

collaborate at all? No answers are provided. Moreover, there is not one shred of evidence in the entire paleontological record for the kind of scenario sketched here.

But some such scenario was more or less forced on the authors by their decision that language could not have been the missing ingredient. In section 6, they make the bald assertion that “Language is not basic; it is derived.” They ask, “What is language if not a set of coordination devices for directing the attention of others?” Well, any number of things, but most importantly an entirely novel means of structuring experience and representing the world (Bickerton 1990).

It is claimed that the notion of linguistic communication without understanding and sharing intentions is incoherent. But what about protolinguistic communication (Bickerton 1990)? The authors would be right if the understanding and sharing of intentions, on the one hand, and language, on the other, had suddenly emerged ready-made; if we did not understand and share intentions the way we do now, language as we know it now would indeed be unworkable. But none of these things dropped from the skies in their current state. All evolved, presumably from very humble beginnings, and it is in dealing with these beginnings that the article is weakest.

The word *coevolution* is tossed around pretty freely these days, but here is where a really strong case could be made for it. Very little understanding or sharing of intentions – perhaps little if any beyond what contemporary apes possess – would have been required to comprehend and act on the kind of single-unit utterances with which language must have begun. (Or do the authors propose that our ancestors suddenly started spouting full grammatical sentences, like the infant Lord Macaulay?) But once the process began, every increment in linguistic skill could lead to an increase in shared intentionality, and vice versa.

The question is, of course, a chicken-and-egg one. Did language trigger shared intentionality, or vice versa? One interesting difference between the two lies in the fact that shared intentionality had primate precursors, whereas language didn't. Tomasello et al. themselves list some of those precursors in section 4.1.1; the differences between apes and children that they point out in section 4.1.2 are mainly matters of degree. Language, however, differed radically and qualitatively from anything that had gone before. It seems plausible to suppose that the radical difference triggered the spurt in the more scalar one rather than vice versa.

A commentary with a thousand-word cap hardly gives room to flesh out an alternative scenario. However, I would urge the authors to consider the kind of coevolutionary account I have merely hinted at here. When all is said and done, is it too trivially obvious to ask what force could have driven shared intentionality more effectively than the ability to tell one another our intentions?

## Joint cooperative hunting among wild chimpanzees: Taking natural observations seriously

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**Abstract:** Ignoring most published evidence on wild chimpanzees, Tomasello et al.'s claim that shared goals and intentions are uniquely human amounts to a faith statement. A brief survey of chimpanzee hunting tactics shows that group hunts are compatible with a shared goals and intentions hypothesis. The disdain of observational data in experimental psychology leads some to ignore the reality of animal cognitive achievements.

In the past, philosophers and scientists have regularly proposed new definitions of human uniqueness based on their personal convictions and intuitions of what animals are or are not able to do. Nowadays, over 45 years of field studies on wild chimpanzees pro-

vide a wealth of observational data against which to confront these preconceptions. In this sense, it is more than surprising to find only a single reference to animal field data in Tomasello et al.'s long citation list. Not surprisingly, their portrayal of cooperative hunting in chimpanzees reminds one of the old philosophers' claims. This is especially disappointing in that their proposition that the ability to share goals and intentions is a uniquely human capacity rests squarely on the assumption that no other species can do so.

