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Chapter III

Formalist Anthropology

There are many things that anthropology need not be: theoretical, cognitively grounded, and formalist or hermeneutic in orientation are but three possibilities. Much of anthropology is concerned primarily with description or contrastive comparison.

> "Twentieth-century social and cultural anthropology has promised its still largely Western readership enlightenment on two fronts. The one has been the salvaging of distinct cultural forms of life from a process of apparent global Westernization. ... The other promise of anthropology, one less fully distinguished and attended to than the first, has been to serve as a form of cultural critique for ourselves. In using portraits of other cultural patterns to reflect self-critically on our own ways, ..." [Marcus 86:1]

Marcus and Fischer [Marcus 86] cogently describe and advocate this focus of anthropological inquiry; one whose importance is undisputed. However, some of the most interesting anthropology is theoretical, is cognitively grounded, and is either formalist or hermeneutic.

Theory is a siren song difficult to resist; therefore much of anthropology deals with proposing, attacking, and defending various theoretical positions. In fact, theory provides the only significant object for mutual criticism in anthropology because of the idiosyncratic nature of ethnography.1

Thought and cognitive activity of any type is so commonplace, so ubiquitous in our common experience, that it is difficult to speak and write of human activity without reference to some aspect of an entity called "a mind." Much, if not most, of anthropology is therefore cognitively grounded.2

Following the lead of Leaf [86], Ortner [86], Schanker [86], and Sperber [84] it is possible to broadly divide anthropological theory according to which of two "dueling paradigms" characterize a given theoretical position. On

1 With the exception of an occasional Derek Freeman of course.

2 A distinction is being introduced, between theory that simply exhibits (implicitly or explicitly) a cognitive dimension and "cognitive anthropology" as a distinct sub-field. This distinction will be discussed in detail in later sections of this chapter.

one side are the formalists (also called positivist or

dualist) and on the other the interpretivists (hermeneuticists or monists).3

Leaf, in particular, bases his classification on philosophical positions (either expressed or assumed) taken with regards to three basic concepts - Man, Mind and Science. Although Man and Science will be playing a role in discussions in this and other chapters, it is Mind that will provide the primary thematic focus.

At issue are the respective positions vis-a-vis Mind taken by hermeneutic versus formalist anthropologists. Definition of hermeneutic and formalist as adjectives modifying anthropologist will necessarily be a part of the discussion. In this chapter the formalist position will be developed while the hermeneutic is reserved for Chapter IV.

Arguments in this chapter will center around the examination of six issues: 1) formalism as a general

3 Although this rough classification necessarily blurs nuances of interpretation in both camps, it remains useful in specific circumstances, for instance, when the intent of a discussion is not to argue the relative merits of either side, but (as in this thesis) is to simply discuss issues which serve to contrast the two positions or those which expose common themes.

approach to anthropological theory; 2) acceptance of the idea that culture is fundamentally, if partially, a kind of cognitive system; 3) cognitive anthropology and the equation

of culture and cognition; 4) the role of linguistics and the "computational metaphor" in the shaping of cognitive anthropology; 5) an outline of the formalist concept of mind; and 6) the degree to which formalist models have encountered problems and the formalist responses to them.

Formalism in Anthropology

Sir Isaac Newton casts a long shadow. Despite clear recognition of the fact that "it is hopeless for anthropologists to pursue deterministic laws of the Newtonian type..." [Aberle 87: 151] it is difficult to downgrade the influence that Newton's achievements have had on anthropology and social science in general.

> "The prestige of Newton's astonishing achievement (now almost 300 years old) has afflicted anthropology throughout most of its history. Our literature is spangled with the imagery of prethermodynamic science, drawn from physics and biology: social statics and dynamics, inertia, equilibrium, and vectors, for example." [ibid]

Einsteinian physics have superceded Newtonian (and Quantum, Einsteinian) and yet the notion that social theory is less than satisfactory unless it is expressed in

concise, formal (preferably mathematical), and mechanical form lingers on. The impulse begins innocently enough, with the simple expression of a need for clarity in organizing and presenting data.

> "The method of reducing information, if

> possible, into charts or synoptic tables ought to be extended to the study of practically all aspects of native life."
> [Malinowski 22]

When simply presenting data in a clear and organized manner is insufficient, when generalizations based on that data are desired or required, it is only reasonable to want the expression of those generalizations to be equally clear, precise, and organized. Mathematical expressions come readily to mind as a model.

