

Hominization and Apes

An Unnatural Kinship

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The study of human origins is a kaleidoscopic field, a multitude of objects, reflections, and disciplines a swirl in an ever-changing tumult. The extreme diversity of the elements of information that are indispensable to this field of study (teeth, bones, apes, genes, ancient objects, present-day objects, biomechanical factors, cultural constructions ...) appears all by itself to be enough to consign any attempt at synthesis to the realm of the utopian. It hardly seems reasonable to expect the disparate sciences that fuel the field (paleoanthropology, archaeology, molecular biology, physics, psychology, and others) and the contradictory conceptions of scientific activity that they defend (human sciences, natural sciences, experimental sciences, exact sciences) to be joined with any regularity. As for formulating an overall problematic of the interdependent phenomena encountered in the field, one would have to be more than optimistic to entertain such dreams. And yet this is exactly the program that prehistory and paleoanthropology are laboring to construct under the label "the study of the origins of man," an expression that includes both diachronic processes (human evolution) and activities or behaviors from particular moments, elements that are exceedingly difficult to compare given the separation of their geographic and temporal contexts.

Curiously, these methodological obstacles are rarely mentioned by specialists: the biology of past human populations is always presented – in both scholarly and popular texts – in the context of a continuous historical movement that is seen as "resolutely" logical. The process of human evolution is approached by means of environmental transformations and human characteristics that are presumed to be dependent on these variations (bipedalism, the

invention of tools, the use of fire, etc.), with all sorts of physical and social traits combined in causalities that are generally conceived as direct but that, in the long run, turn out to explain very little. Thus, the series of relations between bipedalism, the “liberation” of the hands, cerebral development, and the use of tools still continues to form the backdrop for most conceptions of human evolution, even though it is known to be highly susceptible to criticism: in many ways inadequate, in certain areas it is downright false.

A certain number of traits considered to be “decisive” in signaling the emergence of the human race can be observed starting in the Plio-Pleistocene era as well as in human beings of our day or recent times (flaked stone tools or hunting sites, for example), but considerable differences separate us from these distant predecessors (their small brain size, their original bipedalism, their particular scavenging, and so forth), and we are afforded a glimpse of very peculiar creatures, strange to picture and to conceive. This particularity marks a gap that seems to me to be one of the crucial problems of research on human origins. The period from the first evidence of carved stone tools (2.7 million years ago) to the disappearance of the last *Australopithecus* (approximately 1 million years ago) is so vast that it derails the spontaneous intuitions of a research approach that is accustomed (if only for the end of the paleolithic era) to perceiving and describing profound sociocultural upheavals that took place over just a few millennia. If the 100,000 years of the paleolithic era that have yielded the remains only of *Homo sapiens* permit certain comparisons – based on assumptions of a common biology – the huge expanse of the previous two and a half million years is staggering.

This massive span has up until now been conceived as a vague whole resting on an image of continuity: the continuity of *Australopithecus* with *Homo habilis*, of *Homo habilis* with the various *Homo erectus*, of *Homo erectus* with the various *Homo sapiens*; even the continuity of “civilizations” (Oldowan, Acheulean, and the “cultures” of the middle and upper paleolithic). Yet this tacitly accepted hypothesis is not based on any decisive fact that could justify its superiority in comparison to an opposing and methodologically more cautious perspective, according to which prehumans are creatures that differ radically from us in anatomy,

intelligence, society, and linguistic and technical capacities: as long as research is bent on taking present-day referents into account, its task consists of understanding and progressively staking out this enigmatic distance. This enterprise must not be seen as merely collecting missing facts or filling in insufficient data to complete a half-solved puzzle, as implied by the glib expression “the current state of our knowledge”: the gap to be discovered is above all a mental one and it implies a constant questioning of our what we already know. Neither human evolution nor the modifications of prehistoric behaviors can be simply assimilated to a manifestation of a gene, on the one hand, or to an unstable cultural phenomenon, on the other – unless we just ignore the complexity of the objects to be described. And even if we can never feel or think what an *Australopithecus* felt or thought, any attempt to grasp time and distance is a means of reducing our lack of comprehension of these creatures.