I will briefly outline an analysis of the hunting behaviour among wild chimpanzees showing that individual hunters' behaviour is noticeably compatible with sharing goals and intentions. Hunting has been observed in all chimpanzee populations studied so far, and large differences in hunting strategies have been documented, especially in the propensity to hunt in collaborative groups (Boesch 1994a; 1994b; Mitani & Watts 1999; 2001; Nishida et al. 1992; Stanford 1998; Stanford et al. 1994a; 1994b; Watts & Mitani 2000; 2002). Natural observations can address only the question of performance, but we know from human observations that comprehension often exceeds performance (Birch & Bloom 2004; Keysar et al. 2003). During 77% of the 274 group hunts followed, Tāi chimpanzees performed four complementary hunting roles (Fig. 1). Briefly: The *driver* initiates the hunt by slowly pushing the arboreal prey in a constant direction, *blockers* climb trees to prevent the prey from dispersing in different directions, the *chaser* may climb under the prey and by rapidly running after them try a capture, and the *ambusher* may silently climb in front of the escape movement of the prey to block their flight and close a trap around the prey (Boesch 1994a; 2002; Boesch & Boesch-Achermann 2000). Hunting success increases with the number of hunters, so that large groups in which all roles are performed are very successful (63 to 89% of captures achieved). During such collaborative hunts, each hunter synchronizes and spatially coordinates his movements to those performed by others, and sometimes anticipates their future actions. Each individual hunter can perform most complementary roles and individuals may even shift roles during a given hunt, demonstrating a capacity for role reversal and perspective taking. Tomasello et al. suggest that a chimpanzee hunter “simply assesses the state of the chase at each moment and decides what is best for it to do.” However, drivers and ambushers achieve only 1% and 11% of the captures respectively, while 81% are achieved by individuals following the hunt from the ground. Consequently, drivers are granted about three times less meat than captors of the prey (Boesch 2002; Boesch & Boesch-Achermann 2000). Interestingly, ambushers that anticipates movements of the prey and the other hunters are granted an amount of meat equal to captors, even when they have not made the capture.

Thus, under a selfish hypothesis, chimpanzees should only wait on the ground for the prey to fall or perform the ambusher role that guarantees more meat. Group hunting would become rare. This is not the case as Tāi chimpanzees hunt about 250 times per year (Boesch & Boesch-Achermann 2000). On the other hand, a joint goal hypothesis seems more compatible with the observations, with individual hunters assessing whatever role needs to be performed for the joint hunt and able to flexibly perform the roles needed independently of their short-term benefit. Like in a team of soccer players, individuals react opportunistically to the present situation while taking in account the shared goal of the team. Some players will rarely make a goal, like defenders and goalies, but the success of the team will critically depend upon their contribution. This is very reminiscent to group hunting in chimpanzees where synchronization of different coordinated roles, role reversal, and performance of less successful roles favor the realization of the joint goal. Thus, the group hunting behaviour of the Tāi chimpanzees fulfills the criteria set by Tomasello et al. for shared goals and intentions. I am not claiming that chimpanzees perform like humans; I am merely emphasizing that the evidence published on hunting in chimpanzees is compatible with the scenario of shared goals and intentions proposed by Tomasello et al.

## Early development of shared intentionality with peers

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**Abstract:** In their account of the origins of human collaborative abilities, Tomasello et al. rely heavily on reasoning and evidence from adult–child collaborations. Peer collaborations are not discussed, but early peer collaborations differ from early adult–child collaborations. Describing and explaining the similarities and differences in shared intentionality with peers and adults will bring us closer to understanding the developmental mechanisms.

What are the origins of human collaborative abilities? Tomasello et al. hypothesize that humans possess a species-unique motivation to “feel and act and perceive together with others.” This special motivation to share intentions, combined with intention understanding acquired in the context of adult–child collaborations, is proposed to drive the genesis of collaborative activity. By this account, at the end of the first year of life human infants are able to understand others’ emotions, perceptions, intentions, goals, and plans. And, because they are uniquely motivated to share their psychological states with others – that is, to represent others’ psychological states in concert with their own – human infants are able to collaborate with others and become, effectively, members of and contributors to human culture.

Although there is much to recommend this account, it depends exclusively on the role of adult–child collaborations. Nowhere are peer collaborations discussed. In our lab, we have studied early peer collaboration on tasks that require sharing a simple goal, and we find little evidence of either collaborative understanding or motivation to collaborate with peers until the close of the second year of life or well into the third year of life (Brownell & Carriger 1990, 1991; Brownell et al. 2003). Others have likewise suggested that collaborative peer play emerges toward the end of the second year of life (Asendorpf & Baudonniere 1993; Eckerman & Whitehead 1999; Eckerman et al. 1989). Only in the third year does cooperative play and communication with peers explicitly take into account the peer’s actions, desires, and intentions (Ashley & Tomasello 1998; Smiley 2001).

