# ARCHITECTURAL ANTHROPOLOGY

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# The Deep Structure of Architecture: Constructivity and Human Evolution

*Nold Egenter*

> The history of the human settlement has not been written yet—archaeological finds of the stone age period remained too fragmented until now, and, for too short a time only, settlement or landscape archaeology play an established role in research.
>
> —Jens Lüning, 1989

## THE CONCEPT OF ARCHITECTURAL ANTHROPOLOGY

Architectural anthropology is a relatively new type of architectural research. Based on the Yerkes and Yerkes (1929) concept of "Evolution of Constructivity," it defines *architecture* as all that hominoids and hominids built and build. In many former studies, we have tried to outline this approach from various viewpoints.[1] All these studies remained relatively limited on clearly defined subjects, using essentially instruments of architectural description and theory, and as such, they can be considered as contributions to the wider field of anthropology.

However, anthropology is not only a container, which can integrate new things. It is also an immense field of data that has a long and highly complex history of research. And most important, it has developed a systematic scientific structure (see, e.g., W. E. Mühlmann's excellent *His-*

*tory of Anthropology* [1968]). It is in this deeper scientific sense that, from the beginnings, the term *architectural anthropology* was conceived. Architecture, defined anthropologically in the widest sense, is considered as a fundamental part of human culture and consequently has to be researched in this widest framework.

The following shows the essential characteristics of this dialogue. What does the concept of architectural anthropology contribute to cultural and physical anthropology? We will see that, on one hand, the term *anthropology* confronts us with a very challenging framework of existing research and results; on the other hand, the architectural view has something important to contribute.

## Superseding Conventional Anthropology with the Anthropological Implications of Material Culture

### *Architectural Archaeology*

In a recent paper on architectural archaeology we have discussed the present state of research essentially reviewing the book *La maison des origines* (Lepoittevin 1996). Most important, we found indicators to consider the prehistory of architecture with similar time depths as those of the earliest tools, that is, about 2 million years ago. On the other hand, we dealt critically with the archaeological method. Its strict clinging to the methods of history, its fixation on durable and datable remains, and its often very fragmented finds are not suitable for the reconstruction of the highly complex prehistory of "architecture" and "settlement." In addition, if—following the Yerkes concept of a primarily fibrous evolution of constructivity (Yerkes and Yerkes 1929; Egenter 1983, 1990b, 1998*)[2]—we can assume that early remains were dominantly not of a durable character (prelithic) fibro-constructive industries.[3] Thus archaeology reveals itself as a highly questionable instrument. We have to look for other methods.

### *Toward an Anthropological Concept of Material Culture*

*Material culture* is the basic term that supports archaeology and prehistory. Can we define it differently? Can we enlarge the narrow definition used in archaeology (durable remains) into a wider, anthropological concept, which uses the term *material culture* in an ethnoprehistorical framework (Wernhardt 1981), including material (proto) culture in primatology?

In their textbook on anthropology, Ember and Ember (1994) present a list combining fossil records and major cultural developments according to first appearance. Their summarized presentation of most important "cultural developments" provides an overall view of present conceptions of human evolution, biological and cultural. The list schematically uses five phases that are described in the framework of conventional physical and cultural anthropology. They are:

1. Late Cretaceous to Miocene (we will only use the Miocene)
2. Pliocene/Lower Paleolithic
3. Middle and Upper Paleolithic
4. Mesolithic and Neolithic
5. Bronze Age.

The above numbers and periods are used as a basic reference in the following list of dated fossil records and prehistorical sources that can be superseded by a new anthropological grid (Figure 3.1); the grid contains hypothetical sources reconstructed ethnoprehistorically and primatologically in the framework of architectural anthropology. From *left* to *right*:

- Spatial organization of settlement[4]
- Nest-building behavior
- Semantic architecture
- Domestic architecture (derived from semantic architecture)
- Controlled fire (derived from semantic architecture)

These new sources are called "hypothetical" because, consisting of non-durable materials, they cannot be documented archaeologically unless they appear in combination with durable elements (stones, bones, etc.; Egenter 1994c, 1998*). But there are other ways to test the concepts of "constructivity" and "fibro-constructive industries" on their paleoanthropological and prehistorical value. The question is: If we assume that fibro-constructive industries had been widespread in prehistory, can we show any impacts, either in the fossil record or with prehistorical sources?

For this discussion Figure 3.2 was prepared. It shows the same numbered phaseology of Ember and Ember (1994: 49, 63, 84, 124, 126) with numbers 1–5 at the top. But the corresponding fields are turned by 90 degrees, and the formerly vertical arrows are now shown horizontally.

Figure 3.1. New anthropological grid. Author's eleboration on Ember and Ember (1994: 49, 63, 84, 124, 146), list of fossil records and cultural developments.