> "My problem is simple. How can a modern social anthropologist, with all the work of Malinowski and Radcliffe-Brown and their successors at his elbow, embark upon generalization with any hope of arriving at a satisfying conclusion? My answer is quite simple too; it is this: By thinking of the organizational ideas that are present in any society as constituting a mathematical pattern."
> [Leach 61]

The range of patterns available to theorists like Leach are numerous and varied. Statistics is perhaps the most widely used mathematical pattern. It is but a short step from Malinowski's "charts and synoptic tables" to histograms and pie charts, and but another short step into the realm of

statistics and multi-variate analyses. Thomas [69] demonstrates both the temptation and utility of statistics for anthropologists sharing Leach's affinity for the mathematical pattern.

Hage offers another candidate for general purpose use, graph theory. He also makes the argument that most anthropology already embodies (informally presupposes) the

kind of organization which graph theory makes explicit.

> "Anthropology is fundamentally the study of sets of social and cultural relations whose diversity and pervasiveness is illustrated by such terms as 'exchange,' 'hierarchy,' 'classification,' 'order,' 'opposition,' 'mediation,' 'inversion,' and 'transformation.' Our aim is to introduce graph theory as a comprehensive structural model in cultural and social anthropology. Graph theory is a branch of finite mathematics that is both topological and combinatorial in nature. Because it is essentially the study of relations, graph theory is eminently suited to the description and analysis of a wide range of structures that constitute a significant part of the subject matter of anthropology ..." [Hage 83: 1,2]

The culmination of this process of "mathematizing" anthropology is the introduction of the concept of a function - a formal expression relating the value of one variable to the values of others. Since most anthropologists have long since despaired of finding "laws" of human behavior analogous to physical laws (conservation

of energy for example), the function is the highest order mathematical expression available for social scientists.4

Economic anthropology with its definition of the concept of "maximization" in terms of a function (Ri = Vi x Pi, where Ri is the expected reward of a choice [i], Vi is the value measure of outcome [i], and Pi is the probability of success of [i]) offers the best illustration of function oriented theory.5Although maximization6 has its problems

4 A few still argue that such "laws" do exist and can be discovered. One of the few serious claims of this sort is implicit (and occasionally explicit) in Levi-Strauss' discussion of binary opposition as a "law" governing thought.

5 Rational choice in terms of maximization is found in realms of anthropology other than economic. Barth's "transactions" orientation, Foster's "dyadic contracts" and most of ecological anthropology, for example, utilize some form of the concept.

6 "To say that an individual strives to maximize is to state little more than a truism. Unless satisfactions are expressed in some more concrete form, such as money, they are ill-defined ... we are faced with a dilemma. If we state that people act so as to maximize something broad enough ("satisfactions") to subsume all our more specific goals, we say very little. If we state that people act so as to maximize on particular goals - power, money, income, or whatever we choose - then usually we are wrong. But the idea of maximization cannot be abandoned since any discussion of purposive or goal-oriented behavior, or any analysis of choice, does imply a maximization theory ..." [Burling 62:817]

as a concept it remains in widespread use in anthropology and in other social sciences as well. [See LeClair 68]

Like metaphors, once formulated a function seems to take on a life of its own, becoming more complex or becoming part of a system of inter-related functions. This growth comes about when specific expressions of a function are found wanting (in conflict with too many observations) and yet the orientation towards functional expression is retained. The discipline of Economics is an excellent example of this phenomenon as a simple maximization function is elaborated into systems of macro, micro, household,

corporate, etc. economics.

Proponents of this type of theory are not naive. They are usually aware of the limitations of the specific formalisms they propose and in many (most) cases the formalisms are employed almost as metaphors. Metaphor or not, it seems that when flaws are exposed the result is not a re-evaluation of the formalism (or the formalist perspective) but instead is an increase in the complexity of the formalism itself.7

7 This critique of the mathematization of anthropology should not be taken as a blanket indictment of mathematical descriptions and models. In Chapter Seven it will be argued that mathematic formalisms are useful, but they must be appropriate to the problems they address.

