Book Review/ Compte rendu

Michael Tomasello. *Becoming Human: A Theory of Ontogeny*. Cambridge, Mass and London, England: The Belknap Press of Harvard University Press, 2019, 379 pp. $35.00 USD, hardcover, (9780674980853).

What distinguishes humans as a species from other animals is our socially created, group level diversity, developed in part because of our distinct capacity for cooperation. Human culture, it is accepted, arose as a new evolutionary process in response to specific adaptive challenges; our most remarkable achievements are due to our extraordinary capacity to cooperate - in a specific moment, and over the span of generations. But what about human neurological and psychological capacities enable individual humans to participate in cultural coordination and transmission?

This is the puzzle Michael Tomasello, an eminent evolutionary developmental and comparative psychologist, tackles in *Becoming Human: A Theory of Ontogeny*. From three decades of experimental research with human and non-human primates, Tomasello argues that species-unique cooperative and social capacities emerge in the human developmental process and that the emergence and development of these capacities are dependent on species-unique sociocultural activities. In other words, humans are biologically prepared to participate in sociocultural activity but these biological capacities require a sociocultural context within which to become active and to develop.

In the second chapter, entitled, "Evolutionary Foundations," Tomasello provides a brief overview of the evolutionary history of humans' unique capacities for cultural cooperation. "Humans diverged from other great apes around 6 million years ago," as bipedal apes (15). The genus *Homo* emerged two million years ago with bigger brains and the ability to make tools. A period of global cooling and drying led to the dispersion of terrestrial monkeys who began outcompeting *Homo* for resources. Homo needed new strategies for survival. Scientists' best guess is that around 400,000 years ago, *Homo heidelbergensis* began collaborating to obtain their food and that this led to obligatory collaboration for food and resources.

An important aspect of collaborative foraging was partner choice. Individuals who were unskilled at cooperative foraging were not chosen successively as partners and so went without resources. "The upshot was that there was strong and active social selection for cooperatively competent and motivated individuals" (15). These selection pressures led to the emergence of a new psychological process, which Tomasello calls "joint intentionality based on a joint agent." That is, humans became capable of thinking of themselves as both an individual, and as a partner in a joint venture. The emergence of joint intentionality created a new psychology with new forms of cognition and sociality.

According to Tomasello, early humans therefore required the cognitive capacity to understand the world from multiple perspectives, including their own, and to maintain an awareness of these multiple perspectives. "This form of cognitive representation is responsible for much of the remarkable flexibility and power of human conceptual activity" (16). This cognitive ability appears as new skills, such as pointing and pantomiming, to coordinate individual roles and perspectives in collaborative efforts. For example, say an individual hunting with a partner, points to a tree branch. Unless the partner has the cognitive capacity for collaboration, the signal will be meaningless. If the partner has the cognitive capacity for collaborative action, she will remember that she had recently lost her spear, and know that the pointing individual also remembers she recently lost her spear. Therefore, an individual with the cognitive capacity for collaboration will know her partner is pointing out a potential new spear. These new skills of cooperation enabled new forms of thinking. Now individuals are capable of embedding the mental state of another into their own mental state.

There were also strong pressures of social selection amongst these early humans, both to work together and to feel sympathy for and to help others who were, or might be, their partners. Social censure developed as a means to ensure cooperation between partners. Relying on their new cognitive capacity to embed another's mental state within their own, early humans also developed the ability to censure themselves, to internalize a sense of guilt if their own behaviour went against pair- or group-established behaviour for cooperation. That is, these early humans had the capacity to imagine for themselves how others viewed them and they also had the capacity to care about how they were perceived.

The next step in the evolutionary process, from early humans to modern humans, is the step from joint intentionality to collective intentionality. The small-scale, joint intentional foraging activities of early humans was disrupted approximately 150,000 years ago by two demographic factors: competition with other human groups; and

increasing population size. The first factor meant that loosely structured populations of collaborative foragers had to develop more tightly knit social groups to protect themselves against invaders. The second factor meant that these growing groups had to split into smaller groups, or tribes, in which a number of different groups were still part of the same larger "culture" (18-19).

Belonging to a cultural group required new skills of cognition, sociality and executive regulation. Individuals did not share a history of personal experiences with all their potential collaborators any longer. Now, individuals had to take the perspective of the larger group with respect to conventions and norms. Institutions, such as chiefs and marriage, developed and effectively objectified the group norms and conventions. Language is an important convention in cultural groups, which coordinates activities and embeds perspectives (dogs vs. pets, for example) (20). What's more, humans use language to develop reasoned beliefs about their cultural conventions. Individuals participate in these processes by subordinating their perspectives to the 'good' reason of their cultural group. From here, individuals develop a reason-based moral identity and ask themselves how they ought to think and behave within that system.

Within contemporary evolutionary developmental biology, explanations expect to see evolutionary history (the evo) represented in the developmental (the devo) processes of modern animals, in this case, humans. Therefore, Tomasello's evo-devo hypothesis is that three sets of adaptations (individual intentionality, joint intentionality and collective intentionality) will appear in the developmental sequence of modern human children. His more specific working hypothesis is that the skills of joint intentionality emerge in human children around the age of nine months and that after maturation and experience, the skills of collective intentionality emerge in human children around the age of three years.

Developmental pathways, and not individual traits, are the target of natural selection, according to contemporary evo-devo. That is, there is natural selection not just for the adult end-point, but for the construction process that bring those end-points into existence. For example, human infants have a rooting reflex during nursing. Such an adaptation is only adaptive during a certain phase of development. Evo-devo perspectives focus not on genes, but on gene expression as it emerges in transacting with specific environments. Thus, Tomasello's evolutionary developmental psychology contrasts sharply with traditional evolutionary approaches which claim that because of evolution some psychologies are "innate" (24).

Tomasello's account refers to three sets of processes that make up specific cognitive and sociomoral developmental pathways: processes of maturation; individual sociocultural experiences; and self regulation. Using comparative experiments with great ape adults and children and human children, for each set of processes, Tomasello attempts to explain the evolutionary origin and development of four cognitive and four sociomoral developmental pathways. The main part of the book is therefore comprised of two sections, "The Ontogeny of Uniquely Human Cognition" and "The Ontogeny of Uniquely Human Sociality," each of which contains four chapters: Social Cognition, Communication, Cultural Learning, Cooperative Thinking in the first; and Collaboration, Prosociality, Social Norms, and Moral Identity in the second. Each chapter follows the same basic template. They open with a section entitled, "From Apes," where Tomasello reviews the relevant scientific understanding of apes, including their ontogeny. The chapters then describe what is known about relevant human developmental pathways that enable joint intentionality and collective intentionality. Finally, each chapter concludes with Tomasello's understanding of how these pathways contribute to the structure of human rationality and morality. Each chapter includes at least one "developmental diagram," which shows and compares developmental pathways of humans and great apes across age.

The book is a dense read in evolutionary developmental psychology but is a worthwhile investment in time and energy for scholars beyond the discipline. *Becoming Human* will appeal to humanities and social science scholars interested in the role of biology in human culture, as well as scholars of biosociality, the biology of human history and the history of human biology and development. The book offers a non-nativist evolutionary understanding of human biology and psychology and their development in concert with human cultures.

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