

Book Review
Radical Embodied Cognitive Science

Anthony Chemero
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Three tenets make Chemero's embodied cognitive science "radical", as stated in the title: *anti-representationalism*, *direct perception* and *realism*. The combination of these three assumptions offers something excitingly new to several fields of philosophy such as phenomenology, theory of perception and epistemology of cognitive science. This book also represents an intriguing challenge to many established ideas in philosophy of mind, especially representationalism and computationalism. Indeed, Chemero's book is an ambitious work, aiming to become in the field of embodied psychology what Fodor's famous book *The Language of Thought* was for computational psychology. Accordingly, a great deal of the book is devoted to dismantling the Fodorian paradigm.

The book is divided into four sections. The first section (chapters 1-2) introduces the author's dissatisfaction with traditional arguments in cognitive science. In the second section (chapters 3-5), Chemero presents an alternative to representationalism in philosophy of mind, namely, a *dynamical approach* to cognition. In section three (chapters 6-7), the author attempts to define ecological psychology as the background theory for his Radical Embodied Cognitive Science (hereafter, RECS). Finally, section four (chapters 8-9) investigates some philosophical consequences of reductionism and realism in cognitive science. Let me now introduce and comment on each chapter individually.

Chapter One is a nice introduction to what Chemero calls the "Hegelian arguments", that is, arguments based on theoretical posits and no empirical

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evidence, stating (a priori) that some particular explanatory approach will certainly fail. According to Chemero, there are currently numerous Hegelian arguments in the field of cognitive science; it is therefore a field characterized by several contrasting theoretical frameworks, each aspiring to establish itself as the main research paradigm, even if it lacks any empirical support. Although Chemero contrasts such a priori approaches in cognitive sciences, he encourages theoretical pluralism as a positive condition for the development of a scientific discipline. Referring to Feyerabend's epistemological analysis, Chemero emphasizes the fact that the presence of many competitors enhances scientists' ability to deal with the empirical findings of rivals, providing new potential falsifiers and more refined interpretations.

The second chapter proposes a taxonomy that enables Chemero to frame his conception within the contemporary debate in philosophy of mind. The author thus distinguishes between *representationalist* and *eliminativist* approaches to the mind. The former is characterized by the assumption that there are mental representations that stand for external things in the world. The latter, on the contrary, assumes that cognition does not mirror the world and should be understood as a vital function of the animal. Based on this distinction, Chemero's conception emerges as the result of an *eliminativist* choice where the agent and the environment are intended as two coupled systems that cannot be modeled as a set of separate parts. Following this line, Chemero considers the body and the environment as a *dynamical system* constituted by variables that change according to mathematical laws. This makes it possible to account for cognitive processes through differential equations that pair animal parameters with environmental parameters. Here, Chemero also introduces Randy Beers' model of the artificial agent and the Van Rooij *et al.* account of imagined actions as two examples of how dynamical systems have the power to explain different cognitive situations without relying on the concept of mental representations.

In chapter three Chemero considers different accounts of representation, presuming Millikan's conception is representative of the entire field. This functions as an introduction to Chemero's argument against representationalism. It should be noted that Millikan account of representation is characterized by a teleological approach, which means it can be classified as a non-radical theory of representation. As such, what Chemero faces is a definition of representationalism where the question is not simply whether a neuron, or a portion of the nervous system, codifies for something in the

world; he aims to show the supremacy of a non-representational approach even over non-naïve theories of mental representation.

In chapter four Chemero introduces his argument against representationalism in cognitive science. He initially distinguishes between two different anti-representationalist stances: the metaphysical and the epistemological. The metaphysical claim is that nothing in the nature of a cognitive system is a representation; the epistemological stance, on the other hand, is that we need not resort to mental representations in order to explain cognitive processes, without assuming anything about the nature of the cognitive systems itself. Chemero's point is that endorsing a metaphysical stance doesn't add relevant information to a dynamical account of a cognitive process. According to Chemero, even if representational accounts of cognitive systems are possible, that is, even if a cognitive process may be interpreted as positing a role for representations, they appear superfluous and unnecessary when a dynamical account is also available. It is effectively an argument of simplicity (like Ockham's razor), where dynamical descriptions are considered simpler, more complete accounts of cognitive processes, while mental representations are considered nothing but redundant entities. According to this view, a representationalist approach to cognitive systems is superfluous only when a complete dynamical description has actually been developed, so as Chemero himself notes, how much of cognition can be accounted without reference to "representational glosses" is a matter of fact.