Few (if any) areas of anthropology are immune from the temptation presented by formalism. To re-establish our focus is is necessary to limit consideration to a subset of available theories, initially, to those which afford a significant role to the individual in the creation and expression of culture.

Excluded are the philosophical positions as exemplified by Compte and Durkeim in philosophy and the anthropology of Radcliffe-Brown and Evans-Pritchard. Structuralism, Functionalism and Marxism (not entirely) are as, if not more, formalist than the theory that will be discussed. They are equally cognizant of the problematic role of "mind." However, in general they are more concerned with

the formal description of an "etic" structure and its operation independent of the individual's participation in the manifestation of that structure.8

8 Choosing to focus on theories that emphasize the role of the individual in the creation of culture is reflective of three things: 1) contemporary emphasis in anthropology generally; 2) personal bias - analyzing a mind that is an active generator of culture is more interesting that one that is a passive reflector of Culture; and most importantly, 3) consistency with the cognitive tradition that begins (in modern times) with Descartes and Liebniz and is reflected in most of what will be called "cognition grounded anthropology.")

If the contrasting assumption is made - i.e., that individual action (behavior) is the source of culture - it is necessary to posit or assume a means for that behavior to be manifest. Human behavior (for reasons that, perhaps, derive more from ego than rational argument) is generally held to be the result of the operation of mind rather than the purely mechanistic (reflex) and non-conscious (instinct) means allotted animals and other "lower" organisms. Attention will now shift to how the formalist perspective is manifest in theories of mind.

Cognition Grounded Anthropology

Emphasis upon and definition of a concept of mind will

vary from one specific theory to another. It may be as unsophisticated as the simple inclusion of statements to the effect that "person X thinks a particular thought" or "decides a particular issue." Alternatively it can be the very foundation upon which all else is established, as in the famous Descartes (mis)quote, "I think; therefore I am."

Wissler [23] (reflecting his museological purposes) divided culture into three portions: material traits, social activities, and ideas. In this scheme (reflected in

most early anthropology) the realm of ideas was nothing more than another source of "artifacts" to be identified, labeled, and perhaps classified. Correlations might be established among "idea artifacts" and material or social artifacts but the correlations themselves became another form of descriptive data. Such data might be used to support arguments (for or against diffusion, for example) but few causal relationships were established between the mental and the physical realms.

As theoretical interests shifted from description and evolution arguments to explanation of cultural patterns it was probably inevitable that the explanations became firmly grounded in the realm of ideas. Introspection seems to expose the mind as the source of individual actions and therefore it seems reasonable to assume mind as the source of cultural activity as well.

The increasing importance of mind as the source of

culture can be seen in changing definitions. Kroeber for instance first proposed a definition without any explicit primacy among the realms of ideas, material entities and behavior:

> "The mass of learned and transmitted motor reactions, habits, techniques, ideas, and values - and the behavior they induce - is what constitutes culture." [Kroeber 48: 8]

Under the indirect influence of Parsons, via Kluckholn, the definition was modified to reinforce the role of ideas:

> "... the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values ..." [Kroeber 52: 181]

And finally, in direct collaboration with Parsons, culture was subsumed by mind - or at least made a consequence of mental operations:

> "We suggest that it is useful to define the concept of culture for most usages more narrowly ... restricting its reference to transmitted and created content and patterns of values, ideas, and other symbolic-meaningful systems as factors in the shaping of human behavior and the artifacts produced through behavior." [Kroeber 58: 583]

It could be argued that the ascendancy of mind as a major focal point in definitions and theories of culture trivializes behavioral and materialistic influences. (Marvin Harris [80] does in fact make this argument.) However, a distinction should be made between anthropology that is simply cognitively grounded and that which asserts

culture IS, in some sense, cognition.

Kroeber and Parsons drew a line with their 1958 definition of culture. Most of anthropology remains on the conservative side of that line and, while acknowledging the central importance of the cognitive realm, refuses to

abandon the tangible and observable. On this side of the line cognition is almost a "black box." Mentalist terminology (decisions, recognition, selection, etc.) is used and there is attention (sometimes detailed) to the inputs to and outputs from that black box but little attention is paid to the internal workings of the box itself. Culture stands in relation to the black box as a supplier of constraints on the inputs and as an amalgamation of collective outputs and, sometimes, as the medium for communication between boxes.

