

THE CULTURED CHIMPANZEE: NONSENSE OR BREAKTHROUGH?

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ABSTRACT

Controversy surrounds the claim that non-humans are culture-bearing creatures, yet the field of cultural primatology continues to progress. Using the chimpanzee as an example, this essay recounts the historical background to cultural primatology and its stage-wise development from natural history to ethnography to ethnology. First, it summarises the case for cultural primatology being nonsense, based on human uniqueness, dependency, transmission mechanisms, special pleading, language, and cumulative culture. Then, it counters with the case for cultural primatology being a breakthrough, citing multi-level comparative studies, universals, nuanced variation, and primate archaeology. Taking into account the strength of this diverse but convergent evidence, the breakthrough verdict is favoured.

Keywords: *culture, tradition, chimpanzee, technology, primate archaeology, universals*

INTRODUCTION

Primatology has many subdivisions, some traditional, such as ethological primatology, and some more recent, such as applied primatology. In recent years, a field of enquiry has emerged that has come to be known as cultural primatology (McGrew 2004). Such a development perhaps was inevitable, given the realisation of the pervasiveness of social learning in these large-brained creatures, coupled with their long lives and varied manifest

behaviours. Further, decades of study of certain species, notably the chimpanzee (*Pan troglodytes*), led to the accumulation of much behavioural data that suggest abiding traditions.

However, the phenomenon of culture (like language) long has been thought to be the exclusive province of humans, at least of anatomically modern *Homo sapiens*. So, when primatologists proposed cultural explanations for non-human primate behaviour, this met with resistance from social scientists, especially in socio-cultural anthropology. These so-called ‘culture wars’ continue, and a range of expert opinion is readily available (e.g. Hill 2009 *vs.* McGrew 2009, 2010). The aim of this chapter is to tackle these issues, first by summarising the origins and development of cultural primatology, then by comparing the two most extreme viewpoints. These are that cultural primatology is an absurd or at least unproven proposition *versus* its being a game-changing advance with profound implications.

Before continuing, the issue of *definition* needs to be tackled. Whole monographs have been written on this topic, and there is no consensus. In itself, lack of consensus is no problem, as different questions may require different definitions, such as theoretical *versus* operational ones. The standard foundational definition is Tylor’s (1871), “...that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society.” Apart from its compulsive inclusiveness and inherently speciesist stance, it raises more problems than it solves, as each of its component terms also requires definition. A current theoretical definition that is more manageable (though still plagued by the listing of attributes) is Mesoudi’s (2011): “...information that is acquired from other individuals via social transmission mechanisms, such as imitation, teaching, or language.” However, Mesoudi’s definition is not empirically useful, unless ‘information’ can be operationalised for behavioural study. For this paper, I will re-use a five-word definition “the way we do things” (McGrew 2004) that emphasises the features of norms, sociality, action, and collectivity.

ORIGINS OF CULTURAL PRIMATOLOGY

The phrase ‘cultural primatology’ came into use much later than the key ideas emerged. In my opinion, the first serious contemplation of the topic arose from a debate between Wolfgang Koehler and Alfred Kroeber, as published (notably!) in a major journal in biology (Kroeber 1928). They imagined dancing chimpanzees and then outlined six criteria, which if met, would allow that phenomenon to be acknowledged as cultural. This was a purely theoretical exercise, but it was grounded in Koehler’s extensive and intimate experience of chimpanzee behaviour.

Empirical study of non-human primate culture had to wait another 20 years, until Kenji Imanishi and his students began studies of wild Japanese macaques (*Macaca fuscata*). Their best-known research took place on Koshima, an offshore island, where their provisioning of the monkeys led unexpectedly to what they called ‘preculture’ or ‘protoculture’ (Imanishi

1960). Spontaneously, the monkeys invented sweet-potato washing and cereal-sluicing, and these innovations were followed from onset to dissemination. Other novel behavioural patterns emerged, some of which had nothing to do with provisioning.

For chimpanzees, the first person to assert evidence-based culture in these apes was Jane Goodall, when she was still a PhD student, in only her second publication. Speaking of the extractive technological behaviour of termite fishing, which involved both the making and using of tools, she said, “It is a social tradition which represents the emergence of a primitive culture—if culture consists of behavior patterns transmitted by imitation or tuition.” (Goodall 1963).

