Culture and intelligence: anthropological reflections on non-physical aspects of evolution in chimpanzees and humans*

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Abstract

The scope of this work is the recent history of studies on the behavior of chimpanzees, emphasizing research results, propositions about the existence of 'chimpanzee cultures' and their validity. The work discusses the idea based on transmission mechanisms and social learning as well as anthropological and paleoanthropological concepts of culture that associate such phenomena, among modern humans, to their symbolic and cognitive abilities.

Keywords: chimpanzee culture; primatology; anthropology; symbol.

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[Intelligence] is not a sacred gift,
It is a primate's only weapon.
(Barbery, 2008, p.178)

About humans and animals, especially apes[1]

The relationships between humans and other animals in different cultures are varied and include an extensive range of possibilities. Deleuze and Guattari (1980, p.287) recall that references to animals are filled with projections and inspirations arising from the following relationships: man-animal, man-woman, man-child and humans with the elements, with the physical universe and the micro-conscience.

Based on Deleuze and Guattari, Lestel (2004, p.17) indicates that there is much to reflect on the character and meaning of these relationships. Mullin (1999), for example, discusses how the categories and representations of relationships between humans and animals, nature and culture, are windows and mirrors to reflect on the construction of conceptions of race, class and gender identity.

Moreover, on the academic plane and from the perspective of comparative relationships, there are many gaps in what we know about what is analogous or homologous between physical and nonphysical aspects of the evolution of humans and our closest relatives. Despite the enormous relevance of the topic (Waizbort, 2005), the circulation of ideas between the biosciences and the social sciences (Rapchan, 2010, 2005) is still precarious, but it can be broadened.

At present, despite the monologues in each subject painstakingly cultivated by most practitioners of the biosciences and the social sciences, there are significant changes in scientific and common sense conceptions about animals, humans and their relationships. Over the past fifty years, the status of the ape has changed significantly in the Western imagination (Corbey, Theunissen, 1995), in conservationist policies led by primatologists (Jahme, 2001; Schapiro, 2003) and in scientific systems of classification, both in genetic terms (Goodman, 1999; Prüfer et al., 2012) and in cognitive and behavioral terms (Cheney, Seyfarth, 1990, De Waal, 2007; Gibson, Ingold, 1995; Hrdy, 2000; Laland, Galef, 2009; Mithen, 1996; Tomasello, Call, 1997; Wrangham et al. 1994). Currently, for example, there is a common consensus among scientists on the classification of all humans in the group of major primates (Dawkins, 2009, p.141).

The situation today has thankfully changed, when compared with the polarization of ideas associated with the rise of Darwinism in the late nineteenth century, when those who rejected the proposition of the existence of a common ancestor for humans and other primates distorted Darwinist ideas by means of caricatures (Corbey, Theunissen, 1995). Extrapolated to the classification of human populations, such ideas produced hybrid categories which, due to imperialism, patriarchism and racism, promoted approximations between primates, real or imagined, and the non-European peoples (Pieterse, 1995).

Anthropology and primatology: fieldwork and the epistemological revolutions

The unfamiliarity, the curiosity, the revulsion and the need to classify the unknown from its own parameters are basic components of European ethnocentrism (Lévi-Strauss, 1963; Said, 1995) between the mid-nineteenth century and the 1930s. In that period, varied expressions of this ethnocentrism were replicated in a curiously similar manner in the production of systematic knowledge about apes and about non-Europeans, including the peasantry and the poor Europeans.

Both chimpanzees (*Pan troglodytes*) and gorillas (*Gorilla gorilla*) and also humans whose way of life did not correspond to the Western and civilized elite were observed, described and depicted by adventurers, missionaries, naturalists, travelers, scientists, explorers and hunters. In Africa, reports were produced from fleeting contacts, and specimens of chimpanzees were sent from there to be examined by scientists who lived in regions considered to be civilized in America and Europe (Reynolds, Reynolds, 1965, p.394-395).

In a parallel manner, Amerindians, Africans and representatives of populations from Oceania were sent to exhibitions in Europe and the United States. Poliakov (1974) presents a substantial account of the analogies made between apes and non-European peoples, based on the identification of anatomical or physiological similarities between both by naturalists and scientists between the eighteenth and twentieth centuries. The ideas produced by such comparisons predominated in the social practices of Europeans in relation to non-Europeans for decades (Pieterse, 1995).

In contrast, throughout the twentieth century, both primatology and socio-cultural anthropology were radically altered after the adoption of systematic fieldwork as one of the essential sources of material for their research. In both fields, prolonged, systematic and continuous periods spent in research areas profoundly changed their ways of producing knowledge.

The records of 1896 of the pioneer in studies of animal behavior particularly interested in communication, Richard Lynch Garner (Fischer, 1976), are considered the first attempt to study wild chimpanzees and gorillas (Reynolds, Reynolds, 1965, p.394). The first report produced from a longer field study (49 days), is attributed to Henry W. Nissen, researcher and director of the Yerkes Primate Biology Laboratory (Carmichael, 1965), for his work conducted in East Africa, in 1931 (Reynolds, Reynolds, 1965, p.395).