For many anthropologists the black box itself became the primary focus of inquiry. The driving assumption was that the mind must exist in some kind of correspondence to manifest culture and therefore an understanding of the internal workings of the box would yield an understanding of culture. These anthropologists crossed the Kroeber-Parsons line, and that portion of them that held firmly to the formalist perspective established a new sub-field, cognitive anthropology.9

Two forces accelerated and supported the distillation of cognitive anthropology from cognition grounded

anthropology while simultaneously exerting a strong influence on the definition of its program. One came directly from the associated field of linguistics, the other more indirectly from computer science. Linguistics (where interest in formalist theory was resurgent) provided a theoretic and methodological foundation while computer science offered an irresistible metaphor.

Linguistics - "Of all the behaviors an anthropologist might observe, language provide(s) the most direct access to cognitive phenomena with respect to both content and form." [Dougherty 85: 4] Given this assumption (essentially, that language is externalized thought) it is not surprising that cognitive anthropologists patterned their investigations on linguistic analysis.

9 It must be remembered that all cognition focused theorists are not of a single mind. Geertz is equally avid in his cognitivism as is Goodenough. Moving to the cognitive realm did not resolve old conflicts between formalists and interpretivists; if anything it deepened the chasms of disagreement. In general, to be a cognitive anthropologist is to be a formalist and a cognitivist. Therefore, even avid cognitivists,

like Geertz, who are not also avid formalists are seldom identified as cognitive anthropologists.

The influence of linguistics is most notable with regards to the form of cognition but its influence can be discerned in every facet of cognitive anthropology. Dougherty identifies seven principles of cognitive anthropology that were directly borrowed from or derived from principles of linguistics.

> "(1) The principle that particular, emic, systems can be derived from universal inventories of distinctive, etic, features... (2) The principle that a finite set of basic units can be combined to produce an infinite set of derived units... (3) The assumption that a principled inventory of a theoretically infinite set of types of behavior can be inferred on the basis of a partial sample of those behaviors... (4) The idealized speaker-hearer as an analytical construct... (5) Procedures for systematic elicitation... (6) The principle of complementary distribution ... (7) The principle of analogy as the basis for creativity. [Dougherty 85: 5]

Each of these principles are based on one or more formalist presuppositions. Some examples:

- derivation of emic systems from inventories of etic features assumes both an objective (essentially static) reality and a set of human universals that map onto that reality.10
- finite units yielding an infinite set of derived units also assumes that everything "knowable" or

"expressible" can be mapped onto that expandable set of units. (An assumption that is challenged by mystics, among others.)

- inferring an infinite set of types of behavior from a sample of behaviors assumes that any complex pattern is the result of generative application of a rule set and that the rule set can be deduced from analysis of the pattern.11 [This is essentially the flip side of principle (2) in the preceding quotation.]

10 The color term research of Berlin and Kay [69] tended to support this assumption until Kay and McDaniel demonstrated that the classification was a function of human physiology [Kay 78], which subsequently led to challenges of the formalism behind the assumption. [See Lakoff 87 and the Chapter 5.]

11 This assumption plays a significant role wherever formalism prevails, including physics where a certain school of thought still holds out for the discovery of an "implicate order" through appropriate analysis of the pattern of the physical universe. This is in response to the challenge to formalism presented by quantum mechanics. A quick review of Mandelbrot's fractal geometry reveals patterns which are indeed generated from the application of formal rules but where the deduction of those rules from the structure of the pattern would be near miraculous.

Adopting the principles necessarily meant adopting the presuppositions behind those principles. Since cognitive

anthropology is formalist in orientation and since the presuppositions were likewise, this presented little difficulty. However, most of these principles (and accompanying presuppositions) were later the source of significant problems within cognitive anthropology as well as the focus of criticisms from the "outside."

Computer Science - "Intuition, insight, and learning are no longer exclusive possessions of human beings: any large high-speed computer can be programmed to exhibit them also." [Simon 58:6] Artificial Intelligence as a subfield of computer science developed side-by-side with cognitive anthropology and was derivative, in large part, from the same formalist and linguistic roots.

Direct cross-fertilization between AI and cognitive anthropology was less important, initially, than the popular perception that mind could be emulated with deterministic hardware and a formally descriptive program.

