

abilities to perceive and understand actions, and impaired abilities to perceive, engage with and understand subjective/emotional states (Hobson 1995; Moore et al. 1997). The developmental psychopathology of autism suggested that specifically in the domain of registering, responding to, sharing and co-ordinating *attitudes* we might find the developmental foundations for interpersonal understanding (theory of mind) and creative symbolic functioning – two areas of specific weakness in individuals with autism (Hobson 1993). For the past decade, Tomasello has stressed how it is vital for social interaction and understanding that an individual can read and relate to the intentions of others, and in the present article, he and his colleagues give fresh prominence to emotional relatedness in their theoretical scheme. Not only is this re-balancing welcome and important for integrating findings from research with non-human primates, but also it is vital for an understanding of the development of social and cognitive functioning in both typical and atypically developing young children.

But have Tomasello et al. gone far enough in this direction to accomplish their theoretical aims? True, they stress the developmental significance of person-to-person emotional engagement early in life, mostly to emphasize “the motivation to share psychological states,” and at times they refer to (unspecified) “skills” that such engagement might involve. By and large, however, as their title suggests, the account pivots around the claim that “the foundational skill is understanding intentions,” even though there is now the added dimension of *sharing* intentions and goals. What remains ambiguous is how the process of emotional engagement yields the forms of sharing that are critical for specifically human communication and thinking.

Perhaps what Tomasello et al. fail to convey is the role played by infants’ responsiveness to *attitudes* in the story of early human development. It is not merely that emotional engagement is essential to sharing experiences (Hobson 1989), and that it motivates involvement with the bodily-expressed psychological states of others such that infants want to share, to communicate, to help and to inform others. It is also that infants’ responsiveness to and identification with the attitudes of others, as these attitudes are directed both to the infant and to a shared world, structures experience in such a way that infants are in a position to learn about the nature of person-anchored subjective perspectives or takes on the world. In human interpersonal engagement, one is drawn to be aligned with the subjective states and outer-directed attitudes of others, while at the same time registering other-centred and self-centred aspects of experience. To express this differently, there is preconceptual mental architecture in primitive, cognitively unelaborated forms of social experience to provide the structure for what becomes mutual and reciprocal role-taking later in development.

Episodes of emotional engagement – and the processes of identification that configure human self–other connectedness and differentiation to make human emotional engagement specifically intense and moving – serve not only to establish sharing, but also to re-orientate an individual in attitude. Here it is critical that intentionality, and *a fortiori* shared intentionality, involves more than intentions. The intentional nature of mental orientations means that the world falls under such-and-such a description for one person, but may fall under another description for someone else, or indeed for the same person at a different moment. People can construe the world this way or that. Children come to understand this, and before their second birthday: They come to grasp that bodily-endowed people have different mental perspectives, and potentially different ways of experiencing as well as acting towards or understanding a shared world. Indeed, children come to realize their own potential to take up different orientations to reality, including those involved in symbolizing. My point is that, as Werner and Kaplan (1984) described, infants start from a primordial sharing situation and come to understand others’ mental orientations as *both* similar to *and* distinct from their own, through their responsiveness to and assimilation of the attitudes of others.

Tomasello et al. consider that special forms of representation

underpin human-specific forms of sharing intentions, but also entertain the possibility that dialogic representations are the developmental outcome of modes of interpersonal relatedness. However, they (more or less) reject the idea that identification might hold the key to the emergence of progressively supra-individual forms of representation, apparently because they are working with an impoverished notion of what identification entails. Identification proper includes a partial assimilation of the attitude and mental orientation of someone else, such that one preserves something of the “otherness” of the attitude perceived and assimilated. Tomasello et al. take the view that young children come to understand that others have minds on the basis of simulation and analogy with experiences of their own minds, a stance that Wittgenstein and other philosophers have revealed to be highly problematic (although such reasoning by analogy is commonplace, once other people are understood as such). For example, there would be no basis for infants to identify instances of their own mental states correctly if this were a precondition for understanding others, nor would there be adequate grounds for analogy if other persons were not *already* apprehended to be similar to themselves in having mental states.

