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Book Review

A Growing Thought

A review of Sarah Blaffer Hrdy, *Mothers and Others: The Evolutionary Origins of Mutual Understanding*. Belknap/Harvard: Cambridge, MA, 2009, 422 pp., US\$29.95, ISBN 978-0-674-03299-6 (hardcover)

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I don't remember the content of the discussion, but I remember the insight. Friend and fellow graduate student Barb Smuts and I looked at each other and said in near unison, "It's not that human relationships are ultimately reducible to mathematics, it's that mathematics is ultimately reducible to human relationships!" We were pleased with our *bon mot* and had a vague sense of what we meant by it: the emotional content of human relationships precedes and lends structure to human cognition, ultimately even to the most abstract forms. Of course, we couldn't prove it, or even defend the proposition in anything approaching a scholarly fashion. It was just an intuition, and not uniquely ours by any means.

In the 25 or so years since that moment of shared epiphany a confluence of exciting work in neuroscience, cognitive, developmental, and comparative psychology has provided empirical detail and formal structure to what now must be recognized as one of the leading theories of human cognitive evolution. According to this viewpoint, human intelligence rests on a foundation of social cognition reflected in a unique capacity for empathy: for appreciating the perspective of others and for interpreting their motivations and intentions. On this foundation rise the impressive superstructures of language, culture, and technology. In a recent Sackler Lecture at the National Academy of Sciences, E. O. Wilson noted, "As a species we are endowed with Paleolithic emotions, medieval institutions, and near-godlike technological capacity." He got the sequence right. What he didn't stress is that the first item in the list may not be not just inertial baggage, but the necessary prerequisite for the rest.

In her new book, *Mothers and Others: The Evolutionary Origins of Mutual Understanding*, Sarah Blaffer Hrdy takes this new theory of human cognitive evolution and asks the obvious question: "Why us and not them?" The world of our primate relatives, particularly our close cousins, chimps and bonobos, is nothing if not socially rich and complex. Modern primatology has provided ample documentation of the premium placed on sophisticated social strategizing among group-living primates. The hardware of mirror neuron systems and the wetware of Machiavellian intelligence are installed. Why didn't this fertile ground generate a similar course of cognitive evolution for them?

Why indeed? Of all the things that “make us human,” our cognitive capacity has always been the most difficult to trace to its origins. This difficulty was even a primary cause of Alfred Russell Wallace’s final defection from the Darwinian camp. The human capacity for such things as higher mathematics could not have evolved by natural selection, he reasoned, since it had no functional significance to our ancestors and remains latent in most humans even in the present. Natural selection cannot refine “latent” capacities. Exit Wallace. Part of the modern revolution in thinking about the evolution of the human mind has come from focusing less on capacities of abstract formal reasoning and more on capacities for strategic social behavior (Dunbar and Schultz, 2007), and even on emotion (Damasio, 2003). Understanding the evolution of the human mind has become the holy grail of modern evolutionary anthropology and evolutionary psychology, and those who pursue it feel themselves closing in on something big.

Mothers and Others is a heroic contribution to this quest. It is an anthropological T(A)E: a theory of (almost) everything, a genre for which I must confess a weakness. It stands above most other examples of the genre, however, for both its scholarship and its craft. Hrdy draws on a broad literature extending beyond the traditional domains of primatology and anthropology, with particular emphasis on developmental psychology, but breadth of scholarship and lucid vision have long been the trademarks of her writing. It is tempting to see *Mothers and Others* as the third part of a Hrdy trilogy, following upon *The Woman That Never Evolved* (1981) and *Mother Nature: A History of Mothers, Infants and Natural Selection* (2001). As a self-identified feminist sociobiologist, Hrdy has played a major role in recentering human evolutionary studies away from man the hunter/warrior/king toward a focus on women and children as the crucible of our formative past. In *The Woman That Never Evolved* Hrdy champions the sexually motivated, adult female over the image of a passive target of male sexuality. In *Mother Nature* she takes on the madonna-like stereotype of human maternal love to reveal something much more complex and interesting. In *Mothers and Others* her focus shifts to the developing child and its social context (though the “crone” figure makes an appearance in the crucial role played by grandmothers, to complete the classical triptych). The central axis of Hrdy’s work can even be traced back to her original primate fieldwork described in *The Langurs of Abu: Female and Male Strategies of Reproduction* (1977) where she first grapples with understanding female reproductive strategies and ponders the significance of allomothering and the altruism of older females.