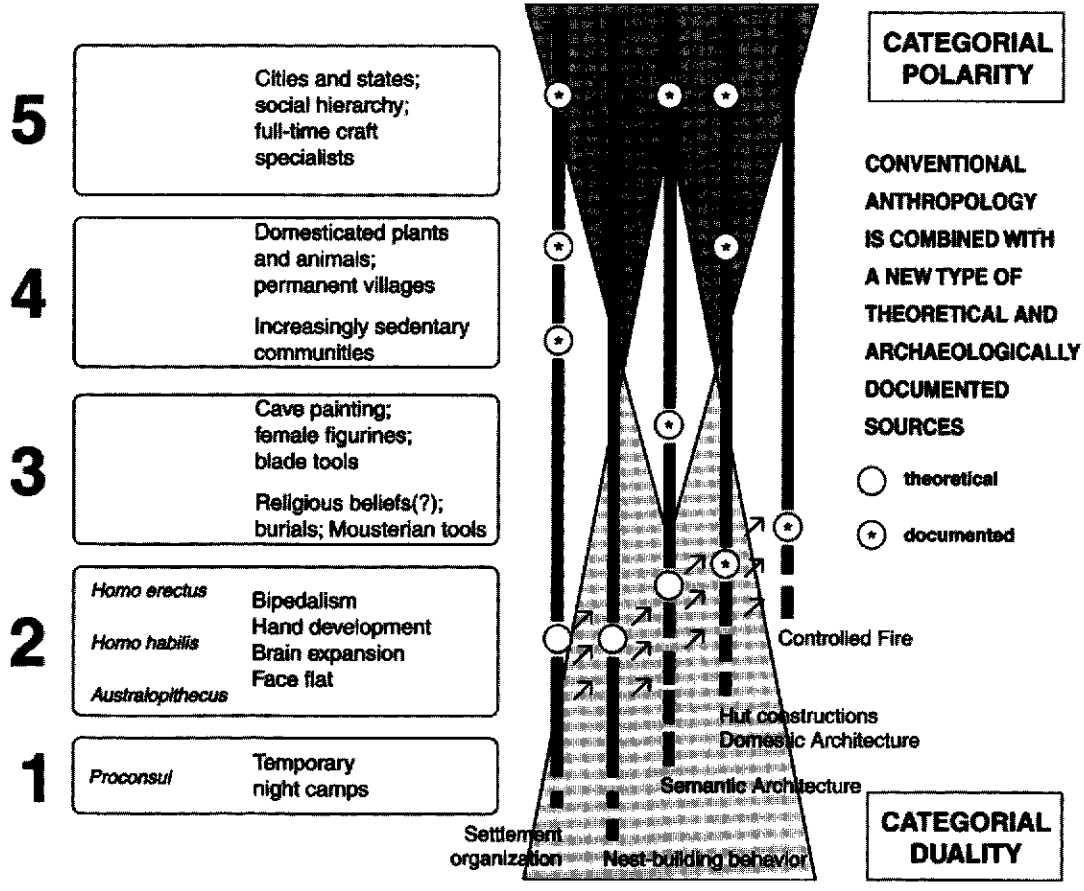
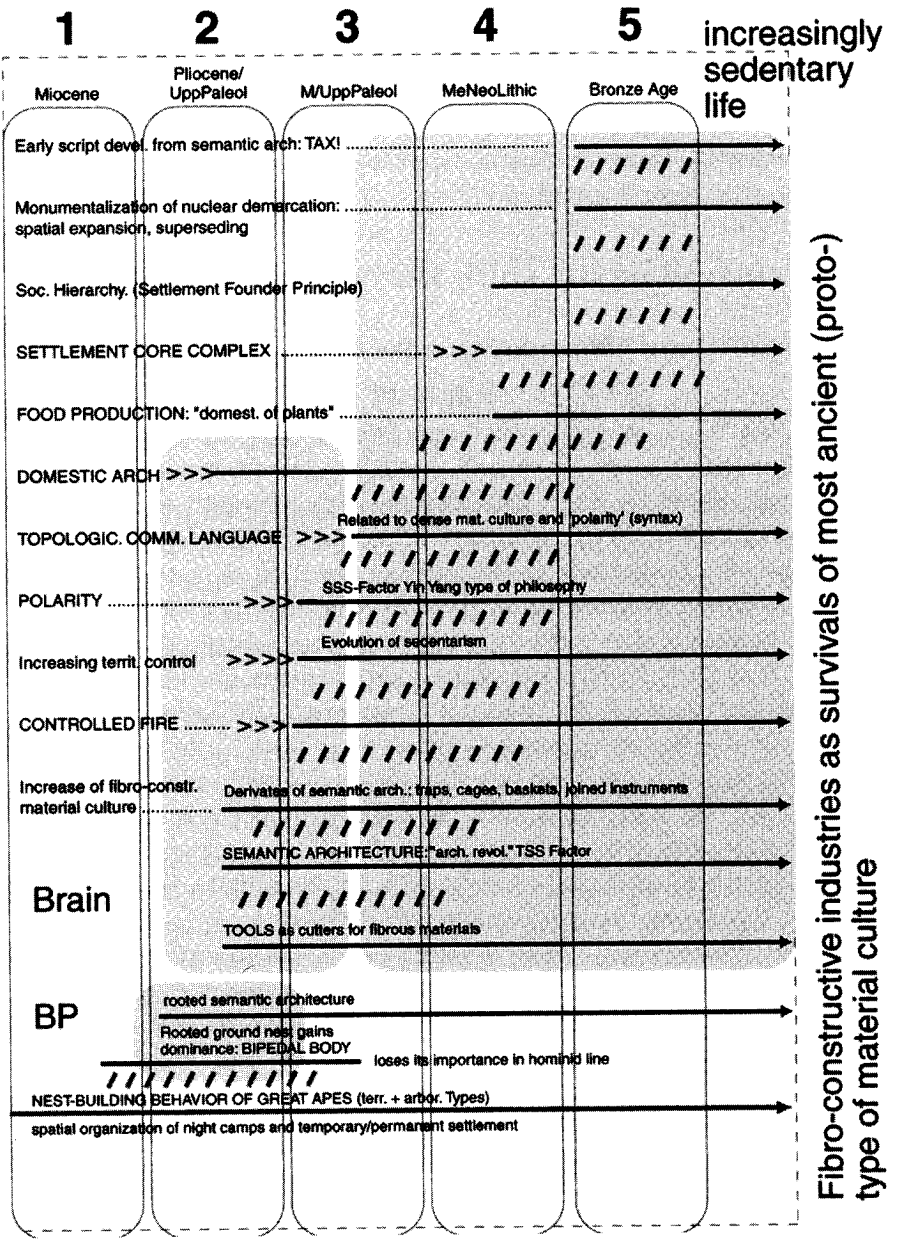