If it is the case that the experience of dwelling in, and being moved by, the feelings of others is foundational not only for human relations, but also for increasingly articulated *understanding* of the nature of human takes on reality, then there is no need for simulation or reasoning by analogy to underpin knowledge of the nature of persons. It is highly likely that, as Tomasello et al. explicate, the ability to interpret goal-directed action makes its own contribution to growth in understanding minds – both one’s own and those of others – and therefore to the emergence of creative, flexible, symbolic thinking. But human beings need more than a special form of *motivation* to complement their ability to interpret actions if they are to connect with (and cognitively benefit from) the subjective orientations of other people.

Identifying the motivations of chimpanzees: Culture and collaboration

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Abstract: Tomasello et al. propose that shared intentionality is a uniquely human ability. In light of this, we discuss several cultural behaviors that seem to result from a motivation to share experiences with others, suggest evidence for coordination and collaboration among chimpanzees, and cite recent findings that counter the argument that the predominance of emulation in chimpanzees reflects a deficit in intention reading.

Tomasello et al. suggest that differences in the cultural cognition of chimpanzees and humans can be explained by evolutionary differences in the ability to understand the intentions of others. These authors propose that, at some point after the divergence of humans and chimpanzees, the human lineage evolved an adaptation that increased our motivation to share emotional states, experiences, and activities with others, leading to a unique ability to engage in shared intentionality. This ability is argued to underlie many human cultural behaviors, from the use of language to the construction of social institutions. Although chimpanzees understand some aspects of intentions, Tomasello et al. argue that they show little evidence for the behavioral markers of shared intentionality that emerge during the course of human ontogeny, such

as sharing emotions, coordinating actions, or collaborating with others.

Although this is a new and interesting idea, it may be worth acknowledging – especially given the pitfalls of negative evidence we have seen with regard to related phenomena, such as imitation and perspective-taking – that data cited as evidence that apes do not participate in shared intentionality are open to alternative interpretations. We believe that the differences between humans and chimpanzees are less clear-cut than Tomasello et al. imply. For example, they propose that chimpanzees do not interact together purely for the sake of sharing experiences, emotional states, and activities. However, chimpanzees participate in a number of cultural behaviors that involve no apparent reward other than sharing experiences with others and conforming to group norms. Examples of unrewarded behavioral copying include the spread of hand-clasp grooming (Bonnie & de Waal, in press; McGrew & Tutin 1978; Nakamura 2002), and the early nut-cracking attempts of young chimpanzees who spend many years trying to recreate the actions of their mothers without ever being directly rewarded for their efforts (Matsuzawa et al. 2001). Similarly, chimpanzees have been observed to conform to population-specific traditions even when alternatives may be more advantageous, such as the use of a less efficient technique for ant-dipping by individuals at Taï National Park in Côte d'Ivoire compared with individuals from Gombe National Park in Tanzania (Boesch & Tomasello 1998). For this reason, de Waal (2001) has proposed that chimpanzees are inclined to copy the behavior of bonded conspecifics, based on identification and a desire to fit in rather than rewards. Indeed, the phenomenon of chimpanzee culture is difficult to explain without acknowledging that a motivation to share experiences with others, and to do as others do, is intricately involved.

