Structuralism in Cultural Anthropology

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STRUCTURALISM IN CULTURAL ANTHROPOLOGY 9512

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INTRODUCTION

This chapter consists of five parts. The first proposes a definition of structuralism against the background of other anthropological approaches. A brief diachronic sketch is found in Part II. Part III reviews some very recent contributions. A theoretical summary follows in Part IV. Finally, Part V focuses first on transformational analysis before examining a few testable hypotheses and their verification.

I. STRUCTURALISM IN ANTHROPOLOGY

The position of structuralism among other approaches in anthropology can be located by means of the Aristotelian notions of causality. Aristotle, and many after him, look at epistemology in terms of etiology. To know means to be able to map the different causes of a phenomenon. There are four causes according to traditional European philosophy:[1] the material cause, the efficient cause, the formal cause, and the final cause. The material cause answers the question "What is the phenomenon made of?" The efficient cause answers the question "What/who made it, what is its origin?" The formal cause answers the question "What is it?" And the final cause answers the question "What is the phenomenon for?"

Applied to social anthropology, the grid yields the following, where neatness does not necessarily mean oversimplification. Material cause: biological and physical anthropology and ethology in so far as they bear on social anthropology—generally speaking, cultural ecology. Efficient cause: evolutionary theory. Formal cause: structural theory. Final cause: functional theory.

This is not the place to deal with the epistemological implications of the model or with the relationships between the different causes. All are different mappings of the same phenomenon, and therefore all approaches reveal different configurations. One can look at a piece of chalk or at the element of kinship from different viewpoints and map them accordingly. Thus, the definition of a chalk crayon in terms of limestone (material cause), or of its manufacturer (efficient cause), or of its cylindrical shape (formal cause), or

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[1] It is appropriate to use this as a frame of reference as anthropology belongs to the European world view.

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of its use (function) depends on the types of questions asked. Similarly, the definition of the element of kinship in terms of biological components, or in terms of its origin when passing from nature to culture, or in terms of its configuration, or in terms of its role in social organization, also depends on the type of questions asked.

Structuralism focuses on the formal cause; the web of relationships between terms. On the one hand, it seems to be only minimally concerned with biological components, their origins, and their actual social functions. Yet it considers essential the substance of components and thus looks at the material cause from a specific viewpoint. It also pays attention to process and therefore considers efficient causes in connection with this form. Teleology (final causes) is also taken into account, but here again with respect to actual sets of relationships between components. This is because form cannot be separated from contents: Aristotle and Lévi-Strauss insist that form is nothing other than the shape of contents in a given state of a system. Content structures form, in the sense that a grizzly bear, for example, cannot be invested with any meaning but only with those a specific tradition makes available. (However, note that coyote, in the same traditions, is much more versatile and is thus a more powerful semantic operator.) There is no such thing as a form which could freely and arbitrarily shape up any contents. Lévi-Strauss is explicit on this in La Structure et la Forme and in the series *Mythologiques* (39–43). Then, the position of the phenomenon in the general system implies considerations of its origin, hence the emphasis on the contrast between nature and culture if not on the passage from the one to the other. Finally, to generalize from a statement about kinship in *Structural Anthropology* (37), "social facts exist only to perpetuate themselves," i.e. their interpretation is teleological and there is no need to worry about that (Maranda 47, Lévi-Strauss 41).

The definition of the field of research commands, however, that consideration of material, efficient, and final causes be on a level different from that of, for example, evolutionary theory. This implies that structure will always evade those who like many British social anthropologists, pursue empirical *patterns* on the ground.[2] To structuralists, social organization belongs to the realm of material causes. Structuralism is not primarily a question of pattern recognition, time series, and stochastic processes; it is above all the study of those properties of a system which remain invariant under a given group of transformations. The last clause is a close paraphrase of Klein's definition of modern geometry and topology.

The analysis of formal causes presupposes the existence of an order which is to be discovered or read into the phenomena. Order here means a system whose properties can be mapped in terms of a constant set of related propositions. The set of related propositions is itself defined when the rules which generate it are stated. Thus, cultures are seen as logical mechanisms

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[2] Except Leach, V. Turner, some of Gluckman's and Worsley's works.

for reducing the randomness of history. Unexpected events occur which have to be faced, defined, integrated into a world view, or else the society disintegrates and/or has to be revamped. Actual solutions vary from society to society, but because the mechanisms are essential and universal features of mankind, they remain constant.

To return to the opposition alluded to above between organization and structure, one can say that the study of organizations is an attempt to define set membership by intersecting listings. For example, a kinship terminology in a given society has a number of features which the anthropologist will list; then he will search other social data in order to find points of intersection with kinship terms, like residence, inheritance, etc; then the overlapping areas will be proposed as the nodes of a network describing the society under investigation. In contrast to this procedure of defining class membership by listing, a structuralist arrives at a definition of class membership by rule. Under what conditions can a "word" be considered a kinship term? What is the rule to define the domain of residence, etc? This does not mean discovering the norms of the society in question; such native models are devised only to handle behavior, whereas anthropological ones are devised to handle intelligibility. In essence, structuralism seeks to understand how societies preserve their identity over time. Structuralism emphasizes therefore not the study of inertia as a cultural fact but, by analogy with information theory, the study of neg-entropic processes. [For clarifications and developments, see Maranda (48, 49, 53, 55); for contrasts between functionalism and structuralism along the lines sketched above, see Leach (30) and the comments in Maranda & Köngäs Maranda (58); for contrasts between psychological anthropology and structuralism, see Hymes (19); for ethnographic applications, see Maranda & Köngäs Maranda (56).]

