The Study of Material Culture Today: Toward an Anthropology of Technical Systems

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... even the simplest techniques of any primitive society take on the character of a system that can be analyzed, in terms of a more general system. The techniques can be seen as a group of significant choices which each society—or each period within a society's development—has been forced to make, whether they are compatible or incompatible with other choices. (Lévi-Strauss 1976:11)

INTRODUCTION

The study of material culture has long been the study of lifeless objects. At first, prehistorians tried to associate action, tool, and worked material in reconstructions, sometimes experimental and sometimes purely intellectual, of the objects they brought to light. The search for more or less controllable analogies today leads some to pose questions about the material culture of living societies, at times with a somewhat simplified vision of the relations between technology and society. For the ethnologist, this has generated new approaches in fieldwork, at least in the profusion it now knows, as well as new theoretical reflections on material culture. Such reflections also characterize some contemporary archeology, notably that which employs the approach called ethnoarchaeological, even if archeology is always ethnology by necessity (Gardin 1982).

Perhaps coincidentally, a veritable anthropology of technology is simultaneously taking shape, which considers techniques in and of themselves, and not solely their material effects (their results in people's everyday life) or only the circumstances and social consequences of their application (the organization of participants among themselves while employing the techniques).

Yet, even as it expands the scope of its considerations to living societies, archeology still seems (understandably) burdened with its own questions and traditional frame of thought. Thus, objects are still at the center of discussion, although they are but one element among others of...
technology (material, action, cognition). Thus, even the most promising and ambitious of theoretical positions still seem to lead invariably to demonstrations where the technological behavior of people is seen only through forms of pottery, lances, stools, hats, arrows, headbands, and so on. I would add that only a few isolated kinds of objects are ever treated, which amounts to taking no account of the systemic character inherent in any material culture (Lemonnier 1983). Just as often, and whatever we might wish or claim, these reflections typically are limited to a single aspect of material culture: the transmission of "information," and refer only to visible characteristics of artifacts, most often perceived consciously by the populations which use them. Finally, in the majority of cases these analyses deal de facto only with details of form—the type of retouch on a stone implement, headband motif, color or decoration of clothing, of pottery, etc.—i.e., with what Leroi-Gourhan has called "les derniers degrès du fait" (1943:27 et seq.).

A recent work by Sackett (1982) will illustrate these points. In this work, the scope attributed to style is the widest possible, at least in appearance style includes the functionally equivalent means to reach the same end, a definition so broad that we could imagine style to exist in any variation of material culture. Yet in spite of this broad definition, Sackett treats only the form of the same type of artifact in practice. Even in his application of an ethnoarcheological approach to a Franco-German battlefield (if I am not mistaken), he is not interested in the mechanics differentiating a Mauser from a Lebel, nor in the relative effectiveness of these two weapon types. In another realm, moreover, he does not investigate the microtraces which would provide supplementary archeological information on the stone tools which he treats, nor does he seem to consider such an investigation especially relevant to his considerations.

Even when embedded and developed within a behavioral theory of style, for example (Wiessner 1983, 1984), the scope of reflection on material culture remains restricted to a few formal aspects of a few kinds of objects. The theoretical and methodological distance—but also the amount of fieldwork required—remains quite large between a brief but fertile remark like that of Sackett inviting the consideration "that different sets of tools may be used by different groups of people in alternative isochrestic 'styles' of activities such as butchering and carpentry," and the beginnings of a demonstration of how such ideas can be incorporated fruitfully in the study of material culture. I would add that it is not just by posing questions restricted to the formal details of a butcher's or carpenter's tools that we will be able to show how and in what aspects

* See Notes section at end of paper for all footnotes.
these activities themselves are the object of technical choices on the part of societies.

The present work aims to show that notwithstanding the traditional materials and questions of archaeology, which in practice limit its scope of reflection, a theory of material culture is possible that takes into account all facets of human technical activity. It also undertakes to show that meaningful choices—the very ones most often at the center of archaeological discussion—can be discerned in aspects of technology which, a priori, involve its most physical dimension, i.e., transfers of energy and matter, more than their informational dimension.

Let us note that this approach has significant implications concerning the manner by which the majority of ethnologists have dealt with technical systems, or if we prefer, with material culture.

MATERIAL CULTURE SEEN BY THE ETHNOLOGIST

Whoever wishes to appraise the sum of ethnological work on material culture is immediately confronted with a paradox: even if some of the greatest names in the discipline are associated with such research, we must note that the scarcity of useful field material is only equalled by the rarity of theoretical writing on the topic. Works can be found by Boas, Kroeber, Wissler, Haddon and many others who have gathered thousands of objects and left as many pages of publication at the Smithsonian Institution, the Bureau of American Ethnology, the Museum für Völkenkunde, the Musée de l’Homme, the Bernice P. Bishop Museum, the Peabody Museum at Harvard, the Pitt–Rivers Museum, or the American Museum of Natural History. Nonetheless, the reader who plunges into these miraculously preserved treasures of information will almost never find what is required to reconstruct that which remains the primary matter of the ethnology of technical processes: an operational sequence (chaîne opératoire), “a series of operations which brings a primary material from its natural state to a fabricated state” (Cresswell 1976:6). The comparison of operational sequences is, a fortiori, even less of a possibility.

Therefore, as soon as we understand by “techniques” (technology or technical processes) something other than the description of objects, these inestimable collections, the joy of curators and the subject of numerous anthropological and archeological works, have only a limited interest for the ethnologist of techniques. The situation appears quite as critical in terms of theory, in so far as it is not totally unreasonable to theorize in the absence of field materials. Also, with some rare exceptions, theoretical writings are first of all programs of research, beginning with the text by Mauss dedicated to “techniques du corps” (1936), which
contains the spiritual seed of any ethnology of techniques, but which has remained almost without impact or response until now.

Other than contempt and ignorance pure and simple, the technical processes of primitive societies have in fact met with three kinds of treatment from ethnologists: (1) comparative analyses with a universal bent but devoid of any more than a very general socioeconomic dimension; (2) more or less precise description considered as an end in itself, the interest in the technical behavior of the particular society ceasing at the end of the chapter devoted to it; (3) global considerations in the form of a more-or-less vague appreciation of their "effectiveness" or of the constraints which they exert over social life. Outside of a few very rare exceptions, we thus never find any attempt to relate techniques, in their most material aspects, directly to the characteristics of the societies which developed them.

To continue, the comparative approach has long nourished anthropological reflections on the technical domain. Without going back to Lane Fox or Tylor, the work of Leroi-Gourhan (1943, 1945) comes most readily to mind here. Presenting a classification of techniques intended as universal, derived from the kinds of action on materials which they employ, this author has established a theoretical framework which remains indispensable to anyone who would examine the nature of the discontinuities observed in material culture. The ethnologist of techniques ignorant of the work of Leroi-Gourhan will inevitably be confronted with notions of "tendency," of "fact," of "favorable milieu." However, the very scale of the subjects dealt with by Leroi-Gourhan, in time as in space, conditions that of the phenomena considered and the level on which he has theorized. For example, he treats assuredly the relations between people and techniques, his work on hominization only touches upon the relations between techniques and society such as an ethnologist can approach them today in a given society.

He has moreover abandoned any attempt to identify a hierarchy of "technical ensembles" and of the societies to which they correspond, placing first and foremost the inseparable link between techniques and the societies in which they are practiced. The techniques of a human group indicate nothing but the most general about its social organization, and any hierarchy of stages (pre-artisanal, artisanal, etc., for Leroi-Gourhan) relates infinitely more to socioeconomic characteristics than to a vague technical level. I would add that today we are justly reexamining the anthropological interest in dividing human history into several stages (band, chiefdom, etc.) such as offered by the neoevolutionists. Godelier (1973a) has noted that to follow Service or Sahlin in this domain leads to assembling in the same stage forms of social and economic organization which are entirely heterogeneous. This creates the greatest doubts as to
the operational value of such historical or anthropological divisions. So, no more than the narrow and one-way determinisms which have attributed profound social transformations to a few technical facts, as limited as they are celebrated, the search for correspondences between "technical level" and "stage" of social and economic organization does not seem likely to lead to a theory of relations between technical system and society other than one so over-simplified and general that it quickly loses all interest.

