

**Mental Mechanisms: Philosophical Perspectives on Cognitive Neuroscience**, by William Bechtel. New York, NY: Routledge, 2008, 328 pp.

In this book, William Bechtel outlines a new and original program for the philosophy of cognitive science using an original concept of mechanism as its core idea. Bechtel's concept of mechanism is intended to allow for a naturalized science of the mind that is continuous with the other sciences. Bechtel is a philosopher of science that is interested in how science is actually made and therefore the book is full of examples taken from several researches made in cognitive science. In this book review, I will focus on the philosophical parts of the book and a few illustrative examples.

The book is divided into seven chapters. In chapter 1, Bechtel introduces his notion of *mechanism*. In chapter 2 and 3, Bechtel looks at two mental mechanistic explanations in cognitive science: memory and vision. In chapter 4, Bechtel suggests how a mechanistic explanation of the mental avoids some of the pitfalls of the mind-brain problem. In chapter 5 and 6, Bechtel proposes a mechanistic account of the mental that explains mental representation. In the final chapter, chapter 7, Bechtel argues that this mechanistic view of the mental does not dehumanize people, but instead that our humanity derives from us being a very specific kind of mechanism that is different from all others.

There are two main ideas in the book that are intimately related and that have several philosophical consequences. One is Bechtel's view of what a *mechanism* is, another is his defence of the scientific practice of *reconstructing the phenomenon*. In fact, Bechtel's book is itself an essay on reconstructing the concept of *mechanism*. I will start with the concept of *reconstructing the phenomenon* and then introduce Bechtel's concept of *mechanism*.

Bechtel says that in scientific research we do not always have a clear view of what is the phenomenon about to be studied when we start. Scientists start studying certain mechanisms and might change their mind about what they do throughout their research. Bechtel says:

'The idea that identifying mechanisms depends upon identifying phenomena does not mean that investigators must have a fixed idea of what a mechanism does prior to their investigation. Sometimes they will arrive at a characterization of the phenomenon itself only as they investigate the mechanism and will revise the characterization of the phenome-

non as they develop a better understanding of the internal operation of the mechanism.’ (p. 14)

This reconstruction is widely used in cognitive science, since mental phenomena are a prime candidate for being reconstructed as experiments and research progresses. As an example of a behavioural experiment in which the phenomenon is reconstructed, Bechtel quotes the case of selective hearing, also called the ‘cocktail party effect’ when one is able to focus on a particular conversation when many other conversations are taking place. This was the subject of various behavioural experiments and the first theory for it was that we have a sort of filter that blocks out other conversations; we block the ones we are not paying attention to and we *hear only one of them*. However, further experiments show that this is not the case because if our name is spoken in a conversation we are not focused on we hear it. Another case is when in a two-channel voice experiment we hear a story in one ear and another in the other and it is shown that we will switch attention if the story changes to the other ear. This indicates that the several conversations that are not consciously heard are being processed at some level and that there is not a straightforward filter blocking out the ones we are not focusing on. This example shows how specific experiments can cause us to revise the way the phenomenon was originally understood and how the *phenomenon itself* can be presented as a *different* phenomenon after research is developed.

Another example is given in the case of the study of memory. Traditionally, memory was studied by decomposing the phenomenon into different parts: short term and long-term memory, memory of events that happened to us (episodic memory) and memory of facts (semantic memory), these are explicit memories. There is also implicit memory of what we learn, of skills and habits, etc. These divisions, however, have been somewhat put into question while studying the phenomenon. Thus, the study of memory provides an interesting case of what *reconstruction of a phenomenon* might look like.

In the case of memory, if a person failed to recall something it was considered a failure of the function. However, recent studies have shown that memory in general is a lot less reliable than what was thought before, so what was considered before a failure of the function has turned out to be *constitutive* of the function:

'Most research on memory has tacitly assumed that memory is largely veridical. In memory tests, recalling something other than what was presented is usually construed as an error and an indication of a failure of memory. But evidence from a variety of sources suggests that memory is considerably less accurate than often assumed. One way to respond is to continue to treat veridical recall as the phenomenon and treat non-veridical recall as evidence of the shortcomings of the responsible mechanisms. Another is to question whether veridical reinstatement of the past correctly describes what an optimally functioning human memory system, in fact, is doing.' (pp. 50–1).