A Strangeness Beyond Exoticism

Research on human evolution is still influenced by two tendencies rooted in distinct intellectual traditions that become intertwined in the interpretation of the facts. The first corresponds to the classical philosophical approach that conceives of man dualistically, with a clear border between human characteristics and non-human characteristics: thought, language, technology, and morality belong to the human sphere; instinct, determination, and nature belong to the animal domain. The convictions of prehistory, whether they heighten or blur these distinctions, are perfectly consistent with this bipartite vision. Even the most seasoned historians see the presence of raw criteria (the manufacture of tools, the sharing of food, the mastery of fire, etc.) as a means of decoding the signs of humanity – even in its oldest forms – as long as the absence of these criteria can be documented in the animal realm. When the prehistorian Glynn Isaac (1989) contrasted anthropoid characteristics to present-day traits, the accessibility of conditions of human life two million (or more) years ago does not give him pause. The distance between “them” and “us,” however sig-

nificant, is not a conceptual problem. “They” are already on “our” side, in virtue of their stone flakes, bipedalism, tools sharing of food, etc.: a somewhat hasty conclusion when we think that we do not yet know whether it was *Australopithecus*, the *Paranthropus*, or *Homo habilis* that produced some of the tools of the Plio-Pleistocene era (Susman 1991).

The human-animal dichotomy instantly gratifies human beings on the basis of a pre-conceived nature, rather than on the basis of a critical examined store of observations – and leaves animals to “vegetate” in their animality. This essentialist approach, resistant to explaining the transition, thus blocks any understanding of the movement from one state to the other.

Another point of view, a more recent one that is often associated with Darwinism, conceives of a “naturalization” of humans, a process whereby the human form was gradually drawn from a higher level to be joined to the animal world, of which it is the culmination, following directly upon the apes. Here biology occupies a central position. This inflection is so dominant today that human evolution has more to do with the development of the upright position, of bipedalism, and of the cerebral cortex, or with the freeing of the hands, than with any social or cultural factors. The naturalization of man goes hand in hand with a systematically biological approach to the phenomena observed.

For example, a substantial number of researchers see hominid behaviors of the Plio-Pleistocene era in exclusively ecological terms and confine them within an evaluation of adaptive strategies of the species itself. Even if this definition of the problem is undeniably productive and effective in many current studies, it nevertheless hinders any possibility of making sense of the economies or cultures of such distant periods by pre-inscribing them within the confines of a biological model.

Is there a way to get beyond these pre-existing simplifications of the question? The solutions that are generally proposed hide behind the reliability of the latest technical advances: a given research method (such as cranial scanning or Polymerase Chain Reaction for genetic analysis ...) will make it possible to provide better and better descriptions of the anatomical structures of ancient hominids, to detect biological rhythms or the use of molecular clocks in fossils.

But the teachings afforded us by these sophisticated tools have only a remote relation to the mechanisms of innovation, the social structures, or the cognitive or cultural significations of hunting tools that were in use in the lower Paleolithic. The latter, it must be acknowledged, escape us for lack of any forethought specially devoted to the scope of the questions at hand and to the inventory of means to be invoked in order to answer them. The phenomena of human evolution are multidimensional. If considered in only one of their dimensions they elude our grasp completely.

Explaining the progressive emergence of emotional, cognitive, social, technical, linguistic, and biological complexity in the natural history of man calls for a constant effort to identify the types of interactions that take shape and even the modulations that affect these interactions. Thus, with regard to the origins of the cultural phenomenon, analyses of hominid biology or environmental constraints (Wrangham 1987; Picq 1994), both of which facilitated this emergence, are not by themselves capable of accounting for it, even in its most primitive form, for the simultaneous functioning of disparate parameters – ways of transmitting information, capacity for innovation, ways of diffusing innovation, symbolic faculties, and so forth – immediately enters into the question. Failure to treat these multiple parameters explicitly leaves the analysis prey to infiltration by stealthy convictions.