The assumption that "societies exist to perpetuate themselves" implies teleology. Obviously, it also implies a concept of dynamic permanence. What is the framework within which things can change without shattering the society that strives to perpetuate its identity despite the repeated blows of history? A brief consideration of approaches to kinship will perhaps help here as an example.

Lévi-Strauss' *The Elementary Structures of Kinship*, or Dumont's *Homo Hierarchicus* do not define kinship *systems* so much as they define the semantic parameters within which kinship operates. The structural analysis of kinship attempts to lay bare a mechanism and is thus both broader and narrower than strict kinship analysis. It is dynamically related to politics and economics, in the sense of Mauss' *The Gift*, and does not aim at producing a description such as those found in the works of componential analysts. Bulmer (7) and Lévi-Strauss (44) state it clearly: the former in his critique of ethnoscience, especially pages 1081–88, and the latter in his conclusion of The Deduction of the Crane:

Such a view [as proposed in the article] allows us to see the possibility of

a mythical typology which would renounce all external criteria. Instead, it would use a single internal and formal criterion, namely the 'degree of order' at which the myths of a region or a population (or for a single population certain myths will thus be distinguished from others) cease the process of composition which proceeds from the indigenous ethnobotanical and ethno-zoological base. This base may well be called 'ethnoscience' as long as we do not forget that it is the first step in a dialectic destined by its very nature to blossom into a logic and a philosophy (Lévi-Strauss 44, p. 20).

And what I consider a key statement in *The Elementary Structures of Kinship* makes the same point more specifically:

> These [ethnographic] facts are important for several reasons. Firstly, they emphasize that matrimonial exchange is only a particular case of those forms of multiple exchange embracing material goods, rights and persons. These exchanges themselves seem interchangeable, viz., a woman replaces a payment for a debt which was in the first place completely different, say, a murder or ritual privilege; not giving a woman takes the place of vengeance, etc. Furthermore, no other custom can more strikingly illustrate the point, which seems crucial to us, concerning the problem of marriage prohibitions: the prohibition is defined in a fashion which is logically prior to its object. If there is a prohibition it is not because there is some feature of the object which excludes it from the number of possibilities. It acquires these features only in so far as it is incorporated in a certain system of antithetical relationships, the role of which is to establish inclusions by means of exclusions, and vice versa, because this is precisely the one means of establishing reciprocity, which is the reason for the whole undertaking (33, pp. 113–14).

It must be pointed out that in this passage Lévi-Strauss emphasizes the positional nature of elements in a set, while in La Structure et la Forme, as said above, he lays the emphasis on the structural constraints which come from the nature of the elements themselves, as he does also in the concluding chapter of *The Elementary Structures of Kinship* where he proposes a definition of the term "woman."

To conclude this first section, I should like to repeat that structuralism in anthropology can be seen as a study of formal causes, and that this implies a consideration of other causes *sub specie causae formalis*. Structuralists opt for a more abstract level of analysis than other anthropological approaches, and the consequence is a concern for general models and their rules of operation—i.e. for formal cross-cultural philosophy in the sense that I used the term in the Introduction to *Echanges et Communications* (62).

II. BACKGROUND

Let us not go back too far. I shall begin with Tylor. A programmatic statement of modern structuralism is found in his *Primitive Culture* published in 1871. His mechanistic propositions on the nature of the human mind are basic [for a more elaborate discussion, see Maranda (53)]. To him, the function of the mind is to combine and derive, not to invent; and he objects

to the popular and unfounded conception of the "limitless'" creative power of the human brain.

At the turn of the century, Hubert & Mauss (17, 18) developed the same approach in their analyses of magic and sacrifice which van Gennep was to apply a few years later to rites of passage (15), Hertz to the conception of death (16), etc. The basic propositions of structural analysis laid at that point were brought to bear on linguistics by de Saussure [for a more detailed discussion, see Maranda & Köngäs Maranda (58)]. At approximately the same time, Boas published his important thesis on language and semantics (5) where he introduced what are called "cultural idioms"—cf Chafe (9).

When de Saussure and Boas were defining their views, the Russian Formalists were working along similar lines. In folkloristics, this culminated in the publication in 1928 of the now well-known and very influential monograph by Propp, *The Morphology of the Folktale* (63). After the models proposed by Hubert & Mauss in their two monographs, Propp's provided a definition of variable and constant elements in folkloric discourse; additionally, he created the technique called afterwards "content analysis" by showing how lexical diversity can be reduced to categorical descriptors. Furthermore, in a paper published the same year as his *Morphology,* Propp initiated transformational analysis in folkloristics (64).

