural Behavior. Natural History Press, pp. 121-128. Garden City.
- Vayda, A. P., A. Leeds, and D. Smith. 1961. The Place of Pigs in Melanesian Subsistence. *Proceedings of the American Ethnological Society*, ed. V. Garfield. Seattle.
- Vayda, A. P., and B. McCay. 1975. New Directions in Ecology and Ecological Anthropology. *Annual Reviews in Anthropology* 4:293-306.
- Vayda, A. P., and R. A. Rappaport. 1968. Ecology, Cultural and Noncultural. Introduction to Cultural Anthropology, ed. J. A. Clifton, pp. 447-497. Boston.
- Vogt, E. Z. 1952. Water Witching. An Interpretation of a Ritual Pattern in a Rural American Community. *Scientific Monthly* 75:175-186.
- Wallace, A. F. C. 1966. Religion. An Anthropological View. New York.
- Wagley, C. 1943. Tapirapé Shamanism. *Anthropologia* 3:41-94. Rio de Janeiro.
- 1977. Welcome of Tears. The Tapirapé Indians of Central Brazil. New York.
- Williams, G. 1977. Differential Risk Strategies as Cultural Style among Farmers in the Lower Chubut Valley, Patagonia. *American Ethnologist* 4:65-83.
- Wilson, J. A. 1949. Egypt: The Values of Life. Before Philosophy, eds. H. Frankfort, J. Wilson, and T. Jacobson, pp. 103-133. Baltimore.