

scientists caused them to start the process of rejecting biological approaches in the 1920s or earlier, beginning with the New Social Science led by John Dewey and Franz Boas (C. Degler, 1991, pp. 200-202; Ruse 1989, p. 203). As late as the 1980s some of the most passionate opposition to sociobiology, for example, was ideologically inspired, such as by S. J. Gould (1981) and S. Rose, R. Lewontin, and L. Kamin (1984). These attacks were not prompted by aversion to names such as ethology or sociobiology. In a way it was a boundary dispute, though the defended academic territory was defined by the hegemony of political values within it.

Now it is true that for various reasons opposition to ethological thinking is fading. This bodes well for initiatives such as the proposed GDP. Perhaps it is safe then to retain the 'E' word in its broad definition?

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Frank Salter, Ph.D., received his masters and doctorate at Griffith University in Brisbane (1984-1990), and was supervised in his graduate studies by Professor Hiram Caton. Dr. Salter's field of research can be described as political ethology or urban anthropology, which consists of applying the concepts and methods of behavioral biology (ethology, evolutionary psychology, evolutionary anthropology) to the study of political and other social phenomena, such as power, hierarchy, social control, ethnicity and nationalism.

Book Reviews

Beyond the Brain: How the Body Shapes the Mind

By **Louise Barrett**

Princeton University Press, 2011, 304 pp; ISBN 978-0-691-12644-9 [Hdbk, \$29.95]

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Over the past decade, the world-wide media has heralded stories about animal cognition with unprecedented fanfare. Almost daily, the general public is inundated with so-called "breakthrough discoveries" concerning here-to-fore unimaginable feats of mentation in species ranging from apes to crows. But, just in case you missed it, here's a sampling. Chimpanzees are hunting with spears (Pruetz & Bertolani, 2007), grieving over their dead (Anderson et al. 2010; Biro et al. 2010), fashioning sex toys (Tierney, 2010), filming documentaries of their own lives (Walker, 2010), imagining what each other are thinking (Schmelz & Tomasello, 2011), negotiating collective actions through offers and counter-offers (Melis, Hare & Tomasello 2009), and even making nests for sticks that they are pretending to be baby dolls (Kahlenberg & Wrangham, 2010). Meanwhile, orangutans are playing charades (Cartmill & Byrne, 2007), and suffering from self doubt (Suda-King, 2008), crows are validating Aesop's fables (Bird & Emery, 2009), scrub jays are engaging in espionage (Dally, Emery & Clayton, 2009), parrots are predicting their own demise ("Alex & Me", 2009), elephants are painting self-portraits ("Elephant 'self-portrait'", 2006), and gorillas are using sign language to emote about their difficult childhoods ("Michael's story", 2008). Viewed from a distance, one might be forgiven for mistaking Pierre Boulle's satiric tale, *Monkey*

Planet (Boulle, 1964) (*aka* Planet of the Apes) as a scientific documentary sent from the future. But are these upwardly ratcheting tales of animal cognition accurate and/or valid? Something doesn't add up. Comparative psychology -- a discipline which once offered the bright promise of defining what makes humans human -- seems on the brink of being reduced to a Vaudeville stage dedicated to performing sensationalistic skits about animal smarts.

Enter Louise Barrett's marvelous new book, *Beyond the Brain* -- an eleven-chaptered plea for psychologists to step back and regroup. As she puts it every dozen pages or so, it's time to temper the cognitive revolution and "put the brain in its place." But far from advocating a return to behaviorism, Barrett rides the wave of embodied cognition, leaning heavily on scholars ranging from James Gibson to Andy Clark, decrying the reification of perception, action and cognition as discrete entities. In a daring take-no-prisoners assault, she confronts head-on the metaphor of brain-as-computer that has been the mainstay of cognitive science since John von Neumann's revolutionary work on the ENIAC. From the stealthy predatory antics of *Portia* spiders to dancing T-shaped robots to crafty baboons, Barrett illustrates how the hard-and-fast distinctions between perception, action, and cognition that have shaped our assumptions about the mind, have misdirected us from the true wellspring of intelligence: the essential embeddedness of the animal in its environment.

Our default model of cognition, Barrett argues, is that the senses generate illusory perceptual images which, in turn, are fed into an internal cognitive system that operates on its storehouse of passive mental representations of the world -- a "disembodied" cognitive system whose job becomes one of analyzing data and then commanding the body in which it resides to perform intelligent actions. Marshalling one richly-described example after another, Barrett reveals that although such an architecture may be capable of roughly mimicking the behavior of animals some of the time, it is an unlikely candidate for a proper scientific understanding of

how organisms actually achieve their flexible feats of intelligence. It's not that brains are unimportant, Barrett stresses, but that much of the time they may work quite differently than the computer metaphor would have us believe.