Another computer-based influence, during this same period of time, were the large-scale projects directed towards the construction of "automatic translators" from one natural language to another. What better affirmation of the program of cognitive anthropology than a success in

programming a computer to "understand" language to an extent sufficient to support language translation?

AI and automatic translators were but specific instances of the general influence of the computer on both

the popular and scientific imaginations. As a metaphor the computer was employed so frequently that it eventually became necessary to "apologize" for the cliche. Both as cliche metaphor and as "existence proof" the computer significantly influenced cognitive anthropology, most significantly by furnishing a working model of the formalist conception of mind.

The Formalist Model of Mind

It is possible to distill five fundamental operational principles of mind from the formalist and cognitive anthropology literature. They are: 1) mind as an independent self-contained entity; 2) cognition being defined as only that activity that takes place in the mind; 3) internal operations of the mind are comprised of formal operations upon a defined set of tokens (symbols); 4) input and output channels between mind and environment that are not direct connections but are symbolic interfaces; and 5) a correlative mapping between the internal structure of the mind and the observed structure of the environment.

The computer not only embodies each of these five operational principles but, in some cases, extends their analytical significance. Some examples follow.

Operational Principle 1 (OP-1) is a re-affirmation of Descartes' dualist conception of mind and matter. Although computers are not perfect realizations of this dualist

principle the fact is that, once a program and appropriate data have been loaded into the computer, it will function totally independent of further human or environmental interference. Because current versions of computers must be programmed from the outside - at least initially - does not seriously detract from the Cartesian ideal for two reasons. One, it is possible to build a simple program that increases in complexity - a phenomenon that comes very close to "self-programming." Two, nothing precludes the possibility of an "immaculate program" - one that arises from intrinsic properties of an abstract computer and need not be entered from the outside.

Whether or not an abstract computer might transcend the need for external programming might seem a moot issue until the context of the question is varied. Consider the search for the basic program of the human genome. A "program" that is coded in binary (actually quarternary) form in DNA results from chance plus evolutionary pressure, and it

eventually results in turn not only in the organism but in cognition.

In a sense the "nativist" argument of Chomsky's linguistics can be seen as an assumption of an intrinsic or "immaculate program" upon which the operation of transformational grammar is based.

OP-2 is supported by the computer in metaphorical terms only. Technically it contradicts the principle of

restricting cognition to activities in the mind. Metaphorically, the CPU and RAM or ROM memory is commonly considered the "mind" of the computer. "Thinking" or processing is the activity that takes place in that location. This kind of metaphor supports the principle.

Complications arise when portions of the "thinking" activity is transferred to "intelligent peripherals" or, realistically, when it is recognized that processing in and out of the CPU-RAM complex is identical - changing the state of an organized bank of switches.

Greater support is offered to OP-3. Computers very definitely operate with a severely restricted symbol set. Ultimately that set consists of ones and zeros but more commonly is restricted to a larger set of symbols based on fixed combinations of the ones and zeros. The fact that these symbols are totally arbitrary means they can be

assigned any possible "meaning" and that the "meaning" is immaterial to the symbol processing itself.

Manipulation of the symbols is similarly based on a severely restricted set of rules. At the most basic level those rules consist of a limited set of logic operations encoded in the physical structure of the machine. A larger set of operations (combinations of the hardwired rules) are defined for convenience and these can be further combined in a complex program. At each step of the process the rule set is a formally expanded version of the underlying rule set.

Given a great deal of time and effort it would be possible to replace any rule at any level with an equivalent (with different form) at a lower level.

The computer provided an existence proof of a formal rule set of the sort fervently sought by cognitive anthropologists but which, as yet, remains undiscovered. Computers reinforced the conviction that cognition could be reduced to symbol sets and manipulation rules which could be combined and expanded (also according to rules) to explain any level of behavior including participation in culture.

OP-4 is the heart of the mind-body problem evoked by the assumption of Descartes' dualism. If the mind and body are completely separate how do they interact? Computers

obviously offer no solution to this problem but they do offer an elegant finesse.

Consider the simplest examples of computer input and output - the keyboard and CRT screen, respectively. Although both devices are directly connected to the computer's "mind", that connection is ephemeral and symbolically indirect. Pressing a key, for example, causes a particular pattern of electrical impulses to be dispatched to the CPU. In a sense, a symbol was sent to the mind and symbols are the stuff of mind. This is analogous to an odor triggering a mental awareness without the need for the mind to be full of aromatic molecules.

