

BOOK REVIEW

Beyond The Brain: How Body and Environment Shape Animal and Human Minds

By Louise Barrett

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“...even from a very young age, many of us are exposed to the idea that the brain is all-important, and it can be very difficult to shake...” pg. 171

For obvious reasons, a great deal of time is spent in neuroscience courses discussing the anatomical, chemical, physiological, and computational aspects of vertebrate and invertebrate nervous systems. Unfortunately, due to time constraints, either in a single course or within a neuroscience program, very little discussion of the body or environment surrounding an organism's nervous system takes place. *Beyond the Brain* acts as a potent reminder to young and well-seasoned neuroscientists alike, that the nervous system is encased in, and interacts with, other tissues to create an animal's overall functional capabilities (i.e., the brain is embodied). Furthermore, an embodied system dynamically interacts with and modifies the environment in which it is embedded. Although these points may seem obvious to most, Louise Barrett argues that neuroscientists often do not take into account the view that the nervous system, body, and environment form a dynamic cognitive system in which modification to one of these units results in alterations to the other two. Dr. Barrett's well reasoned and tractable case suggests that a brain centric neuroscientific community may be inappropriately interpreting empirical results in a theoretical framework that does not adequately describe the features of perception, memory, attention, etc. For example, in the early chapters of *Beyond the Brain*, she argues that artificial distinctions have been made between perception, cognitive processes, and action. Regardless of whether you believe this claim, Barrett's prose provides a platform upon which students and faculty can discuss the philosophical underpinnings of modern neuroscience and, perhaps, both parties will leave the classroom with markedly different views than those with which they arrived.

As a psychologist who studies animal cognition and behavior, Louise Barrett makes it her goal to remind the reader to shy away from anthropomorphizing when attempting to explain the cognitive behaviors of animals. Like philosopher Daniel Dennett before her (Dennett, 2006), Barrett argues that assuming an animal's current motivations are the same as our own may allow us to predict an animal's behavior, but this assumption will most likely fall short of explaining the mechanism underlying that behavior. After she (re-)defines a cognitive process as “any process by which sensory input is transformed into behavioral output” (pg 10) she provides her mantra for the remainder of the text:

“...an organism's behavior is driven by physiological processes (which include cognitive/psychological processes) that reflect the kind of nervous system it possesses, which in turn reflects the kind of body it has, which in turn is influenced by the kind of ecological niche it occupies. If we accept this as a reasonable proposition, then anthropomorphism becomes inappropriate...because other animals have different bodies and different nervous systems, and live in different habitats. This means that, even though their behavior may look similar to ours in some way or another, it need not be produced by the same underlying mechanisms. pg. 11

The remaining chapters weave together brief descriptions of field observations of living and robotic systems with those of controlled psychophysical and physiological experiments in an attempt to convince the reader that very simple embodied circuits, neuronal or synthetic, embedded in specific environments will produce behaviors that neuroscientists normally assume require a large, interconnected network like that of our own brains (Chapters 3, 4, & 5). Interpreting both classic and nascent experiments in the light of evolutionary biology and Gibsonian ecological psychology (Gibson, 1979) she makes an impassioned plea for the reader to embrace the philosophical views of embodied cognition (see Anderson (2003) for review) when designing experiments and interpreting data (Chapters 6-11).

Although this book could be used at the end of an introductory neuroscience course to introduce embodied cognition, I would suggest that it be used to complement textbooks and/or primary literature in an upper level behavioral neurobiology or a capstone course. After dipping their toes into the deep end of the embodied cognition pool, students should be able to dive into the landmark philosophical texts by Mark Rowlands, Andy Clark, J.J. Gibson, etc., granted a much slower pace, that the author bases her work upon. After doing so, a generation of students will most likely begin questioning whether and/or how the computers which they use to type their lab reports, the smartphones they use to surreptitiously text in class, or the cars that they drive are both influencing the makeup of their brain and are part of their cognitive system. I personally believe that this discussion is warranted and useful. Others may feel the same after reading *Beyond the Brain*.

REFERENCES

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