Review

The Body in Mind, Understanding Cognitive Processes by Mark Rowland. Cambridge: Cambridge University Press, Cambridge Studies in Philosophy, 1999. Pp. 270.

PIERRE JACOB

On Mark Rowlands' view, much current philosophy of mind is in the grip of the *internalist* picture of the mind (internalism for short). Rowlands thinks of the role of this picture on the model of how Wittgenstein thought of Freud's views of the unconscious as in the grip of a mythology (pp. 8–12). Rowlands rejects internalism. But a picture or a myth is not something that is directly open either to confirmation or refutation: its propositional content is not sharp enough to be directly tested. Hence, in his book, *The Body in Mind*, Rowlands wants to 'subvert' the myth (pp. 12–15). His stated purpose is not to demonstrate that it is empirically inadequate let alone logically incoherent. His goal is to show that internalism is not mandatory, i.e. that a different picture of the mind is possible. In this very stimulating book, he does present such an alternative picture which he labels *environmentalism*. In so doing, he makes his own significant contribution to the fast growing body of anti-internalist philosophy of cognitive science, which is currently referred to under such various labels as 'situated cognition', 'the extended mind', the 'embedded mind', or, as implied by the title of his book, 'the embodied mind'.[1]

Not unreasonably, Rowlands ascribes two theses to internalism: a primary ontological thesis and a derivative epistemological thesis (p. 8). According to the former, mental states and processes are located exclusively inside the skin (and skull) of cognizing organisms. According to the latter, which quite naturally follows from the former, it is possible to derive knowledge of the mind by focusing only on events and processes occurring within the skin of cognizing organisms, e.g. on brain processes. Environmentalism is then defined as

Address for correspondence: Institut Jean Nicod, CNRS, 1 bis, avenue de Lowendal, 75007 Paris, France.
Email: jacob@ehess.fr

[1] Clark (1997) falls squarely in this tradition.

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the negation of internalism: neither are mental states and processes located exclusively inside the skin of cognizing organisms, nor are they knowable by focusing only on what is happening there (pp. 22, 31). At first sight, environmentalism looks suspiciously close to *externalist* views of the mind. But there is an interesting difference between Rowlands' environmentalism and most versions of externalism, whether social or non-social, which have been discussed since Hilary Putnam's (1974) seminal paper.

To see what is at issue here, consider Rowlands' methodological distinction between two complementary tasks: psychotectonics and psychosemantics.[2] Psychotectonics deals with the engineering question: Which cognitive processes are required to build a mind? Psychosemantics tries to account for mental representations *qua* representations, i.e. to account for the fact that mental representations are states with content. Externalism is generally put forward as a principle of individuation of meaning or content: a person could not entertain such and such a thought unless she stood in some appropriate relation to objects, properties and relations instantiated in her environment. Because most arguments in favor of externalism belong to psychosemantics, not to psychotectonics, they are ineffective against the internalist ontological claim construed as a claim about the location of mental states and processes. Although the individuation of the content of an individual's thought may depend upon relations between the individual's brain and items in her environment, nonetheless the thought may well be a brain state. If so, then it will be securely located within the individual's skull.

Rowlands' major goal then is to make plausible the environmentalist ontological claim that the location of an individual's mind is not coextensive with the location of her brain. His method is to shift the burden of the anti-internalist argument from psychosemantics to psychotectonics: he argues that 'minds are hybrid entities' (p. 29) by providing evidence that the cognitive processes required to build a human mind are not pure brain processes. Human cognition involves the manipulation of external structures which carry information about the environment. I started the book, I must confess, being an internalist. After reading the book, I still am an internalist in Rowland's sense. I am not an environmentalist in his sense. I am an externalist since I believe that the contents of many of my thoughts are extrinsic, not intrinsic, properties of my brain: they depend on the relations between my brain and its environment. But I still believe that my thoughts are in my brain.

Although most of the book (part I, which involves seven chapters) is devoted to psychotectonics, nonetheless part II (which involves only three chapters) is devoted to psychosemantics. I will start with the latter. At the beginning of Part II, Rowlands examines two naturalistic approaches to mental

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[2] 'Psychotectonics' was coined by Colin McGinn (1989). 'Psychosemantics' is of course part of the title of Jerry Fodor's (1987).

content: informational semantics and teleological semantics. He argues that teleological semantics has the resources to solve one major problem which informational semantics fails to solve, namely the problem of misrepresentation (pp. 212–29). However, teleological semantics, which Rowlands accepts, is widely supposed to face two major problems: the problem of indeterminacy and the problem of transparency. Thus, Rowlands' goal in Part II is to solve them. In fact, he provides one and the same solution to both. His solution is on the whole, I think, quite successful.