Tomasello et al. also state that it is almost unimaginable that two chimpanzees would collaborate together to achieve a common goal. They cite studies from their laboratory, in which, when given the opportunity to either compete or collaborate for a reward, chimpanzees are more skillful in the competitive situation (Hare & Tomasello 2004). Nevertheless, in other contexts, there is well-documented evidence for chimpanzee collaboration, such as soliciting support during coalition formation (de Waal & van Hooff 1981), holding up a “ladder” to be used by others to climb to out-of-reach places (de Waal 1982; Menzel 1972), mediated reconciliations (de Waal & van Roosmalen 1979), and the richly varied expressions of empathy and consolation that seem to set apes apart from monkeys (de Waal 1996; de Waal & Aureli 1997). Individuals in need of help are observed to use both vocalizations and bodily gestures to successfully encourage affiliates to come to their aid. Many of these interactions seem to involve an understanding of the other's needs and intentions as well as a close coordination between partners. Such collaborative interactions were studied by Crawford (1937) using a cooperative pull apparatus. In this task, two chimpanzees were presented with a heavy box containing fruit that could be pulled toward the chimpanzees' enclosure by using two ropes. However, the box was sufficiently weighted down so that it could only be dragged into reach if both chimpanzees pulled their respective ropes at the same time. Tomasello et al. argue that this study does not provide conclusive evidence for collaboration. However, in the original film footage, two juvenile chimpanzees can clearly be seen to act together, coordinating their actions so as to pull in unison. In addition, when one chimpanzee was reluctant to work, the other can be seen to guide her partner to the apparatus and provide gestures to encourage collaboration. Interestingly, once the food is drawn into reach, the unmotivated collaborator allows his partner to eat all the food. This footage is available for viewing at http://www.emory.edu/LIVING_LINKS/crawfordvideo.html.

Several experimental studies of social learning in apes particularly those involving tool use, have found evidence for emulation learning rather than imitation (Call & Tomasello 1994; Myowa-Yamakoshi & Matsuzawa 2000; Nagell et al. 1993; Tomasello et al. 1987). Tomasello et al. suggest that this indicates that chimps are

not attuned to the action plans or intentions of the model. However, a recent study by Horner and Whiten (2005) showed that chimpanzees were able to use either imitation or emulation to solve the same task, depending on whether they could see the causal relationships that were involved. When the task was presented in an opaque condition such that participants could not see the causal relationship between the tool and the reward, they reproduced a relatively complete copy of the model's actions, including both necessary and unnecessary parts of the demonstration, in accord with imitation. However, when the same task was presented in a transparent condition so that the causal relationships were visible, the chimpanzees selectively excluded the unnecessary actions and reached the same solution by using a more efficient technique, in accord with emulation. The results of this study indicate that emulation may be the predominant learning mechanism in chimpanzees because it represents the most flexible and efficient strategy. Chimpanzees are able to employ imitation, but may do so mainly in situations where emulation is not possible. This seems to undermine the authors' argument that the predominant use of emulation by chimpanzees is due to a deficit in the ability to read intentions.

In light of the aforementioned issues, we feel that some specific questions remain with regard to the presence or absence of shared intentionality in chimpanzees. Nevertheless, Tomasello et al. have collated a large body of dispersed literature and proposed a number of hypotheses that are likely to generate great interest and new avenues of research in a field that has traditionally been treated with trepidation.

Dolphin play: Evidence for cooperation and culture?

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Abstract: We agree that human culture is unique. However, we also believe that an understanding of the evolution of culture requires a comparative approach. We offer examples of collaborative behaviors from dolphin play, and argue that consideration should be given to whether various forms of culture are best viewed as falling along a continuum or as discrete categories.

We are sympathetic with Tomasello et al.'s contention that human culture is unique, and are intrigued by their hypothesis that the human capacity for shared intentionality is the basis for our species' cultural accomplishments. However, as Tomasello et al. note, there is still much to learn. Much of what remains to be learned concerns the extent to which species other than humans possess culture, and the ways in which the cultures of nonhuman animals compare to those of humans. Obviously, if culture is defined as human culture, then only humans have culture. However, we believe that other species have culture, and that future investigations should focus on whether cultures on Earth are best viewed as falling along a continuum ranging from *no culture* to *human culture* or as discrete categories (see Morgan, 1894, for an early consideration of continuities and discontinuities in the evolution of mental abilities).

Tomasello et al. suggest that shared intentionality, their proposed prerequisite for human culture, involves both the ability to understand the intentions of others and the motivation and ability to share psychological states with others. The authors claim that only humans possess both types of abilities and that it is this combination that enables us to engage in collaborative activities involving shared goals and socially coordinated action plans. Although the authors believe that only humans engage in such activities, they recognize that human collaborative activities range