The consistency and focus of Hrdy’s *oeuvre* has resulted in an increasingly powerful theoretical perspective and the accumulation of an increasingly broad base of empirical support. *Mothers and Others*, while it may not appear literally as weighty as *Mother Nature*, is even more ambitious as a T(A)E. Channeling Darwin, Hrdy refers to her book as “one long argument,” and it can be useful to trace that argument in skeleton form chapter by chapter.

Chapter 1, “Apes on a Plane,” presents the problem. Humans are “wired to cooperate” (borrowing a phrase of Michael Tomasello’s). Hence humans packed on to a plane accommodate each other using myriad unconscious and semi-conscious signals whereas chimps would likely tear each other apart. But how did we get here from there? “How could Mother Nature concoct such a hypersocial ape starting with such an impulsively selfish one?” (p. 30).

Chapter 2, “Why Us and Not Them?” presents the proposed answer. The key evidence is drawn from studies of infant development in humans and non-human primates. After a wonderful review of recent work on infant gazing and mimicking, mirror neurons, and the transient evidence of nascent intersubjectivity (the sharing of subjective experience) in infant chimps, Hrdy hypothesizes that it is the “rearing conditions of infants in the genus *Homo*” that

led to the greater and more sustained development and elaboration of intersubjectivity in our ancestral lineage (p. 62).

Chapter 3, “Why It Takes a Village,” explains what Hrdy imagines these special rearing conditions to be. “I hypothesize that novel rearing conditions among a line of early hominins meant that youngsters grew up depending on a wider range of caretakers than just their mothers, and this dependence produced selection pressures that favored individuals who were better at decoding the mental states of others, and figuring out who would help and who would hurt.” (p. 66). The chapter reviews the range of cooperative breeding situations in primates and the arguments that “shared care” is critical in supporting the high rate of reproduction in humans compared to other hominoids.

Chapter 4, “Novel Developments,” reviews evidence for the ubiquity of multiple infant and child caretakers in human societies, exposing the limits of the traditional focus on mother-infant attachment stressed by Bowlby and others. Hrdy then links the elaboration of infant intersubjectivity and the appearance of shared care to other features of human life history evolution, arguing that this novel feature of our social biology made the rest possible. “What I am proposing, however, is that some of these emotional qualities that distinguish modern humans from other apes, especially mind reading combined with empathy and developing a sense of self, emerged earlier in our evolutionary history than anatomically modern humans did.” (pp. 37-38).

Chapter 5, “Will the Real Pleistocene Family Please Step Forward?” takes on one of the more venerable arguments about the evolution of the human family and its consequences for human evolution. Although not the first to espouse the position (that honor probably falls to Darwin), Owen Lovejoy presented a notable modern version of this argument in *Science* in 1981, humbly titled, “The Origin of Man.” In this article, Lovejoy notes the fact that humans evolved a longer lifespan and slower rate of growth and development than other African apes, and yet also accelerated the rate of reproduction. His solution to this central puzzle of human life history evolution is to evoke the evolution of pair-bonding, division of foraging labor, and the important contributions of male partners to female reproductive success. Hrdy is not persuaded by this argument. She allows that fathers do contribute to infant and child caretaking, but only to a limited degree and in a facultative fashion, ultimately due to the fact that their own reproductive success is not tightly enough constrained by that of their partners. Fathers can help, but not enough to drive the evolutionary change that occurred, in Hrdy’s opinion.

Chapter 6, “Meet the Alloparents,” focuses instead on the development of cooperative breeding in the human lineage. The chapter includes a broader review of cooperative breeding in animals other than primates (the subject of a separate review in chapter 3). The origins of cooperative breeding are traced to “misdirected parental care” in species with intense parenting of altricial young. The most developed form of cooperative breeding is found in eusocial species that typically have sterile castes dedicated to supporting the productivity of the reproductive members. Hrdy suggests that humans may fit this mold with postmenopausal females playing the role of the sterile caste.

Chapter 7, “Babies as Sensory Traps,” elaborates the notion of misplaced parental care, “stressing how responsive primates are to infants and how preadapted they are for the evolution of shared care” (p. 231). But if primates are so “preadapted,” we are back to our opening question: why us and not them? “What are the missing ingredients?” Hrdy asks. “I propose a twofold answer having to do with just who was available to help, and the sort of help that was on

offer under conditions where allomothers were needed not just to care for but also to help provision children” (p. 231).