Another recent comparative approach is illustrated by works dealing with the distribution of "cultural traits," notably of technical traits, with the aim of statistically defining "cultures" which correspond to as many different associations of these diverse traits. Such work provides mines of information, often misunderstood; we think for example of the maps of Driver and Massey (1957). But as much by the extent of the "cultural areas" included as by the imprecision of the technical traits surveyed, the links between techniques and society only appear in the form of correlations which are scarcely interpretable.

Technological descriptions represent the best and the worst: the best because most often they constitute the only testimony we will ever have of practices that are extinct or nearly so; the worst because none of them permits the reconstruction of operational sequences with any precision, thus not permitting anything other than an intuitive comparison or comprehension of the processes involved. And again the worst because these descriptions always concern a few techniques only, although all techniques of a society together form a system, and not to consider certain ones is as arbitrary as it is unfavorable to their comprehension. Finally, the worst of all, because the descriptions of techniques always remain isolated, without the least attempt to relate the manner by which people act on material to the way in which they behave in society.

Let us nonetheless make no mistake: imperfect as they are, the few descriptions we dispose of are as many rare pieces for which we can never thank their authors too much. In New Guinea for example, to which we will return later, the work carried out by Blackwood (1939, 1950) in 1936-1937 among the "Kukukuku" (henceforth "Anga") of the Upper Watut constitutes an irreplaceable witness to the techniques of a society emerging from the Neolithic. Even better, his ethnobotanical research (1940) remains an exemplary model of the genre. At a few days' walk from the Upper Watut, Fischer (1968) has devoted numerous particularly precise and annotated plate drawings to the techniques of the Jeghuje, another Anga population. Watanabe (1975) has devoted an entire volume to the bows and arrows of the Oriomo region to the west of the Gulf of Papua. At the beginning of the century, Haddon gave us monographs on Melanesian and New Guinean canoes (Haddon and Hornell
stone clubs (Haddon 1900), and pipes (Haddon 1946). In all these cases, however, study is concentrated on the objects, their manner of use never taking up more than a paragraph, if it is treated at all. Curiously, it is when they analyze collections of museum objects that the authors take the most pains to reconstruct what it would suffice to have observed in the field (Kooijman 1962; Fetchko 1972).

A relative consideration of techniques has recently developed in the stirrings of “cultural ecology” on the one hand, and Marxist-inspired economic anthropology on the other, marked by an increase of interest in the relations between material culture and society. Carried out by field researchers, these studies contrast with large scale comparativism and with monographs lacking sociological content by their willingness to establish relations between the material environment of societies—ecosystem and means of action on material—and their socioeconomic organization. The techniques themselves, however, are not given the better portion, but are always considered as a given, as an ensemble of phenomena by which we simply evaluate productivity and output and examine no further. Taking techniques into account thus becomes, for those who consent to this approach, an appreciation of the “level of productive forces” or at best the disclosure of technical “constraints” studied for their effects on social relations.

While in New Guinea, for example, and still among the Anga, Godelier published two studies on economic anthropology containing fine technical descriptions (operational sequences, work time, etc.) which leave nothing to be desired when compared to the work of the pure “technologists.” One is devoted to the production of “cash” from vegetable salt (1969), the other to the comparative usage of stone adzes and of steel axes (1973b) among the Baruya; yet these studies consider only those aspects of their subject that do not directly involve the physical aspects of action on material: sexual division of labor, cooperation, work time, productivity. Even when provided, information relative to the four elements which define any technical process—material, tool, action, and specific knowledge—remain unutilized.

In Rappaport’s study (1968) devoted to the relations between the Tsembaga and their environment, New Guinea ethnology provides one of the most remarkable works of cultural ecology. Nonetheless we are again obliged to remark that if the material conditions of Tsembaga existence are at the center of the argument, their techniques remain once again a given which is not directly treated. Since Mauss (1968) no one has dared to deny that techniques constitute indubitable social phenomena and even the most materialist of ethnologies do not examine their social content further.

Paradoxically, those researchers most attentive to the importance of
material culture in the socioeconomic organization of human groups skirt
the subject of techniques without trying to penetrate their social dimen-
sion. They study their effectiveness in the exploitation of ecosystems, of
social relations that obtain during their use, but they ignore the socially
pertinent choices resulting in the recourse to a given material, the use of a
particular tool, the application of a sequence of actions, or the mobiliza-
tion of specific technical knowledge.

AN ANTHROPOLOGY OF TECHNIQUES

This is a very curious section heading for anyone who knows that mu-
seums of ethnography are filled with lovingly labeled objects, and that
every anthropologist has one day or another devoted a place in his note-
book to descriptions of the preparation of a fire, the construction of a
house, or the carrying of infants. The very existence of at least one
chapter dedicated to material culture in every traditional monograph
would confirm, if necessary, the astounding interest of ethnologists in the
techniques of their hosts. Astounding, of course, if we compare the ef-
forts deployed to assemble information with the nonexistent use to which
it is put. Moreover the preceding pages have recalled that it is common
to pose questions about the effects of techniques and about the social
conditions of their application. Finally none can deny that problems of
diffusion, borrowing, innovation, or technical progress have been dis-
cussed by anthropologists, historians, and linguists.

However, if words have meaning, we are not here dealing with anthro-
pological approaches. Whether treating kinship, politics, or magicoreli-
gious practices, the anthropologist defines the elements of the domain
concerned and studies its social relations and cultural representations,
seeking to encompass the culture and relations among the people there
inscribed. Yet we find nothing similar with respect to techniques.

It is nonetheless primarily in themselves, and not solely for their ef-
teffects on the material life of societies or for the social relations sur-
rounding their application, that techniques are of concern to anthro-
pology. It is because they manifest the choices made by societies from a
universe of possibilities that techniques, in their most material aspects,
form part of the scope of anthropology. The lines from Lévi-Strauss cited
above are presented as a suite of hypotheses whose demonstration could
constitute the program of an anthropology of techniques. To the study of
the social relations established on the occasion of the application of tech-
niques—and notably the social relations of production—would logically
be added a technology, the "science of productive forces" (Haudricourt
1964).
Mauss called *technique* "any effective traditional act" (1968:371). Concretely, we have seen, techniques bring into play materials, sequences of action, "tools" (including the human body), and a particular knowledge. This latter is at the same time know-how, manual skills, procedures, but also, as we shall see, a set of cultural representations of "reality."

Techniques form a system, and they do so in three ways. First of all each technique, arbitrarily defined, is the locus of multiple interactions and of constant adjustments among its elements: without the action animating it and without knowledge of its effects, the tool is nothing. Action itself is constantly adapted to transformations in the material, to the characteristics of the tool, to the evolution of know-how; technical knowledge in turn takes account of the available tool, of the effective action, of the material worked, and so forth. But in a given society the diverse techniques likewise unceasingly refer to one another. They can, in fact, share the same resources, the same knowledge, the same sites, the same actors. Moreover the use by some techniques of the products of others, as well as the existence of operational sequences or of technical principles in common creates among them multiple relations of interdependence, which confer on them a systemic character. Finally, we shall see that the cultural representations of techniques by a given group, and notably their classification, add yet more to their systemic character.

The study of relations between material culture and society then becomes the study of the conditions of coexistence and of reciprocal transformations of a technical system and of the socioeconomic organization of the society in which it operates. Rather than seeking one-way determinisms without nuance (and which are therefore dubious), we are inclined to study the manner by which different elements of a technical system are compatible, among themselves on the one hand, and on the other with various characteristics of the society whose material life it assures. Thus, as Digard has noted in a programmatic article, now more relevant than ever, it is correlations more than causality which cultural technology seeks to establish (Digard 1979).