Frogs visually detect flies which they catch by means of a rapid strike with their tongue. Frogs' motor response can also be triggered by the motion of lead pellets which are not flies. The question is: What is the content of a state of the frog's visual system? Does it represent the presence of flies or the presence of small black moving dots? From a teleological semantic standpoint, there seems to be no fact of the matter. This is the problem of indeterminacy. The property of being a fly and the property of being a small black moving dot are (and have been in the past) reliably coinstantiated. If the frog's visual system has been selected for detecting the former, then it must have been selected for detecting the latter. This is the problem of transparency.

First, Rowlands' solution is based upon a distinction between what he calls respectively a mechanism's 'organismic' proper function and its 'algorithmic' proper function, where a mechanism presumably possesses the former in virtue of possessing the latter (pp. 238–44). Second, Rowlands claims that the mechanism's algorithmic proper function and the mechanism's organismic proper function do not underwrite ascriptions of content to one and the same thing: whereas the latter warrants attribution of content to the whole organism, the former warrants attribution of content to a sub-organismic state of the mechanism (pp. 244–48). Both the problem of indeterminacy and the problem of transparency arise from the assumption that two distinct contents attach to one and the same object. On Rowlands' view, the algorithmic proper function of the frog's visual system is for it to represent small black moving dots. The organismic proper function of the frog's visual system is to enable the frog (not its visual system) to detect, not flies per se, but eatibility. Hence, both problems—indeterminacy and transparency—evaporate.[3]

I now turn to Rowlands' major goal: to make plausible the ontological environmentalist thesis. In chapter 4, he argues in favor of what he calls the 'manipulate the environment' strategy. Suppose an organism is faced with a certain task, e.g. lift a weight (p. 93). Broadly speaking, he has the choice between two strategies, which Rowlands calls respectively 'manipulative' and 'non-manipulative' strategies. A non-manipulative strategy would consist in engaging in a program of body-building until you are able to lift the weight,

[3] It follows from Rowlands' account that, whatever its algorithmic proper function, the organismic proper function of the mechanism which allows a predator to detect a prey is to enable the predator to represent eatability.

i.e. in developing one's own inner resources to solve the task. A manipulative strategy would consist in getting someone else to lift it for you, i.e. in exploiting opportunities afforded by the environment to get the job done. The rationale for manipulative strategies is variously epitomized by variants of Occam's razor and by what Rowlands calls 'the barking dog principle'. The former is the injunction to 'work smart, not hard', or to minimize effort (p. 21). The latter says (pp. 79–81): if you keep a dog, then he will bark for you. In chapter 4, Rowlands assembles interesting and detailed evolutionary considerations (such as parasitic behavior) in favor of the view that, everything considered, manipulative strategies are generally more adaptive than non-manipulative strategies: they are more likely to enhance the organism's overall fitness.

Each of chapters 5 to 8, then, is devoted to the task of spelling out how the 'manipulate the environment' strategy applies to such basic human cognitive processes as visual perception, memory, thought, language-use and language-acquisition. Human cognition, on Rowlands' view, has exceptional opportunistic abilities: it is an engine uniquely geared towards the manipulation of environmental structures.

In chapters 7 and 8, Rowlands relies on connectionist modelling of mathematical reasoning, language-use and language-acquisition. He vigorously sides with the connectionists against the advocates of the symbolic paradigm. Whether, as argued in chapter 7 on thought, various kinds of pattern-mapping (e.g. pattern-recognition, pattern-completion, pattern-transformation, pattern-association) can indeed account for the human ability to perform logical and arithmetical operations is something very controversial and widely discussed. Consider e.g. the claim (p. 164) that an 'embodied network' with a pattern-recognition device capable of recognizing external symbols such as '2', 'x' and '3' and a pattern-completion device capable of completing already recognized patterns such as '$2 \times 3 =. . .$' can be credited with the 'capacity to manipulate mathematical structures'. I would find suspicious the claim that such an embodied network could be said to understand the multiplication function.

In chapter 8 on language, Rowlands seems willing to concede that the properties ascribed by Fodor and Pylyshyn (1988) to thought—i.e. productivity, systematicity and inferential coherence—are exemplified by sentences of external public languages. But he denies that they are properties of thoughts or mental representations. The question naturally arises: How could an organism whose internal representations lack productivity, systematicity and inferential coherence ever acquire and use an external system of representations with these properties? How could the former represent the latter? Rowlands' suggested answer to this question seems to me either handwaving or unintelligible. The suggestion is that such properties as productivity and systematicity are 'effected' in or by the external linguistic system and 'enforced' by the community-wide patterns of use of the external symbols (pp. 178–82). Productivity and systematicity seem to me to be properties which are instantiated

(or exemplified), not effected, by sentences of natural languages. The question is whether they are exemplified by human thoughts and mental representations. Whether they could be 'enforced' by communal practices upon an organism whose internal representations cannot exemplify them seemed a mystery to Chomsky years ago. It still seems so to me.

