BOOK REVIEWS

A Review of *Enaction: Toward a New Paradigm for Cognitive Science*, ed. by J. Stewart, O. Gapenne, and E. Di Paolo, Cambridge, Mass.: MIT Press, 2010.

There has been a paradigm turn toward embodiment and environmentalization in cognitive science since the middle of 1980s. Of currently fashionable approaches to cognitive studies, especially of those that are claimed to have evolved new paradigms for cognitive science, the model of enacted cognition is widely utilized, most radical, and least understood. It is one of the four E-models of cognition—the other three being embodied cognition, embedded cognition, and extended cognition—and it is such a model that without which the other E-models would be incomplete or inapplicable. However, it has been partially interpreted or misunderstood, and this is so even among proponents of E-models. *Enaction: Toward a New Paradigm for Cognitive Science*, which is a collection of fifteen research articles, is an attempt to offer a systematical response to these problems. It is primarily based on an International CNRS Summer School organized by the Association pour la Recherché Cognitive (ARCo), held in 2006 in Ile d'Oléron, France.

The idea of enacted cognition, which is sometime vaguely dubbed "embodied action," finds its origins in John Dewey's and J. J. Gibson's works. Enaction was first articulated as a model for understanding cognition by F. J. Varela, J. Thompson, and E. Rosch in their 1991 book *The Embodied Mind*. Then it has been developed as a radical alternative to dominating model of cognitive science which is characteristically formalistic and representational. At a talk at the University of Sussex in 2009, Andy Clark described the future of cognitive science and philosophy of mind as research activities under the name of enactivism. Standing in sharp contrast to classic commitment to the idea that genuine cognition only takes place between sensory input and motor output, the enactivist proposes that an organism enacts its environmental conditions for living and that this enaction constitutes its perception and thereby grounds its cognition. However, this doesn't mean that the model of enacted cognition falls short of an account of higher-level cognition. A half number of the essays collected in this volume are devoted to account of higher-level cognition, covering such topics as consciousness, socially shared abstract concepts, mathematics and cognition, language, the human brain and its relation to lived experience, emotion, etc.

The goal of this volume is to show how enaction is a new paradigm and framework for the next generation of cognitive science. It begins with an essay that makes a methodological point that enacted cognition makes sense from the viewpoints of evolutionary development of species (phylogeny) and development of individual organisms (ontogeny). It is followed by an essay dedicated to the core ideas and essential characteristics of enaction. The remaining essays engage in specific topics on cognition and cognitive science, and these essays make points which are intellectually stimulating, theoretically controversial, or thought-provoking. Here are some examples of these points. Metabolism and locomotion contain already

the germ of reflexive consciousness. Accidental actions set up an autonomous dynamic. The model of enaction recovers the intimate unity of mind and body which Descartes himself recognized as being the core of emotions. Spatial concepts are in our correlative capacity to think in movement. The distally perceived object is nothing else than the experience of body motion. Language is a medium for the expression of bodily metaphors. Brain activity involved in cognition is a subset of autonomous and interactive brain-body systems. Cognitive activity takes place in the interface where organism and world meet. All of these points seem converged on the idea that cognition is not the property of an organism alone, let alone the property of brain alone, but rather the property of a synergistic organism-environment system. Thus, if "mental" representations, symbol manipulations, even information processing are characteristics of the mind, then they are secondary.

The reader may be intrigued to read that this volume distinguishes enactivists from Gibsonians. One of the salient characteristics that mark the originality and the specificity of enaction as a paradigm is the emphasis on the balance between first-person experience and third-personal scientific methods. It is claimed that this feature distinguishes the perspective of enaction from Gibsonian ecological psychology. This claim, however, may be debatable. Gibson's 1979 work *Ecological Approach to Visual Perception* Gibson makes it clear that the perceiving act is an act of picking up information and it is a continuous process of keeping-in-touch with the world--i.e., it is a process of information transformation, rather than a process of the transformation of mental representations. On the one hand, the act of picking up information is neither a mental act nor a bodily act, but what Gibson calls a psychomatic act of a living observer. On the other hand, the act of picking up information is an intentional activity. An organism's perceiving acts involve awareness of objects of the things that populate its environment in such a way that none of its contents are independent of that of which the organism is aware. In addition, the act of picking up information involves the co-perceiving of the self. Thus, the intentionality of psychological contact is not to be explained by physical contact alone nor is it explained by cognitive operations alone. It is explained by informational relations. The reader may find that philosophically, enactivists are in much more agreement with Gibson than they claims to be or that the balance between first-person experience and third-personal scientific methods is equally well explained by Gibsonian ecological psychology.

Like any immature theory, the enactivist theory of cognition suffers from conceptual ambiguity. A careful reader will see a variety of notions of enacted cognition exhibited in the articles collected in this volume exhibit, which means that the authors may have quite different understanding of the notion of enaction. Nevertheless, there are some common characteristics underlying their commitment to the notion of enacted cognition. It may be helpful for the reader to have a brief preview of those characteristics. What does it mean to say that cognition is enacted? The key idea is that an organism enacts its environmental conditions for living, a part of which is the idea that the organism enacts its cognitive field for cognizing. Specifically, this idea includes the following aspects. (1) A cognitive agent creatively activates a cognitive field rather than merely reacting to a world; (2) a cognitive agent

constructively contributes to making a cognitive field meaningful to her rather than merely representing it; (3) the synergistic, dynamic, and interactive relationship between the enacting agent and the enacted cognitive field, gives rise to a system of invariants that afford cognitive acts; (4) the cognitive field (environment) and the body acting in the field in turn constrain what is enacted and how it is enacted; and (5) as experiencing is essentially enacting, experiences are thus embodied. It seems to me the philosophical significances implied in these ideas are profound. The enactivist concentrates her zeal on the maneuver to reunify the conceptual dualities of mind and body, cognitive experience and bodily experience, theory and practice, and subject and object. Dualism is a tenacious tradition. The enactivist reform, if it is to be successful, has a long way to go.

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