The period that might be called 'the modern era' in the study of chimpanzees starts around 1950, with the extension of the increasingly detailed observation periods (De Vore, 1965). Focuses on the collective behavior of chimpanzees only emerged in the following decade (Reynolds, Reynolds, 1965, p.395).

In the 1960s, the social anthropologist De Vore (1965) published his research on baboons, which was the result of an exercise in fieldwork and a record heavily influenced by ethnographic practice. De Vore was sent out by paleoanthropologist Sherwood Washburn, to conduct this seemingly unusual work, though it made a decisive contribution to primatology (Kuper, 1994).

Washburn intended to draw up models of behavior that make it possible to find comparisons between modern hunter-gatherer populations, hominids and nonhuman

social primates (Kuper, 1994). This initiative was sharply criticized by Lévi-Strauss (1963), who pointed out the flaws in the models that sought to compare behaviorally modern humans, our contemporaries, and other hominids in terms of social organization. However, the outcome was that De Vore (1965) provided us with the results of a groundbreaking work on the behavior and ecology of baboons, filtered through a keen ethnographic eye.

Jane Goodall at Gombe National Park in Tanzania since 1960; Toshisada Nishida, in the Mahale Mountains National Park since 1965; and Christophe and Hedwige in Boesch in the Taï Forest in the Ivory Coast since 1976, were the precursors of the three research projects on chimpanzee behavior that are acknowledged as accumulating the longest continuous observation of these individuals (Goodall, 1994, p.XV-XVII).

The intense and profound contact of anthropologists and primatologists with the populations studied reformulated the research practices as fieldwork became established as the research method. One cannot, however, equate both of these disciplines in this regard.

While the immersion into intersubjectivity was a one-way street for socio-cultural anthropology (Lévi-Strauss, 1963; Oliveira, 1997), this was not the case with primatology. Despite the fact that the primatological object consists of beings of distinct species, both are actors, and the interaction is actually possible. However, in the last two decades, primatology departed from the ethnographic discourse (Strier, 2003, p.16), perhaps in search of objectivity and the establishment of boundaries between academic discourse and the deep personal involvement of many primatologists with conservationist practices (Jahme, 2001; Schapiro 2003).

Whatever the case and despite differences, undoubtedly the consequences of such intensive fieldwork were one of the most fundamental factors for profound reformulations in the scope of knowledge about anthropology and primatology. The fieldwork also made it possible to obtain surprising data and promoted empathetic interactions between researchers and the beings studied. Thus, anthropology and primatology experienced dramatic changes and in this manner acquired their broader contemporary profiles.

Since the early twentieth century, anthropology has accumulated consistent arguments to transform abstract ideas about humanity into solid concepts about the unity and homogeneity of human capabilities. Highly detailed records about each human culture have been gathered. For its part, primatology concentrated on studies on behavior and has produced an immense volume of data on the production and use of tools (Boesch, 1990; Davidson, McGrew, 2005; Matsuzawa, 2001; McGrew, 1994), social dynamics (Arcadi, Wrangham, 1999; Arnold, Whiten, 2001; Baker, 2000; Baker, Smuts, 1994; Boehm, 1994, De Waal 1994, 1996, 1998, 10 set. 2006; Mason, Mendoza, 1993; Parr, De Waal, 17 June 1999; Wrangham Peterson, 1994), as well as communication (Hewes, 1995; King, 2004; Parker, Gibson, 1994; Wokler, 1995), and cognition (Carpenter, Tomasello, Savage-Rumbaugh, 1995; Hooff, 1994; Joulian, 1996; Rumbaugh, Savage-Rumbaugh, Sevcik, 1994; Shettleworth, 2009; Tomasello et al. 2005).

Moreover, in relation to chimpanzees, for example, primatology has provided input to foster two of the major ethical debates of the twenty-first century. The first concerns the 'person status' of nonhuman animals. The second refers to the approximation between the predation of wild chimpanzees and their risk of extinction.

In the first case, based on the knowledge that chimpanzees are social animals that have profound and lifelong bonds with their group (De Waal, 2007; Dunbar, Oct. 2003; Dunbar, Schultz, 2007), have memory (Tomasello, 1994a, 1994b, 1999) and refined cognitive abilities (Fouts, Mills, 1997; Savage-Rumbaugh, Rumbaugh, 1995; Tomasello, 1994a, 1994b, 1999), movements were created seeking to safeguard chimpanzees living in captivity.

The major targets of these movements are private breeders, namely the cosmetic and pharmaceutical laboratories and those geared to disease-oriented research, the entertainment industry, parks and zoos (Goodall, 1994; Jacobson, 2010; Oates, 2006). They strive to protect chimpanzees from maltreatment and guarantee their rights. There are even initiatives in favor of eliciting social debate about the possibility of raising chimpanzees to the legal status of 'persons' (Cavalieri, Singer, 1995).