If we have a field of research in cultural technology (and not sparse information recorded with no other end but to satisfy ethnographic tradition), three areas within it can be identified in a relatively direct manner. The "simple" study of technical processes, conducted through the observation of operational sequences\(^5\) brings to light "strategic moments" and variants. The first correspond to operations necessary to the pursuit of a technical process, or which can be neither altered, eliminated, or replaced without seriously affecting the result. Examining the social con-
control of these moments or strategic tasks is a simple and fertile means to bridge the gap between technical phenomena and other social phenomena (Lemonnier 1976:143-44, 1980:9-12). For example, the manner whereby a social group does or does not take advantage of technical knowledge or a practice it possesses takes on a particular interest when we study the conditions for the emergence of relations of domination and of exploitation in classless societies.

The observation of technical variants—the very ones represented by the discontinuities in material culture whose study forms the major part of archaeology, but also as we shall see of the anthropology of techniques—often designates different social realities. In equivalent material environments, to try to explain these variants is to explore their sociocultural context, which generally leads to revealing pertinent links between a technical phenomenon and factors of social order (Lemonnier 1980:165-176). Better still, the irregularity observed in technical behavior sometimes points toward sociocultural differences which have hitherto escaped observation.

By belonging to the system of cultural representations of any human group, technical knowledge constitutes a third "bridge" between techniques and society. This bridge is at once the most evident and the most complex. If societies exercise "choices" in a universe of possible techniques—most often unconscious choices, it goes without saying—these necessarily leave traces in the systems of representations, and the technical solutions retained must, one way or another, be in harmony with these latter. Here the ground is less unknown than it appears. The work of ethnoscience illustrates how social representations can exercise an effect on technical behavior: any classification of the vegetable world, for example, is also in part a classification of potential material for technical activity. Inversely, in a famous article showing parallels between the mode of domestication of nature and the mode of administration of people in European culture and in the orient, Haudricourt (1962) has evoked a possible influence of technical thought and behavior on a society's ensemble of its system of representations.

The relations between technical thought (or behavior) and social representations are obviously far from being as simple as my biased presentation of these examples might lead us to suppose. First, their influence can only be reciprocal, but, above all, it doubtless takes the form of relations of compatibility or incompatibility rather than that of simple and direct causality.

Having presented the complexity of the field of research, now is the time to enter directly into it in one way or another. I here advance the hypothesis that indigenous knowledge or reflection on techniques is translated by, among other things, implicit or explicit classifications of
the materials treated, of the processes brought into play, of the means and tools employed, and of the results obtained, without speaking of the representations of the actors' roles. These classifications add again to the systemic character presented by techniques. In fact, alongside the material dependences evoked above, two or more technical traits may be linked only by the representations made of them by those who apply them. It even happens that, contrary to any "technical" logic in the most restricted sense of the term, technical behavior takes a different, indeed opposite, form to that which the natural environment, the potentials of the material culture, or any physical determinism whatsoever would lead us to expect.

That the technical choices of societies are thus established by means of "criteria" which are not at all material will pose problems to whoever would advance the hypothesis that material life, and notably the relations among individuals during activities of production, plays a fundamental role in the functioning of societies, beginning with the author of these lines. Can such choices be brought to light? This is what I undertake to demonstrate here, with the example of the technical system of the Anga of New Guinea.

A GLANCE AT THE ANGA TECHNICAL SYSTEM

The Anga

Numbering from 60,000 to 70,000 individuals, the Anga are horticulturalists who occupy a territory of 140 by 130 km between the highlands of the central New Guinea range and the shores of the Gulf of Papua, in the provinces of Morobe, Gulf and Eastern Highlands, Papua New Guinea. They are divided into 30 tribes or local groups, speaking a dozen related languages. Though the majority of groups occupy the lower mountain zone (1000 to 3000 m in altitude), the ecosystems occupied are relatively varied. The rain forest often gives way to a herbaceous savanna of anthropogenic origin (where Imperata cylindrica and Saccharum spontaneum dominate), sometimes over a considerable area as is the case for 30 km of the Tauri valley, around Menyamya or in the Langimar valley (Fig. 1).

The different Anga groups are generally considered to belong to a single culture, but this unity is only relative; their principal point in common is mainly to be very different from the non-Anga groups which surround them. Thus, despite their internal diversity (21 to 75% proximity according to the lexicostatistical test based on Swadesh's list of 100 words), the Anga languages are all much closer to each other than to that of any neighboring group. They no more relate to the Austronesian
tongues than that of the Elema of the Gulf of Papua. Moreover they display a distant similarity to the language group of the East New Guinea Highlands and to the Kunimaipan (Lloyd 1973:33–34, 94–96).

The Anga tribes are likewise related through social organization. All are societies without chiefdoms and have patrilineal clans, exogamous or not. In several of them (Kapau and lowland groups in particular), alliance, war, collective ownership of land, or initiatory cycles bring into play residential units larger than clans or lineage segments. If in some groups' sister exchange, direct or delayed, dominates alliance practices (Simbari, Baruya), marriages accompanied by compensation payment
(pig or piece thereof, game, shells, European goods and cash) seem to be the rule in numerous other cases (Menye, Kapau, lowland groups, and, today, Langimar and Watchakes).

Exploiting Nature

The modes of exploitation of nature are relatively diversified. All Anga are “horticulturalists,” i.e., they practice a careful cultivation involving various species in small “gardens” with no other tilling implement than digging sticks or, since the arrival of Whites, spades. However, the mode of garden cultivation and the species grown vary somewhat from one group to another. The same goes for the importance of semidomesticated pig populations or for the proportion of hunting and fishing products in the diet. Quite intense in certain upper valleys of the central range (notably among the Baruya), pig raising is nonexistent among the lowland groups of the Gulf of Papua where hunting (wild pig, cassowary) holds by contrast a not inconsiderable place. Among crop foods, for northern groups, the sweet potato \((Ipomoea batatas)\) holds first place in the diet before taro \((Colocasia esculenta)\) and to a lesser degree sugar cane \((Saccharum officinarum)\) and bananas \((Musa paradisiaca)\), but its importance is diminished or eliminated in favor of “kongkong” taro \((Xanthosoma saggitifolium)\) and “cooking” bananas \((Musa troglodytarum)\) between the Tauri and the Vailala. \(S. edule, Setaria palmifolia\) and \(Amaranthus spp.\) are cultivated everywhere. With the exception of the Lohiki and perhaps the Ivori, two populations distinguished by their seminomadism over an immense territory, largely encroaching on the lowlands, vegetable salt was produced recently in all Anga groups.

In the most traditional and restricted sense of the term, Anga material culture appears at first analysis relatively homogeneous. At first analysis only, as it is precisely the perceptible differences from one group to another that I have been observing since 1978. Nonetheless certain pieces of clothing or body decoration, such as bark capes and skirts of rushes or vegetable fibers, neck straps of braided orchid stems, or rattan belts, permit the ready identification of an Anga at first glance, as surely as cassowary femurs emphasizing the fore-hips or crossed neck straps, pigs’ teeth or cowrie shells. Also specifically Anga is the shape of certain wooden arrowheads and stone clubs. Meanwhile, for other traits constituting their technical system, we observe that differences recorded from one group to another are sometimes greater than between certain of them and non-Anga groups. A Youndouye house, for example, is distinguished with difficulty from a Baruya house or a Simbari house, while a Baruya, Watchakes, or Yoyue house differs discernably from a Kapau, Ivori, or Lohiki house by elements as varied as the number of walls to an enclo-
sure, roof slope, mode of covering, or type of hearth, without speaking of the materials used for the walls or floor. Likewise, if it is often possible to distinguish different Anga groups by looking at the types of barriers used to keep the semidomesticated pigs out of the gardens, we must recall that the majority of these barrier types are in widespread use throughout the Highlands (Steensberg 1980:111–123). Finally, other technical traits are invariant in the entire Anga zone, as in neighboring societies: stone adzes, bows, carrying nets, to consider objects only; the use of bamboo, manner of working the soil, of fire-making, for example, among technical processes.