These differences in development are not trivial. Such evidence does not call into question the assertion of Tomasello et al. that cultural cognition depends on shared intentionality, a point with which we fundamentally agree. But it does raise potential alternative developmental sequences and pathways, which in turn may introduce new explanatory demands and the possibility of other mechanisms. In particular, it suggests that shared intentionality may itself develop.

On the whole, infants and young toddlers do not appear particularly interested in social exchange with age-mates, in contrast to their interest in collaborating socially with adults or even older siblings (Dunn 1988). Among 12-month-olds, familiar peers engage in simple social exchanges, such as looking and vocalizing to one another, less than once per hour. This increases over the second year to about once per five minutes at 24 months (Eckerman & Peterman 2001). Cooperative play with peers emerges between 20 and 24 months (Eckerman & Whitehead 1999; Eckerman et al. 1989; Howes 1988), and increases markedly between 24 and 28 months of age (Eckerman et al. 1989). Thus, the motivation to share intentions does not apply equally to all other persons early in development. One possibility for such a motivational difference is the developmental preeminence of attachment relationships during infancy (Brownell & Hazen 1999). Perhaps, in fact, it is their attachment relationships that make social engagement emotionally rewarding for infants and that first motivate them to share their emotions, desires and intentions.

Not only is children’s interest in peer collaboration relatively late developing, but their ability to represent the peer’s goals, in-

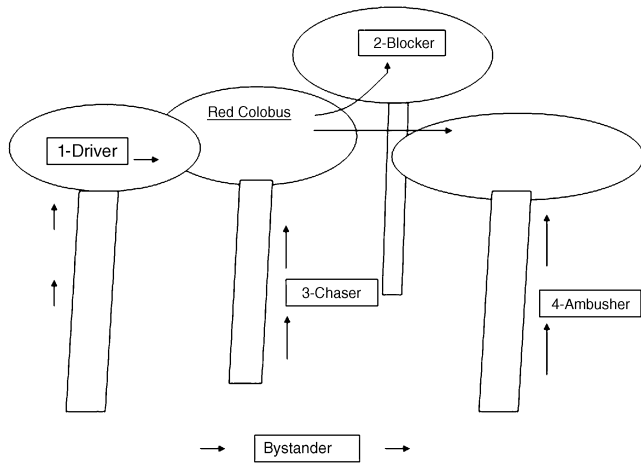


Figure 1 (Boesch). Illustration of a “typical” joint collaborative hunt in Tai chimpanzees indicating the spatial coordination of the different roles. The numbering indicates the approximate order in which the roles are joining into the hunt.

and therefore not a distinct human feature. One possible difference might be that human soccer players sometimes explicitly plan movements or strategies before the play starts and we have not yet seen this kind of shared planning in chimpanzees.

In the broader interest of the field of comparative psychology one further aspect is worth addressing: Why did Tomasello et al. ignore the published evidence on wild chimpanzee group hunting? Such an attitude is far from being isolated as illustrated by the conspicuous scarcity of reference to observations on wild animals in some of the cognitive literature claiming human superiority (e.g., Evans 2003; Heyes 1994, 1998; Povinelli 2000; Tomasello 1999). Generally, there is a tendency in comparative psychology to accept only experimental data. Observational data are dismissed as mere anecdotes or are discredited as not conclusive because alternative scenario could always be constructed. However, if we want to understand the specificity of cognitive abilities in humans and chimpanzees we have to take in account what they do in real life. Such data are irreplaceable as they provide the necessary information about how human and non-human primates perform. My point is not that field data answer all the questions about mental processes. What I am suggesting is that we need to formulate our hypothesis about human uniqueness in terms of performance that we should confront to the known performance of animals. The outcome could then be used as a guide for the aspects requiring more evidence, including experimental studies. Had that been done in Tomasello et al.’s article, I would probably have had no critical comment to forward on shortcomings or premature conclusions.

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