On the other hand, by revealing the broad intergroup variety of behavior patterns of wild chimpanzees and the great cognitive abilities of chimpanzees reared in humanized environments, primatology draws attention to another problem. African wild chimpanzees are often subject to predatory hunting, the devastation of their habitat and the terrible consequences of civil wars, to which human populations are indeed also sadly subjected.

In this context, a new standpoint has emerged regarding the problem of the imminent extinction of chimpanzees: that their disappearance is not confined to the death of individuals or the disappearance of a species which, in itself, is already a tragic and inexcusable loss. The contemporary perception of primatologists about behavioral diversity suggests that threats to populations of wild chimpanzees are also threats to unique, irreplaceable expressions of collective life. Thus, exterminating a population of chimpanzees is tantamount to exterminating a culture (Goodall, 1994; Whiten, 2005).

From the grotesque to the similar; from the small group to complex sociability

Since the 1960s, after the publication of the first results of field studies on wild chimpanzees, amazing research data have emerged. The reaction of amazement of Louis Leakey, the renowned paleoanthropologist, almost seems prescient upon reading the report by Goodall on the use of tools by chimpanzees, when he said: "Now we must redefine tool, redefine 'Man', or accept chimpanzees as humans" (quoted in Goodall, 1991, p.23, emphasis in the original).

Almost simultaneously, in addition to recording the use of tools, Goodall (1991) was also responsible for reporting of the first information on consumption of meat by chimpanzees. However, just like the earlier researchers, she was initially unable to identify organizational structures in the groups she studied. It was Nishida who proposed a model to explain the chimpanzee social grouping which he called a unit-group (Stanford, 1998, p.400), an expression that was substituted by the term community by Western primatologists (Stanford, 1998, p.400).

From then onwards, the existence of social organizations of primates has become a reference for research (Rodseth et al., 1991, p.222). It is most likely that this was only possible at that juncture due to the fact that Nishida is Japanese, as since the 1950s Japanese primatology, under the aegis of Kinji Imanishi (Perry, Oct. 2006), produced models to

describe the primate collectives and attributed the behavioral variations recorded to social interactions among animals.

In 1970, primatologists began to investigate the impact of environmental influences on the behavior of chimpanzees, and also to detect new elements of their collective structure. It was believed at the time that the organizations of wild chimpanzees are based on exclusively philopatric communities. The fact that they are defended by males who are born and remain in the communities ensures the stability of the group. Females for their part migrate from the community in which they are born to neighboring groups (Stanford, 1998).

According to the researchers, this explains the fact that the social bonds of the males are stronger than the females (Stanford, 1998, p.400-401). Later, Goodall realized that the status of a female is decisive in her remaining in the group of birth or migrating (Goodall, 1991). Furthermore, it was seen that females transmit status to their offspring, both male and female, which benefits them if they remain in the group in which they were born.

In the late 1970s, McGrew and Tutin (1978) presented the first results of comparative interpopulational studies based on different behaviors. They were the first Western primatologists to associate the phenomena of behavioral variability with the existence of culture. However, it was only in the late 1990s that the idea of 'chimpanzee cultures' achieved greater visibility (Perry, Oct. 2006).

Between the 1980s and 1990s, knowledge about the enormous diversity of behaviors of wild chimpanzees increased. Chistophe Boesch, Craig Stanford, John Wallis, Eslon Mpongo and Jane Goodall identified variations in hunting styles (Stanford, 1998). Colin Chapman, Frances White and Richard Wrangham observed distinctions between the ecology of feeding in different groups (Stanford, 1998, p.401).

From that period onwards – and many researchers attribute this perception to the increasing number of women dedicated to primatology (Hrdy, 2000; Jahme, 2001; Schapiro, 2003; Strum, Fedigan, 2000) – the variability in behavior between sexes, from chimpanzee population to population was also noted (Stanford, 1998, p.401). Since then, new aspects of the behavior of chimpanzees have been periodically reported.

In the late 1990s, there were three major conferences that brought together the most important primatologists dedicated to research on chimpanzees. Two of them were part of the *Understanding Chimpanzees* cycle that began in Chicago in the 1980s. These events resulted in the making of a public and collective defense of the existence of chimpanzee cultures by many of the most eminent Western primatologists (Wrangham et al., 1994, Whiten et al., 1999). The impact of this on the media and on circles of scientists was significant.

According to Lestel (1998, p.209), the accumulation of amazing stories about the behaviors of chimpanzees has indeed led the idea of 'animal culture' in a broader sense to be taken more seriously. For dealing with culture, primatologists, in general, were inspired by the six criteria presented in the 1950s by cultural anthropologists Alfred Louis Kroeber and Clyde Kluckhohn (Lestel 1998, p.211) as the expression of a synthetic definition that is valid for any human culture, namely innovation, dissemination, standardization, durability, diffusion and tradition.

To these factors, McGrew and Tutin (1978) added non-subsistence and natural adaptiveness (behaviors not stimulated by human influence) (Lestel, 1998, p.211). According to Lestel (1998, p.211), although no single chimpanzee population has all these characteristics, observations on the behavior of chimpanzees that are noteworthy correspond to each criterion indicated.