The rapid expansion of structuralism with the works of Lévi-Strauss bears witness to a continuing interest in the view found in Tylor's *Primitive Culture.* The opening paragraph of Chapter 17 of *Tristes Tropiques* (36) actually reiterates and expands Tylor's fundamental proposition. The combinatorial model of human societies and cultures which Lévi-Strauss envisages there, "similar to an anthropological Mendeljev's table" (and which is not without similarities to Kroeber's "cultural traits"), assigns an ambitious objective to anthropology.

Thirteen years after the publication of the founding paper of modern structuralism, Structural Analysis in Linguistics and Anthropology (31) and 3 years after that of The Structural Analysis of Myth (35), the first English translation of Propp's *Morphology* contributed importantly to further developments [for references to the secondary literature as well as for other orientations, see Köngäs Maranda & Maranda (26)]. Figure 1 summarizes my point.

Over the last 10 years structuralism has become a consolidated field. Courses are now devoted exclusively to structural anthropology in many universities in North America as well as abroad.[3] This probably indicates the need for a renewed theoretical framework or at least for a complement to other theories in anthropology—without forgetting that the structural myth is now part of the intellectual establishment's system of values.

[3] See also the high proportion of papers revolving around structuralist issues in the annual meetings of the American Anthropological Association over the last few years.
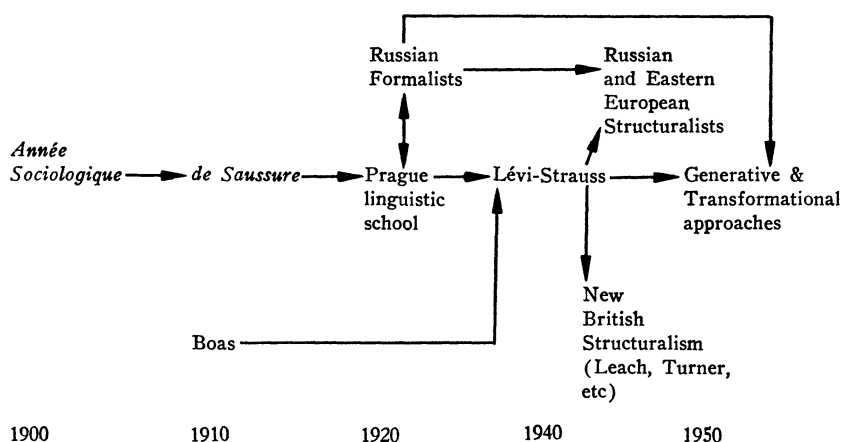
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                              ┌─────────────────────┐
                              │  Russian              Russian
                              │  Formalists────────►  and Eastern
                              ▲                       European
 Année                        │                      ╱Structuralists
 Sociologique──► de Saussure──►Prague ──►Lévi-Strauss ──────► Generative &
                              │ linguistic       ╱           Transformational
                   │          │ school          │            approaches
                   │          └─────────────────┘
                   │                             │
                   │                             ▼
                   │                             New
                   │                             British
                   Boas ───────────────────────┘ Structuralism
                                                  (Leach, Turner,
                                                  etc)

 1900            1910            1920         1940            1950
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FIGURE 1. A summary diachronic view of structuralism
in modern anthropology.

III. SOME RECENT CONTRIBUTIONS

The most noteworthy event in the field is doubtless the completion of Lé-
vi-Strauss' monumental *Mythologiques,* whose fourth and last volume ap-
peared in 1971 (43). Other significant contributions were the English transla-
tion of Piaget's book *Le Structuralisme* (61), and Turner's *The Ritual Pro-
cess* (69). The Lévi-Strauss *Festschrift, Echanges et Communications* (62)
contains over 80 chapters from all continents illustrating applications of the
structural method. Over the last few years in the Soviet Union[4] a strong im-
petus was given to structuralism by Meletinski and his associates. Finally,
Structural Models in Folklore and Transformational Essays (26) and *Struc-
tural Analysis of Oral Tradition* (57) appeared almost simultaneously. These
and two recent readers will be the works examined briefly in this section. The
selection is restricted by the limits of this reviewer's knowledge and by the
criteria of significance adopted. Significance is defined in terms of the head-
ings of the two next parts, viz. theoretical contributions and testable hy-
potheses.

Lévi-Strauss' *L'Homme nu* consists of two parts. The first, to page 558, is
a continuation of his analysis of Amerindian myths. It culminates in the
Northwest Pacific Coast area. Lévi-Strauss finds there the key to the interpre-
tation of the some thousand myths he tackles in his four volumes.[5] It is note-

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[4] Under the influence of Soviet space engineers who discovered and rehabilitated
Propp's works.
[5] "Dans une telle hypothèse dont on se gardera d'exagérer la portée, les mythes
sur lesquels s'achève notre inventaire représenteraient les formes toujours vivantes,

worthy that he summarizes his findings by focusing on a technological fact, the earth oven. This constitutes most significantly "a formal and intimate homology between infrastructure and ideology" (43, p. 557). But the latter may be more determinant than the former, "if the peoples who have the earth oven do not make pottery, it is because of the incompatibility of a philosophical order, as it were, which they conceive more or less consciously between these different techniques" (43, p. 553).