Figure 3.2. Evolution of constructivity and its impact. Interpretation by the author of the five fields of the Ember and Ember (1994) grid.




*Key:* Comm = Communications; TSS = Temitorio-Socio-Semantic; SSS = Spatio-Structuro-Symbolic

In addition, other criteria are added as arrows, for example, "structuro-symbolic factor" implying "polarity," or Yin-Yang type of cognition (Egenter 1979, 1980, 1982, 1994a, 1994b, 1994c, 1995). It is evident that this scheme stimulates new discussions in anthropology and prehistory (Egenter 1986, 1998*). The interactive zones are shown in three rounded rectangles. They indicate three anthropologically important subjects: (1) vertical position of the body, (2) increasing brain size, and (3) increasing territorial control and sedentarization. We will discuss these topics under the following three main titles.

## THE ERECTION OF THE BODY: NEST BUILDING

### Routine Ground Nest Building of the Great Apes

In a study by the author entitled "Ape Architects" (Egenter 1983, 1990b, 1998*), the distinction between arboreal nests and ground nests was emphasized. In present theories of hominization the ecological distinction of arboreal and terrestrial domains of locomotion is crucial. Both types of space form a climatically conditioned transitional environment with specific implications for locomotion, food control, and social behavior. Most anthropologists today agree that this transitional environmental background provided the stage for hominization processes in Africa. However, the function of the components in this environment is controversial (Sabater Pi, Veà, and Serrallonga 1997). Sociobiology is fixed on the toolmaker concept. Authors are not aware of the empirical implications of nest-building behavior, and consequently its potential as a prototype of "material culture" is neglected (McGrew 1992). Sociobiological primate research thus deprives itself of an important element of the subhuman condition: *constructivity* and the routine demarcation of existential place and space (Egenter 1983, 1998*).

On the other hand, if nest-building behavior is considered from the Yerkesian point of view as a constructive alteration of the natural environment for an important existential function, nightly rest and sleep, with the potential of adaptation to evolving processes, then the ground nest becomes a phenomenon of outstanding importance (Egenter 1983, 1998*). First, from a constructive point of view the arboreal nest is part of the tree in which it is built. It gains its stability naturally from the tree. In contrast to this, the ground nest introduces entirely new parameters that are evident if we look at it as a construction. Rooted materials are used, for example, bamboo stalks in a bamboo grove. Now

vertical stability is fully a result of the technological activity of the animal. Stalks are broken, bent toward the center, interwoven, and knotted. A hutlike construction results, which, however, is used as a "tower" to sit or lie on (for illustrations, see Egenter 1983, 1998*). A further important point: If we assume that, like among present great apes, nests are built routinely for each day's night, it gains an enormous quantitative importance. Sociobiologists are not aware of these quantitative dimensions, very likely due to the nest's perishable character. Note that if the life production of one subhuman nest builder is vertically heaped up, a tower of about 11 times the height of the Eiffel Tower in Paris results. To be aware of this quantitative aspect is of utmost importance (Egenter 1983, 1998*).

### The Ground Nest and Vertical Position of Body

Zoologically speaking, bipedalism and erect locomotion are not uniquely human. But, evidently, very important changes of existential conditions are related to such biological transformations. However, present theories regarding the evolution of hominoid and hominid bipedalism provide rather superficial interpretations of firsthand impressions. In contrast to this, the argument based on nest building is cogent. It relates not only to the erection of the body but includes the whole complex of arm and hand development (increased rotation, precision grip) and increased importance of stereoscopic vision (flattening and verticalization of face, vision focused on operations with hands). If we assume that open savanna became dominant in certain regions, the capacity to efficiently build a stable ground nest of a certain height in vertical body position might have become an important selective advantage, essentially by the spatial and social protection it offered (Egenter 1983, 1998*).