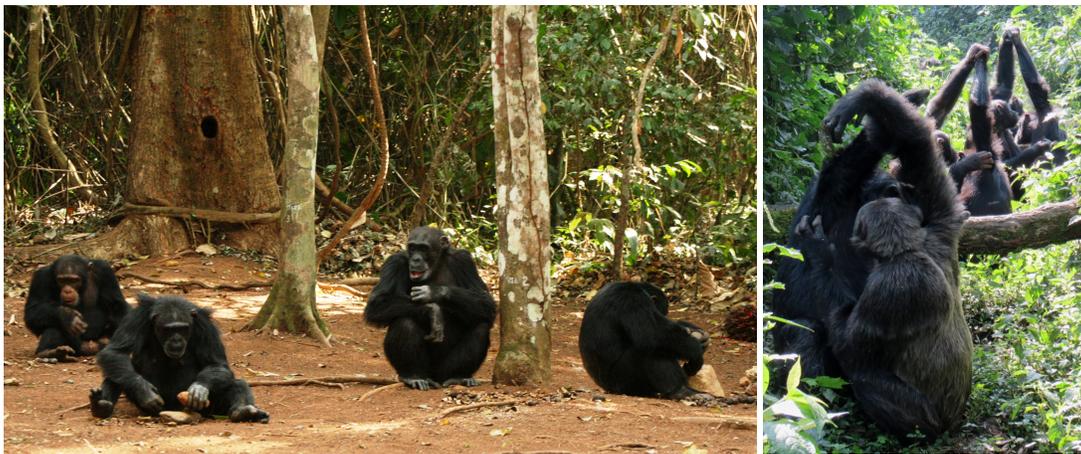


Figure 1. a) Left: Chimpanzees use stones as hammers and anvils (percussors) to crack open oil palm nuts, Bossou, Guinea. (Photo by S. Carvalho). Right: Chimpanzees engage in the grooming hand clasp during social grooming, Kibale, Uganda. (Photo by K. Koops)

The first attempt to synthesise cultural primatological findings was a symposium convened by Emil Menzel (1973), which appeared as an edited volume entitled *Precultural Primate Behaviour*. Strictly speaking, this wording indicated near-culture, rather than the full-blown phenomenon, but the cautious usage was typical of the time. The most notable paper was Goodall’s, whose chapter was the first to compare chimpanzees across study sites.

A notable milestone in cultural primatology was the publication of Whiten et al.’s (1999) comparative paper in *Nature*. It compared wild chimpanzee behaviour in six long-term study sites in East and West Africa, showing that 39 patterns showed meaningful cross-population variation. That is, the authors systematically coded habitual or customary variation that could not be explained by genetic or environmental causation, hence by exclusion, it was cross-cultural variation. The method was soon adopted by others studying orang-utans, bonobos, capuchin monkeys, and spider monkeys.

DEVELOPMENT OF CULTURAL ‘PANTHROPOLOGY’

The bad pun is Andrew Whiten’s, but the term reflects the prominence that the genus *Pan* has played in the development of cultural primatology over the last 50 years. In retrospect, one can see three stages of development, which follow the same three stages in the development of cultural anthropology, from its origins in the 19th century.

The first stage was *natural history*, reminiscent of a time when naturalists included ‘primitive’ humans in their academic jurisdiction. Reports were qualitative, often consisting of anecdotes or opportunistic observations. At the outset, especially before subject populations of apes were habituated to close-range observation, researchers took what they could glean from whatever chances were afforded them. These were the methods of the pioneering generation of ‘chimpanologists’ working in Tanzania and Uganda in the 1960s, such as Jane Goodall, Junichiro Itani, Toshisada Nishida, Vernon Reynolds, and Yukimaru Sugiyama. They laid the foundations, and most of their field sites continue today.

The second stage was *ethnography*, when behaviour was carefully described, ethograms defined, and categories classified. Each field worker focussed initially on a single site, eventually producing a monograph with the title format of *The Chimpanzees of ...* (*Gombe, Mahale, Kibale*, etc.). But having laid a foundation in depth at a single site, several researchers went on to do comparative work at one or more other sites, thus adding breadth. Christophe Boesch, McGrew, Sugiyama, and Richard Wrangham are examples. Finally, it was in this stage that Tetsuro Matsuzawa (2006) began serious experimental research in the natural environment, at Bossou, Guinea. He set up an ‘outdoor laboratory’, a clearing in the forest, where the elementary technology of the chimpanzees could be studied with some variables controlled, such as raw material abundance and quality, whenever the apes turned up.