Since the reconstruction of mental phenomena is a research fact in cognitive science, Bechtel suggests what he calls a *heuristic mind-body identity theory* (p. 71). The heuristic identity theory is not so much a theory, but more a method where we do not simply go from a certain mental phenomenon, like memory and its subdivisions, and look for the matching brain structures. We start with *some view* of this phenomenon, but in the processes of its research, we might change the view of what the phenomenon really is.

Bechtel's notion of *mechanism* is quite simple, but somewhat different from the traditional notion of mechanism. For Bechtel a *mechanism is something that is constituted by specific parts that interact with each other in a specific way*. However, looking at the parts of a mechanism is not sufficient for understanding the whole mechanism. We have to know how the parts of a mechanism work together to perform the functions the mechanism is supposed to perform. Sometimes we even have to know how the mechanism interacts with the environment in order to understand its function. Now, traditionally, a mechanism was something that was governed by or in accordance with the principles of mechanics, something that was completely explained as matter in motion under a system of regular laws of nature. The notion of *mechanism* being used by Bechtel is more of a schematic view of what a mechanism is that can include biological mechanisms and does not imply being explained by a system of laws at all.

Bechtel's also says that his notion of *mechanism* can explain why reductionism is often not possible. If the explanation of mental and brain phenomena is of the mechanistic kind, in Bechtel's sense, that is if understanding the brain and the mental is about understanding the brain and its parts, then there is a case to be made where the whole cannot be reduced to its parts. We can study the parts in microscopic

detail, but that will not tell us how they interact, we have to take a step back, so to speak, to see the behaviour of this mechanism as a whole. In cases where the environment plays an essential role on how the mechanism behaves, we have to take another step back, and so forth. In this way, what we learn about the parts can influence how we see the whole and what we learn about the whole can influence our understanding of the parts. It is thus not a one-way reduction, but a constant, up and down, multi-level interaction until the phenomenon is properly understood.

Bechtel also elaborates on his notion of mechanism to include organic living mechanisms and mental mechanisms. Living organisms are active mechanisms (not mechanisms that simply respond to what happens to them), these organisms need to maintain themselves and have to remain active in order not to dissipate (p. 201). Mental mechanisms are also autonomous agents and so, like organisms in general, they are active as well. Self-initiated action is the essential characteristic of living systems and the purpose of this kind of action is to avoid decay (the idea is that the same matter in a non-active organism will decompose much faster than in a self-initiated action organism, p. 207). Living organisms are different from manmade mechanism in that they are in perpetual motion, a cell under the microscope does not remain stationary until something happens, but instead is in constant motion (p. 208). The traditional notion of mechanism was not considered adequate to explain organic life (as strongly defended by vitalists); however, Bechtel's modified notion of *mechanism* allows for mechanistic explanations in biology.

Mental mechanisms, even though much more complicated, also exhibit features similar to living organisms in general. Bechtel sketches a view on how mental mechanisms might have arisen from non-mental adaptive organisms. Originally there were single cells interacting with the environment, they would just divide themselves and create new cells. But eventually, two cells divided and stayed together. A simple form of communication between cells is then necessary and there is room for specialization of tasks. Neurons are cells that specialize in controlling the behaviour of the group of cells. Simple brains then divide and specialize more and more, they have to guide the organism and they have to maintain themselves within their organ. Each part of the brain specializes in specific activities of the organism and this is an account of how brains of different organisms have evolved to the current state (p. 225–9).

Understanding the brain as an essentially active mechanism, as opposed to a reactive mechanism alone, can change the strategies used in the various areas of cognitive science research. Networks of neurons can be understood as oscillators in constant motion even before any input is given. Bechtel refers to perception research by Van Leeuwen (van Leeuwen, C., Steyvers, M., & Nooter, M. (1997), 'Stability and intermittency in large scale coupled oscillator models for perceptual segmentation. *Journal of Mathematical Psychology*, 41, 319–44), where recognition of visual patterns happens when already oscillating neurons start synchronizing as the pattern is presented. In this type of explanation 'external stimuli serve only to modulate the ongoing behaviour of the system' (p. 233). The visual system is already in operation and adapts its operation depending on the input it encounters. Experiments have shown that visual perception is not a simple recording of what is in front of us. Depending on what else the brain is engaging in one can notice or not things that are quite obvious. One example is the Ulric Neisser's 1979 video where two teams of men, one in white and one in black, are passing a ball. Subjects to whom the video is shown are asked to follow the ball passed in the white team and count the passes. Mid-way through the video, a man in a gorilla suit enters the scene and dances in the middle of the screen. Most subjects fail to see the gorilla. Experiments such as this seem to indicate that the visual system is better understood as a dynamic system that depends on what activity it is engaging in.