In short, we can maintain with solid arguments that routine ground nest building must have been the main factor in the erection of the body and bipedal locomotion among Miocene hominoids living in or at edges of open woodlands and grasslands. This evolutionary process of terrestrial locomotion with erect body posture was more or less completed with bipedal hominids that lived in East Africa about 4 million years ago (*Australopithecus*). It was maintained and refined as a basic characteristic in the following hominid evolution including *Homo habilis, H. erectus, H. sapiens,* and *H. sapiens sapiens,* that is, modern humans. To conclude, we might ask a fairly provoking question: Is the upright body posture of humans, in fact, a reminiscence of a very primordial "history"

of architecture, the dominant development of ground nests in open savanna landscapes? (See Figure 3.3).

## THE INCREASE OF BRAIN SIZE

### The Complexity of the Pongid Nest: Prerequisite for an Architectural Revolution

#### *Protocultural Characteristics of the Nest*

Let us shortly come back to the suggestion of Yerkes and Yerkes (1929) of an evolution of "constructivity" related initially to nest-building behavior of the great apes. It is very important here to stress the complexity of the apes' nest. It is deeply interwoven with pongid life.

- It supports an existential need that covers half of the animal's life, the nights. Pongids are nomads. Each animal produces one nest every night of its approximately 40 years of life. In contrast to the daytime spent mainly with locomotor activities and nutrition, the large-sized animals need rest and sleep in horizontal body position (Egenter 1983, 1998*).
- Nest building is of a high complexity in its material, constructive, social, spatial, topo-semantic,[5] and formal conditions (Egenter 1983, 1998*).
- It is partially instinctive behavior, partly learned behavior (Bernstein 1962, 1969; Lethmate 1977).
- In an evolutionary sense, the distinction of tree nests and ground nests is of primary importance. Nest types correspond to two different environments (arboreal, terrestrial) and thus might have played an important role in hominization.

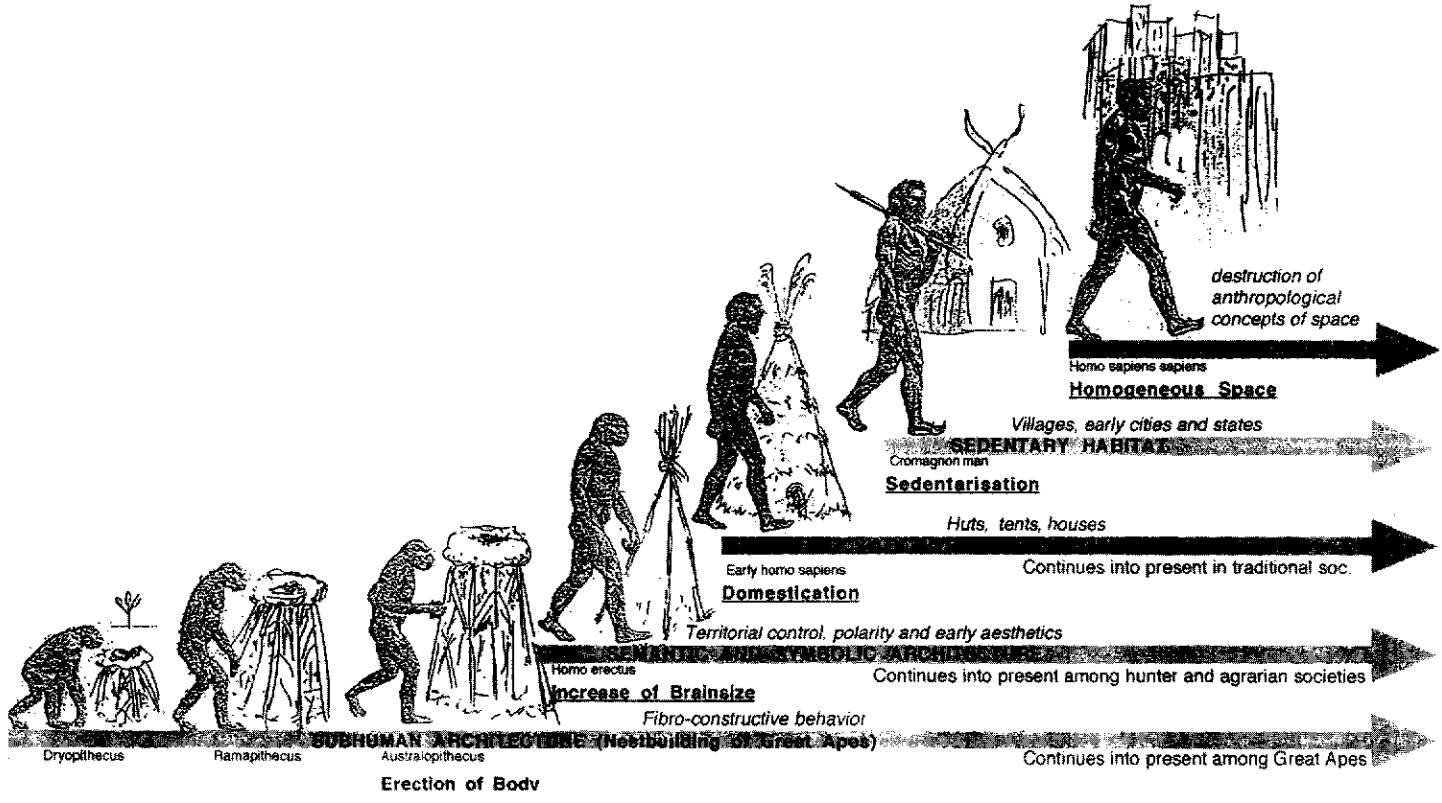
Thus, nest-building behavior shows much more protocultural characteristics than nut-cracking or ant-fishing in the toolmaker concept. In this context, McGrew's (1992) book with its bold title *Chimpanzee Material Culture. Implications for Human Evolution* is extremely misleading. It is based on the very marginal phenomenon of tool use; nest building is completely neglected.