According to this empirical characterization, a potential problem for a dynamical account arises. Given the Humean roots of dynamical cognitive science, according to which no unobservable entity should have an explanatory role, one could argue that it doesn't provide a useful guide to predictions and new discoveries. In order to face this problem, chapter five is dedicated to a defense of the heuristic value of anti-representationalism in cognitive science. With this purpose in mind, Chemero analyzes the Haken-Kelso-Bunz dynamical model, showing how this framework is able to produce predictive systems without any reference to mental representations.

In order to make sense of Gibson's ecological psychology as a theoretical background for a dynamical and anti-representationalist approach to cognitive science, chapter six is devoted to introduce the critical notion of *direct perception*. In the first part of this section Chemero explicitly acknowledges his debt to the Turvey-Shaw-Mace approach, which has introduced a new order in the field of ecological psychology. He thus outlines a philosophical account

of Gibson's ecological theory of perception, according to which environment, information and perception determine one another. In the second part of the chapter, Chemero tries to overcome the limits of the Turvey-Shaw-Mace approach (concerning its generalizability and its application to social information) focusing on the unmediated character of perceptual processes.

The assumption of perception as a direct and unmediated process leads Chemero to emphasize the animal's ability to use environmental information to guide actions without necessarily needing mental representations. Drawing from this view, chapter seven focuses on a renewed definition of Gibson's famous notion of affordance, aiming to make it more clear and sound. Chemero endorses a notion of affordance that is actually deeply different from Gibsonian and post-Gibsonian definitions. According to Chemero, affordances are relationships between the perceiver and the environment and cannot be reduced to mere properties of the perceived things. More precisely, Chemero emphasizes the causal role of the perceiver's motor abilities, arguing that the agent's motor repertoire may cause changes in the layout of the available affordances and that the perception of affordances may change the way motor activities are exercised. Accordingly, perception and action cannot be considered two independent cognitive modules. Rather, perception emerges as a type of action; furthermore, a great deal of action can be considered functional to realize perceptive purposes.

Chapter eight turns to the implications of anti-representationalism for reductionism. Radical reductionism (i.e., physicalism) ignores the ecological character of perception, confining the entire account of cognition to the nervous system. Chemero's RECS focuses primarily on the relationships between action, perception and environmental information, resisting the "brain obsession" that frequently inspires reductionism in philosophy of mind. Chemero also includes in this chapter an analysis of animal exploration based on a comprehensive review of many published papers on this subject, showing that the literature often ignores the ecological character of the object employed in the experiments, and therefore fails to notice their effects on the animal's exploratory behaviour.

Finally, in the last chapter of the book, Chemero defends a realist approach to radical embodied cognitive science. Here, as the author himself notes, the source of the problem is represented by the notion of affordance and its dependence upon the perceiver. The question is: can an affordance be considered an autonomous thing, distinct from the basic furniture of the

world? According to Chemero, affordances are not something pertaining to the domain of subjectivity, nor are they mere properties of external reality. Affordances are relations between the agent's motor abilities and the features of the environment (chapter 7). Therefore, their ontological status appears controversial in light of traditional views such as physicalism or idealism. Referencing to Hawking's entity realism, Chemero argues that affordances are genuine theoretical entities that acquire their value of reality in light of their role in actual experimental practice. This constitutes what can be considered a *pragmatic* stance about scientific realism that makes it possible to disentangle affordance perception from the domain of subjectivity, without committing RECS to an untenable metaphysical notion of reality.

Let me conclude this review with some brief remarks about Chemero's book. The work is certainly a provocative presentation of an alternative to the mainstream representationalism in cognitive science. It provides both an introductory and a "technical" approach to what cognitive science might look like without reference to inner mental representations and computations. Accordingly, Chemero's book is accessible to readers with different backgrounds and from different areas of expertise. Philosophers such as phenomenologists and epistemologists will find many intriguing suggestions concerning the development of a theory of perceptive experience linking traditional pragmatism, ecological psychology and contemporary enactivism. At the same time, scientists confident with questions involving the modeling of perception will find this book an incisive attempt to establish a new framework in cognitive science. The many experimental examples contained in the book represent a challenge to scholars who are still skeptical about a cognitive science that affords no role for mental representations.

As for RECS potentially becoming a mainstream framework in cognitive science in the near future, that depends on the empirical adequacy of its theoretical model. As Chemero himself recognizes in his endorsement of a pluralistic stance in epistemology, RECS is not the sole true account of the mind. Yet it is certainly the most comprehensive conception that links the mind to the body and the ecological order.