From the framework defined in the above mentioned conferences, significant initiatives have emerged in conducting joint projects for the development of comparative studies (Heltne, 1994, p.XI; Whiten et al., 1999, 2001, 2007) and standardization of fieldwork procedures (Goodall, 1994, p.XIX). However, the most relevant result was the value attributed to the behavioral diversity of wild chimpanzees, emphasizing its complexity, variability, stability and plurality.

Strictly speaking, 'chimpanzee cultures' are conceived as variations in behavior, the causes of which are not strictly genetic or ecological. In this sense, they come quite close to the definition of 'tradition' in ethology (Fragaszy, 2003). However, some primatologists, including Whiten (2005), have argued that 'chimpanzee cultures' are different from 'traditions' because the former correspond to a large number of behavioral variables (more than thirty), while the traditions recorded in other species, for example, in cetaceans (Rendell, Whitehead, 2001) and New Caledonian crows (Holzhaider, Hunt, Gray, 2010; Holzhaider et al., 2011), are restricted to one or two variable behaviors.

On the other hand, the proposition of the existence of 'chimpanzee cultures' mandatorily requires the endorsement of socio-cultural anthropology. The majority of anthropologists have abandoned the above criteria of Kroeber and Kluckhohn for human cultures as they consider them too simplistic (Ingold, 2001). The more one appreciates that cultural phenomena are essentially symbolic phenomena, the definition of cultural anthropology becomes increasingly unsatisfactory for anthropologists themselves.

Consequently, for anthropology, the phenomena recorded, quantified and defined by most primatologists as 'culture' do not correspond to the anthropological criteria of culture. By the same token, it is no longer possible to claim that chimpanzee behavior is solely guided by their instincts, despite the vast plethora of meanings that the word 'instinct' can acquire (Skrzypczak, 1996). Indeed, data on the considerable cognitive ability, behavioral plasticity and complexity in the social interactions of chimpanzees are continuously accrued.

This being the case, we move inexorably toward the consistent acknowledgement of the profound similarity between humans and our closest relatives (Fouts, Mills, 1997). Chimpanzees are not grotesque caricatures of humans. As we get to know them better, we understand more about the need for protection, not only of individuals or the species, but of each unique population. The need to adopt ethical standards in relation to them is becoming an increasingly public and consolidated stance at the same time as practically all the boundaries between human and nonhuman primates are dissipating.

Between jungles and laboratories: studies on behavioral variability and cognition

Modern research on chimpanzee behavior can be classified into two major groups. On the one hand, there are the studies that focus on the intergroup variability of behaviors

observed in wild chimpanzees (De Waal, 1999). On the other, there is the research that emphasizes cognition, developed mainly in laboratories (Tomasello, 1999).

Chimpanzees are intelligent and sociable creatures whose behavior is strongly influenced by their experiences and their life together as a group. Therefore, wild chimpanzees and chimpanzees that are born and/or living in captivity are potentially distinct beings. For this reason, research on one group or the other differs in terms of contexts and is distinguishable in theoretical, epistemological and methodological terms. However, as far as we know, both continue to be members of the same species. So perhaps, in given contexts, what is valid for wild chimpanzees is also valid for captive chimpanzees. The parameter for assessing the validity of such a claim can only be defined when we know how deep the influence of experience on the constitution of the ontology of chimpanzees really is.

As with wild chimpanzees, in the 1970s, studies of chimpanzees in humanized environments also experienced profound changes. At that time, the psychologist couple Beatrice and Allan Gardner began developing a project on language learning with chimpanzees received from the laboratories of the North American Space Agency (Nasa), when the agency began to abandon the experiments with rockets crewed with animals (Fouts, Mills, 1997).

The Garners' assumption was that the absence of a vocal apparatus in chimpanzees does not necessarily mean that they do not have the cognitive ability to learn a non oral language. Thus, they proposed to teach young chimpanzees American Sign Language (ASL). They were integrated into fully humanized environments in which all researchers, interns and chimpanzees only communicated by means of ASL.

The result was impressive. In addition to learning words and using them properly, the chimpanzees on the program created phrases and invented names for objects (Fouts, Mills, 1997). Chimpanzees like Washoe intuited terms and described events in coherent contexts.

Also since the late 1970s, Susan Savage-Rumbaugh has dedicated herself to research on language skills among apes, especially bonobos, in humanized environments. The main objective of her research and that of her collaborators is to check the learning and use of lexigrams by bonobos.

According to the researchers, Kanzi, a 26-year-old male bonobo with whom they had worked since she was born, understands three thousand words spoken in English. Moreover, she communicates through lexigrams, symbols inscribed on a board that correspond to familiar objects, favorite activities and concepts considered abstract. Currently, she is able to use 348 lexigrams and combine them to form expressions in a 'protogram'.

Data on cognition and transmission of behaviors arise predominantly from laboratory studies while data on variability of behavior patterns are the result of fieldwork. The problem lies in the fact that primatologists do not consider laboratory chimpanzees possess culture, unlike wild chimpanzees. The first is at most 'acculturated' by humans (Carpenter, Tomasello, Savage-Rumbaugh, 1995).