In sum, Bechtel says that in order to understand mental mechanisms one must see the human brain as an autonomous adaptive agent. The brain is constantly working to regulate the whole mechanism and the inputs presented to it are processed within the already working frame. This characteristic of the mental explains how it can be considered as a mechanism, but not a simple reaction mechanism, and it allows Bechtel to talk about other levels of human character and experience. At the end of the book, Bechtel suggests that a mechanistic view of the mental does not put in jeopardy our dignity, freedom of choice or moral responsibility. This, he says, only follows from a simplistic account of what mechanisms are. If we understand mechanisms as active systems, then freedom, dignity and responsibility are features of such mechanisms. Bechtel's position is not that these human characteristics arise despite our mechanistic nature, but *because* of the specificity of our elaborate mechanistic nature: 'It is our mental mechanisms in particular that make us autonomous adaptive

agents who can enjoy freedom and dignity' (p. 240). The mind-brain is an active dynamic system that is not only changed by the environment, but can also change itself and the environment, it is a constant dynamical and active exchange.

Also on the last chapter, Bechtel briefly tries his hand at the problem of determinism. The problem of freedom and determinism is usually presented in conditional form: if everything has a cause, then all our actions are caused and we are determined to do what we do, therefore, there is no real freedom. Bechtel's strategy is to ask the determinist to give an example of an *uncaused* event and to show how this event is free and creates moral responsibility. A free action must involve values and beliefs. But in giving such explanations for behavior or action of the type that is usually considered free, we are giving *reasons* and for many reasons are causes. Bechtel concludes: 'if someone does something for no reason, but just does it without any causal processes involved, we are not presented with an exemplar of free, autonomous, responsible agency.' (p. 242)

For an action to be free it needs is to start with causes within the agent, or it will not be an action for which the agent is responsible. If a person is forced to do something by external forces, they are not usually considered responsible for their actions and it is not said that those were free actions. If a person's mental abilities have been conditioned in a way that it is hard for her to freely pick an action, then the freedom of their action and their responsibility is in question as well. Thus, a person is acting freely when her actions are adequately caused from within the agent and the agent has not been conditioned in a strong way to perform those actions. Another characteristic attributed by Bechtel to moral free choices is that we use our values to make those choices and we *care* about their outcome. Emotion and reason work together to create choices that are free and for which we are responsible. Therefore, we are free adaptive agents because we use values that we care about in our moral decisions. When deciding a course of action we use goals, purposes, emotions and values for our decision and we care about the decision being made.

Bechtel's book is an extremely interesting first programmatic proposal in the area of philosophy of cognitive science. It could be criticized for being too wide in scope and including too many details on scientific examples or for rushing through a series of philosophical questions that could each have their own 'treatise,' so to speak. But this book represents an extremely interesting approach to philosophy of

science, when it reconstructs, not a *phenomenon*, but a concept, the concept of *mechanism*. This reconstructed notion of mechanism presented by Bechtel does indeed show promise regarding the possibility of a *naturalized science of mind*. Bechtel's book announces the possibility of a new science of mind and a new approach to the philosophy of cognitive science. It also provides inklings of a new way to do conceptual research and conceptual review in philosophy. Therefore, *Mental Mechanisms*, is definitely a must read, at least for all who are working or interested in the philosophy of cognitive science and maybe for those interested in a new way to develop conceptual research in philosophy.<sup>1</sup>

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<sup>1</sup> My work is funded by a post-doc grant provided by Fundação para a Ciência e Tecnologia (SFRH / BPD / 34391 / 2006). Many thanks to Antonio Blanco Salgueiro (Universidad Complutense de Madrid).