The second part consists of a critical reflection on the method followed in the analysis. The style switches from the impersonal "we" to the engaged "I," and Lévi-Strauss begins by considering the critiques addressed to volumes 1–3. He divides them into two sets, the not too enlightened ones, which he deals with first, and those he considers significant, which he discusses carefully. The work ends with a philosophical statement in line with similar passages in *Tristes Tropiques* (36), and the very last sentence, 20 lines long, proposes a world view implicitly in agreement with the second law of thermodynamics (cf the conclusion of *Tristes Tropiques;* and see below, Part III).

Piaget's synthetic review and discussion of structuralism (61) in the social and behavioral sciences is perhaps the most useful in the field. For Piaget, and this is a restatement of his *Traité de logique opératoire* [see my application of it to anthropology in (55)], a structuring action is essentially a system of transformations. In effect, phenomena are structured by "laws of composition"; they are therefore "structuring'" by their very nature at the same time as they are structured. He does away with Chomsky's innateism to hold instead that constricting equilibrating processes are enough to describe the system, and he opts for constructivism against those who prefer an axiomatic approach.

The three "mother structures" distinguished by Piaget are fundamental and all are relevant to anthropology. The first is algebraic, the second order relations (e.g. a lattice), and the third topological. The theory of categories then is important for the constitution of morphisms, which puts the emphasis on the operations performed on constitutive operations. It is impossible to give an adequate idea of Piaget's valuable methodological reflection in the present format. I should like to recommend it to all those who wish to take stock of the recent developments of the field. Chapters 1, 2, 5, 6, and 7 are especially relevant to the problems anthropology deals with.

Leach's theory of tabu [Animal Categories and Verbal Abuse (29), *Kimil: A Category of Andamanese Thought* (30)] was developed by Mary

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les plus riches et le mieux préservées aussi, d'un système qui, en se diffusant vers l'est et le sud, se serait progressivement décomposé, et dont nous n'aurions fait que retrouver, jusqu'au coeur de l'Amérique du Sud, les débris charriés et éparpillés au cours des siècles par le flux des migrations. Recueillant et mettant bout à bout ces morceaux, nous aurions patiemment reconstitué ce système tout au long de notre entreprise, remontant pas à pas jusqu'à sa source où, sous un état encore relativement intact, nous l'aurions enfin retrouvé" (45, p. 536).

Douglas in her *Purity and Danger* (11) and *Natural Symbols* (12) and still further in Turner's *The Ritual Process* (69). Although the latter refers to Leach's theory only indirectly through a few lines in connection with Douglas (69, p. 109), his concept of liminality expands what Leach calls his theory of tabu. According to it, indeterminate margins surround discrete elements in a symbolic field, and such margins are the danger zones in which tabu is imposed. These convergences between the works of Leach, Douglas, and Turner seem to indicate the emergence of a new form of British structuralism.

    I cannot give here even a dim idea of the contents of Lévi-Strauss' *Festschrift*. It ranges from structural ethnographies to political analyses (e.g. Peacock's "President Sukarno as Myth Maker"); the first volume contains a drawing by Max Ernst and a piece by Michel Leiris. The *Festschrift* is structured after the works of Lévi-Strauss himself. The eight parts correspond each to one or more books, from *La Vie familiale et sociale des Indiens nambikwara*, an ethnography published in 1948, through *The Elementary Structures of Kinship, Race and History, Tristes Tropiques, Structural Anthropology, Entretiens avec C. Lévi-Strauss, The Savage Mind*, to *Mythologiques*. The diverse contributions are grouped under each of these headings according to their subject matter methodology.

    The publication in Russian, German, Italian, and French of monographs and papers by the Soviet and East European structuralists bears witness to the fecundity of their approach. I do not think a list of those works would be very useful as most of them are written in languages little known by anthropologists. Instead, I should like to mention that the series *Approaches to Semiotics* (ed. T. A. Sebeok, Indiana University and Mouton) will publish English translations of some of the contributions by Meletinski, Nekludov, Novik, Segal, and Pop. The journals *Uomo & Cultura* (University of Palermo); *Semiotica; L'Homme et la Société* (Paris); *Langages* (Paris); *Annales-Economies, Sociétés, Civilisations* (Paris); *Communications* (Paris); and the publications of the Soviet Academy of Sciences in the Social Sciences all contain new and original studies. Perhaps most significant so far from Eastern Europe and the USSR are the drastic revisions of linguistic models on the one hand and elegant mechanistic description in folkloristics on the other. The researchers in the Soviet Institute for Applied Mathematics and in the Institute for Mathematical Linguistics have proposed, for example, a definition of synonymy in the framework of discourse analysis and conduct field tests in folkloristics to refine their protocols. Propositions made along the same lines elsewhere are inspired by transformational linguistics. For a summary of results by the Eastern Europeans over the last few years, see Rozentsweig (66).