None of the available theories – whether borrowed from the human sciences, the life sciences, or even mathematics – could guarantee that all the indispensable data be incorporated, or that the currently atomized fields of knowledge truly cooperate with one another. The paradigms cannot be combined. When a “recipe” to do so is tried, doubts as to their compatibility and the coherence of the process accumulate so quickly that the target of the project is soon lost from view. The mutual impermeability of the human sciences and the natural sciences is such that scores of prehistorians have been nonplussed by it.

The practical solutions that can be envisaged to this disconcerting situation will be outlined below. First, we must anticipate a “common wave” that might cut across the broad sweep of data and bring their heterogeneity into relief without limiting the expression of each element: this task will be assigned to *behavior*,

Table 1 Criteria usually used to distinguish human beings from animals (Joulian 1995a)

<p><i>Biology</i></p> <ul style="list-style-type: none">bipedal locomotionliberation of the hand from motor constraintsincreased brain sizereduction of facereduction of canines
<p><i>Intelligence</i></p> <ul style="list-style-type: none">intentional behaviorsanticipation, prediction,strategic behaviorsself-awarenesslanguage
<p><i>Economy</i></p> <ul style="list-style-type: none">huntingfood transportcommon dwellings, central foraging areahouseholds of monogamous couplessocial cooperationsexual division of labor
<p><i>Material productions</i></p> <ul style="list-style-type: none">use of toolstool-making (flaking)existence of secondary toolsmastery of fire
<p><i>Symbolic productions</i></p> <ul style="list-style-type: none">burial of the deadsymbolic behaviorsreligious (sacred) behaviorsaesthetic and artistic productionsmoral conscience

without ignoring the imperfections of its theoretical definition or concealing the tensions it comprises.

By behavior, I mean the active expression by an individual, a group, or a species with other individuals, groups, or species, within the physical surroundings in which they are evolving. No doubt this is an overly broad definition, but it does have the merit of holding out hope for a common language to describe and compare human and animal behaviors, present and past, without enclosing them within excessively rigid explanatory frameworks. A second motive for according behavior primacy over social and material productions (to which prehistorians are intimately and necessarily connected) is that it constitutes the “interface” – a hackneyed notion, to be sure, but one that can be useful – through which creatures enter into relation with multiple aspects of the world (in the case at hand, with other prehumans, with animals, or with physical and social environments).

When paleoanthropologists speak of behavior, they are generally referring to a particular behavior (feeding or motor behavior, for example) which they relate to a morphological quality or to an anatomical structure. They are thus in danger of freezing the very notion whose pertinence and originality lie, on the contrary, in its ability to express interactions: behavior is the flux that affords us the means of resisting the petrified worlds of conventional analyses.

Behavior is the means by which species adapt to changes (climatic, technical, or other changes) (Chance 1974; Lee 1988); only afterwards do novel social forms and certain anatomical characteristics stabilize. This approach differs from traditional ethology in two tenets: first, that it is important to seek out the adaptive or functional value of the behavior in its sociocultural as well as its biological forms (whereas only the latter play a role in ethology); and second, that behavior, even if it represents a very general mode of exchange between individuals and the world, must not be approached as a uniform reality that implies a base of behaviors that is common to related species. In other words, the phylogenetic perspectives of Lorenzian ethology (Lorenz 1981) on the very similar ones from Eibl-Eibesfeldt’s human ethology can be appropriate for describing specific behaviors, but they do not do justice to the complex questions of hominization, which they chalk up to preconceived causalities (e.g., aggression, sexuality).

Finally, this conception of behaviors assumes that they are accessible to researchers by various paths: the direct observation of contemporary animals must operate in tandem with a “paleoethology” that interprets archaeological or paleontological remains (Brugal 1995); the common goal of these approaches is, of course, to bring to light ancient facts that are far from self-explanatory.