Chapter 8, “Grandmothers among Others,” takes up the twofold answer of means (the sort of help that was on offer) and opportunity (just who was available to help) by first debunking the assumption of primitive patrilocality in the human lineage and instead reviewing evidence for the importance of matrilineal kin in supporting especially new mothers among extant human groups. Hrdy reviews and accepts the evidence for grandmaternal contributions championed by Kristen Hawkes and her colleagues, but notes that a broader web of matrilineal kin and even non-kin can also be important. “If long-lived grandmothers were humankind’s ace in the whole, all these classificatory kin—distant relatives, godparents, possible fathers, namesakes, trading partners, and other manufactured alloparents—became their wild cards” (p. 272).

Chapter 9, “Childhood and the Descent of Man,” closes out the argument by indicating, if not fully fleshing out, implications for other aspects of human nature and life history. In the section, “Extended lives, longer childhoods, bigger brains,” Hrdy recapitulates an argument she and others have made before: Shared care by many caretakers reduces infant and child mortality, and “[o]nce the likelihood of dying young is reduced, a later age of maturity becomes an evolutionary advantage” (p. 276). Later age at maturity in turn allows a longer period for brain growth and development. And the rest, as they say, is history. Except that Hrdy notes in closing that human evolution never stops, and points out that the loss of our formative “conditions of rearing,” the dissipation of webs of shared care and domestic cooperation, could undermine the very conditions that have made us human.

Hrdy’s long, cogent, and powerful argument is buttressed, as noted above, by broad scholarship. Among the many shoulders she stands on a few deserve special note. One clearly influential work is Peter Hobson’s fascinating volume, *The Cradle of Thought: Exploring the Origins of Thinking* (2004), which makes a wonderful companion volume to Hrdy’s. Hobson, a psychoanalytic psychotherapist and insightful researcher in the area of child cognitive development, provides an accessible review of the experimental literature on intersubjectivity, its development, and its relationship to the emergence of concepts of intention, not only in others but in the developing infant’s own sense of self. He draws on his work with autistic children to highlight the crucial processes of emotional mirroring between mother (usually) and child that lead to the ability to share perspective. He follows the logical trail to some very interesting observations, including the similarities in compromised capacity for intersubjectivity displayed by autistic children and those blind from birth. (He also provides some excellent descriptions of psychoanalytic concepts, such as “transference,” that I would recommend to colleagues who dismiss psychoanalytic theory without much knowledge or understanding.) Michael Tomasello’s *The Cultural Origins of Human Cognition* (1999) is another important antecedent to *Mothers and Others*. Tomasello’s work has been notable for the direct comparison of chimpanzee and human infants, and *The Cultural Origins of Human Cognition* makes a strong argument for intersubjectivity and theory of mind being the unique foundations of human cognition and for culture providing the conditions in which they mature. What sets Hrdy’s argument apart from Tomasello is her identification of “shared care” in our “conditions of rearing” as the ultimate crucible for this evolutionary alchemy.

Another pillar receives somewhat less attention in *Mothers and Others* than I think it should. This is the recent work on mirror neurons that has generated considerable insight into the links between perception and action. Mirror neurons, located in particular cortical areas that are

associated with premotor cortex and sensory inputs, appear to underlie many of the cognitive processes that result in empathy and the projection of intention (Rizzolatti, Fogassi, and Gallese, 2001). They are somatically specific like more classical sensory and motor cortex areas, but fire when a subject observes a conspecific moving or being touched, or imagines such experiences. They appear even to fire differentially in response to intentional aspects of movement. We all experience the activity of these neurons. When we watch an athlete or a dancer, we experience a level of kinesthetic empathy, a ghost part of us “moving” in synchrony. When we observe emotions flitting across the face of an actor on the screen, we are aware of his slide from suspicion to fear, anticipation to disappointment because we experience, at an unconscious level, the same facial changes and associate them with certain feelings. When a downhill skier visualizes the racecourse, turn by turn, she rehearses the actions that will be required in this same area of the brain. When a young bird is learning its species typical song, it “dreams” the motor pattern in this area of the brain as part of its learning mechanism (Shank and Margoliash, 2009). Among the most provocative and exciting proposals in this area is the idea that mirror neurons underlie the acquisition and use of language in humans (Arbib, 2006).