    Structural Analysis of Oral Tradition (57) contains an introduction and 11 chapters, several of which mark new developments in the field. Myth, ritual, folk drama, folk tale, riddle, folk song and myth in culture contact are the seven areas which specialists tackle after brief presentations of their analytic concepts. Lévi-Strauss uses the Kantian notions of empirical and tran-

scendental deductions as tools for the analysis of myth. Leach contrasts structuralism to functionalism, reanalyzing Radcliffe-Brown's Andamanese data. Hymes uses the method presented by Lévi-Strauss in *Totemism* to test Jacob's psychoanalytic interpretation of Northwest Pacific Coast myths. Greimas introduces the concepts of "posed" and "inverted contents" to characterize mythic thought. A metalanguage for semantic analysis in the field is presented by Turner (70), who applies it to ritual. Peacock merges Burke's and Parsons' categories to map out the structure of Javanese folk dramas. Continuing his application of the Proppian model, Dundes shows its utility for comparative analysis by contrasting a theme in North Amerindian and African folk tales. Metaphor, metonymy, and transformations are the concepts used by Köngäs Maranda in her analysis of a corpus of Finnish riddles. Lomax and Halifax adopt content analysis procedures to conduct a broad cross-cultural piece of research in folk song texts. Culture change—see also Savard's recent monograph (67)—is investigated by da Matta in terms of a relational analysis which implicitly brings together Propp's and Lévi-Strauss' methods. Finally, a test of the validity of desk analyses—armchair anthropology—is successfully carried through by Dundes, Leach, and the present author. Maybury-Lewis, who had collected the documents analyzed in this exercise, concludes that, after all, it seems to be possible to say something meaningful about a society totally unknown to the analysts using a well-defined method. His final statement shows that the new theory of myth being elaborated by structuralists is indeed needed.

Chapter 2 of *Structural Models in Folklore and Transformational Essays* (26) is a revised and enlarged version of a monograph originally published in 1962. In it the authors devise a taxonomy of plots and find that five models are necessary and sufficient to describe adequately myths, folk tales, riddles, proverbs, rituals, as well as other genres. Thus the actual number of possible plot structures is presented as finite—this is both a modification of Propp's single model and a new development. The five models are in fact paths followed by the carriers of oral tradition, and they also represent learning steps in the process of mastering more and more complex structures (experimental approach, Chap. 2, Sec. 8). A typology is therefore set up of rules that govern the generation of folkloric items. Furthermore, the authors argue that statistical predominance of the different models in different cultures are indicative of value orientation (see below, Part V).

Transformational analyses are used in Chapters 3 and 4. In Chapter 3, on myth, semantic domains remain constant while a structure is transformed into another structure. In Chapter 4, on riddles, structure remains constant while a semantic domain is transformed into another semantic domain.

Köngäs Maranda's work on riddles should be read along with the papers by Morin on jokes (60) and by Milner on proverbs (59). Developed independently, these show a remarkable convergence. See also Maranda & Köngäs Maranda on proverbs (26, Chap. 2.6), the Soviet Permiakov's monograph, still untranslated, *From Proverb to Tale: Notes toward a General Theory of*

the Cliché Text, and the continuing team research conducted at the Centre d'Ethnologie Française in Paris by Loux, Charraud, Richard and Virville. Units are defined in the same way; metonymic and metaphoric processes are shown to be basic mechanisms in the constitution of the data. Köngäs Maranda's transformational analysis [like Maranda's in his algebraic approach in *Structural Models* (26, Chap. 3)] shows that semantic analysis is not a matter of atomization. This bears out the propositions of Lévi-Strauss (39) and Leach (29) on the discrete and the continuous and corroborates Schneider's objections to componential analysis.

Finally, two important readers must be mentioned: *Structuralism,* edited by Lane (27), and *Anthropologie et calcul,* edited by Jaulin & Richard (20). Both contain theoretical chapters and applications. In addition to papers of historical interest by de Saussure, Prague linguists, and Jakobson, those by Abell and Barbut are especially valuable in Lane's reader. The first one applies, after Flament (14)—a relevant book Abell does not seem to know—graph theory, to the "element of kinship." The second, written by a mathematician specialized in the social sciences, provides a good introduction to Klein's groups[6] and to the most fundamental concepts of isomorphism and homomorphism [on their role in structural analysis, see this author's *Anthropological Analytics* (55)].

Anthropologie et calcul contains original and critical essays in addition to reprinted papers. Lucid assessments of formalization and structural approaches are made available in a convenient and sober form. I hope this reader will be translated into English in the near future, for it would be most helpful in many anthropology courses.

IV. THEORY

I propose to summarize structuralism's main recent theoretical contributions in terms of a parallelism with the second law of thermodynamics (see above). This may be my own reading. To support it, I would argue that it should not be unexpected to find modern analyses of myth and ideological systems by members of our societies, partaking in our societies' scientific world view. Natural scientists see the universe as a process of increasing disorder (entropy). Since there is a gradual loss of available energy in the physical world, total entropy increases with the flow of time; in sociological terms, history would be the description of mankind's increasing entropy despite its efforts to counteract it (negentropy).

If we agree that in order to communicate (*a*) people must share common mythic conceptions, as I have argued elsewhere (53); (*b*) that members of our own societies share a common mythic conception of science as a dynamic set of beliefs; (*c*) that this scientific myth rests on and is expressed by the second law of thermodynamics (entropy increases over time); then how could anthropological and other theories free themselves from these thought

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[6] Lévi-Strauss refers to this type of formalization in *Mythologiques III* (42).

parameters and from their culturally defined conceptions of their own intellectual substance? I do not mean that anthropological and other sciences derive their theoretical patterns from thermodynamics; I mean that structural anthropology as well as physics and other sciences would all be molded by our mythic, i.e. entropic, conception of the universe. The story of the Original Sin in the Bible already laid the ground for this. According to the Biblical semantic charter, knowledge can be achieved only at the expense of a loss of order, Sin. If Eve had ranked immortality higher than knowledge, mankind would still be immortal—and ignorant—and there would have been no loss of the original stable order, i.e. no entropy.