A reverse process takes place when the CPU transmits a symbol to the CRT which results in the illumination of certain phosphors which conveniently are interpreted by another mind as a meaningful symbol - a character.

Input and output symbols are also ephemeral - they are not stored and do not clutter up the mind. They alter the "state" of the mind and then disappear.

This process supports OP-4 metaphorically. At the same time it masks a deeper and more problematical assumption: that because some inputs and outputs can be symbolically treated then all inputs and outputs must be so treated. The fallacy of this argument is easily illustrated by locating a

magnet near the "mind" of the computer and observing the results.

The last operational principle (5) is computer supported only in a negative sense. In a computer it is all too possible to have "unassigned" symbols present. The internal state of the machine is intended to be an exact simulacrum of the external environment both in terms of the symbols employed and the rules brought to bear to manipulate those symbols. This is an ideal that is seldom realized except in relatively simple situations and then only after the expenditure of much effort. The fact that it is an ideal and intended state of affairs does, however, offer support to the simulacrum principle.

In operational terms a computer offers the perfect

"proof" of the formalist and cognitive anthropologist conception of mind. Trouble arises only at the level of constructing a program - the specific combination of symbols and rules - required to engender a given action. Computers have decisively demonstrated the complexity of such programs and the difficulty intrinsic to their construction.

Programming difficulties elicit a basic paradox of human nature. We are convinced that programs capable of emulating human capacities can be devised (hubris) while simultaneously entertaining the notion that we are currently

incapable of the task (self-deprecation). In balance, however, the model of mind provided by the computer has greatly strengthened the formalist conception of mind and thereby the program of cognitive anthropology.

Limitations

Much was promised and hopes were high in the early years of cognitive anthropology, AI, and computational linguistics. It soon became apparent that expectations were not going to be realized, at least in the near term. Many advocates of the formalist approach became disillusioned and some became downright antagonistic. Stephen Tyler for example:

> "No less than the death of meaning should we have forecast from a manner of thought that emptied thought of all content, and what else could we expect

> from a method of analysis that presumed to show that meaning might mysteriously emerge from the mechanical concatenation of meaningless elements? ... Whether in art or science nothing is clearer than the intellectual poverty of formalism." [Tyler 78: 465]

Or Roger Keesing:

> "For almost fifteen years, cognitive anthropologists have pursued "the new ethnography" as far as it would lead them. For the last five, at least, it has been obvious that this would not be very far - that the messianic promises

> of the early polemic were not to be realized. "The new ethnographers" have been unable to move beyond the analysis of artificially simplified and delineated (and usually trivial) semantic domains and this has discouraged many of the originally faithful. [Keesing 76: 307]

In related domains outside of anthropology similar fates were befalling other major formalist projects. The grand plans for automatic translators failed dramatically. Criticisms leveled at AI research are almost direct echoes of those quoted above, especially that the techniques and methods of formalism were useless outside of narrowly constrained and trivial problem domains.

A far more common reaction within cognitive anthropology was the simple recognition that the problem of cognition was more difficult than it first appeared. One typical example is the reactions of Kay and Berlin arising from their participation in the Chiapas drinking study of the mid-1960s. Both became convinced that it was impossible

to isolate a given aspect of a culture (as a formal system) from the cultural context as a whole and that a wholistic study was best served by traditional anthropological methodology.

> "It turned out that after collecting a huge amount of material and spending two or three years looking for a set of objective procedures ... we gave up,

> because we could not find such a set of procedures. Drinking is an institution in Chiapas that permeates the entire lives of a people ... so to do an ethnography of drinking there is to do the total ethnography. [Kay quoted in Murray 82: 169]
>
> "We are not convinced that what could be said from the elicited data was that much more revealing than what could be said on the basis of old-fashioned participant observation." [Berlin quoted in Murray 82: 169]

Dougherty notes five important lessons learned from the early setbacks for cognitive anthropology.

> "First, the analogy of the ideal speaker-hearer is inappropriate to cultural analysis. ... Linguistic performance is governed consistently by an integrated grammatical system. ... Cultural performance is less neatly integrated (so) there does not appear to be one general set of rules that provides the structural (let alone semantic or symbolic) possibilities for behavior relevant to all activities of a society. Nor is there any reason to assume that the individual's representation of culture is a coherent system.
>
> Second, taken alone, formal systems of interrelated categories and associated rules have failed to provide an adequate account of the principles governing behavior.