Simian Models of Hominization and of Behavior

Understanding behaviors among ancient hominids and the processes whereby they are transformed up through modern humanity requires not just the multidisciplinary approach described above, but also multiple models of interpretation that aim to organize these facts so as to illuminate more general patterns in ethology and the evolution of prehistoric human beings. Yet frequently, those who use these models believe them to be “natural” rather than constructed. The illusion of obvious models emanating directly from nature diverts the mind from the fact that they are reconstructions or “stories” that are credible to a greater or lesser degree, rather than verifiable models. Landau’s work (1991) on the scenarios of hominization or, more recently, the critical epistemology that Stoczkowski (1995) applies to scholarly and popular visions of bipedalism have revealed the artifice employed in such explanations: in particular, Stoczkowski has exposed the outmoded theoretical underpinnings of some of the most refined recent scientific theses.

Confining ourselves here to models of behavior (and not to models that explain anatomical changes, for example), it appears that apes – “the” ape, as it is often presented in medicine, in the neurosciences, and even in paleoanthropology, without regard for the fact that two hundred different species are projected into a single image – monopolize the majority role in the development of explanations.

In the case of the man/animal duality mentioned above, the ape is summed up as the inverse of Man. With the ape’s nature defined negatively, by default (Burgat 1996), it thus becomes impossible to take the ape as a model of even an early form of

humanity. Thus, in an evolutionary perspective imbued with teleology – particularly that of Teilhard de Chardin (1956) or his current disciples – the animal is an incongruous figure for understanding hominization and ancient prehistoric behaviors, for the simple reason that the emphasis is on man's original characteristics, his departure from animal nature: his tools, his mastery of fire, his culture, his unique geographical dispersion, his art.

Concerning prehistory properly speaking, Kenneth Oakley's 1959 book *Man the Tool-Maker* perfectly reflects a prevailing dichotomy, which still persists to this day. Paleoanthropology used other criteria, such as brain size (the "cerebral Rubicon"), and even if these criteria seem ridiculous to us now, they nonetheless reflect a doggedly pursued approach to identifying criteria that might enable us to trace a clear boundary between man and animal. A corollary of this endeavor is the game that consists of continually pushing this limit further and further back in time. Unearthing the oldest tool or the earliest biped is the favorite occupation, even the obsession, of most of the teams researching the origins of man (Johanson and White 1979; White *et al.* 1994; Coppens 1994; Leakey *et al.* 1995). Scientifically speaking, however, this contest that strives to push back the borders of human origins without making the transition any more intelligible, is of very little interest. It is fitting to note that, despite everything, the animal figure is always invoked; this was already true of Oakley's work in the past, and it is even more true of much research of a more recent vintage (Isaac 1989; Chavaillon 1996) – and for good reason! Indeed, it is difficult to believe that human tools sprang out of nowhere, or else sprouted in the mind of a peerless, exceptionally gifted primate (such a belief effectively closes off the possibility of any explanation besides a miracle). While certain prehistorians or paleoanthropologists (Leroi-Gourhan 1964/5; Chavaillon 1986; Pigeot 1991) have referred to studies in animal psychology, most of them have based their work on imaginary apes (the myth of "the" ape), that is, on fabrications rather than on available observations. Prehistory and paleoanthropology have all too readily claimed a monopoly – in object and method alike – on analyses of the evolution or behavior of ancient humans. This strictly empirical conception of research in France has led them to

ignore the fact that other disciplines, particularly psychology or ethology, are also interested in hominization.

Reflecting this orientation, the naturalization of Man in the nineteenth and twentieth centuries (Blanckaert, 1998) has made it possible to invoke the animal model. Moreover, beginning in the 1960s, with the exacerbation of a certain anthropomorphizing tendency among zoologists, various gaps have been closed, fostering comparisons that have led to more thoroughly developed models (de Vore and Washburn 1963; Lancaster 1968). As a result, both primatologists and paleoanthropologists alike build explicit simian models when seeking for interpretive instruments.

In principal, the primary task of primatology is clearly not to answer questions of hominization, but rather to understand animal behaviors in and of themselves. Still, since the 1950s (for Japanese primatology) and the 1960s (for its Anglo-Saxon counterpart), the observation of monkeys and then apes (chimpanzees, gorillas, orangutans) in their natural habitats has tended to fuel theoretical projections on the origin of familial organization (Imanishi 1961), on the origin of culture (Kawamura 1959), or on survival in a savannah environment (de Vore and Washburn 1963).