In a particularly informative example, she examines how research with both real and robotic rats establishes the plausibility of the idea that rather than constructing much ballyhooed "mental maps" of their environment, the body and brains of these animals may instead be learning what they are doing each time an environmental feature is encountered and what actions they can execute. This illustrates one of Barrett's recurring themes: although we (as outside observers) can describe such information in the rat as a "map of the environment", from the rat's point of view it is better described as an elaborate action plan. Again, Barrett seeks not to discard the idea of mental representations altogether, but to view them in proper perspective. Perception, action and cognition are rarely (if ever) discrete "things" inside the organism: they co-occur, nestled inside each other in ways that demand a new language for capturing how intelligent behavior is generated. The most straight-forward message of this book might be put as such: "What nature has entangled in environment, and body and brain, let not psychologists split asunder."

But this book has a bigger message, and one that requires a mirror to fully appreciate. Barrett begins by noting that as human beings -- armed with the "representationally hungry" processes characteristic of language -- we can't help but anthropomorphize animals: it's part and parcel of the way human folk psychology works. And for the attuned reader, her deeper message builds steam from there. This human folk psychology, she argues, is almost equally misplaced when applied to ourselves. After all, the human animal, too, is embedded in an environment which allows much "cognition" to be situated in a diffuse, non-explicit fashion in the body and the "reliably recurring resources" present in the world: in the spatial configuration of our hands, the angle of our knees, the optic flow we experience, the

extended nervous system that flexibly joins and disjoins tools with our body schema.

Barrett encourages us to think broadly: consider the overworked bartender, who off-loads the memory demands of keeping track of her orders by lining up glasses of distinctive shapes as external sources of information for what really matters: the actions of mixing and delivering the right drink to her alcohol-craving patrons. Rather than immediately defaulting to the assumption that the human mind is an omniscient library of information wedded to an omniscient controller of action, Barrett corrals existing experimental and theoretical perspectives to show how action-oriented, dynamical, and soft-assembly perspectives can illuminate phenomenon as seemingly unrelated as how insects maintain a flight path along the surface of a wall to how babies learn to walk and reach for objects. She contends that such processes are rampant in human "cognition", relieving the necessity to create complex sets of disembodied brain representations that must then feed back into a completely separate motor system. Human cognition, too, is surely at least partly composed of highly efficient and intelligent systems in which explicit representations (e.g., of walking and reaching) are nowhere to be found.

But to my way of thinking, the bigger payoff is yet to come. By adopting this view of how much human behavior is not "controlled" by an "CPU", we are free to take a fresh look at how the higher-order, representationally-hungry processes that Barrett freely acknowledges are part of the human mind have been woven into our more anciently-evolved, fully-embodied processes (and, I believe, lower-order representations, as well) (Penn, Holyoak & Povinelli, 2008). In doing so, we can turn Barrett's favorite example of Antoni Gaudi on its head. True, rather than using complex mathematical equations to design his perfect compression-based cathedral arches, the pioneering Spanish architect off-loaded this work to photographs of sagging of strings. But even truer, it was a human mind that concocted the idea that a sagging piece of twine might be a good model for an arch in the first place. In the six

million years since our split with chimpanzees, their cognitive system has never discovered this method for building cathedrals, let alone the peculiar religious beliefs they house. It seems unlikely they will unearth any of that in the next six million years, either.

And so we can see Barrett's brave new book as a beacon to future generations of scientists who wish to investigate the particularly human niche in cognitive evolution. Perhaps unlike all other species, we stand bipedally as a complex mosaic of both mechanical, dynamical, embodied and lower-order representational processes, as well as more abstract forms of cognition that allow us to think and imagine in a higher-order, role-governed relational manner -- the kind of cognition that makes analogical and metaphorical thinking possible (Penn, Holyoak & Povinelli, 2008). It may well have been the evolution of such genuinely "disembodied" cognitive operations that gave us a leg up over the more primitive embodied and lower-order representational systems stitched into us from our evolutionary past. On this view, it was disembodied cognition that allowed humans to roll out the wheel, tame fire, and invent rule-governed games like checkers, chess, charades and *jeu de boules*, not to mention allowing Gaudi to plan how he would carry forth the sky-scraping completion of the *Sagrada Familia* long after his demise. And as Barrett notes, it is disembodied cognition that allows us to ask scientific questions about the mind in the first place. How ironic, then, that these may be the very dimensions of human cognition that blind us to the way the human "mind" really works most of this time -- and the way animal minds work all of the time.

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