#### *The Psychology of the Nest*

The nest-building behavior provides arguments to even speak of the "psychology of the nest."

- *Learning*. Constructive behavior is partly learned (Bernstein 1962, 1969; Lethmate 1977). This implies psychological components. For example, babies were

Figure 3.3. The evolution of man, habitat, and architecture. Interpretation by the author showing bipedal locomotion and upright body posture in relation to the evolution of architecture.



observed playing "to construct nests." The relation of mother and child also reflects in the form of the nest (Egenter 1983, 1998*).

- *Judgment.* The selection of site and material implies selective capacities (Egenter 1983, 1998*). Stability resulting from construction is crucial for the nest's function as a protecting platform for the night.
- *Form perception.* Formal aspects are involved. Evidently the animal is sensitive to the constructive outcome (stability, comfort; Egenter 1983, 1998*). Aesthetic qualities are absent.
- *Individual identity.* The nest is always used by the individual that makes it. Struggles are reported (VanLawick-Goodall 1971).
- *Territorio-semantic aspect.* The group expresses its social relations in space (Kawai and Mizuhara 1959). The nests of a night camp are a system of efficient spatial control (see Figure 3.5).

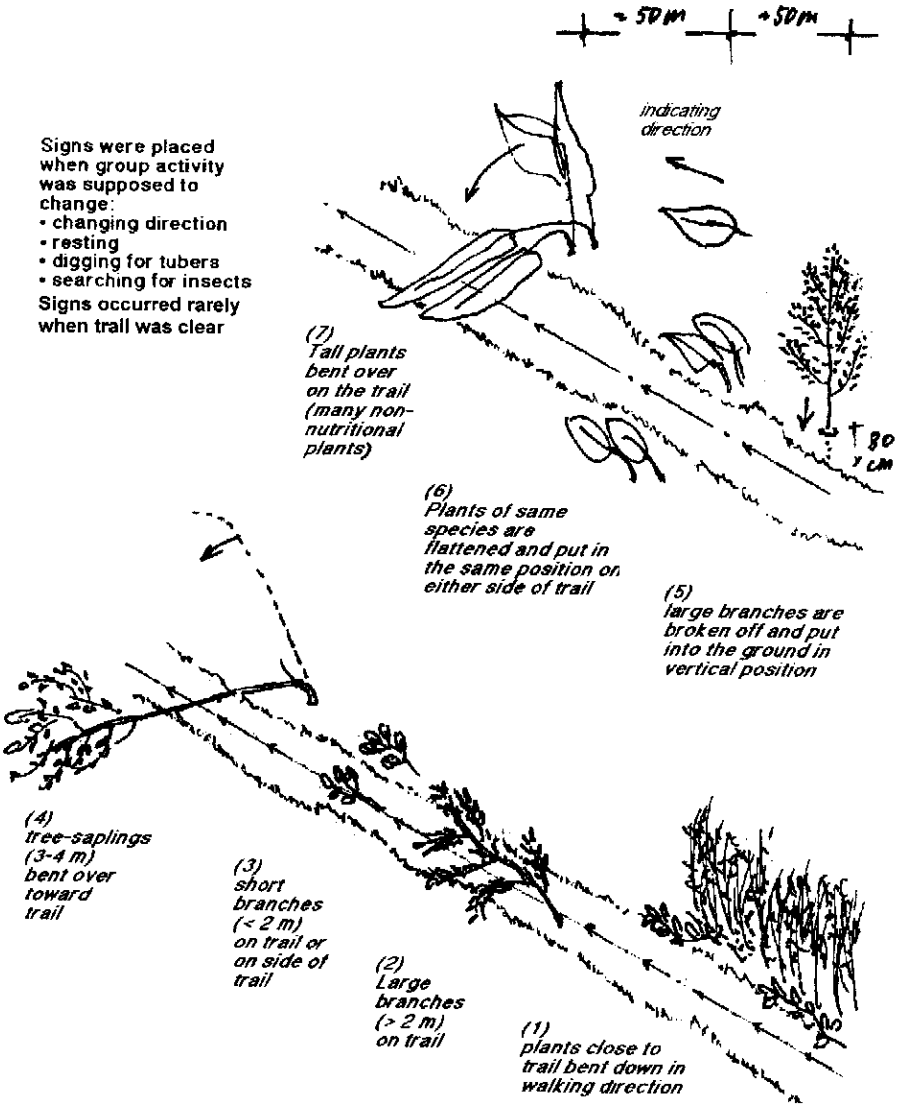
These psychological aspects show clearly that the nest is intrinsically interwoven with the existence of the great apes. A definite artifact is created that suggests a high degree of identification of its maker with the produced object and its complex functions.