The records on the variability of behaviors of wild chimpanzees are extremely rich (Whiten et al., 1999, 2001, 2007). The primatologists operate from the standpoint that the basis of variability lies in transmission, but there is only one record on behavior transmission in the field (Boesch, 1991).

So the major challenge for primatologists dedicated to studying 'chimpanzee cultures' is dealing with a behavioral phenomenon whose essential feature, namely variability, is provided by transmission or by learning phenomena about which there are few consistent records (Call, Tennie, 2009; Gruber et al., 2009).

From cultures to social learning: symbolic transmission, cognition and capacity

One of the most important current debates about what we can learn and discover about the human condition is related to phenomena linked to culture, language and cognition. Such phenomena can be classified as non-physical aspects of evolution. The most varied disciplines and some of the most important contemporary discussions converge in this sense.

One of the core aspects of these discussions lies in the acknowledgement of the existence of several species of animals that possess a so-called 'social brain' (Dunbar, Schultz, 2007). This is associated with the understanding that life in groups and the necessary skills for this (recognition, interaction and communication capabilities, learning of behavior patterns appropriate to the group, etc.) are not restricted to humans. However, it is important to remember, though, that 'social intelligence' is not the only form of intelligence to be found in the animal kingdom (Thorndike, 1911).

Indeed, Dunbar (Oct. 2003) is conducting a fascinating study in order to examine the hypothesis of the existence of a 'social brain' (or 'Machiavellian intelligence') in primates. According to this hypothesis, primates evolved in order to be born with given cognitive and interactive capabilities, favorable to life in groups which, appropriately stimulated, promote the development of skills for cooperation and certain types of intelligence. Humans are a species that has a more developed 'social brain', followed by apes.

It follows logically that, even among nonhumans, there are behaviors related to life in groups that depend, though it is uncertain to what degree, upon the dynamics established between the members of the group itself. This focuses attention on social phenomena in nonhuman species that have that kind of brain.

Within groups of wild chimpanzees, there are certain behavior patterns that can be classified according to some kind of divide, and it can be seen that such behaviors are transmitted from generation to generation with high levels of stability, despite also being susceptible to the possibility of innovation (Davidson, McGrew, 2005).

One of the essential features of such behaviors is that they are reproduced by vertical (intergenerational), horizontal (between members of the same group) or oblique (between members of different groups) transmission (Castro, Toro, 2004, p.10237).

Transmission of behaviors is studied by primatologists based on emphasis on the 'social' perspective (Boesch, 2003, p.85; Fragaszy, 2003; Perry, Oct. 2006; Van Schaik, Pradhan, 2003, p.648) or the 'individual' perspective (Boesch, 2003, p.85; Call, Tennie, 2009, p.R982). According to Fragaszy (2003), for example, learning between primates is essentially social. In her analysis, the author replaces the emphasis on information sharing by the group dynamics in organizing activities and maintaining behaviors. All learning experience involves the exchange of meanings. Such meanings consist of social and asocial elements

(e.g. tools, food, environmental conditions). These elements influence the emotional and motivational states of the individuals and directly reflect on their behaviors

All these factors constitute a 'network' that makes it impossible to disassociate the social factors from the asocial factors in relation to the individual. In this context, it is more appropriate to conceive of social learning as a set of factors that influence action and not as a specific, representational and abstract process of transmission of information (Fragaszy, 2003).

Van Schaik and Pradhan (2003, p.648), for their part, suggest that opportunities for social learning are proportional to the degree of proximity between the neophyte and the expert and the number of experts that are in the group. According to them, in highly tolerant social organizations, social learning occurs through vertical, horizontal and diagonal transmission. In despotic groups, which are most common among primates, vertical transmission is predominant coupled together with some other types of transmissions (Van Schaik, Pradhan, 2003, p.648).

According to these primatologists, modes of transmission may occur by observation followed by trial and error (Boesch, 2003, p.85, Castro, Toro, 2004, p.10236; Enquist et al., 2010 , Gruber et al., 2009, p.1806; Schöning et al., 2008, p.48-49), by facilitating learning (Boesch, 2003, p.85; De Waal, 1999, p.635; Premack, Hauser, 2001, p.350-351), by intentional teaching (Boesch, 1991) or by imitation (Castro, Toro, 2004, p.10238; Janson, Smith, 2003, p.57-8; Slater, 2001, p.356; Whiten et al. 2001; Whiten, 2005, p.52-53). Despite the apparent similarity between the first and the last mechanism, the perfection of the result in behavior transmitted by imitation is almost immediate. In observation followed by trial and error, on the other hand, there are several steps between the time when neophytes have contact with the new behavior and the development of their ability to perform it satisfactorily.

Castro and Toro (2004, p.10236) note that primates maintain brain structures intact from the evaluation systems necessary for learning by trial and error. According to them, in mammals, these systems are phylogenetically older than those associated with the capacity for imitation.