From this brief exposé we will retain chiefly that the Anga present in several ways a homogeneity such that the anthropologist of techniques can reasonably conclude that he is comparing comparable things. In fact, beyond belonging to the same cultural ensemble by language, social organization and techniques, they occupy a continuous geographical space and contiguous ecosystems. The most favorable conditions exist for identifying, with an ethnography as refined as possible, the differences such as the presumed choices which mark Anga techniques from one group to another. It likewise ought to be possible to measure the relative arbitrariness of these choices and to measure in what ways and how they are compatible with other aspects of Anga societies which we shall have to specify.

From Variation to the Arbitrariness of Techniques

The discontinuities of material culture constitute the raw material for the anthropology of techniques. Taking as the point of departure the material culture of a given human group—whether a professional group, an age class, a social class, etc., within the same tribe, or a village population, a single tribe, or an ensemble of tribes, a linguistic group or a vast region of the world—we observe that the majority of technical traits present in this group disappears sooner or later to the degree that we move away, whether or not they are replaced by other more or less equivalent traits. The vagueness of the term “technical trait” here intentionally reflects the diversity of the situations encountered and their scale. If bipedalism is a universal technical trait, at least for certain age classes, it is inversely possible to isolate culturally marked processes, which I take to be so many technical traits. Wearing shoes is opposed to going barefoot and among the ways of protecting the feet from heat, cold, or other hazards of the ground; sandals, clogs, shoes, etc., represent more and more limited and precise cases. We find today for example, among the young break dancers of suburban Paris, the marking of “bande” or neighborhood of allegiance by mode of the lacing of their sneakers (in
parallel or crossed, above or below the tongue), indeed by the laces themselves (plain, colored, bearing the Coca-Cola logo, etc.). Each of these elements—type of sneakers, lacing mode, color of laces, etc.—is here considered as a technical trait.

Leroi-Gourhan called "degré du fait" the different levels at which these traits appear. It is recognized that the last of them lose any functional character and take on an essentially symbolic dimension. These are the traits which express what it is convenient to call "style" in the restrictive (and common) sense of the term, as it is employed by Wobst (1977) or Wiessner (1984) for example. These are aspects (most often of detail) of an artifact's form relating to the informational dimension—or "symbolic" or "signifying," the precision of vocabulary still seems quite illusory in this topic—of techniques rather than to their "material" functions. Thus it is well known that the decoration of pottery or of a weapon, or some accessory trait of clothing or of a body ornament, can express the ethnic identity of the person using it.

The Anga technical system does not escape this rule, and here as elsewhere the material and form of the skirt, for example, will express the sex, the age class, the initiatory stage, as well as the ethnic group to which the individual belongs (Lemonnier 1984a). No less "classically" Anga arrows comprise variants with a reduced "functional" significance but whose distribution follows tribal boundaries (Lemonnier n.d.). We cite the simplest arrow type, with unbarbed point and round cross-section, that only certain groups ornament with circular notches considered to be the beginnings of breaks (to cause the point to break off and remain in the wound increasing injury and mortality; Fig. 2).

But for anyone with the wish and the possibility of devoting thorough field research to them. Anga techniques also display less superficial variations, i.e., that are not limited to aspects with little or no importance in physical action on material. The following pages will be devoted to describing such variations, concerning a single type of object, but also entire technical processes—operational sequences—while placing foremost the extent of potential choices open to those who apply these techniques. (Scheme 1 summarizes the progression followed in this expose).

Thus, certain "secondary" features which vary from group to group have a material function, i.e., of a physical order, which is not negligible. This is the case for the barbs on the arrows, for example, unknown in several Anga groups, common in others (Fig. 3), for the hearths, sometimes hanging, sometimes built in a funnel shape (Fig. 4), or for the ligatures used in building houses, which in some groups have the appearance of an endless spiral while in other groups they are made knot by knot. We can also note that in all the examples cited thus far the solutions not used by a group are nonetheless known to the members of that group who...
have had opportunity to observe them among their neighbors during trading or war expeditions. It is for this reason that we can speak of "choices"; a trait absent in one society is not unknown to it, and we may therefore conclude that this society has "chosen" not to utilize or produce it in favor of another technical trait.

It also happens that we observe the absence (or the presence) of entire technical processes in certain groups and not in others, and not simply...
Technical traits that have "meaning"

Traits with essentially material function (entire techniques)

With other known technical alternatives
- Pig traps
- House form
- Sequence of garden preparation
- Vegetal salt
- Bows
- Bark capes

Without alternatives
- Eagle hunting
- Cassowary hunting
- Bamboo tweezers

"Secondary" traits

With undeniable material function
- Barbs on arrows
- Hearths
- Ligatures of houses
- Cracking pandanus seeds

"Classical" (whose primary function is to carry "meaning")
- Material of skirts
- Decoration of arrows
- Belt of rattan/orchid

Scheme 1. Nature and variability of Anga technical traits; examples are cited in the text.
traits of detail. Some of these techniques are genuinely unknown where they are not used. This is the case, for example, of certain techniques for hunting eagle or cassowary, which, when described by the ethnographer, are taken as a good joke, invariably provoking laughter unto tears in the incredulous representatives of most Ánga groups, while these same tech-
Fig. 4. Types of Anga hearths (suspended, funnel-shaped, and on floor).

Techniques are common and well attested in others. Quite as sharply contrasted is the use of bamboo tweezers to turn over the tubers cooking on the hearth ashes, here quite common, there totally unknown. A final example: during the preparation of “Polynesian ovens” intended to steam meat or tubers, heated stones must be moved, either to create a level bed for the food or to cover the food. Yet if men and women generally use sticks to extract them from the glowing coals which have raised their temperature, replacing them to form the top layer of the oven may be done, depending on the group, either barehanded or by protecting the hands with a carrying net. Informants belonging to groups unaware of the latter technique generally deny that it is possible to grasp such a heated stone with a carrying net without burning and destroying it.

But other technical traits hold a particular place in this short inventory of irregularly distributed traits among the Anga. These are the ones which, though known in a group, are not used in that group. They pose in the clearest manner the problem of technical choices. In fact, noting the absence of a technical trait, as in the three examples which follow, it is not possible to explain it by a failure of diffusion or of local invention. It is not through lack of knowledge, but quite by choice that a trait—here again entire technical processes—does not appear in the technical system considered, since it is familiar to those who make no use of it and sometimes even described and commented upon by them. This type of rejection corresponds to what Leroi-Gourhan called “unfavorable technical milieu” (1973:373 et seq.), advancing as explanation the incapacity or the absence of technical need to adapt a newly available trait. We shall see that the strictly material argument sometimes quickly finds its limits and that the choices exercised also possess a purely social dimension.

Besides bow hunting, the Anga make use of three types of traps to kill wild pigs. The first consists of a trench dug in the earth, the bottom bris-
tling with sharpened stakes and the opening covered with branches (Fig. 5). The second is likewise passive and designed to transfix the animal by assuring its fall on a row of sharp stakes. This time they are placed in a garden, planted at ground level pointed toward an opening in the barrier normally blocking access. Scenting a windfall, the pig leaps the barrier only to impale itself (Fig. 6). The third is a dead-fall trap, consisting of two or three strong cudgels which strike together in a passage where the animal is first caught, crushing its head and body with their weight (Fig. 7). In the majority of Anga groups these traps are used indifferently, the substitution of one for another depending variously on the nature of the terrain and very much on the inspiration of the trapper, except among the Langimar. The latter can name without difficulty the 10 pieces making up the dead-fall trap, can describe its functioning, and can even make a rough sketch. But they do not use it. To the classic "our ancestors did not use it"—the polite response to any stupid question from the ethnographer on the origin of things, when such questions deserve no comment—they nonetheless add that the Kapau, whose closest villages are a 2- or 3-hr walk, or the Menye, whose houses are easily seen across the river, currently use this trap. We shall return to this association of material culture with ethnic identity. Note for the moment that a perfectly understood technology is left aside voluntarily by members of a given group.