In chapter 5, Rowlands exploits two insights from James Gibson's ecological approach to visual perception. The first insight is Gibson's general emphasis on the role of action and movement in visual perception. Gibson's second insight is that much of visual perception consists specifically in manipulating information contained in what he calls 'the optic array'. The optic array is an objective commodity present in the environment: the former conveys information about the latter. At bottom, Rowlands' view is that the human visual system is a tool for action upon, and manipulation of, the optic array. Visual information processing consists in 'effecting transformations' in the optic array in order to extract information from it.

Now, the view that visual perception is nothing but a certain kind of action raises at least two problems one of which is straightforwardly empirical and the other conceptual. It is an empirical question whether, as argued by Milner and Goodale (1995), the two visual pathways of the human brain—the dorsal stream and the ventral stream—process visual information in two fundamentally different ways: a vision-for-action and a vision-for-perception.[4] If they are right, then visual perception cannot consist in action. The conceptual problem is this: if visual perception is constituted by the manipulation of external information carrying structures contained in the optic array and if it in turn requires the identification or at least the detection of the structures to be manipulated, then the view seems plainly threatened by circularity. The culprit is, I think, Rowlands' relaxed use of the word 'manipulation' throughout the book.[5]

The goal of chapter 6 is to capture what Rowlands takes to be the fundamental trend in the evolution of modern human memory, i.e. semantic memory. On his view, the functional architecture of the modern human semantic memory system is fundamentally different from its procedural and episodic precursors. What is distinctive of modern human semantic memory is the 'incorporation of external means of representation' (p. 129), i.e. the increasing ability to use external data structures or representations for the purpose of storing information. Consider the task of reporting verbal military instructions. Rowlands contrasts two kinds of transmission: whereas preliterate people must rely heavily on their episodic memory resources to store the exact sequence of words used, people with the ability to use visuographic representations can

[4] On p. 2, Rowlands dismisses the problem of consciousness. His dismissal is of a piece with his insistence that perception is action of a certain sort.

[5] Early on (p. 23) Rowlands acknowledges the fact that his use of 'manipulation' is loose.

restrict their reliance on episodic memory resources to the learning of the visuographic code (pp. 134–5).

Both chapters (on visual perception and memory) are supposed to lend support to the view that the manipulation of external structures is constitutive of some human cognitive processes, and hence to the ontological claim that not all cognitive processes are located within an individual's brain. Rowlands thinks that the conclusion is to be reached roughly by means of the following sequence of steps in reversed order (pp. 108, 122): (i) the manipulation of physical structures in the environment is relevant to achieving some cognitive task *T* (ii) We cannot assess the amount of internal information processing required in order to achieve *T* until we know what relevant information is available in the environment. (iii) The amount of internal information processing needed in order to perform *T* is inversely proportional to the amount of relevant information available in the environmental structures.

Notice that step (ii) in the reasoning is epistemological, not ontological. Furthermore, I do not think that Rowlands should be granted step (iii) for free. To see why not, consider again the illustration of such principles of manipulative strategies as 'the barking dog principle' or the revised version of Occam's razor principle: it is more adaptive to get someone else to lift a weight for you than to engage in a program of body-building. Now, only a creature with the cognitive ability to communicate with conspecifics will be able to choose the manipulative strategy. I take it that quite a lot of internal information processing must take place in order to enable a creature to engage in communication with conspecifics, such as the ability to represent mental representations. More internal processing, not less, seems required in order to minimize muscular exercise. Similarly, the use of visuographic representations may alleviate the amount of information *storage*. But there may well be a trade-off between storage capacity and the computational resources required to use external representations: first of all, if a device is to use external representations, it better be able to extract their meanings. Secondly, more computation, not less, might be required in order to draw inferences from a thinner internal data base.

As I see it, the major problem with Rowlands' strategy here is that what he requires is that the external structures be *constitutive* of human cognition. Unless they are, Rowlands will not get his desired ontological conclusion. Although I found the book very challenging, I remain unconvinced. Consider the following analogy: microscopes contribute mightily to human knowledge about viruses. From the fact that microscopes are powerful tools in forming justified true beliefs about viruses, it does not follow that microscopes are constitutive of the contents of thoughts about viruses or that they are part of the meaning of the English word 'virus'. Similarly, from the fact that the manipulation of some external structure is relevant to achieving a given cognitive task, it does not follow, it seems to me, that the external structure constitutes human cognition.

Institut Jean Nicod
CNRS, Paris, France

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