Review of the book, *How the Mind uses the Brain (to move the body and image the universe)* by Ralph D. Ellis and Natika Newton. Chicago and LaSalle: Open Court, 2010. Journal of Theoretical and Philosophical Psychology 31(1), 258-261.[1]

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One of the more intriguing observations made in Ralph Ellis' and Naika Newton's excellent account of consciousness, *How the Mind uses the Brain (to move the body and image the universe)*, is the assertion that one cause for the muddled state of contemporary human sciences is that consciousness has been largely ignored or avoided by both of the main traditions in the field: naturalism and phenomenology. Consciousness, the authors argue, presents a problem for natural science because it entails experience and feeling, and thus cannot be treated in accordance with the scientific norm of objectivity; it cannot be put under a microscope or subjected to any other of the methods available to the natural scientist. For phenomenologists, the problem is that discussing consciousness suggests a focus on individual conscious subjects and so risks the Cartesian subject/object dualism. Also, as phenomenology has become progressively postmodern and relativistic, it has tended to reject the notion that there can be any phenomenal remainder, after accounting for social factors like culture, gender, class, and language.

Neither the naturalist nor the phenomenological avoidance of consciousness has been absolute, however, and in large part the value of this book is rooted in its authors' use of more flexible strains in both traditions. In phenomenology these strains are represented by work done in the first half of the 20th century by Merleau-Ponty (1963) who tied his phenomenological research to contemporaneous work in neurophysiology, and by aspects of Heidegger's philosophy, notably his observation that the subject is a product (born out of) the natural world (1927), which is a wholly different notion from the radically separate subjectivity of Descartes. In the natural science tradition, the authors look at dynamical systems theory: both early work like that of Monod (1971) and Polanyi (1967) and more recent contributions by cognitive scientists like Mark Bickhard (1993) and Lewin (1999). Working from both traditions, Ellis and Newton propose that consciousness is an emergent property of complex dynamically self-organized systems and that it is defined by three essential elements: 1) Organismically interested anticipation. 2) Sensory and proprioceptive imagery generated by the interested anticipation rather than by

sensory input. 3) Resonating of these activities with activities stimulated by sensory data, where the interested anticipation precedes the processing of input (pp. 99-100).

Such a condensed summary definition, of course, requires considerable unpacking. One crucial element in the authors' analysis is the combined notion of emergent properties and dynamical, self-organizing systems. Among the issues historically dividing phenomenological and neuroscientific approaches to consciousness is 1) the apparent contradiction between objective observations of mechanistically determined causal relations between neurons and also among larger brain structures involved in behavior and 2) the phenomenal experience that materialists like Daniel Dennet (1991) refer to as the illusion of choice. The authors note a number of attempts to deal with this conflict, including efforts to ground choice in quantum indeterminacy, an approach they reject, noting that, even if indeterminacy prevails at sub-atomic levels, the chemical and metabolic interactions that constitute organic life are clearly deterministic.

Rather than looking to sub-atomic processes, the authors understand the experience of choice in terms of self-organizing activity, which allows humans and other organisms to maintain their structural integrity while repairing and replacing the elements that make up that structure. One key aspect of self-organizing systems is the top-down causal influence exercised by the system as a whole on the substructures of which it is comprised. Higher level structures, they point out, are built on the efficient causality operating between its sub-structures, but, the system as a whole both constrains or focuses the actions of those substructures and provides the background conditions that make specific instances of the efficiently causal laws to operate. The authors note that the efficient causality of turning on a light by flipping a switch is only possible in the presence of background conditions – e.g., a power source and a conducting medium connecting that source, the switch and the lamp – that are aspects of the circuit within which the switch and lamp operate and which exercises a form of top-down causal effect constraining the possible relations between the elements of the structure, without violating the efficient causality of those relations.

In addition to top-down causality, which allows for causal closure, the authors note that dynamical systems, as distinct from artificial structures like the electrical circuit, are able to replace and reorganize their constituent elements, exchanging matter and energy with the environment, while maintaining the coherence of their overall pattern of activity. In living beings, this self-organizing takes the form of motivated activity, and it is this motivated action, the authors argue, that, in sufficiently complex organic systems, gives rise to consciousness.

Ellis and Newton call their theory an "action centered account of consciousness" (p. x), but differentiate their approach from embodied or enactivist theories that equate understanding the world with acting on it. For them, the key element in consciousness is not that the brain controls motion in the world, but rather that it does so by forming images of the organism's actions. Conscious awareness of any aspect of the environment, they argue, involves imagining how we might interact with it. And they hold that our repertoire of action images is not limited to the neural traces of acts we have performed, but includes traces of movements we have considered or rehearsed without performing, including the responses of mirror neurons to motions we have merely observed. Furthermore, the authors' conception of motion includes not only motor movement like walking or writing, but also the internal micro-motions of substructures – e.g., pumping blood through the circulatory system -- that function to maintain the organism as a whole.