Let us now consider the distribution of arrow types among the Anga. I have already indicated that at first analysis the presence of barbs may appear to be a detail of "style" proper to certain tribes. Figure 8 displays the distribution of barbed and unbarbed arrows without reference to subtypes. We clearly see that the six groups occupying the south of the Anga zone do not use barbed arrows, while there can be no doubt—at least for the Kokwaye, Menye, and Kapau, in physical contact with the northern

FIG. 5. Pit trap for pigs.
groups—that their members have had many occasions to note the superiority of barbed arrows shot by enemies possessing them. They have nonetheless neither fabricated nor imported them, proof that a reason other than "technique" here opposes the adoption of a device more deadly than that habitually used. Let us add that no correlation is possible between the use of barbed arrows, the available woods, or the game hunted (Lemonnier n.d.). The existence of a choice is here indisputable.

The case of Anga houses illustrates once again the quasiarbitrary choice of a particular technical solution by one or several groups. Among the dozen criteria permitting the characterization of house type proper to each group, the number of walls to the enclosure draws immediate attention. In the northern groups (Simbari, Baruya, Watchakes, Kokwaye, Menye, Yoyue, Kawatcha, Langimar), the houses adopt the so-called "hive" form, their thatched roof descending to the level of the floor over the pilework or, indeed, lower (Fig. 9). They have a circular wall made of double, vertical layers of bark or *Pandanus* leaves and a single door opening. Among the Ankave, Ivori, Lohiki, and Kapau, the houses are lower and larger, and, above all, they have two enclosures: the exterior one delimits a passage whose interior wall encloses the only room of habitation, most often circular. The floor of this room is elevated and reached by a door generally situated in the first two meters of the passage, to one side or the other of the external opening (Fig. 10). Encountering for the first time a house of this type at Kanabea, in Kamea...
country known for its long periods of bad weather and low temperatures
due to humidity and altitude (1600 m), I immediately found the presence
of the double wall quite logical, capable of protecting one from external
cold and retaining the heat from the hearth about the inhabitants. This
was not taking into account, however, that other groups (Baruya,
Watchakes, Yoyue) build houses with only one enclosure, while it is not
rare to see the thermometer indicate less than 10°C at dawn. Moreover
this would be to ignore, also, that houses with double enclosures are
found as well at around 400 m of altitude on the last slopes dominating
the Gulf of Papua where the nights are incomparably warmer.\textsuperscript{11} The in-
terior compartment then has a skylight! It is only in the Papuan lowlands
that Ivori, Lohiki, or Kapau build houses with no other wall than a partition stopping at mid-height. The presence of houses with single enclosures here, with double walls there, thus demonstrates no environmental determinism. At equivalent temperatures or humidities we meet, depending on the group, one type or the other. Yet the Ankave or the Kapau know perfectly well that their northern neighbors build houses with one enclosure; reciprocally, Kokwaye, Menye, or Langimar have had occasion to see, one time or another, doubly enclosed houses. In the absence of any correlation with environmental factors, I once again speak of choice.

Whether dealing with relatively secondary traits, or on the contrary with entire branches of technical activity, the collection of examples cited tends toward a first important result: all else being equal, we note that certain modes of action on material—here called technical traits—are differentially distributed among the 12 Anga groups referred to here. The comparison of comparable things permits us to affirm that the technical variants considered are not responses to different material environments and may in consequence be held until proven otherwise to be arbitrary choices proper to one or several groups. It is as much the nature of the traits considered—whose principal function involves a physical action on material and not the transmission of information, and sometimes even involves the totality of an action on material, an entire "technique"—as the intensity of their variations in an apparently very homogeneous cultural context, which constitutes the remarkable character of this result. A final example will illustrate the surprising diversity which the same type of action on material may assume in neighboring societies.
In seven highland Anga societies cultivating the same vegetable species in largely comparable ecosystems, the last three phases of garden cultivation bring into play an operational sequence whose final three stages are the burning of plants cut down during land clearing, the construction
of a barrier intended to protect the garden from the incursion of semidomestic or wild pigs, and the planting of seeds or cuttings (Lemonnier 1982). Yet we observe that these three important operations follow a variable order depending on the society considered and can take three configurations:

- burning—barrier—planting (Baruya, Watchakes)
- burning—planting—barrier (Langimar, Simbari, Yoyue)
- barrier—burning—planting (Menye, Kapau)

It cannot fail to surprise that tasks so specific, associated in the same very specialized operation, may constitute sequences so variable in societies sometimes less than a day’s walk apart. Such is nonetheless the reality of Anga agriculture. We can imagine without difficulty the latitude left to technical creativity in the societies for other operations a priori less heavily determined than agricultural tasks.

Scheme 1 displays the diverse examples treated. We find there the normal continuum of degrés du fait, or if one prefers, a progressive transition from technical traits whose principal function is to transmit information (derniers degrés du fait) to others whose primary function is to act on material. In the lower branches of the tree, I have opposed traits attested in the absence of any alternative possibility—no other technical solution is known—to those which correspond to incontestable choices. This opposition does not appear in the upper branches of the tree (classic “secondary traits”) which are all the traits which each Anga group or ensemble of groups know to be their own.

But the study of the Anga technical system reveals not only operations more arbitrary than we might have expected; it also brings to light the existence of an organizing principle behind the diversity and arbitrariness of the technical choices. Having noted the differential distribution of several technical traits among the Anga, there is occasion to wonder if this occurs by chance. The map of the distribution of houses with one or two enclosures provides the first element of an answer (Fig. 11), for we see here two clearly delimited zones within which the trait considered maintains the same form. In the northern part of Anga territory the houses possess only one circular wall, while in the south they have the passage and double door. Hence we have a continuity in the distribution of each trait that allows us to suppose that it does not occur by chance but, on the contrary, reflects the same “point of view” shared by several groups for the technique considered. But there is more. If we compare the distribution of house types among Anga groups with the distribution of barbed arrows on the one hand (Fig. 8), and with the distribution of bow types on the other (Fig. 12), we observe that the zones opposed for a given trait are in very large measures likewise opposed for the two others.

Such concomitant variations would not be at all surprising if the tech-
FIG. 11. Distribution of houses with single and double enclosure walls among the Anga.

The technical traits considered were functionally linked. It is logical that the form of a cake of vegetable salt, for example, depends directly on that of the mold in which it is crystallized, or that the type of wound inflicted on game animals is linked to the nature of the traps or weapons used. But there is nothing of the sort in the present case; the two Anga bow types can shoot any type of arrow with the same effectiveness, and whether they are barbed or not has no relation to the cross-section of the bow which shoots them. We would also have trouble finding common technical antecedents to the form of both houses and bows. Finally the probability that three traits, capable of taking two different values, taken at random would have exactly the same distribution in 12 groups is very low, so low that is it perfectly reasonable to admit that chance has nothing to do with it.

Having eliminated both the hypothesis of a functional link and that of random distribution, we return to the hypothesis of an ordering and of classifications of the technical domain expressed by choices, ultimately unrelated to what the natural environment or a strictly technical (material) logic would lead us to expect. The simultaneous presence in one or several groups of a series of techniques not functionally linked would then "simply" reflect the application, most often unconscious, of one or several classifying principles.

THE TECHNICAL TRAIT AS SIGN?