My proposition is therefore that the structuralist interpretation of mankind and of its operations and processes is congruent with the second law of thermodynamics as the second law of thermodynamics is congruent with the myth of the Original Sin and with a great many of our cultural axioms, and that it is so because both physics and structural anthropology are products of the same culture, because they both rest on the same myth. (Whether the same could be said for other approaches in anthropology or whether only structuralism comes close enough to the natural sciences to meet them on the level of our basic myth is beyond the scope of the present review.)

The debates between historians and structuralists, the oppositions built between synchronic and diachronic approaches, converge in fact on the concept of time. Again, this is not the place to discuss the debate's philosophical implications, not even the supposedly "cyclical" conceptions of time in non-literate societies (cf Eliade's works, especially *Cosmos and History,* and Leach's *Rethinking Anthropology,* Chap. 6). Structuralism sees history as irreversible and mankind's operations on this flow as vain attempts to slow it down if not to stop it. In the physical world, some processes can reverse entropy. Thus, freezing increases the internal order of a liquid and reduces entropy—a process called negentropy (cf Lévi-Strauss' concept of "cold" vs "hot" societies in *Race and History*). The same concepts are used analogically in Communication Theory, and it is possible to measure the entropy of verbal messages (see 48, 52).

In effect, the conclusion of the last volume of *Mythologiques,* and more or less explicitly the other works briefly reviewed in the preceding section, see mankind's ideologies as the classical Greeks did: devices to pass from chaos to cosmos, to cancel disorder, to negate entropy—i.e. to nullify the complex and threatening future by resorption into the past. Thus science and philosophy are attempts to reduce the randomness of history to a pattern, that of one's own culture's myth (see 53).

Administer a Word Association Test to a sample of Overseas European (Murdock's name for "Americans"). Use the word "tobacco'" as one of your stimuli. You can predict a high association score with responses like "cancer," "pollution," "heart condition," and the probability is extremely low that you will get "Pleiades." But it is the other way around with Plains Amerindians. The reason is that Overseas European thinking habits are conditioned
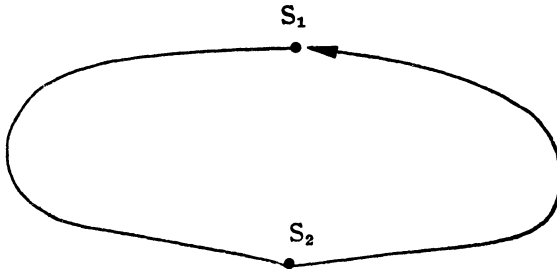
FIGURE 2. Model III (see 26).

by a mythology very different from that of Plains Amerindians. The former is continuously molded by "scientific" statements and is structured by a set of beliefs idiosyncratic to technologically overgrown societies. The latter's thought patterns, as shown by Lowie (46), are molded by a dynamic cosmological view which has more to do with prayer than with the medical arts.

This is to say that mythology conditions thought, and consequently language, like language conditions speech acts. De Saussure's distinction has thus to be read in the full context it implies, viz.

myth : *langue* :: *langue* : *parole*

In this view, myth is defined as a charter—not a charter of society as Malinowski's narrow functionalism would have it, but a cognitive charter. It delineates the parameters within which the members of a society can communicate and beyond which they are lost—"out of the way" poets, "foreigners," or crazy (on this, see Mallarmé's works and T. S. Elliot's Tradition and the Individual Talent in his *Points of View*). In other words, myths (and other folkloric genres as well) map out the grooves along which thought can move in a linguistic and cultural community. They also, by virtue of this, teach which associations are permitted and which ones are not, within specific parameters. The study of cargo cults is very instructive in this respect as well as that of culture change [see Burridge (8), Hymes and da Matta, both in (57), etc]. As pointed out in Part I, this theory of myth stems from Tylor, the French School of *L'Année Sociologique*, Boas, and Lévi-Strauss. It can now be considered well established and supersedes the Sapir-Whorf hypothesis which in fact it pulls inside out.

Take a cultural system in a state S_1. An event occurs that alters the state to S_2. Homeostatic, cybernetic, or other devices (according to the analyst's theoretical inclinations) attempt to bring it back to S_1 [Model III in the terminology of (26)]. However, it may be impossible, attempts fail, and the system collapses (Model II in the same terminology). Or it may be possible to bring it back to a state approximately equivalent to S_1, say $S_{1'}$. To use Lévi-Strauss' metaphor, the outcome of the process will be on the same longitude but at a different latitude. This twist over time generates a helicoidal

structure (Model IV)—social change—towards either a temporarily more stable or unstable pole, with unstability prevailing ultimately. Figures 2 and 3 represent the structure graphically.

The distances S_1–$S_{1'}$, or S_1–S_2 can be positive or negative in reference to the number of elements subtracted from or added to S_1 and thus provide a measure of entropy if negative and of negentropy if positive. [For a more elaborate discussion, see (26, 42) and for technical applications, see (26, 48, 52), where the concepts of structural strength and entropy are discussed.]