### *The Topo-Semantic Characteristics of the Pongid Nest*

Finally, we should also ask for semantic criteria. To what extent are the nests part of the pongid orientation system? Are used nests perceived as signs in their landscapes? Can they be distinguished from those of other groups? While it seems there are no reports on semantic aspects of nest-building behavior, Savage-Rumbaugh et al. (1996) recently reported on their observations of a group displaying a fairly elaborate system of traffic signs (Figure 3.4). A large group split into two parts. The first subgroup used at least seven different methods to inform the second subgroup about the way they had taken. Leaves of different size, twigs, branches, and small trees were used. Signs were bent or torn and laid on or beside or across the path, indicating direction. Most interesting in our context, large branches were broken off and stuck into the ground in upright position! Evidently the animals were using their strength. Branches were stuck about 80 centimeters into the ground. Thus, the Bonobo sign system confronts us with an extremely important fact that there is an artificial semantic dimension in primate behavior with the purpose of information and communication. The transmitted code is independent of physical or vocal contact; it is "read" from the conditions of an artifact and its position in the environment.

This "topo-semantic" element is also present in nests arranged by a

Figure 3.4. "Traffic signs" made among the Bonobo subgroups while on daily migration. Drawings based on Savage-Rumbaugh et al. (1996: 173–95).



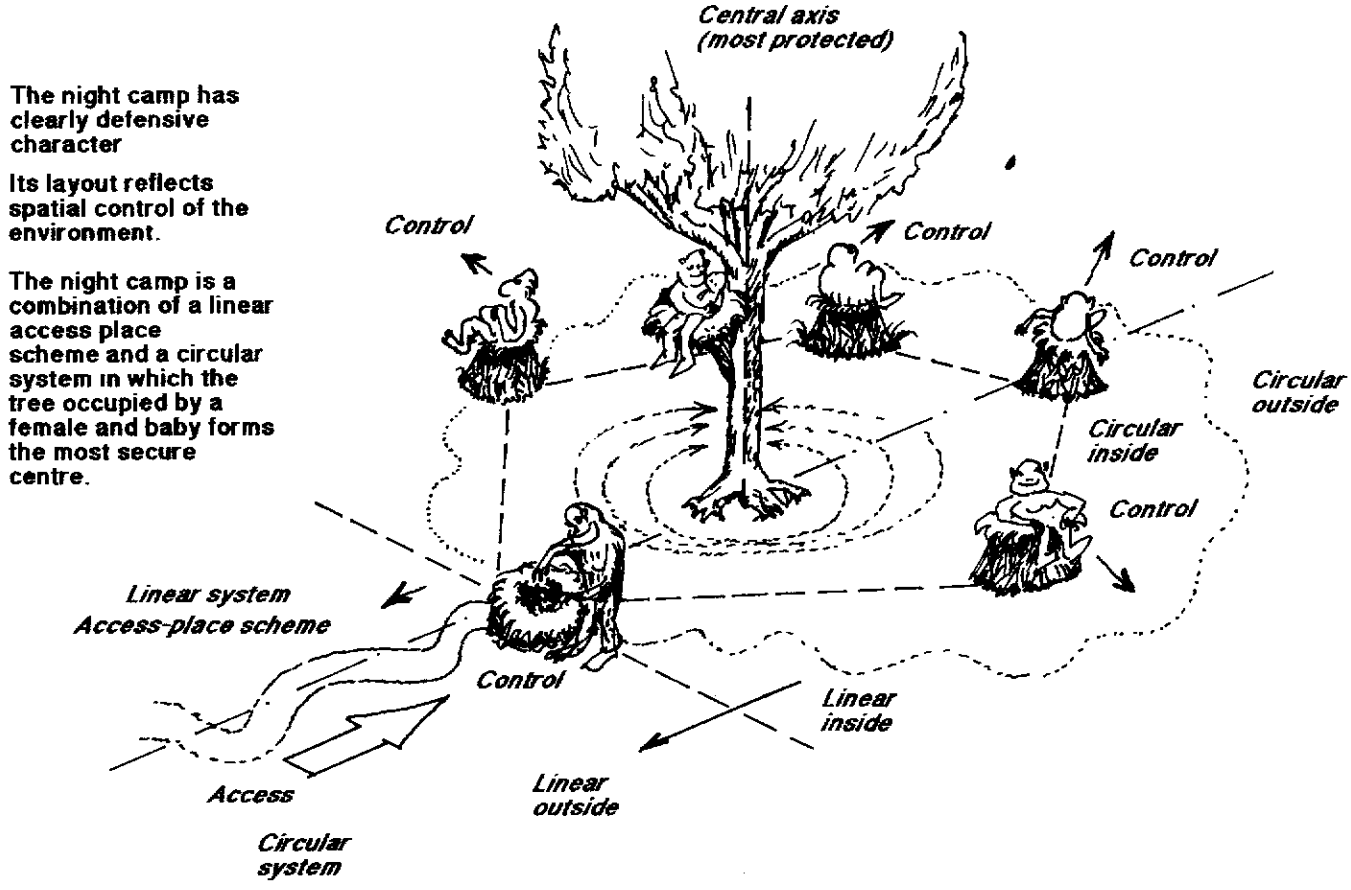
gorilla group in temporary night camps. Kawai and Mizuhara (1959) have measured such a night camp and have published plans of it. The arrangement of the nests shows a clear order (Figure 3.5). Their disposition expresses spatial values (center, periphery). The nests are clearly organized in view of environmental control (Egenter 1983, 1998*). Thus the topo-semantic concept is not only valid in the domain of "migration" (Bonobo) but also in the framework of "dwelling" (night camp), eventually also in regard to food control.