To discern the probable role of factors other than material in the ordering of certain strictly material aspects of the technical domain is one
thing. To verify that, at least in the Anga example, "everything occurs as if" this ordering resulted from indigenous classifications of techniques tends to reinforce the hypothesis. But to specify the role and the mode of functioning of these classifications requires further research. To conclude I will indicate some of the doors that are opening for us here.

It is once again from Lévi-Strauss that we must surely borrow the theoretical framework capable of taking into account the phenomena at issue here, replacing in their context the lines cited at the beginning of the present article. The affirmation that a local technical system can be conceived "as a group of significant choices . . . compatible or incompatible with other choices" is for Lévi-Strauss the result of an examination of the signifying character of the realities studied by anthropology:

But is this true of other aspects of social reality, such as implements, techniques, and modes of production and consumption? It would seem that we are concerned here with objects, and not with signs—the sign being, according to Pierce's famous definition, "that which replaces something for someone." What, then, does a stone axe replace, and for whom?

. . . In a given context, and for the observer capable of understanding its use, it stands for the different implement which another society would use for the same purpose. (Lévi-Strauss 1976:10–11)

We know that it is not to material culture that Lévi-Strauss has devoted his main work;¹⁴ also research on the signifying character assumed by techniques is quite undeveloped.¹⁵ We can nonetheless suppose that without making explicit reference Lévi-Strauss has only considered the cases where technical traits present the arbitrary—or, following Benven-
iste (1966), conventional—character proper to any sign. We have seen that this is also the case for the situation in which we find ourselves here. Immense problems then arise concerning the mode of functioning and the role of the signifying system in which technical "signs" participate.

To examine its "mode of functioning" would be to "designate the unities it puts into play to produce 'meaning' and to specify the nature of the 'meaning' produced" (Benveniste 1974:57). Now is obviously the time for hypotheses only. I see two which are, moreover, not mutually exclusive. The first takes up the idea advanced by Lévi-Strauss of a parallel between mythic thought and the activity of the "bricoleur" (1966:16-36), according to which the elements used by the latter are "preconstrained," immediately carrying a "meaning," i.e., a complex of potential technical functions. It then remains, and this is no small task, to identify not only those elements, materials, and tools, but also segments of operational sequences outside the particular case of bricolage. We will note that the "meaning" of the combinations retained by a society would be essentially technical. The second hypothesis leads outside the strictly technical domain into that of representations. This is the one explored in the present article, notably through finding the classifications of the technical universe.

Now, examining the function of these signifying systems poses other problems just as considerable. We can certainly postulate that one of the roles of technical systems is to mark difference. Differences between groups first of all, since technical choices participate, as do others, in the "desire of each culture to oppose itself to those around it, to distinguish itself from them, in a word to be itself" (Lévi-Strauss 1983:15). But also differences within the same group, marking age, sex, social status, specialization, etc. We must, however, observe that, powerful as it is, the hypothesis according to which technical systems have among others the function of affirming difference, remains to be demonstrated. In this domain it seems rather the time to confront the hypothesis with the facts than to construct theories taking it as a secure point of departure. It is one thing to affirm that "the Anga mark their ethnic differences in the form of bows, of arrows and of houses"—which I take care not to do: it is another to explain what the difference in question is, why and how it is marked in this manner and not another!

In other words, if today we have evidence for arbitrary choices among techniques whose distribution seems juxtaposable with the mosaic of different Anga groups, we remain a thousand leagues from a theory of material culture as an ensemble of signifying traits. We can also note that there is no promise that such a theory would provide ready-to-use "recipes" permitting archeologists to attribute diverse "symbolic" functions to a technical repertoire. The Anga example recalls the contrary (what eth-
nologist would doubt it, moreover?), that at the "will" of the cultures where they appear, the most diverse techniques will be sometimes implicated in a classification and in some form of communication, sometimes restricted to their most material aspects.

As has just been said, it is functioning principles of technical systems as signifying systems which we can hope to reach some day. We must expect to find that the relationships between elements of these systems are more important than the elements themselves, conforming to the teaching of that "Copernican revolution which the human sciences owe to structural linguistics" (Lévi-Strauss 1983:12). We are far from determining any correspondence between categories of objects and linguistic modes of communication.

Nevertheless, this does not mean that is is impossible to put a certain order, to locate a few (too) general principles in the signifying technical behavior of people. It remains to be seen whether their very generality does not render them useless to archeologists. The observations of Wobst (1977:330) relative to the qualities required for artifacts to be considered to exhibit "stylistic behavior," or those of Wiessner concerning objects capable of being exchanges and of being used in stylistic communication (Wiessner 1984:200, 204–207, 220–221) have scarcely any predictive value for an archeologist. These authors themselves moreover insist (Wobst 1977:337; Wiessner 1984:229–230) on the limits of their approach to archeological applications.16

So rather than demanding more than we can deliver from the Anga data, for the moment I will merely present some reflections compatible with the hypothesis evoked above of the marking of ethnic identity by material culture.

Let us first note that, from the bamboo tweezers used to move taro during cooking to the manner of crushing the heads of sleeping eagles or of binding a floor, all the examples cited in the present article are compatible with the hypothesis if we can conclude that I have effectively shown that all these techniques are in large degree arbitrary. To argue that the Anga use these techniques and their substitutes to affirm group by group their ethnic identity is not too costly. We return no less immediately to the labyrinth of questions evoked moments ago: why eagle hunting and not the capture of frogs? why the binding of houses and not that of adzes? and, most of all, how? We rightly recall that the Langimar spontaneously specify that the pig trap which they can so well describe but do not use is that of "the Kapau," their mortal enemies. Unhappily the research remains to be done, if it makes any sense, that would permit us to comprehend further why it is the pig trap in question and not an element of their common technical system which has perhaps been abandoned by the Langimar to mark their differences with the
Kapau, to say nothing of the no less mysterious reason why the unused trap is not attributed to the Menye of Naniwe, quite as implacable enemies of the Langimar as the Kapau.

On the other hand, two other Anga techniques seem to illustrate the expression of ethnic identity by material culture. One which is, in fact, very precise, is remarkable because it is a motor habit: according to their valley of origin, Marawaka or Wonenara, the Baruya break Pandanus seeds with their molars or, on the contrary, with their incisors. The other technique concerns an exclusively, or almost exclusively, decorative piece of Anga "costume": the belt. Nearly always, this is made of braided orchid stalks (Bulbophyllum), with the exception of three groups, the Lohiki, the Simbari, and the Baruya, where it is replaced by a rattan (Calamus sp.) spiral. If we consider Menyamya, the cradle of all the Anga, as suggested by oral tradition as well as by the savanna landscape characterizing the middle Tauri valley, these three tribes may all be said to have been displaced. In each a long migration is spoken of, which brought the group from Menyamya to its present territory, most often under direct or indirect pressure from Menye expansion. We may then ask whether the exchange of orchid-stem belts for others of rattan would not reflect the wish to distinguish oneself from one's former or new neighbors, and for at least one tribe, the Baruya, things seem to have occurred in just this way. The Baruya recall that upon arriving at Wonenara, the last valley conquered at the beginning of the century, the "elders" still wore belts of braided orchid stems which today they use only in neck straps. It was only at contact with the Youwarrounatche and the Gulutche who then occupied the valley that they abandoned that ornament for one of rattan. This was still more recent among the Simbari where mature men sometimes wear both materials. Whether this is to distinguish themselves from the Kokwayne—ancestors of the Baruya, still a few hours walk from Menyamya—or to resemble those they defeated and whose language they adopted, the change of belts by the Baruya (and by the Simbari, whose history is similar) was quite voluntary. Differently from the orchids, to which special gardens are reserved in the high mountains, rattan is absent from their territory and is only obtained on the occasion of intertribal exchange with the Simbari or the Kokwayne of Andakombe, or with non-Anga groups in the Lamari valley.