Table 2 lists the best-known models of behavior or of hominization that are based on primates. The types of primates most often used in these studies are the baboon and the macaque (for the *cercopithecids* apes) and the common chimpanzee and its relative the bonobo (for anthropoids). The objectives and requirements of the studies vary greatly. Some of their goals are general (to explain early human traits as a whole or the process of hominization) and refer to different species of primates; others are particular and focused on a specialized aspect (the emergence of language or the sharing of food, for example). The comparisons made may be based on a single species that serves as an interpretive key or benchmark, or else on systematic or cladistic analysis with a view to reconstructing a common ancestral form (Last Common Ancestor, or LCA), a sort of prototype.

Another frequent approach is based not primarily on a species or on a particular trait, but on an explanatory axis or a process (morphological or behavioral adaptation to the savannah, development of techniques and language acquisition). There are also

more strategic constructions (Tooby and de Vore 1987) that combine several levels of comparison – intraspecific (savannah chimpanzee *versus* forest chimpanzee) and interspecific (chimpanzee *versus* australopithecus or Last Common Ancestor) – in order to shed light on adaptation to the savannah (Moore 1996). Finally, it is to be noted that these approaches – referential models – are based on behavioral homology (which implies a similarity due to common ancestry) or on analogy (implying a similarity due to common adaptation), this major distinction being applied more often to morphological analysis than to behavioral analyses.

Most of the models purport to be explanatory and take the form of plausible scenarios. A tiny minority of them propose ways of testing the induced hypotheses: their observable incidence in paleontological or archaeological materials constitutes the only acceptable scientific means of corroboration. Yet all the analogies that have been gleaned in the present world (and not only with simians) are good only on condition that they lend themselves to a falsification process on the basis of ancient data.

This is why some researchers (including the author of the present article) decided a few years ago to try a different methodological orientation, geared not towards explanatory models but rather towards progressive models of understanding that aim to establish new universes of reference and new bodies of data. For example, the accumulation of debris from chimpanzees “nests” and the formation of their sites (Sept 1992), or “traditional” variations in primate tools (Joulian 1994), comprise an untapped category of findings capable of setting in motion new modes of representation that, freed of the strait jacket of the old presumptions described above, permit a telling criticism of earlier interpretations.

Complex Hominization and the Conditions of Comparison

We have identified one reason for the failure of simian models, even those that are limited to particular aspects: they are practically inapplicable to ancient data, which in return, are unable to subject them to examination. This shortcoming, prohibitive in

Table 2 Principal simian models for hominization and behavior
(The bonobo is a “pygmy” species of chimpanzee; LCA and the notion of “referential model” are defined in the article)

SPECIES COMPARED	TYPE OF MODEL	OBJECT OF EXPLANATION	REFERENCE
Macaque/Prehuman	Thematic	Origin of family, of culture	Kawamura 1959; Imanishi 1961
Baboon/Prehuman	Referential	Adaptation to savannah, ecology, social structure	de Vore, Washburn 1963
Chimpanzee/Prehuman	Thematic, referential	Hunting, aggression, weapons/tools	Kortlandt, Kooij 1963
Howlers/Prehuman	Referential	Society	Carpenter 1965
Primates/Prehuman	General, thematic	Hunting, sociality	Lancaster 1968
Chimpanzee/Man	General	Language	Gardner, Gardner 1969
Primates/Prehuman	General, process-oriented	Technology, society, culture, intelligence	Morin 1973; Moscovici 1972
Primates/Prehuman	General, thematic	Language	Hewes 1973
Chimpanzee-Hunters and Gatherers/Prehuman	Referential, thematic	Tools, subsistence	Teleki 1975
Chimpanzee/Prehuman	Referential	Tools, hunting, sociality	Goodall, Hamburg 1975
Primates/Prehuman	General, thematic, process-oriented	Tools, subsistence, intelligence	Parker, Gibson 1977, 1979
Chimpanzee/Man	General	Language, intelligence	Premack and Premack 1984
Primates/Homo	General, thematic	Tools, subsistence, sociality..	Isaac 1978, 1984, 1989