So far these are all primatological data. But, as the hypothesis of Yerkes and Yerkes indicates, fairly constant behavior patterns are assumed in the framework of sociobiology. We can thus assume that the Miocene apes about 15 million years ago had a fairly complex landscape of built form. In niches of open woodlands (formed due to climatic changes between 16–11 million years ago), it consisted of the night camp type dominantly consisting of ground nests described by Kawai and Mizuhara (1959). What is extremely important here is to be aware of the high complexity of this constructive topo-semantic behavior as a prerequisite for the following: It can be taken as a basic precondition for the hominization of the brain.

### Paleoanthropology: The Problem of the Human Brain

Slightly simplified, the fossil records tell us the following in regard to the increase of brain size. *Australopithecus* shows no difference to living pongids (500 cc [cubic centimeters]). Among *Homo habilis*, we find about 750 cc, *Homo erectus* shows about 1,000 cc, and *Homo sapiens* appears with a brain size of approximately 1,500 cc. The overall increase is about 300%. What provoked this tremendous need for an increased memorizing capacity? In the framework of anthropology this question is still widely open. Was it "language," "toolmaking," "social interactions," "outwitting rivals to get mates"? All these potential impacts are discussed and taken individually or more or less collectively as the main cause(s) of early hominid brain developments. In contrast to this questionable guesswork, architectural anthropology proposes a *hidden architectural revolution* as the *prime mover* for the development of the hominid brain. The process was triggered by the early use of stone tools. This shall be outlined in the following.

Figure 3.5. Gorilla night camp configuration. Spatial interpretation by author of gorilla night camp after Kawai and Mizuhara (1959: 16).



### *The Toolmaker Concept Is Overrated Today*

Many anthropologists strongly favor tool use as the "prime mover." However, on a closer look it is evident that the conventional toolmaker concept is much overvalued today. First, toolmaking and tool use are very marginal among present-day pongids, even absent among orangutan (McGrew 1992). In addition, its complexity is extremely low. And third, tool activities like nut-cracking and ant-fishing are only a small part of an existential category, namely, nutrition. McGrew's attempt to describe tool behavior of the great apes as a prototype of "material culture" is not at all convincing. Evidently, it is a scientific construct influenced by the durable finds of conventional prehistory.

### *The Tool and Increasing Brain Size*

*Australopithecus* had no tools, and for *Homo habilis*, the earliest types of tools are assumed. *Homo habilis*, the first remarkable indicator of an increased brain size, lived more or less in the temporal period where the earliest stone tools are assumed (around 2.2 million years ago). This approximate temporal coincidence is seen as a very strong argument for the "man the toolmaker" concept. The early tools are generally attributed to hunting and/or scavenging. However, it is very difficult to imagine how a relatively simple and stereotyped manipulation, like making stone tools and using them for cutting meat and scraping skins, might have been able to influence brain size and memorizing capacity.

## The First Architectural Revolution

### *The Impacts of Fibro-Cutting Tools*

Only a few authors involved in this discussion focused on toolmaking and brain development are aware of the variable factor immanent in the term *tool*. How was it used? Lawrence H. Keeley (1980) showed that stone tools were not used exclusively in the framework of hunting activities but also for cutting fibrous materials, plant stems, and wood. This is very important information. But what did this mean? Of what nature were the fibrous materials that were cut with early stone tools? To gain an idea of the considerable dimensions of these questions, let us return shortly to the discussion of the ecological circumstances of hominization.

If we have a look at our Figure 3.2, we see that the arrow representing "nest-building behavior of great apes" continues into the present. Evidently it owes this continuity to the uninterrupted presence of a mixed

arboreal and terrestrial environment. Relatively original conditions were preserved. Brain size remained constant and has not increased among the great apes. If, however, in some regions climatic changes favored the formation of open savannas, it can be assumed that the ground nest became dominant in and around open landscapes. As we have mentioned above, it can also be inferred that the unique social grouping of terrestrial night camps provided protection against predators. The ground nest offered a selective advantage, but it had a great limitation (and this is very important in view of its implications as a prototype of material culture): With some observed exceptions of heaped grass nests ("siesta nests"), ground nests of the pongids are exclusively constructed with rooted materials. The topo-semantic system was limited on the conditions of identity of biotope and technotope. That is, each nest had to be constructed where suitable plants grew.

