know I know" also gives rise to complex humanlike (also found in some apes) emotions – those I have called the self-conscious emotions, such as shame, guilt, embarrassment, and pride (Lewis 1997) as well as the social skills of imitation, empathy, and sharing (Lewis 2005).

Finally, a word about motivation. It would seem that a self – a system with knowledge about itself – would be interested in and be motivated by the similarities and differences between the self and others. "Like me" or "not like me" becomes an important feature in the world – one that becomes part of the cultural knowledge, the transmission of ideas, and the cause of likes and dislikes. Without an understanding of the mental state of the idea of me, without the knowledge of "I know I know" (whether conscious or not), the understanding of human behavior and human artifacts is incomplete.

Motivation is not enough

Derek E. Lyons, Webb Phillips, and Laurie R. Santos
Department of Psychology, Yale University, New Haven, CT 06520.
derek.lyons@yale.edu **webb.phillips@yale.edu**
laurie.santos@yale.edu **http://pantheon.yale.edu/~lrs32**

Abstract: Tomasello et al. provide a new account of cultural uniqueness, one that hinges on a uniquely human motivation to share intentionality with others. We favor an alternative to this motivational account – one that relies on a modular explanation of the primate intention-reading system. We discuss this view in light of recent comparative experiments using competitive intention-reading tasks.

In the 1990s, Tomasello and colleagues argued that the ability to represent mental states was a uniquely human capacity. They further argued that it was this representational capacity that accounted for the singular attainments of human culture; without the ability to represent mental states, nonhuman primates (hereafter primates) were consigned to remain in our species' cultural dust (Tomasello et al. 1993). Over the past few years, Tomasello and colleagues have gathered a wealth of compelling empirical evidence suggesting that their initial hypothesis was mistaken: primates can in fact reason about the mental states of others in some (usually competitive) contexts (e.g., see Hare et al. 2000, 2001; see also Flombaum & Santos 2005). As a result, there must be more underlying our cultural uniqueness than simply the ability to represent mental states. In the target article, Tomasello et al. revise their prior conclusions to account for these new data. They posit a new feature of human cognition to explain our cultural sophistication – one that that is argued to be absent in primates. This time that feature is our unique capacity for shared intentionality.

Tomasello et al.'s new account of human cultural uniqueness has a noticeably different flavor. The older account – that primates cannot reason about mental states – was a distinctly *representational hypothesis*. Primates lacked a crucial piece of cognitive machinery; they could represent the behavior but not mental states of others. Under the new account, however, primates *can* in fact represent the mental states of others. The distinction is that they are not *motivated* to share in these mental states. As they put it, "[O]ur claim [is] that there is a special kind of shared *motivation* in truly collaborative activities . . . each interactant has goals with respect to the other's goals" (sect. 3, para. 3, emphasis added). This motivation is what primates seemingly lack: "The overall conclusion would thus seem to be that although apes interact with one another in myriad complex ways, they are not motivated in the same way as humans to share emotions, experiences, and activities with others of their own kind" (sect. 4.1.2, para. 5). Note that there is a distinct epistemological difficulty with such a motivational argument. Whereas a representational account has the advantage of making firm predictions about the structure of primate thinking, an account expressed in terms of motivation is more poorly constrained. In particular, how would we go about defining motivation in an experimentally quantifiable way? We worry that the inherent subjectivity of motivation as an explanatory construct makes Tomasello et al.'s new hypothesis dangerously close to nonfalsifiable.

A further potential problem with Tomasello et al.'s explanation of human cognitive uniqueness is that it fails to account for an important pattern in the existing data on primate intention reading. As the authors note in their target article (and which has been reviewed elsewhere [see Hare 2001; Hare & Tomasello 2004; Tomasello et al. 2003]), chimpanzees' performance on intention-reading tasks is often context dependent. Hare and Tomasello (2004), for example, have demonstrated that chimpanzees exhibit significantly greater proficiency at an object-choice task when it is presented in a competitive rather than cooperative context. This result is just one instance of a larger trend in the recent literature – that primates' understanding of mental states is most strongly evidenced in competitive situations. Again, these researchers have tended to account for this empirical pattern in terms of motivation. With regard to the object-choice task, they argue that subjects performed better "because they were more motivated to succeed and paid more attention when competing" (Hare & Tomasello 2004, p. 580).

We, however, believe that the extant data support an alternative account. We favor the view that the intentional attribution abilities of nonhuman (and possibly human) primates are localized within a domain-specific module – one whose application in primates is confined to competitive social interactions. We use the term *module* to refer to a cognitive system that has access only to specific informational input and whose internal operations are hidden from external cognitive processes (see Fodor 1983; Scholl and Leslie 1999); the larger cognitive system, under this view, has access only to the module's final output. Note that these properties of modularity provide a sensible framework for interpreting the apparent context sensitivity of primates' ability to reason about the mental states of others. First, the existing data are consistent with a module whose input conditions are satisfied only by competitive social contexts. When such a competitive situation arises, the module provides output – presumably in the form of imputed goals or predicted behaviors – for external cognitive processes to manipulate; in noncompetitive situations, the module remains silent. Second, the modular account resolves an irksome "chicken and egg" problem: how do primates go about *detecting* competitive situations in the first place? It is difficult to imagine a means of detecting competitive situations that does not entail reasoning about the intentions of others, yet primates appear to reason about the mental states of others only in competitive situations. This seeming circularity is resolved by positing a modular process. Presumably the intention-reading module continuously receives input regarding the behaviors of conspecifics and uses this information to continuously predict future behaviors. These predictions, however, output to the rest of the cognitive system only when the inputs to the system are competitive in nature. In other words, a modularized mechanism enables detection of competitive contexts and subsequent intentional reasoning to be reduced to a single process.

The target article provides an excellent reflection of its authors' scientific rigor. We wish to commend Tomasello et al. both for their willingness to challenge their own prior conclusions and for generating some of the best experimental innovations in the field of primate cognition today. Our goal in this commentary has been to add to the valuable theoretical foment that this enviable intellectual productivity has made possible. We believe that the available data enable us to go beyond the potentially problematic notion of motivation and to posit instead a more readily testable architectural hypothesis.