Primates/Homo	Thematic, analogical	Spatial behaviors	Isaac 1981
Chimpanzee/LCA, Homo	General, process-oriented	Tools, hunting and gathering, sexuality, sexual division of labor	Tanner 1981; 1987; Dahlberg 1981
Langur/Prehuman	General	Adaptation, socioecology	Hrdy 1981
Bonobo/Australopithecus	Referential	Anatomy, bipedal locomotion	Zilhman et al. 1978
Chimpanzee/Prehuman	Referential	Tools, culture	Sabatier-Pi 1978
Chimpanzee/Prehuman	Referential	Tools, sexual division of labor	McGrew 1981
Anthropoids/LCA	General, projective (cladistic)	Social structure, anatomy...	Wrangham 1987; Ghiglieri 1987
Baboons/Man	Referential	Hunting, social behaviors	Strum, Mitchell 1987
Primate/Prehuman	Referential, strategic	Social behaviors	Tooby, de Vore 1987
Anthropoids/LCA	General, projective (cladistic)	Social structure, anatomy...	Lee, Foley 1989; Foley 1991
Bonobo/Prehuman	General	Language, intelligence	Savage-Rumbaugh, Lewin 1994
Primates/Prehuman Man/Prehuman	General, thematic	Social structure, social behaviors, sociality...	de Waal 1992, 1997
Chimpanzee/LCA, Hominids	Referential	Tools, subsistence, intelligence...	Wynn, McGrew 1989; McGrew 1992
Chimpanzee/Hominids	Referential	Adaptation to savannah/ forest, tools, hunting	Boesch-Achtermann, Boesch 1994
Chimpanzee/Homo	Referential	Home-base, spatial behaviors	Sept 1992
Chimpanzee/Hominids Chimpanzee/LCA	Analogic, Process-oriented Heuristic	Hunting, technical activities Techniques, tools, culture	Joulian 1993, 1995b, 1996, forthcoming 1996
Chimpanzee/LCA Chimpanzee/Chimpanzee	Analogic Process-oriented	Subsistence, anatomy...	Moore 1996

itself, becomes even more serious when the goal is to clarify ancient behaviors and their evolution since the Plio-Pleistocene: the target is in short deprived of the right of scientific rebuttal, even as it exhibits an unheard-of complexity. "Hominization is hyper-complexity," Edgar Morin showed in 1973. This hyper-complexity is of course due to the amalgamation of the biological and the sociocultural, but also to the nature of the data that are involved and put to comparison: these mixed bags of anatomical and behavioral data, or of past and present facts, which cannot be over-emphasized, because they make possible true methodological departures.

It must first of all be admitted that nobody works on "the origins of man" or "hominization" strictly speaking: these areas are far too broad. *A posteriori* reconstructions of facts, which are intuitively tacked on to a temporal ladder that is supposed to induce their coherence, have little heuristic value as regards the problems under consideration, except when care is taken to define them precisely (isolating a particular activity, a particular physical or cognitive ability that can be correlated with it, or the like).

The pre-eminent criteria for humanity that shape contemporary research (bipedalism, cerebralization, the origins of the tool, of society, of language, and so on) no longer afford the most promising approach to behaviors. The classical distinctions must yield to new research objects that have emerged from newly discovered terrain and the interaction of various disciplines: these objects (the behavioral study of modes of locomotion, technical rationality in human and non-human primates, the analysis of traditions, and social cognition in a phylogenetic perspective, to name a few) are in a position to reinvigorate future research.

Before choosing a referent, it is important to explore the comparison itself. A well-defined technical approach (e.g., "were the traces of impacts on skeletal remains from level X at site Z produced by social carnivores or by hominids?") will, by virtue of its clear delimitation, be able to invoke analogies inspired by modern hunting and gathering societies: "ethno-archaeology" has made demonstrable progress (Bunn *et al.* 1988). Here the comparison emanates from the narrowly circumscribed field of investigation (which is above all functional) and from the construction of two

comparable bodies of data. The many differences between *Homo sapiens* and an ancient hominid have little bearing on the analysis (which, it is true, does tend to evacuate any anthropological dimension – but that is another question).