### *From Rooted to Artificially Stabilized Architecture*

In this environmental scenario of a widely diffused and complex terrestrial nest-building behavior, the appearance of the first tools must have provoked the first architectural revolution. Using stone tools for cutting fibrous materials allowed an important evolutionary step away from rooted construction.

- It provided independent choices of (a) nesting/resting/camping sites and (b) sites where construction materials were taken.
- The tool allowed the divergence of biotope and technotope.
- What we called "judgment" above, a capacity for topological evaluation in the framework of nest-building behavior might have evolved considerably under this new condition.

In addition, the appearance of tools might have produced further dynamic processes of building.

- *Mixed materials.* Different materials could be mixed into the same construction.
- *New techniques.* Binding, bundling, weaving, and the like, were probably very quickly developed.
- *Staking.* Rooted stability had to be replaced by artificial stability.
- *Structural differentiations.* Particularly staking and other types of stabilization led to structural differentiations with heaping, binding, covering techniques.
- *Functional differentiations.* Rooted, layered, or staked constructions were functionally differentiated. They were used as signs for food control, food conser-

vation, traps, cages, storage, and so on. Early hunting outfits like spears and arrows very likely were derived from staking.

- *Development of stone tools.* Increasing differentiation and refinement of building processes must have greatly stimulated the development of stone tools. Refinement of tools allowed increase in constructive precision.
- The use of sharp stone blades combined with handles to form axes provided construction materials offering increasing stability and durability.

### *An Open System of Fibro-Constructive Potentials and the Demand for Memorizing Capacity*

We have theoretically outlined an open system of fibro-constructive potentials that allows a wide range of developments also in regard to its social, spatial, psychological, and particularly also topo-semantic aspects (communication). If we assume that this high complexity increasingly gained importance with the first architectural revolution, we can imagine the demand for increased memorizing capacity. Places were marked for settlement, for migration, maybe increasingly also for food control. It required a new capacity: to memorize these places, the markers, their structure and form and their surroundings, what they signaled and so on. Very likely those who in this increasingly complex situation were disposed to larger memorizing capacities had greater selective advantages. Evidently these parameters allow us to reconstruct theoretically a wide range of early outfit with material culture. But what does such a fibrous culture really look like? What are its forms, its functions? Prehistory naturally has only very fragmentary sources, but in the framework of the anthropological definition of material culture, the hypothesis can be tested in the domain of ethnology.

## Semantic architecture

### *Fibro-Constructive Industries and the Ethnological Concept of Material Culture*

Fibrous and fibro-constructive industries are a common and very important factor in the material culture of traditional societies (Hirschberg and Janata [1966] 1989). Functionally they cover wide ranges of traditional societies' needs, including dwelling (Oliver 1997), food control and clothing. But, owing to their materially perishable nature, fibro-constructive industries have not been not considered of any value in

regard to high antiquity. They have not been attributed "historical" value, like stones and bones, in spite of their evidently "primitive" characteristics. Binding with fibrous materials is without doubt a very ancient method of fixation. Similarly, weaving as a method to produce flat or curved surfaces, is a technique of high antiquity, already observed in the animal world. Note further that often the hand is exclusively used as some sort of primary, or most primitive, tool. In addition, since the fibrous materials used are directly taken from the environment, a great autonomy is guaranteed, a further characteristic speaking in favor of great antiquity. These three points sufficiently legitimate the interest in the "historic" value of fibro-constructive industries and we can ask questions like the following. Can the ethnographical domain be used to gain insights into the prehistorical conditions of fibrous material culture? Can we gain indicators of corresponding parameters as listed above and, eventually, can we reconstruct principles of their development?

### *The Ethnological Model of the Paleosiberian Ainu*

There is probably no better example to answer these questions than the material culture of the Ainu as reported in detail and with very precise technical drawings by Kayano (1978). His important book lists about 250 tools and instruments an archaeologist would never find in any site of Ainu archaeology. Most of the objects are exclusively made with fibrous materials and wooden sticks. The Ainu were gatherers and hunters with a strong paleosiberian component. A great part of their material culture can give us fibro-constructive ideas about prehistorical conditions. Very simply constructed traps and nets for small animals, cages to keep them, fish traps and nets, baskets and bags for transportation, very crudely made boats, various instruments, weapons, tools for various purposes, even games for children, and status symbols or objects for the decoration or protection of the human body can be found. Small temporary huts were used while hunting. Such an equipment of objects of material culture was doubtless possible to make in the Mesolithic period (see next paragraph) but very likely already during the Upper and Middle Paleolithic. Consequently, material culture must have been much richer than archaeologists make us believe. The ergological and technological characteristics of this broad range of Ainu objects show very clearly that these things were not "invented" recently. Most of them were conceived not functionally but with polar principles.