While failing to teach us much about the manner in which techniques may be used as cultural markers, this last example draws our attention to the economic dimension—in the most banal sense of the term—of certain technical choices. The import of rattan while one disposes of another material for the same use will not go unremarked. But to obtain through intertribal commerce products available in one’s own territory is no less curious. Nonetheless this is what we can observe among the Baruya.
We know that from the ashes of *Coix gigantea* Koenig ex Rob. they make a "salt" exchangeable for a sufficiently wide range of products that we may consider it a universal equivalent, as cash (Godelier 1969; Lemonnier 1981, 1984b), used notably to obtain products not available in Baruya territory. Among these products, several are of primary importance for the reproduction of Baruya society, of its material life as well as of its symbolic life: adze stones, rattan for binding them to a handle, certain arrows, bows, sheets of bark from which they fashion capes for protection from cold and rain, Bird of Paradise plumes, and seashells, for example. The specificity of Baruya salt with respect to other Anga vegetable salts logically leads to the conclusion that the Baruya have voluntarily developed on a grand scale the production of a commodity which assures regular access to indispensable goods (Godelier 1969:22). However, two of the products thus obtained are in fact available on Baruya territory: the bark capes and the bows. Among the dozen species of *Ficus* present in their environment, the Baruya could in fact use at least two—midZamaŋa (*Ficus* sp.) and kaje (*Ficus dammaropsis*)—the bark of which is beaten by other New Guinea tribes to make capes. Yet they systematically import sheets of bark from *F. elastica* Roxb. already beaten. The bows imported by the Baruya are either finished products or rough-hewn preliminaries. In both cases, the wood used is from black palms (*Palmae*), reputed not to grow in the Baruya valleys. Some amburje (*Caryota* sp.) have meanwhile been recently planted in the Won-enara valley, and the fact that a great many bows have already been made from them shows that nothing in the ecosystem exploited by the Baruya evidently prevents them from making their own bows. Their specialization in the production of vegetable salt, which constitutes an economic, even commercial choice, thus duplicates a technical choice. Here we must speak of an "intertribal division of labor." The specialization of each in the production of different goods in fact takes on two aspects. To produce a good not available to the others is to oblige them to provide in exchange goods unavailable to oneself. But to abstain from making goods which one could quite easily produce is to incite the others to provide them. This augments the chances of advancing one's own speciality and of not lacking goods which are truly absent in a determinate territory. In a word, this is to maintain intertribal commerce, which is the only means of obtaining certain products.  

Technical choices thus do not all have the same "signification." If some seem to mark ethnic identity, others appear rather to respond to economic necessity. To say that a specialized production is also a means to mark one's identity is not sufficient.

One of the aims of this article, moreover, is to stress the complexity of social content in material culture, which some ethnoarchaeology—never-
BRIEF ENCOUNTER WITH A LIMITED CLASSIFYING PRINCIPLE

Taking into consideration the form of skirts or capes of beaten bark in the 12 Anga groups brings more evidence for homogeneous zones within which we observe the same concomitant variations in certain traits (Figs. 13–15). Here again technical traits—vegetable species used, types of beating, wild or cultivated origin of materials, types and forms of products fabricated—are combined in a largely arbitrary manner, and here again we find the opposition between northern and southern groups.

Research on the technique and the use of beaten bark has for once permitted the determination of the classifying principle behind the distribution of technical variants among the Anga groups. Yet if the variants of form seem to reflect nothing other than ethnic identity and the division between northern and southern groups, those dealing with the origin of materials express rather the distance between men and women. Women, in fact, wear wild species, notably a particular Ficus sp., while the men wear materials of cultivated origin. When their environment contains no other species usable for making capes but this Ficus sp., the men wear it...

FIG. 13. Distribution of the manner of attaching the maro-skirt among the Anga. 1 = at the neck. 2 = at the waist.
only when it is "defeminized": the women no longer have access to it for making their skirts and the men use it only when cultivated. Finally in lowland groups where a similar distance between men and women appears not at all or only slightly marked in the material of skirts, or capes, we observe that the hierarchy between the two sexes is less marked (Lemonnier 1984a).

Fig. 14. Distribution of skirt forms among the Anga.

Fig. 15. Distribution of skirt shape among the Anga. 1 = "voluminous," 2 = flat.
Unfortunately this result only complicates things. Must we in fact conclude that the organizing principle which in part explains the technical variation of beaten bark among the Anga groups likewise determines the classification of other techniques, on the pretext that they have the same distribution? Are we to push the reasoning, and the absurdity, as far as to mix the relations between men and women with the form of bows, arrows and houses? Certainly not.

We shall conclude rather that the logic of technical choices made by the Anga still escapes us and that the classifications resulting in the similar distribution of functionally independent technical traits have mutual relations which are not at all direct. We must turn toward a larger inventory of Anga techniques and toward a study of the Anga discourse on techniques in the 12 reference groups. We will perhaps then see that here, as in the study of other social realities, conforming to the teachings of the structuralist approach it is rather the relations among terms, indeed relations among relations, which are reflected in the variety of choices made by societies.

At the present state of my research on Anga techniques, I am assuredly ignorant of the very terms to put in relation in order to understand the distribution of house forms, or of the bow cross-sections, and I am yet more ignorant of what relation the houses might have with the treatment of beaten bark and with the relations between men and women which this seems to reflect. It remains that these diverse technical phenomena do not vary at random and that societies put some order into the arbitrariness—relative but indisputable—of the technical choices they make.

I quite intentionally neglect to review those unanswered questions toward which the present work points and which an archeologist would not fail to ask: under what conditions is a trait of a technical system capable of being the object of a choice, or on the contrary, of remaining constant in diverse culturally related groups? where to locate the frontier between technical traits primarily carrying meaning and technical traits primarily involved in action on material? etc. Whatever their interest for archeology, these questions are not mine, at least for the moment.

This is essentially because nothing says that the logic of technical systems considered as signifying systems will permit the linking of object types, their effectiveness, their visibility, or whatever to the probability of their use in social relations other than strictly "technical" (material). As has already been said, it is more likely that, at the "whim" of social logics, with no immediate relation to the effectiveness, the aspect, or the nature of the technical processes involved, societies also "choose" technical traits capable of being the object of choice.

These are logics which ought to be explored and grasped. Then only—and not by virtue of universal laws deduced from behavior toward a few
objects in a few societies—will it perhaps be possible to explain why a certain eel trap, whose fabrication and use are here (Baruya) reserved to a few mature men, can be manipulated there (Ankave) by any child, and elsewhere (Langimar) holds a central place in mourning. We will perhaps also understand how technical traits seen only by members of one tribe (or indeed one clan), such as a cassowary trap, by definition hidden deep in the bush, seem able to serve as ethnic markers.

I will draw conclusions, rather, on the necessity of taking the measure of our domain of research. When a theory of kinship or of magicoreligious behavior is established, it is on the basis of hundreds of field expeditions and of thousands of hours of observation and patient research. For what obscure reason would we develop a theory of that other object of ethnology, material culture, on the basis of the fate of a few pots, arrows or tools? These pots, arrows or tools must be replaced within the technical systems from which they have been extracted, and these technical systems must be studied conjointly with the other domains into which ethnology has traditionally—and arbitrarily—sliced social reality. I do not see what particularity of archeological problems would justify evading this banal necessity.

Whether called ethnoarcheology or anthropology of techniques, the study of the material culture of primitive societies cannot hide the complexity of the phenomena it encompasses. It must aim at the comprehension of a technical system, and thus observe, describe, and analyze technical processes and not attribute more or less simplistic symbolic significations to merely a few objects. Most of all, it must avoid considering as “demonstrated general laws” what are at best powerful hypotheses. An anthropologist of techniques can only be astonished at the facility with which Hodder, for example, considers verified his hypothesis—sometimes perfectly worthy of being retained—of the reinforced marking of ethnic identity through material culture in situations of intergroup tension (Hodder 1982). Even were such a result established, and it doubtless is in numerous cases, there would be the necessity of bringing out the specificity of it, or risk transforming it into a dangerous and useless recipe for a careless archeologist. So we might recall, for example, that many other means exist besides material culture for expressing ethnic identity, which implies the necessity of explaining why it plays this role in the case of the Lake Baringo groups (Hodder’s fieldwork), and how it plays it. Moreover ethnology and history teach us that we can quite easily pillage and kill while sharing with our victim the same language, the same material culture, the same culture pure and simple. Inversely we can quite easily keep the peace with neighbors quite different from ourselves! What then becomes of Hodder’s result?