When the problem is more broadly defined, the situation changes. When we confront the multiple significations of the first flaked stone tools, the array of observable technical options in nature can *and must* be mobilized in both human and non-human primates (and even in other animals), in pursuit of significant analogies to be decoded (and, where possible, to be gradually transformed into homologies). In other words, the analysis will concentrate on structural, rather than contextual, similarities and differences. My comparative study of operative chains of tool manufacture and use in chimpanzees (*Pan troglodytes*) and in hominids of the Plio-Pleistocene (Joulian 1996) adopts such a strategy: the similarity (in terms of variability and complexity) that is observed between certain technical activities separated both by 2 million years and by a non-negligible biological distance underlines *the probable absence of a qualitative threshold between pre-human and animal technical activities*. In this case, the comparison is justified neither by the intuition of a particular behavior nor by the genetic proximity of men and chimpanzees, but rather solely by the technical capacities of the latter. The problem to be tackled thus had a general scope, and this is what guaranteed the mastery of the comparison.

On the contrary, the scientific relevance of inducing a bonobo (named Kanzi) to produce sharp stone flakes (Toth *et al.* 1993) will call for extended discussion, considering the fact that this species does not use tools in nature: even if the flakes obtained bear some resemblance to Oldowan stone flakes, their intrinsic interest for our understanding of prehomimid techniques is seriously biased by the artificial experiment that produced the situation. The study of Kanzi brings to light a methodological hiatus that has been neglected in the field of research on the origins of man: the discontinuity between the information produced in experimental settings and field observations gathered in the natural habitat. The former, products of laboratory psychology – teaching language to great apes, for example – can provide a framework for appreciat-

ing the biological potential of a particular species. The field approach has more difficulty accounting for such capacities (a handicap that is partially compensated by ethology), but it does observe natural performances, in all their behavioral diversity and variability: it is thus a pre-eminent and indispensable resource in confronting the major phenomena of hominization, in particular culture. Chimpanzees in captivity (Tomasello 1990) or orangutans reintroduced into nature (Russon, forthcoming) can contribute fragments of knowledge about a behavioral innovation or an “anthropoid” technique; on the other hand, they can teach us nothing about “protocultural functioning” or “tradition” in the universe of anthropoids. This being said, as long as we remain vigilant as to the type of argumentation employed, as I have tried to stress in this article, the combination of experimental approaches in captivity (Vauclair 1992) and observations in the natural habitat (Matsuzawa, 1994; Savage – Rumbaugh, 1996) offers a truly promising outlook.

Diachronic or Synchronic Perspective

It bears repeating: an analogy will make sense only as a function of the way the question is framed, the nature of the data to be compared, and the precision of the analysis. But also, its contents will change radically depending on whether the perspective adopted is evolutionary (seeking changes, processes) or synchronic (seeking a comparison that is constructed so as to reject the intervention of kinship). In the second case, the approach is generally functional and the comparison is obliged to narrowly define its terms.

The “original” period to which I am referring, the Plio-Pleistocene, lends itself to the mixing of genres, and this distinction is indispensable if we are to avoid irreparable confusions between goals, procedures, and modes of testing. For example, to juxtapose hammers with pits found on the “chimpanzee” site of Monogaga (Ivory Coast) and on the prehistoric Oldowan site of Olduvai (Kenya) implies the introduction of particular morphological and functional criteria, whereas an investigation of the evolution of

hunting or the evolution of technical activities involves a comparative ethology of the various species of primates that hunt or use tools (Joulian 1993; Joulian, forthcoming).