The third stage can be called *ethnology*, if by that is meant theory-driven, hypothesis-testing efforts, often framed by modelling. The best-known example is the collective effort of the Collaborative Chimpanzee Cultures Project, cited earlier (Whiten et al. 1999). Data-sets were coded in ways that allowed independent and dependent variables to be analysed quantitatively by third parties (thus resembling Murdock’s standard *Cross-Cultural Sample* for human cultures). These same data provided fodder for modelling, especially using analytical methods borrowed from the natural sciences, such as cladistics, as pioneered by Lycett et al. (2007). Finally, at this stage, efforts spear-headed by Andrew Whiten and colleagues (2005, 2011) sought to simulate the processes of cultural transmission in the controlled environments of captivity. Experimental protocols, such as the two-action choice test (in which the same problem can be solved by either of two alternative solutions), were used to test the extent and utility of social learning of tasks.

NONSENSE?

Since the emergence of cultural primatology, there has been resistance, even ridicule, from sceptics. If they are right, then the discipline is spurious. These doubters come from both anthropology (Hill 2009) and psychology (Tomasello 1996, Galef 2009). So, what are the objections?

A simple argument merely states that culture is by definition uniquely human, assuming this to be self-evident. (Such an argument requires defining humanity, which is rarely done. Does 'human' here mean *Homo sapiens*? But what about Neanderthals? Etc.) Of course human culture is unique, by definition. Each species is unique and therefore, so is any attribute of that taxon, including culture. It seems strange that we have no problem in addressing other basic processes, for example, digestion, across primate, or mammal, or vertebrate species, but somehow we balk at culture. Such an assertion should be an hypothesis, not a premise.

Another statement frequently found in textbooks is that humans are uniquely dependent on culture, whereas other species can take or leave it. Unfortunately, this proposition is logically untestable, as we would need to have non-cultural humans with which to compare cultural ones, in order to investigate dependence. As human culture is universal, such a comparison cannot be done. As it turns out, every chimpanzee population that has been studied for the long-term turns out to be cultural too, suggesting similar universality. Some chimpanzee populations may depend on cultural patterns, such as extractive technological foraging in lean seasons (Yamakoshi 1998).

A third line of argument focuses on transmission mechanisms. That is, particular means of cultural transmission are said to be uniquely human, and these are presented as being essential to culture. A prime candidate was imitation (not to be confused with emulation), but carefully controlled (e.g. including a 'ghost' condition) empirical studies have shown that non-humans imitate (Whiten 2011). Another such rubicon is teaching, said by some to be uniquely human and essential to cultural transmission, especially of high-fidelity material (Thornton and Raihani 2008). Again, various non-human species appear to teach one another (although one must be careful to scrutinise the operational definition used in such studies, especially as contrasted with training). Finally, it seems anyway that culture can be transmitted with simpler mechanisms, such as a combination of stimulus enhancement and trial-and-error. This line of argument peters out accordingly.

Another line of argument focuses on a particular feature said to be crucial, such as brain size. A brain of ca. 400 cc or less, as found in living apes, is said to be insufficient to enable culture, a priori. Or, for the material culture of elementary technology, lack of flaked stone tools is said to be damning, as if unflaked lithics or modified non-lithics were somehow insufficient. Such arguments reach their epitomy in the 'Space Shuttle Fallacy' (McGrew 2004). What chimpanzee ever designed a space craft? Or composed a symphony? Or even cooked a soufflé? None, obviously. But in fact, most individual humans have done none of

these (have you?), nor have whole human societies (foragers). Using such a criterion from modern industrial society would exclude entire traditional populations of *Homo sapiens* from humanity.

A special case of this particulate argument is to appeal to language. If language and culture are inextricable, and only humans have full-blown language, then only humans can have culture. This begs several questions: Is language restricted to humans? The answer seems to depend on definition of the phenomenon. As it happens, there is nothing magical about language, and cultures emerge and develop in its absence, both in humans and non-humans.

A compromise argument is to distinguish between degrees of culture, such that non-humans are credited with some simple form of the phenomenon, while humans retain exclusive sovereignty over the more complex kind. As noted above, the former is distinguished by 'not-quite' labels such as 'pre-culture', 'protoculture', or just "culture". The latter are exemplified by imposing phenomena well-known to humans but usually yet unstudied in non-humans, labelled as institution, convention, ritual, morals, taboo, etc. Comparative investigation of these features depends crucially on their operational definition, which usually has yet to be done.

Finally, the most confidently asserted distinguishing characteristic of human culture is that it is cumulative, whereas non-human tendencies toward culture are not (e.g. Mesoudi 2011). That is, only humans refine and advance culture chronologically, building on the achievements of their predecessors. This is sometimes called the 'ratchet effect' (Tomasello 1994). Of course, there is the obvious semantic problem that ratchets only move in one direction, while cultures devolve as well as evolve, and that the 19th century notion of cultural evolution as progressive has long been abandoned. However, the existing ethnography of non-human primate behaviour in nature already contains examples of cumulative culture, meeting even the strictest criteria (cf. Dean et al. 2013).