Among wild chimpanzees, in addition to the mechanisms of trial and error, the strongest evidence of forms of transmission encountered refers to observation and facilitation of learning. However, there is a single record in the literature of the behavior of active intention to teach among wild chimpanzees (Boesch, 1991, 2003).

This single record reinforces the comment by Ingold (1988). According to this author, chimpanzees learn but do not teach because teaching is an action that mandatorily implies a symbolic exchange. This backs up our observations that chimpanzees do not possess culture in the anthropological sense.

It is precisely within the scope of the transmission of behaviors or social learning that some researchers establish the boundaries that seem to differentiate humans from chimpanzees (Boesch, 2003; Call, Tennie, 2009; Tomasello, 1999; Van Schaik, Pradhan, 2003). Among these, there are experts on animal behavior who claim that when transmission of behavior patterns occurs within a population, there is always the occurrence of 'culture' (Janson, Smith, 2003, p.57-58; Richerson, Boyd, 2005; Tomasello, 1999). However,

human cultures are different from animal cultures because they are 'cumulative' or because they have the 'ratchet effect'.

Broadly speaking, according to the ratchet effect concept, emphasized for example by Tomasello (1999, p.509), uniquely human cognitive skills foster the storage of individual or social information such that the inventions made by an individual or a group can be reproduced and modified. Similarly, the idea that human cultures are 'cumulative' points to the fact that its elements are preserved to form a heritage that, in turn, can be redeemed or innovated.

However, both 'cumulative cultural evolution' and the 'ratchet effect' have been questioned by some primatologists as acceptable boundaries between humans and chimpanzees. According to Whiten et al. (2007), while for millennia there are no records of innovation in the use of tools by hominids, a few decades of observing wild chimpanzees have revealed consistent data regarding the occurrence of innovations at this level. They ask themselves, when faced with this fact, if such innovations might not be evidence of a 'cumulative culture', and they tend to respond in the affirmative.

However, it is necessary to reflect carefully about this. To make more accurate comparisons between the variance observed in the tools of chimpanzees and the apparent immutability of the tools of hominids – rejecting the hypothesis of the 'Upper Paleolithic creative revolution', which allegedly expanded the inventive capabilities to levels encountered for modern humans – one should also collate the time and cost required to construct one and the other.

Perhaps the stability observed in the making of tools by hominids is linked to unwillingness to discard precious resources and not the inability to innovate. One notes that, for example, the time spent by a chimpanzee to produce a tool is probably much less than the time spent by a hominid. Moreover, innovations do not always and necessarily correspond to improvements in living conditions. The capacity for analysis and decision-making when faced with a favorable or unfavorable choice regarding innovation can, for example, be evidence of complex thinking as much as the ability to produce new items.

In the same vein, Whiten et al. (2007) present examples which, according to them, are modest but valid expressions of the 'ratchet effect' among chimpanzees. One of these examples is the variety of methods used for gathering ants in agglomerations of these insects, which can inflict very painful stings. To deal with this problem, in Bossou and Taï, chimpanzees use a short twig to transfer ants quickly and directly into the mouth. In Gombe, however, a long stick is prepared and once many ants are on it, the other hand is agilely used to scrape them from the stick scooping them straight into the mouth. It would seem that this technique is four times more efficient than techniques used elsewhere. The authors assume that it was not invented in this format, but was derived from a simpler method, which suggests it is a case of the 'ratchet effect' (Whiten et al., 2007).

The intentional attitude of teaching, taken as an essentially human characteristic (Ingold, 1988), is according to many primatologists also to be found among chimpanzees (Boesch, 2003), despite the rare existing records.

In Taï forest, young chimpanzees learn to break chestnuts by watching their mothers. According to Boesch (2003, p.85), it occurs in three distinct phases of growth, and mothers

create situations that facilitate the association between the act of breaking chestnuts and getting food.

According to the author this context signals the occurrence of a 'pedagogical action' by the mother chimpanzees that facilitate, stimulate and behave in such a way as to promote active teaching. The opportunity to register these episodes is, however as already mentioned, very rare. Boesch was also criticized to the extent that the facilitation of observation is not exactly a 'pedagogical action'. To his critics, the primatologist responds that learning by observation is very common among humans. In some societies, it is indeed dominant.

However, it should be pointed out that the dimension of observational learning highlighted here suggests two limiting factors for equating 'chimpanzee cultures' to human cultures. One is the emphasis on the purely functional aspect of behavior. Ideas, values or meanings are systematically ignored here, though they are essential in the learning process of a given culture for a neophyte. The other factor corresponds to the fact that observation may be a good learning strategy for techniques. However, social rules, myths, values and ideas require other types of vehicle to be transmitted, for example language, emblems or rituals.

The aforementioned difficulties relating to the assessment of the variation in behavioral patterns via transmission, which are essential for primatological conceptions of culture, have led some of the most influential primatologists in the debate to explore other ways. De Waal (1999, p.65), for example, suggests that the emphasis of the work on 'chimpanzee cultures' should be on the variability of behavior itself, rather than addressing their transmission mechanisms. According to him, the core nucleus of the biological definition of culture is the variation that generates a unique set of behaviors that are characteristic of each group. The mechanisms for the propagation of culture (imitation, teaching or language) are secondary factors in the author's opinion.