In this respect, mediation and inverted symmetry appear to be fundamental analytic concepts. Lévi-Strauss has drawn extensively on them for many years (32, 35, 38). Gluckman, Turner, and others have also shown their relevance as general mapping devices, i.e. as transformers.

More specifically, one of the main methodological consequences of structural theory has been to reactivate Mauss' concept of total social system. Thus, as implied above (Part I, references to Bulmer and Lévi-Strauss), myths structure philosophies. This means that ethnoscience and componential analysis are unproductive exercises as far as comprehensive interpretations are concerned—and let us bear in mind that they are not proposed as comprehensive by their founders—and that, in this respect, the approach by the metaphor must be preferred. Schneider's position is thus corroborated: instead of being considered peripheral (Lounsbury), metaphor must be taken as the central core of the phenomena under study (see 10, 22–25, 29).

V. TRANSFORMATIONAL ANALYSIS AND TESTABLE HYPOTHESES

I shall take up two topics in this part. The first one, transformational analysis, will be examined in a different way than it is in linguistics. Then I shall review some structural hypotheses and the procedures used to test them.

Transformational analysis.—I want to make it clear at the outset that there may be very little in common between Chomskyan linguistics and transformational analysis in structural anthropology. The notion of transforma-
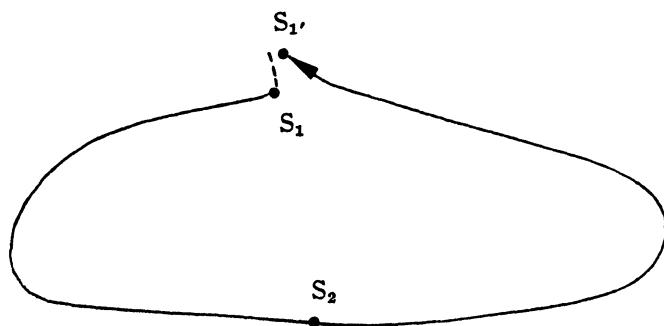

FIGURE 3. Model IV (see 26).

tional analysis in our field was first used by Propp in 1928 (64). Then Lévi-Strauss reintroduced it independently in 1949 (32) and developed it further in 1956 (34). For Propp, the transformers are the sociological contexts of folkloric items, and the transforms are terms or dramatis personae [for a summary and discussion, see Maranda & Köngäs Maranda (58)]. Lévi-Strauss used the term first in the analysis of art and in the context of symmetry. This may be a coincidence, but it so happens that in mathematics symmetry is also the point of departure of isomorphic mappings (= transformations). It may be that the consideration of plastic symmetry led Lévi-Strauss along a path parallel to that followed by mathematicians. A simple form of transformation is repetition in a reverse order or reflection (in Köngäs Maranda's terminology, transformation by *renversement;* in Lévi-Strauss' terminology, by inverted symmetry). We then have bilateral symmetry. The next one on a plane is rotational symmetry, and sequences of rotations and reflections can generate a number of figures or myths. Two-dimensional symmetry is more complex but is essentially based on the same operations of transformation. [Compare the transformations in folkloristics described by Propp (64) and Köngäs Maranda (23).]

In structural anthropology, therefore, as in mathematics [see Barbut in (27) and Maranda (55)], transformation means mapping. Mappings are either one-to-one (isomorphism, following the rule called bijection) or one-to-many/many-to-one. An example of the former is the Arabic and Roman numerical systems (except for zero); an example of the latter is spoken English and written English—e.g. the ten graphemes in /gloucester/ are mapped respectively seven-to-four and three-to-two in the two syllables of spoken English, and this shows that graphemes are irrelevant units for the analysis of speech.

As Propp pointed out several decades ago, transformational analysis is a useful tool to reduce the multiplicity of empirical data to explanatory simplicity. But it can also be used to proceed in an inverse way, viz, to show the depth of mental processes at work in the construction of a mythology (44). The operations Tylor refers to (combination, derivation) can indeed generate extraordinarily complex products which contain implicitly advanced pieces of higher mathematics. Not only Australian and Oceanic kinship systems but also myths from all over the world bear out that if the human mind can barely do more than derive and combine, it performs these simple operations with great virtuosity. We may hypothesize that, like Arabic art and divination, myths exhaust all the possibilities tolerated within a semantic universe.

A word about culture change in this connection. Whenever societies are under stress, they draw on all their semantic resources in ritual and in myth to interpret the situation. Culturally defined mediators are then revamped and surcharged, as it were, with all the semantic resources possible, to face the emergency. They often fail (Köngäs Maranda & Maranda Model II). But the very mobilization of resources also triggers all available transformation processes available in the semantic repertoire, and the society in question lays

bare its most fundamental mechanisms. Similarly, when the world is to be ordered, all resources are grouped and put at the disposal of a versatile culture hero. Savard, for example, has shown this at work among the Montagnais-Naskapi Indians (67), and da Matta is tackling the same ethnographic situation among the Timbira in (57).