As long as we have not justified in detail why we are enlisting common chimpanzees or bonobos in an analogy that excludes orangutans or baboons, we will have to choose one or the other of the perspectives put forth. The commonly used argument of genetic proximity – “the chimpanzee shares 98 per cent of its genetic makeup with man” (de Waal 1996) – merits some degree of attention from a phylogenetic point of view (for the biology of hominids, for example), but it is devoid of value as regards the functional analysis of material productions and behaviors: in this aspect, the strategy defended here differs from many Anglo-Saxon approaches (Tanner 1987; Wrangham 1987; Ghiglieri 1989; and even McGrew 1992). Unless, possibly, the murky relations between genotype and phenotype, and between biological structures and behaviors, have been thoroughly elucidated, something that we are not close to achieving. The choice of the common chimpanzee in the effort to understand broad realities of the human past can be explained as much by divergences as by similarities. It is unlikely that any important inroads will be made in this direction until the differences have been understood, or at the very least approximated: thus, how did the chimpanzee’s formidable technical capacities develop despite its peculiar mode of locomotion (“knuckle-walking”)? The next stage in the use of analogies for the Plio-Pleistocene will most likely be the multiplication of points of view, by which we will strive to understand not just one technical innovation in the context of human history, but rather *multiple* technical innovations that show similarities across different primatological histories.

One other function of the analogy remains, this one more formally heuristic: chimpanzees enable us, in effect, to show the variability of certain relations that cannot be described in terms of simple causality, and thereby to criticize ubiquitous “metaconceptions” – the correlation between the liberation of the anterior limbs and the manufacture of tools is one example – in order to glimpse pathways that are less “obvious” and more fertile.

Similarities and Differences, Deviations and Reformulations

The scientific imagination clearly needs to explore general models in order to uncover the questions therein. However, it is essential to accord a certain “everyday” precedence to establishing patterns on a local level, where they can be clearly delimited and mastered; the object of the game is to compare present-day and ancient groups of creatures, objects, and behaviors in order to illuminate them, and to transfer the wealth of available details on the former to the narrow limits of the latter. This being said, we have not exhausted a profound reflection on the kinship of related species, and a general study of kinship that relates human beings to apes is necessary if we wish to control the instruments with which we work: our analytic categories (species, genus, animality *versus* humanity), the targets of our examination (tools, techniques, food, locomotion), the problematics themselves (ecology/economics, diachrony/synchrony), or the methods used (on the quality of information yielded by various approaches).

This type of reflection on the similarities and differences that have been recorded by a method that integrates the multiple determining factors (as opposed to a reflection confined to differences in anatomical or behavioral traits) will lead researchers to justify their preferences for one species over another, rather than simply indulging intuitions that are laden with theoretical baggage: for example, why would the chimpanzee explain *Australopithecus* adaptations to savannah better than the baboon? An awareness is beginning to take hold that human technology itself can be correctly identified only in a very broad frame of reference, for which Leroi-Gourhan in his time (1957, 1965) laid the groundwork: that of hominids including “non-technician” species. Unfortunately, there has been little follow-up in this area. As for cognitive or social abilities, the lack of tools in a given species is often as informative as the existence of instruments in another. In sum, I would suggest that the myth of “the ape” taken as a single group should give way to clear and simple expressions of the reasons for which the chimpanzee, the baboon, human beings, or hominids are chosen in an effort to discover particular facts about human

evolution or prehistoric behaviors. That is all. But the task is more enormous than it appears.

How should we respond to the unbridled media hype over “news” of the origins of man, to the vague discourses that incite everything from peremptory scientism, to surprising bouts of irrationality (the paleontological quest for the yeti, Almasty or Brahmanou, products of the Indo-European imagination), to even more troubling political excursions – such as the enthronement of the “acceptable” European ancestor by the extreme right in France (Routhier 1997)? We must first hold our ground, take care to use analogies responsibly, and develop more controlled knowledge – “as much as possible” would already be a good thing.

Multidisciplinary and interdisciplinary approaches already seem to be employed in research on the origins of human beings, but they are confined to certain sectors, and some of them subtly subordinate one scientific domain to another. It should have been a given that we must work together to make the disparate ways of going about science compatible: the task remains an urgent one. Herein lies what may be the only reasonable hope for dusting off this field of research and breathing new life into it. If the origins of man were no longer conceived in terms of the opposition between biology and humanity, and if they could bring advances in the human sciences – including the cognitive sciences – together with field studies in primatology, the resulting reconfiguration of the disciplines would lead us toward new discoveries that would never cease to amaze us.

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