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Book Review

Mind and Causality. Edited by Alberto Peruzzi. Amsterdam and Philadelphia: John Benjamins Publishing Company, 2004. 231 pages. ISBN (USA): 1-58811-474-0; Europe: 90-272-5189-4.

One of the important side effects of the last several decades' research in cognitive science and nonlinear dynamics has been an invigoration of the dialog about the nature of causality that dates back to David Hume. Computer scientists, social scientists and biologists have all increasingly come to see fundamental issues of causality as important to their work. *Mind and Causality* is an edited collection of ten pieces by researchers who are active in the study of causality as it relates to cognition. The authors include philosophers, psychologists and evolutionary biologists.

Any edited volume that draws on such a diverse list of scholarly disciplines runs the risk of lacking focus, and to some extent the content of this volume is sufficiently varied that readers may have trouble discerning an overarching theme. That said, there is an overarching theme in this book: the challenges that researchers face in explaining human cognition and causal reasoning through reductionist mechanisms and the consequent rise of theory grounded in nonlinear dynamics, the interaction between brain, body, and the broader physical and cultural world, and the idea of emergence. The majority of the book's chapters involve specific instances of this general theme, with several chapters typically addressing different applications of a given area of theory.

For instance, Brian Hopkins's chapter, "Causality and development: Past, present and future" argues for the importance of applying nonlinear dynamical methods to the study of human development, while admitting that such application will be difficult to reconcile with rule-based cognitive approaches. In the next chapter, "Perception of causality: A dynamical analysis," Riccardo Luccio and Donata Milloni review Albert Michotte's work on the perception of causality, which showed, among other things, that participants would perceive a causal relationship between two objects projected on a screen if the first object

moved toward the second, stopped when it began to touch the second, and then the second object began to move. Luccio and Milloni argue that the perceptual impressions of causality that Michotte found can be understood as instances of standard models of phase transitions.

Other chapters address the idea that human cognition cannot be separated from its broader cultural and environmental context. Again, each of them does so in a somewhat different way, and draws somewhat different implications. Antonella Lucarelli's chapter, "Causes and motivations: Merleau-Ponty's phenomenology confronts psychological studies" addresses the views of the French phenomenologist regarding developmental psychology. Merleau-Ponty was particularly concerned with the way in which perception in everyday life is bound up with the assignment of meaning to the thing perceived. However, these personal meanings do not exhaust all possible meanings, and psychological development can be seen as a process of interaction between one's own meanings and those of others in one's cultural context. The linear cause and effect structure of most psychology and most other social science is poorly suited to capturing complex interactions between individuals and contexts. Lucarelli suggests that the embodied mind approach may be helpful in understanding the interchange between subjectivity and context.

In his chapter on the embodied mind, "Embodiment and the philosophy of mind," Andy Clark stakes out a position on embodied mind approaches that he describes as "Minimal Cartesianism" (pg. 42). He agrees with Lucarelli that traditional cognitive science, with its strong emphasis on the manipulation of inner representations of the world, is poorly suited to a wide range of human experience. However, the embodied alternative that Merleau-Ponty among others emphasized, in which a complex ongoing mutual influence between the individual and the environment, such as the feedback between two dancers, can involve no representation whatsoever, fails to address the situation in which interaction involves planning and therefore representation of things that are not immediately present. Clark argues for a third position, in which subjective inner representations are primarily directions for action in the contextual environment. Cognition is therefore the interface between these action oriented inner models and the external environment, while the external environment of human language, culture and artifacts itself alters the possibilities for thought.

Very few readers will be entirely satisfied with this book. It is broad enough in scope so that nearly all readers will find some chapters that seem irrelevant to their interests. On the other hand, it is also broad enough so that nearly any reader with an interest in cognition is likely to find one or more chapters that are well worth his or her time.

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