One implication of this definition of motion is that it encompasses the activity of neurons and other brain structures, which makes thinking a form of action. The kinds of action that are relevant to a dynamical systems theory of consciousness are, of course, motivated actions, which is why the authors refer to their theory as "emotivist" (p. x). Emotions, for Ellis and Newton, are understood to be expressions of the self-organizing tendencies of the organism, which can be either conscious or not depending on whether or not they are represented mentally; they give, among others, the example of a person suffering from low blood sugar who experiences only agitation when this condition is not represented as hunger. The distinction is important to their account because, for them, a conscious emotion or motivation represents the bodily state of the

organism, in relation to those aspects of the environment that are important for action. For the hypoglycemic person, for example, her bodily distress is only conscious, and recognizable as hunger, when associated with images of actions by which she finds and consumes food: which is to say, *something to eat*.

The very idea of *something to eat,* of course, entails motivated action on two levels. It defines a feature of the environment in terms of an action – eating – and it suggests that our awareness of such features is dependent on our actively looking for them. Ellis and Newton speak of emotionally motivated anticipation as an essential element of any consciousness perception. We see only because we are looking, which is an aspect of perception not accounted for in Cartesian or Empiricist models based solely on sensory input. Another term for this anticipation is attention; and in the absence of which an inattentive driver, who receives the same sensory input as an attentive one, fails to (consciously) perceive relevant road signs and hazards.

A theory as rich and complex as that presented in this book entails a myriad of elements that cannot be covered in a brief review but two aspects of the action imagery concept are worth noting. One is the way it deals with the qualia or privileged access question. Ellis and Newton point out that if consciousness is seen as a kind of passive perception in the empiricist vein, then the fact that one cannot observe another person's conscious percept is problematic. If however, conscious perception is an action, the privileged access question disappears, as we would no more expect to exactly replicate another person's act of observation than we expect to share in the specific actions of a particular dancer or acrobat. Actions, as the authors point out, are by their very nature, specific to the person who performs them. A second important aspect is the authors' account of how this imagistic and movement centered theory accounts for abstract thought. While noting and agreeing with Wittgenstein's observation that we can think things that we can't visualize, they point out that their notion of representation includes nonvisual images – olfactory, auditory, and proprioceptive – as well as visual ones. And, in defense of their privileging movement, they observe that abstract thought, even mathematics, is built on action imagery –divisors are envisioned as "going into" dividends, and multiplication is repetitive action –

specifically the action of adding to something that already exists. Similarly, they note that the element of motivated anticipation is present, even in the most abstract thought processes, in the form of a general expectation of finding answers and obtaining satisfaction in so doing.

How the Mind Uses the Brain is, with one exception, a clearly written work. The only section where this clarity is somewhat lacking is in the discussion, about two thirds of the way into the book, of the preconscious or unconscious analogs of the elements of consciousness. The trouble here seems to stem from a decision, made early in the book, to use the phrase "non-conscious" to refer to the kind of information processing that is carried out by computers. This is an unfortunate choice because the most important difference between computers and minds is not that computers aren't conscious, but that they are artificial. This is a point to which the authors allude toward the end of the book when they say that the differences between machines and organisms lie in the way they are organized (p. 208); but even this does not quite get at the essential fact about computers, which is that they are, as Rom Harré (2010) has observed, prosthetic devices, and as such are only intelligible in relation to the organic consciousness that create and use them. The information processing carried out by computers is invariably carried out for the purposes of and under the direction of the human beings who make and use them. As such, computer processing is just as purposeful and consciously intended as anything we do with our unaided brains, of which the computers are extensions. Thus, artificial information processing is quite different from the naturally occurring proto-desire and proto-representation. The latter are "non-conscious" by virtue of the simple fact of being precursors to consciousness; they exist prior to and, thus, are not dependent on, human consciousness. The authors' treatment of these precursors to consciousness would have been considerably clearer had the they kept it entirely distinct from their discussion of artificial information processing.

Given the enormous influence of the computer metaphor for the cognitive science tradition that Ellis and Newton are trying to move beyond, their decision to emphasize the non-conscious aspect of computer processing does make a certain rhetorical sense and the awkwardness of one, relatively brief, section of

the book is minor in comparison to what is achieved by the book as a whole. The model proposed in the title, in which the information processing capacities of the brains are subordinated to emergent consciousness (mind) and the account of how brain-based mental imagery relate to bodily movement and motivated interaction with the environment, is enormously powerful. *How the Mind uses the Brain (to move the body and image the universe)* is an important book that deserves careful consideration by any theoretical psychologist interested in dissolving the unfortunate opposition of *Geistes-* and *Naturwissenschaften*, which has tended to undermine the legitimacy of the very idea of the human sciences.

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