Transformational analysis and the generative approach in structural anthropology, therefore, are essentially a matter of mapping rules which reduce empirical diversity to cognitive manageability. One can then pass from the discrete to the continuous and vice versa in a hierarchical system whose nodes are indicative of semantic depth, as suggested by Buchler & Selby after Yngve (6); see also (49).

Testable hypotheses.—Word Association tests (see above, Part IV) are useful tools for investigating the semantic structures which underlly cognition and its parameters as expressed in mythologies. Sophisticated approaches have been developed over the last decade by psycholinguists and semanticians.

Word Association tests enable students of myth and cognitive systems to test hypotheses formulated on the basis of narratives, taxonomies, and other folkloric documents. I have modified the approach into Sentence Association tests and Plot Association tests (50, 54). These strategies make it possible to define the idioms or semantic units larger than "words" which are the components of discourse (cf 9). Patterns are thus identified, parameters are hypothesized, and transformers are shown to be either productive or not in a given cultural universe.

Two examples will illustrate the point. The first one is an analysis of riddles and the second, an analysis of myth. In her papers on the structure of riddles, Köngäs Maranda (22–25) can generate riddles by using the mechanisms which describe their structure. The analysis of a sample enables her to formulate a core structure and its mappings. By using the rules formulated on the basis of the sample, she generates new items. Standard collections are then searched to verify the acceptability of the riddles artificially generated.

While Köngäs Maranda remains within well-defined linguistic and cultural areas (Finnish; Lau of the Solomon Islands), Lévi-Strauss works on a higher comparative level. To take the case of one of the "zooemes" in the Amerindian corpus, the positional definition of the north American "pheasant" corroborates the results of the analysis of the south American "partridge." Thus, a structure defined deductively in *Mythologiques I* (39, pp. 209–13) is confirmed empirically in *Mythologiques IV* (43, pp. 353–54). In other words, the North American data provide evidence to assess the interpretation of the South American ones: the definition by a series of commutations of the "partridge" as mediating between the world of the living and of the dead is borne out by the North American conception of the "pheasant" in the same role.

In the Soviet Union, Meletinski and his associates combine synchronic

and diachronic analysis to investigate the dynamism underlying the evolution from myth to folktale. Although restricted mainly to the European area, their works occasionally refer to nonliterate societies [for an application of their approach by one of them to Tsimshian myths, see Segal (68)]. As mentioned above, they base their model on Propp's fundamental contribution. Such operational concepts as the constant amount of power distributed between dramatis personae, the function of tests in the structure of folktales and myths, and that of magical objects (inverted from myth to folktale), are all testable propositions. In fact, several were tested on Okanagan and Kwakiutl data and on the *lais* of Marie de France (where folklore and early literature merge), by the Jileks (21), Reid (65), and Layton (28). The conclusions reached show clearly that structural folkloristics has reached a high level of sophistication in anthropology.

The society-specific prevalence of one or the other of the Marandas' models as indicative of cultural and social orientations has also been tested on different corpora and provides a broad basis for semantic taxonomies. The semantics (cognitive parameters) of interaction with the physical and social environments, and competition versus coalition in both cases, culminate in self-assertive exploitation strategies ("capitalistic" orientations, as in European folklore, or cooperative strategies, as in Eskimo folklore) which can be typical of more or less successful societies in the face of culture contact or under other forms of stress. Mythic structures thus provide predictive models: closed, sterile structures (see above, Model III) have only survival power, while open, productive ones (Model IV) allow for versatile and winning combinations.

The same models are also useful for investigating culture-learning behavior. As experiments with children have revealed, structural competence is achieved only at age 9 in well-to-do areas in our societies. Additional tests will show whether this varies with socioeconomic factors and cross culturally (26, Chap. 1.8).

Finally, the growing use of Digraph theory in the field yields more and more systematic and precise formulations of problems, of testable hypotheses, and of their verifications (1–3, 6, 14, 51, 52, 56).

To conclude this part, I should like to say that perhaps two of the major results of structural analysis are: (*a*) the definition of basic mechanisms at work in ideological systems which rests on the construction of homomorphisms (transformations); and (*b*) the hypothesis that myths, like other major semantic mechanisms, are ergodic systems—in other words, Propp's approach leads to valid predictions.

SUMMARY AND CONCLUSION

The five parts of this survey have presented some aspects of structural analysis that are salient according to the present reviewer. Themes have been briefly developed as well as summarized. Emphasis was put on semantic systems as chartered in myths, which are viewed as negentropic devices. These

function as mechanisms to annul history. The fact that they fail to do so in no way affects the methodology. The Sapir-Whorf hypothesis and componential analysis should thus be pulled inside out. To state it in topological terminology, which is appropriate, anthropological domains are not *simply connected,* as Sapir and Whorf, functionalism and componential analysis would have it, but they are *multiply connected.*

Testable hypotheses were also considered. On this front, it seems that structural theory has been perhaps one of the most productive fields in our discipline over the last decade. The next 10 years should see still more valuable results.

In conclusion, I should like to say that a negative picture might very well have been depicted. I could have emphasized a number of flaws; I could have dealt at length with shortcomings, oversimplifications, trivia, and I could have presented the field as a futile exercise in pseudo-mathematical pretensions. I do not deny that structuralism lends itself to such critiques. Yet I opted for a more positive evaluation.

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