Boesch (2003, p. 83), for his part, provides a classification of concepts of culture with distinctive emphases in psychology and biology. According to the author, culture in terms of psychology, corresponds to the learning processes involved in the cultural transmission of information. For biology, which is interested in the processes of evolution of culture, it is a type of phenomenon that has a more rapid impact on organisms than genetic evolution, because it is independent from reproductive events.

The problem is that in order to defend this argument he overlooks the fact that social phenomena have their own dynamics. For this reason, permanence or change in behavior does not depend exclusively upon the emergence of innovations or not, nor on their power of dissemination and fixation among members of a given group. It depends fundamentally on values and ideas associated with what remains and what changes in the dynamics of collective behavior.

This means that we again find here the limits posed by the symbolic character of human cultures on the primatological or biological definition of culture. This strengthens the probability of absence of culture in other species.

Imitation is behavior more commonly observed in laboratory experiments (Tomasello, 1999; Whiten, 2005), i.e. among chimpanzees reared by humans (Castro, Toro, 2004, p.10238). One might even be led to think that chimpanzees in these 'unnatural' conditions

of socialization (Shanker, King, 2002, p.618), learn elements of human cultures by imitation, but do not produce their own cultures. As for wild chimpanzees, Castro and Toro (2004) observe that some authors acknowledge their ability to imitate, while others doubt that this is truly possible in their original habitat.

Culture, cultures: anthropocentrism or anthropological rigor?

Some primatologists who are internationally renowned for their research on chimpanzees (Boesch, 2003; De Waal, 1999; McGrew 1992, 2004; Whiten, 2005) have argued that questioning the validity of the term culture to define varying patterns of behavior among wild chimpanzees is exclusively based on anthropocentrism. With his arguments, Boesch (2003) sets out to question what he calls the golden barrier between human cultures and the 'chimpanzee cultures' based on recent research results.

According to him, research such as this provides data that reinforce intergroup differences in patterns of behavior and the occurrence of behavioral innovations in short periods of time, when compared to the stability of standards of tools of hominids, for example, and the existence of flexible material cultures. All of these factors prove to Boesch (2003), that the differences between human cultures and 'chimpanzee cultures' are differences of degree.

In order to prove the conditions for the existence of 'chimpanzee cultures', Boesch (2003) emphasizes the patterns, mechanisms of social cognition and especially behavioral variability. He also discusses the symbolic dimension of 'chimpanzee cultures' emphasizing the potential variation of meanings that can be associated with one action. In this case, he analyzes leaf clipping.[2]

Boesch (2003) then considers the symbolic dimension of behavior based on the verification that the same behavior (leaf clipping), in different groups, is associated with different intentions of the agent and different reactions on the party of members of the group. However, there is no evidence that the meanings are grasped by the researcher. What one sees is that it is possible to correlate a given action (which may well have arisen randomly from the behavior of an individual and spread within the group) and the reaction to such action.

Contrary to what the author says, this situation may, at most, be a communication mediated by a sign (leaf clipping) which, in different groups, represents different things. Boesch (2003) uses the term 'symbol' when it is really a sign. Although both are arbitrary, the symbol relates to multiple meanings and it is virtually impossible to exhaust its meanings, which may even be contradictory. In our society, for example, flowers appear both in marriage rituals and in funerary rituals.

This occurs because the symbol is linked to the social dynamics of phenomena related to the same group and even their material culture, producing meanings that are part of rituals, mythology, social organization, art and technology. A sign does not have the same role. It serves to communicate specific information such as: "Danger!" "Sex," "Stop." This also suggests that not all forms of communication are necessarily symbolic.

Whiten (2005, p.52) indicates the similarity between human cultures and 'chimpanzee cultures' based on the comparison between the two by examining three aspects, namely

the degree of standardization of traditions in a population, the mechanisms facilitating the transmission of traditions and the content of the traditions. Two years later, Whiten (2007, p.17559) refers to research conducted by Lycett, Collard and McGrew (2007), which uses cladistic methods to compare the behavioral variations of several populations of African wild chimpanzees in order to propose the foundation of a 'pan-anthropology', an expanded science of culture, an anthropology with broader purposes than exclusively dealing with human populations and that also includes the 'chimpanzee cultures'. For this, the findings of variations in behavior patterns in other species (primates or otherwise) should expand the possibilities of building bridges between the human forms and nonhuman forms of culture, in what they consider to be a more exciting and integrated proposition of 'science of culture' than anthropology has been to the present day (Whiten, 2007, p.17560). The big problem of the arguments of primatologists in favor of the extension of cultural phenomena to certain sets of behaviors of chimpanzees lies in the fact that they refuse to reflect on the diversity of phenomena to which the word 'culture' is assigned. They prefer labeling their critics anthropocentrics rather than observe that the abandonment of the conceptions of Kroeber and Kluckhohn on the part of the socio-cultural anthropologists is due more to the inability of the definition to satisfactorily embrace the cultural phenomenon in its full symbolic character, than to a strategic effort to maintain the human prerogative before other species.