BREAKTHROUGH?

Comparative studies

Most comparative studies of chimpanzees until recently have restricted themselves to the *species* level, that is, drawing intra-species comparisons across populations (demes) (Whiten et al. 1999). (Confusingly, however, populations sometimes are not the same as study-sites.) Similarly, even when comparisons are drawn across the four subspecies of chimpanzee, these may be labelled geographically, for example, as East vs. West African chimpanzees.

All chimpanzee *subspecies* engage in dipping for army ants (*Dorylus* spp.), but variation exists across them in technology and techniques employed (Schoening et al. 2008, Pascual-Garrido et al. 2013). Other patterns of material culture seem to be limited to one subspecies, despite the wide spread presence elsewhere of the same raw materials and resources. With one as yet unconfirmed exception, only *Pan troglodytes verus* engages in nut cracking using

the percussive technology of hammer and anvil (McGrew et al. 1997, Carvalho and McGrew 2012). (See Fig. 1)

Regional differences within a subspecies sometimes are huge: The *P.t.v.* chimpanzees of Fongoli, Senegal, occupy hot, dry and open savannas, where there are no nuts to be cracked. In the neighbouring country of Guinea, the rain-forest-dwelling chimpanzees of Bossou daily crack oil palm nuts using percussive technology with stone hammer and anvil. Carvalho & McGrew (2012) compared nut-cracking in nine communities on six variables (tool type, nut species, lithic raw material, transport, tool re-use, terrestriality/arboreality) and found much variation.

More recently, comparative analyses have been more precise and explicitly multi-level. Communities (or *groups*) that exchange genes and migrants within the same population show proven behavioural differences (Luncz et al. 2012). Thus, local behavioural differences between neighbours may be sub-cultural ones, and individuals who immigrate into another community may have to adjust their day-to-day behaviour (O'Malley et al. 2012).

Within communities, *lineage* differences seem to be emerging. Matrilineages differ in dominance (rank) status, such that high-ranking matriarchs occupy higher-quality core areas for ranging (Murray et al. 2007), and this may influence the frequency of performance of elementary technology, or even their dispersal patterns.

Finally, *individual* differences (idiosyncrasies) occur in the expression of some customary behaviour, as revealed by careful detailed analysis of (for example) chimpanzee females and their offspring using flexible probes to fish for termites (Lonsdorf 2006).

All in all, comparative studies at embedded levels of population size, from species to individual, yield differing results, which must be carefully noted, if we are to make sense of the cultural contribution to variation. Ethnographically, no population of chimpanzees that does termite fishing does nut cracking, and vice versa. Presence or absence of resources does not explain this exclusive relationship between two of the best-known patterns of chimpanzee material culture, so more study is needed (Koops et al. 2013).

Universals

Most studies of chimpanzee culture have stressed *differences* across units of comparison. Such a bias is not surprising, given that contrasts are always notable, especially at the outset of any investigation. However, with the development of cultural primatology, universals have emerged, that is, behavioural complexes that are present in all populations studied. Notably revealing has been Phase II of the Collaborative Chimpanzee Cultures Project (unpubl. data). In Phase I, Whiten et al. (1999, 2001) compared six study-sites on 39 behavioural variants, noting presence or absence of habitual/customary patterns. Phase II doubles the data-base to 12 study-sites and increases the number of candidate behavioural variants by more than an order of magnitude, to almost 600. This generates a master matrix of about 7000 cells, and given that each cell may have one of 16 code assigned, the number of codings to be done exceeds 110,000!

Scrutiny of the Phase II data-base reveals 35 behavioural complexes (that is, related sets of behavioural variants) that are universally found across Africa, from Senegal to Tanzania. (Also informative are ‘exceptions that prove the rule’, that is, when a complex occurs in 11 of the 12 populations.) These complexes cover all aspects of chimpanzee daily life, *in addition to* subsistence activities: self-maintenance (e.g. nest/bed construction), communication (drum), agonism (branch drag display), sexual relations (copulation interference), play (invitation tag). The extent to which the elements of these complexes are isomorphic, or show nuanced variation remains to be seen. Cultural primatology has come a long way from the early days of crude ‘presence/absence’ comparisons!

Nuanced variation

The grooming hand clasp (GHC) of chimpanzees exemplifies nuanced variation. This particular form of social grooming is commonplace in many wild populations, where it is one element of the complex of grooming patterns (McGrew 2015). It is striking and unmistakable in form: Two individuals sit facing one another, each with left or right arm extended overhead, distally in contact, in a sort of ‘A-frame’ configuration. Each uses the other hand to groom simultaneously the armpit revealed by the raised arm. The position is symmetrical, in that it is done either with two left or right hands. (See Fig. 2) GHC occurs in many populations across Africa but is absent in the longest-running field study at Gombe, Tanzania, and the third-longest one, Bossou, Guinea.