Let us not be mistaken. With what it implies for the preliminary hy-
hypotheses of fieldwork, and most of all for the consideration of techniques as social phenomena in themselves, the ethnoarcheological approach of the type employed by Hodder constitutes a key element for research on material culture, so long left aside despite the efforts of isolated researchers as famous and irreplaceable as Lynn White, Leroi-Gouhan, Haudricourt, and Gille. But there are not a thousand methods for observing and describing technical facts. The observation and the transcription of operational sequences, in particular, is an indispensable part of any fieldwork. Not to do so is to treat objects as hardly less isolated and lifeless as those in a museum. Unfortunately there is no simplified version of societies and of their technical systems for the sole use of archeologists. And today there are not many among the dozen researchers (archeologists or ethnologists) who observe the peeling of sweet potatoes, the washing of children, or the sharpening of stone axes, to arrive at the formidable complexity of the relations between people and their most banal technical processes. Better to be conscious of this reality, and not to do it in a haphazard manner, if possible.

NOTES

1 This is moreover explicitly what Sackett writes. For him, style and function concern the same phenomena, envisaged from two different points of view (1982:68, 75), which recalls Leroi-Gourhan's continuum of "degrés du fait" (1943:27 et seq.).

2 Lefebvre des Noettes (1931), White (1969), and Marx (1961) have, respectively, attributed to the ancient harness, to the stirrup, and to the steam engine the decline of slavery, the rise of feudalism, and the development of industrial capitalism. It is mostly the pedagogic abridgement of Marx which has done the most damage, making simplistic the work of orthodox Marxist researchers a priori favorable to the study of material culture.

3 Reynolds marvels justly at the immediate disinterest of ethnologists for the objects they confer on museums as soon as they are deposited (Reynolds 1983).

4 Any "technique" is decomposable into operations embedded in one another, each of which likewise constitutes a "technique." Thus "building a house" is a technique, as is "raising a wall." Today no one can affirm that the holding of a trowel, or the position of the fingers on its handle, does not exhibit any cultural variations. It is thus arbitrarily that the anthropologist isolates one level or another in the continuum of technical operations.

5 An "operational sequence" ("chaîne opératoire") is a "series of operations which brings primary material from the natural state to a fabricated state" (Cresswell 1976:6), as previously discussed. The corpus of operational sequences indicating the type of action on material being processed, the tool used, the state of the material, the duration, the site, the name of the operation, the identity of the actor, etc. constitute the base material of the anthropology of techniques.

6 Other than the work of Blackwood and Fischer already cited, the Anga have been studied by C. Gajdusek who, if he is better known for his work on the kuru which won him the Nobel Prize in Medicine, has several times visited the majority of the groups (Gajdusek 1961; Gajdusek and Alpers 1972; Sorenson and Gajdusek 1969). Godelier began his study of Baruya society, a highland group, in 1967 (Godelier 1969, 1973b, 1982); Lory joined his
work in 1974 (Lory 1981–82, 1982). Herdt began his research on the Simbari at the outset of the 1970s (Herdt 1981), and Mimica has been working among the Kokwaye since 1977.

In this article “group” refers to the 12 Anga linguistic groups, here identified with the 12 ethnic unities with which my research deals. Experience in fact shows that differences in social organization as much as in material culture are always greater in this case between linguistic groups than between tribes speaking the same language.

Leroi-Gourhan has postulated the existence of a technical determinism “comparable to biological determinism, with as much overlap, as many exceptions, but with as much clarity in the ensemble” (1943:334). By tendency he meant that characteristic of technical evolution by which, independent of any direct relation, processes and tools appear employing the same forces, mechanical properties, chemical properties, etc., in response to technical problems posed in identical terms. The fact he continues, “as opposed to the tendency is unforeseeable and particular. It is quite as much the encounter of the tendency and the thousand coincidences of milieu, i.e., invention, as borrowing pure and simple from another people. It is unique, unextendable, an unstable compromise established between the tendencies and the milieu.” (1971:27) From a general “tendency” ethnic groups produce objects whose morphology or mechanical properties differ to the degree that the observer is precise. So the facts present degrees which correspond to their “progressive individualization.”

We ought to recognize that to climb a scaffold at night prepared in advance to strangle a female eagle nesting her young in her tree-top eyrie is as surprising as twisting the neck (sic!) of a sleeping cassowary after approaching secretly, placing one’s feet in spaces expressly cleared of all twigs 15 days earlier so as to make no noise. This last exploit seems so unlikely that a New Guinea specialist such as Roy Rappaport, to whom I told it, refused to believe it, cassowaries being too hostile and dangerous.

Anga life before contact was characterized by an incessant state of war, and each group fought against all of its neighbors at one time or another, regardless of whether they had barbed arrows. Nonetheless the Kokwaye, Menye, and Kapau, while they did not fight among themselves, had more than one occasion to fight groups using barbed arrows in close combat (Lemonnier 1981:46).

Let us say that the temperature never drops below 20–22°C in the lowlands and 10–12°C at 2000 m altitude. Any indication of temperature, however, would be misleading; we only have reliable series for Menyamya, Aseki, and Wonenara (then Marawaka). Ivori and Parisian ethnographers may shiver with cold at 19°C in the dense fog of Kanabea. At the same temperature, a nice Baruya night might seem warm despite the altitude (2000 m).

And of others to which we have simply not paid sufficient attention to judge. In France it is a historian-ethnologist, F. Sigaut, who has applied himself to putting a little order in the formidable diversity of agricultural practices in all times and places (Sigaut 1975, 1978, for example).

And even lower if one considers other traits having the same north–south distribution not taken into account here, such as the utilization of Coix in the production of vegetable salt, the order of operations in preparing and planting gardens, already discussed, etc.

Even if many pages, notably in The Savage Mind, certain numerous notes apt to stimulate reflection on the part of the anthropologist of techniques, as the lines cited earlier attest—without forgetting the “culinary triangle” (Lévi-Strauss 1964).

See, however, the article by Bromberger (1979) for a very important “semiotechnological” analysis, even if devoted to objects and very particular ones at that.

Quite justly, I admit to not understanding why the headbands of the Kalahari San “help create social solidarity by expressing complementarity of roles” while the styles of their arrows “participate in strengthening relations of social solidarity within language groups” (Wiessner 1984:38). If through an ethnological approach to a living society, an author can
only explain that difference by (what seems to me) a tautology, we can imagine without
difficulty the headache which awaits archeologists!

17 On occasion a few arrows or a stone club handle may be passed through this belt.

18 The complementarity between "utilitarian" goods (bows, axes) and nonutilitarian
goods (cowrie shells, plumes) responds to the same necessity (Lemonnier 1981:72–73).

19 Beginning with the study of technical vocabulary. Lefèbure (1978) has shown what the
contribution of lexicographic studies and synchronic linguistics might be to the problem of
cultural technology. He has notably found in the degree of specialization in technical vocab-
ulary and in the coherence of its semantic structure an original link between language and
technology, and he has formulated a powerful hypothesis concerning the analogy between
the notion of "tendency" elaborated by Leroi-Gourhan and that of "motivation" in lin-
guistics.

20 I will be told that I am only calling for, following others (Hodder 1980:24; Wiessner
1984:40–41), the replacement of techniques in their context. It all depends on what we call
context.

21 Original translation from the French made by Joseph Gaughan.

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