Final considerations

Among paleoanthropologists, there is a strong tendency to uphold that the symbolic capacity is only found in *Homo sapiens*. The mental rearrangement which turned us into symbolic beings, when it emerged in the evolutionary process approximately forty thousand years ago, invaded all aspects of collective and mental life and promoted the emergence of art, myths and rituals (see the analysis of research results in Diamond, 1992; Mithen, 1996; Neves, 2006; Rapchan, Neves, 2005). In addition, advanced aspects of cognition, such as abstract thinking and complex language, which depend on the symbolic capacity also became feasible.

Paleoanthropology has been intensely dedicated to find out from when, or from whom, it is possible to trace the origins of what we call the modern human (Mithen, 1996), which includes research on the evolutionary origins of culture. Using a radically different theoretical and methodological approach, paleoanthropology has expressed convergent views with respect to socio-cultural anthropology, with regard to the identification of indices of cultural production that, in this case, both hark back to symbolic capacity.

There are surprising paleoanthropological indications related to the appearance of cave paintings, to the variability in the standards of weapons and tools of the same type, to the emergence of adornments and burials that indicate its ritual character, with bodies arranged in standard postures and with the presence of objects in the tombs. These factors point favorably to a revolution in behavior (Neves, 2006), outlining the period of the emergence of modern humans. However, the significant change in relation to material found on older sites does not correspond with anatomical changes, especially in the shape

of the skulls of modern humans, after forty thousand years, compared to skulls of modern humans earlier than forty thousand years ago.

Therefore, the dramatic change in the behavior of hominids, known as the 'Upper Paleolithic creative revolution' is not related to physical changes of note, but certainly expresses profound changes in mental abilities and in many aspects of behavior and group life. These changes range from the use of waste such as bones, teeth or horns of other animals as raw material for the production of artifacts to the production of ornaments and painting pictures, through the printing of personal or group styles in stone tools and ritual burial of their dead (Neves, 2006, p.273). No hominid had done this before.

Bipedalism, manipulative ability and brain size are indicators of the anatomical proximity between the great apes, hominids and behaviorally modern humans. In contrast, our unlimited capacity for symbolic and artistic expression that includes articulated speech appears to be unique among the species.

The full human symbolic capacity permits the production of complex meanings, abstraction and the displacement of information from one domain of the brain to others (Mithen, 1996). Symbols play an essential role in such operations. Art, science, social institutions, linguistic systems, myths and religion are expressions of this capacity and therein lies culture. The emergence of the ability to produce and reproduce symbols also coincides with the emergence of capabilities that, according to Mithen (1996), are the origins of cognitive science, such as the ability to generate and test general hypotheses, the ability to develop and use tools or objects to test specific hypotheses and the possibility of using metaphors and analogies as "tools of thought" (Dennett, 1997, p.100).

The principle according to which we are all primates and therefore have more similarities than differences (De Waal, 10 set. 2006), has gained increasing consistency and more meaning as research moves forward. More than that, the negation of the separation between body and soul or body and mind, which acquired shape with the materialism of Darwin, proves to be valid (Rapchan, 2009). With the exception of culture, whose origins are also evolving, it is confirmed that most of the differences between us, human and nonhuman primates, are gradual and not essentialist.

Therefore, it is precisely the convergence between the phenomena related to 'culture', 'sociability', 'cognition' and 'symbolic capacity' which gives rise to one of the most important current debates about what we can learn and discover about the human condition and its relations of similarity and difference in relation to other species. Put differently, the existence of several species of social animals is associated with an understanding of what forms of intelligence similar to human intelligence are to be found in species that have greater genetic proximity to humans, resulting in collective behaviors of similar complexity (Dunbar, Schultz, 2007). On the other hand, at the same time as one sees the importance of sociability for interactive and cognitive development of non-human species and the cognitive similarities between humans and other species that have social intelligence, there is no convincing evidence that what scholars of animal behavior call 'culture' is in any way similar to the human capacity to produce and reproduce symbols, which are an essential factor for their existence.

It is essential to reflect on this subject from the standpoint of multidisciplinary perspectives that include socio-cultural anthropology, primatology and paleoanthropology. If this is not done, primatologists continue to reproduce the paradox of rigorously gathering and organizing surprising data while they continue to be bound by the rhetoric of a blind defense of the existence of a phenomenon that, as conceived by anthropology, does not correspond to their research results.

NOTES

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[1] 'Ape' is the word used to translate the Brazilian word 'mono', adopted by the researchers at LEEH-USP/IB, as the word ape encompasses the group of primates formed by bonobos, chimpanzees, gorillas and orangutans.

[2] Leaf clipping is "a behavior whereby chimpanzees bite a leaf into pieces to produce a ripping sound without eating any of the leaf" (Boesch, 2003, p.86).

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