The original ethnography reported the hand-to-hand contact to be palm-to-palm, perfectly symmetrical. However, later scrutiny revealed this to vary, as sometime the fingers are interlaced, but sometimes not. Moreover, other configurations were noted, such as palm-to-wrist, or palm-to-forearm, or just minimal wrist-to-wrist. This variation is not random but appears to vary from group to group, suggesting the possibility of its signalling group membership, perhaps as a sort of identity marker. Another aspect of GHC that seems to show nuanced variation is who provides the ‘work’ of supporting the upraised arms, when the contact is asymmetrical. For example, if the form is palm-to-wrist, then whose palm rests on whose supporting wrist? Early observations found a correlation between this variable and dominance rank: Dominants rest their hands on subordinates’, not the reverse. Anyone looking at a pair doing GHC easily can see who is higher-ranked. Such signalling (if it is such) may be useful in a fission-fusion species.

Inter-species culture

All living apes, even in nature, live in interaction with humans, like it or not (Hockings et al. 2014). It seems that this mutually impinging relationship affects the cultural expression of each species. In socio-cultural anthropology, this is the province of ethno-primatology (Cormier 2003), but only recently have primatologists looked at the exchange from the viewpoint of their subjects (Hockings et al. 2012). Some interactions are clearly problematic: When humans clear forest to practice horticulture, then apes who previously foraged in those areas must look elsewhere for sustenance. If the vegetation planted in those

fields is edible, then the apes may turn to crop-raiding, thus prompting a cycle of conflict between species. The tactics and counter-tactics of this emergent sub-culture may approximate to an evolutionary arms race, costing both sides time, energy and even life and limb. In time, stable conditions may evolve, such that humans may punish incursions into cash crops that take a long time to mature (pineapple) but ignore pilfering from abundant species that require little or no labour (papaya).

Such daily contact as close quarters may have unintended side-effects. Chimpanzees living cheek-to-jowl with humans may range through human settlements with hazardous consequences. Even the simple act of crossing a road may lead to the apes developing a sort of risk-management strategy (Hockings 2011). Fatalities may ensue on both sides: Humans may kill and eat apes that fail to discriminate between hunters and familiar humans; apes may kill and eat human infants if these are left unattended through parental carelessness (Hockings et al. 2009). However, some aspects of chimpanzee nature seem to be immune to human influence, such as lethal aggression, which is a species-typical universal (Wilson et al. 2014).

Primate archaeology

Until recently, all non-human primate ethology has been limited to the present, but now it is being extended into the past. This is possible because non-humans also leave an archaeological record of recoverable artefacts. These can be sought, acquired, analysed and interpreted in the same way that archaeologists do with hominin prehistory (Haslam et al. 2009). The same theory (e.g. *chaine operatoire*) and methods (e.g. radiometric dating, stratigraphy, residue analysis, micro-wear, etc.) can be applied to the material culture of past apes and monkeys. Of course, as with human archaeology, the task is much easier with persisting non-organic materials, such as lithics, than with ephemeral plant or animal tissues.

The obvious starting point was percussive technology, in which stones are used as hammer and anvil to crack open nuts. Over time, this food processing activity leaves recognisable wear patterns on both stones. It turns out that different raw materials (harder stones) are used for different kinds of nuts, and that particular pairs of hammer-and-anvil stones are favoured (e.g. Carvalho et al. 2009). Primary studies were of surface assemblages of percussors and nut shells, but this has been followed up by excavations that yield comparable tools thousands of years old (Mercader et al. 2007). In some cases these can be refitted, showing that hammers used today are fractured anvils from times past. Unlike the archaeology of pre-humans, which will never have direct access to the behaviour that produced the products of the behaviour, primate ethologists today can see both.

CONCLUSIONS

Cultural primatology is a breakthrough for understanding the complexity of our nearest living relations and for modelling the evolutionary origins of human culture. Although these

efforts originated with chimpanzees, they already have spread to other species, thus allowing both intra- and inter-species comparisons. Paralleling the transition from ethnography to ethnology that occurred historically in socio-cultural anthropology is a similar progression in cultural primatology. This provides the potential for tackling the precursors of such human cultural features as custom, convention, mores, institution, prestige, taboo, identity, etc., as has already been done with such challenging phenomena as teaching, tactical deception, etc. What is needed are operational definitions of these domains that allow empirical testing, both qualitative and quantitative.

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