> Third, the restriction of the study of meaning to structural analyses by extension from principles of phonological analysis is inadequate to account for the construction and use of systems of knowledge.

> Fourth, systematic procedures of frame elicitation reveal only a limited range of meaningful features and conceptual relations.
>
> Fifth, analogy has failed to provide a general account of the processes of change in cultural knowledge or cultural systems." [Dougherty 85: 8-9]

From the comments and criticisms of formalist approaches in cognitive anthropology it might be expected that the field would be abandoned and that the formalist paradigm would be discarded. Neither happened, although some particular aspects, like ethnoscience, essentially terminated. Instead, to use an phrase first applied to AI, the subfield entered a period that might be characterized as "a cognitive anthropology winter."

Formalist Cognitive Anthropology Lives!

Bloodied but unbowed, cognitive anthropologists continue in their formalist quest. If straightforward classification, employing Aristotelian either/or logic, is inadequate, then substitute Zadeh's fuzzy logic and allow for so-so membership in classes. Zadeh's logic is no less formal or axiomatic, after all. [See Lehman 78, Burgess 83, Kronenfeld 76, and Rosch 76]

Is the ideal speaker-hearer construct inappropriate to ethnological investigations? Three alternatives suggest

themselves. First, restrict the domain for which you expect the informant to have ideal knowledge; second, replace elicited reports from informants with structured observation of the behaviors of participants; and third, use statistical methods to abstract and reconcile reports from multiple informants. [See Boster 85, Gatewood 85, and Esterik 85]

If meaning is a function of context then contextualize meaning. Colby [85] is representative of a contemporary trend in cognitive anthropology that retains the formalist perspective, borrows heavily from computer science (artificial intelligence), and deals with the problem of how to contextualize cultural meaning.

> "We are rapidly coming to the point where 'intelligent' computer programs will be of practical use in handling information accessed through computers. A major impediment in the development of such programs is the lack of an ethnographic component. In a system designed to simulate text comprehension, it is not enough to include syntactic parsers and semantic rules. There have to be presuppositional statements as well. These statements are essentially ethnographic." [Colby 85:269]

Colby proposes a "Discourse Research System," a computer system designed along AI principles, that will provide the missing contextual dimension to an understanding of cultural knowledge. To the traditional components of a

cognitive anthropology system (symbols and manipulation rules) he adds "frames."

> "Frames are basically data structures. They can be of several types. The most important ones are sentence, situation, text, and text-world frames. Sentence frames map out conceptual relations ... Situation frames represent the current state of the world at any particular point ... Text frames model the rhetorical structures of the text and such higher-level phenomena as plot or eidochronic structure ... Text-world frames model the ethnographic knowledge ... [Colby 85: 271]

Through the judicious use of frames it is possible, according to Colby, to capture a complete ethnography, one that is amenable to computer processing and is reflective of the underlying cognitive organization of the culture. This type of analysis adds a hierarchical dimension to the traditional symbol plus rule structure.

> "... an ethnography [should be] organized around roles and settings and [those] roles and settings, in turn, [should] be organized around processes and situations, the situations including causes, goals, and results of the processes. At a still higher level such information could be organized into themes ... [ultimately to be] generalized in accounts of social structure and institutions." [Colby 85: 281]

Colby's scheme is borrowed from the frame based approach to cognitive modeling of Minsky, Papert, Rumelhart,

Schank, and Abelson. Although they are definitely more

complex in operation than early attempts to represent and emulate knowledge processing they are no less formal. Frames are data structures with open "slots" which can contain other data structures or symbols. Occupation of a slot is determined by explicit rules. It is unclear how this type of scheme resolves the acknowledged problems of formalism and cognitive anthropology.

Whether the formalist and the cognitive anthropology programs are ultimately viable or not is not at issue at this time. Concerns in this chapter are to outline the formalist approach to anthropology in general and cognitive anthropology in particular and to outline the formalist conception of mind and its realization in the modern digital computer.

The next chapter will discuss some of the major objections to the continuing formalist approach to mind and will outline the hermeneutic alternative.