All of this rests on the ability to empathize directly with what another is doing, and more importantly, with *why* they are doing it, what emotional and motivational states are in play, what their intentions are likely to be. Hrdy mentions this work, particularly in chapter 2, but doesn't mine it to the degree that she might have. She points out that mirror neuron systems exist in other primates and other animals, and so must be considered a common heritage, not a uniquely human feature, which is true. However, our understanding of the mirror neuron system can provide deep insights into the ways in which human intersubjectivity works, at the physical level, and thus can provide crucial insights into our understanding of the development and elaboration of this aspect of human cognition. *Mothers and Others* covers so many areas of pertinent scholarship so well it seems petty to point out one area that may have received less than its due. I plead guilty.

T(A)Es in human evolutionary studies often take the form of a search for the “key element” in the evolution of humanness, the lead domino in the cascade of phylogenetic events toppling into the present. Even while our instincts tell us that it is unlikely that there was a single needle's eye through which the caravan of human history had to pass, narratives based on diffuse causal webs in which everything affects everything else never seem a satisfactory alternative. Even though they almost always fail in the end, T(A)Es often take us further, forcing us to think clearly about the evidence we have and trying to place it in something approaching linear order, both in terms of logical necessity and phylogenetic history. Hrdy does this better than almost anyone, holding the constituent parts of a long argument in clear enough relation to each other for the reader to absorb the whole. Along the way she points out many pieces that others, in her view, have misinterpreted, or placed incorrectly.

What I do miss, however, is Hrdy's own critical assessment of the weaknesses in and/or alternatives to her own theory. Powerful arguments, powerfully presented, will almost always carry the day simply by virtue of their superior rhetoric. The late Stephen Jay Gould is a perfect exemplar of the authority that gravitates to a gifted scientist-writer in large part due to the elegance of his style. Hrdy is at least as gifted as a writer as Gould and at least as clear a thinker. I also find myself in agreement with her far more often. Because of this, I find myself working harder than usual to imagine the strong alternatives to her argument, if only to be more convinced that she is right.

The core of Hrdy's argument is that novel “conditions of rearing” provide the selective context for the development of intersubjectivity. This thesis in turn rests on the notion that

intersubjectivity is of crucial functional significance *in infants and small children* needing to determine “who would help and who would hurt” (p. 66). A logical alternative might be to assume that the selectively relevant aspects of intersubjectivity function primarily in adults, supporting protocultural cooperation well in advance of the development of language, and that the developmental emergence of intersubjectivity in infancy is simply the necessary ontological progression. This would point attention more toward novel changes in the ecology of foraging, food sharing, and cultural learning, in the sense of Tomasello, Boyd and Richerson (among others) and thus toward the social organization and interactions of adults with other adults. Solutions to the ecological challenges of being a savannah ape in the Pleistocene may have produced the selective context for intersubjectivity, and that in turn may have led to novel conditions of rearing. Hrdy suggests that intersubjectivity evolves because infants need to understand the intentions of their caretakers and that empathy and understanding among adults is a secondary consequence. This alternative view would suggest that intersubjectivity evolves to support mutual understanding among adults and that its early appearance in infants is a secondary consequence.

I am not championing this alternative scenario here, though I do think it bears consideration. Some of my colleagues and I, for example, have noted that the appearance of a pooled energy budget in human ecology helps to make sense out of otherwise incommensurate aspects of human life history (Reiches, et al., 2009). While the social organization associated with pooled energy budgets provides a context for shared care, that is not its primary function, we believe. No doubt there are other alternatives to Hrdy’s thesis as well. I do think that it is useful, when presented with any T(A)E, to imagine the logical alternatives and to think them through. Readers of *Mothers and Others* will have to do that for themselves.

In summary, this is a very important book, and a beautiful one. It is a book that will delight a broad lay readership coming to it from disparate perspectives. It will be a wonderful book to assign to undergraduates in a range of courses. But most importantly, it is a challenging and provocative book for academics and scientists interested in human cognition and human evolution. Once again, Hrdy has woven together strands of material from many sources into an elegant tapestry of insight and logic, emblazoned with her vision of who we are, and why.

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