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Brain, Behavior, and Knowledge

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Abstract In "Minds, Brains, and Norms," Michael Pardo and Dennis Patterson claim that the idea that 'you are your brain' does not contribute to a plausible account of human behavior. I argue that they leave too little of the brain in their account of different types of behavior.

Keywords Brain · Mind · Behavior · Empirical explanations · Conceptual explanations · Wittgenstein

In "Minds, Brains, and Norms," Michael Pardo and Dennis Patterson offer a welcome antidote to the explanatory reductionism in some of the neuroethics literature [1]. One may question their claim that reductionism is the "current orthodoxy" in the neuroscience of ethics. But the idea that our thought and behavior can be explained by appeal to the brain alone has considerable influence in this field, and they present a serious challenge to it. They acknowledge that the properties "we associate with the mind depend upon a (properly functioning) brain." However, they believe that the idea that "'you are your brain' simply leaves too much out of its picture of human action for the picture to be plausible."

While I am generally sympathetic to their position, they leave too little of the brain in their account of different types of knowledge. As a result, they do not offer an adequate explanation of such activities as rule-following, understanding, and interpretation. The examples that Pardo and Patterson use, and their discussion of them, support the view that what we think and do cannot be explained entirely in terms of brain function. Yet persons know how to do such things as follow rules because normal brain functions enable these practices by generating and sustaining the mental capacities associated with them. Pardo and Patterson are concerned "with conceptual questions involving the proper application of the relevant concepts, not with empirical questions regarding the brain and its functions." Given their acknowledgment that the mind depends on the brain, I do not take them to mean that empirical questions can be excluded from an account of behavior. Instead, they suggest that the empirical does much less work than the conceptual in such an account. But they underemphasize the extent of the brain's role in the types of behavior at issue. A satisfactory account of behavior requires equal emphasis on conceptual and empirical aspects of the relation between the mind and behavior, which rests on the relation between the brain and the mind. Our thought and behavior cannot be separated from their neurobiological underpinning. Empirical explanations of practical and moral knowledge may not make any sense in and of themselves. Nor do purely conceptual explanations. The empirical correctness of how the brain enables behavior is necessary to make sense of how we think and act. The brain does not follow rules or understand

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concepts—persons do. But it is because of their brains that persons can do these things.

In their introduction, they claim that "the brain is intimately related with mental life." Yet immediately thereafter (as well as in note 62) they say that "particular neurological states . . . *may be* a necessary condition for various mental activities."[1] Failure to state that neurological states *are* necessary (though not sufficient) for mental life and behavior underlies the limitations of their account. The mental states associated with behavior are not reducible to neurobiological states. Yet this does not imply that the dependence relation of the mind on the brain is only contingent.

Pardo and Patterson note the influence of the later Wittgenstein in their discussion of rule-following. This activity, together with the associated activities of interpretation and understanding, are all part of what Wittgenstein calls "mastering a technique [2]." They are not simply functions of mental states but also of acting and interacting with other human subjects in social and cultural contexts. We know that a person understands a concept or correctly applies a rule, not by having access to some process in his or her brain, but by observing that person in action. In their own words: "Rule following is something only human beings do, and they do it not alone with their brains but in concert with others." Nevertheless, it should be emphasized that, while brains alone cannot account for how we follow rules, we could not engage in this activity without a normally functioning brain.

The authors claim that in order to follow a rule one would have to be aware of it. They question the intelligibility of the idea of nonconscious rule-following. This is puzzling because many forms of rule-following occur at the unconscious level. We can distinguish following a rule from conforming to a rule. It is not surprising to say that one can conform to rules unconsciously. Yet my claim here is the stronger one that following a rule can be unconscious. Many of our beliefs obtain outside of our conscious awareness; they are not before the mind. One need not be consciously aware of rules in order to know how to follow them. There is not just one but two epistemic components—conscious and unconscious—to this activity. Although these components operate at the mental level, both are grounded in neurobiological functions. Our use of linguistic rules when we speak is one example of rule-following that occurs outside of our conscious awareness. The capacity to follow these rules depends on the proper function of the cortical brain regions mediating language. Damage to these regions can impair the capacity to use words and construct sentences.

Behavior based on procedural memory is another example of nonconscious rule-following. Unlike the declarative forms of semantic and episodic memory, which involve consciously *knowing that* something is the case and *knowing when* something occurred, procedural memory involves *knowing how* to do certain things. This includes motor activities such as riding a bicycle and driving a car. As nondeclarative memory, procedural memory is a form of tacit knowledge. In some countries, we are taught to drive on the right side of the road. In others, the rule is to drive on the left. This is a rule of which we are consciously aware in the initial stages of driving. It becomes an unconscious mental state or process, a conditioned response to driving, after we have performed it countless times. My staying on the right side of the road when I drive is a form of rule-following, and I do it without consciously thinking about doing it. I do not have to be consciously aware of the rule or the fact that I am following it in order to follow it correctly. This form of procedural memory is not a purely psychological state but one that is mediated by neurobiological processes in the brain.[2]

The subcortical cerebellum and the striatum (in the basal ganglia) mediate procedural memory. Damage to these brain regions could make one lose this type of memory and the capacity to follow certain rules. Knowing which brain regions are necessary for procedural memory is an empirical finding necessary to explain why one has or lacks this capacity. Researchers studying the amnesiac "H. M." (Henry Molaison) discovered that different brain regions mediate different types of memory. Bilateral surgical removal of H. M.'s hippocampi and adjacent structures in his medial temporal lobes to relieve seizures resulted in severe anterograde amnesia and temporally graded retrograde amnesia [4]. He was able to recall some events up to the years immediately preceding

[1] Emphasis added.

[2] See [3]

his surgery but unable to retain newly formed memories for more than a few minutes. H. M. lost most of his capacity for episodic memory. Yet he retained his procedural memory and ability to perform motor activities because his cerebellum and striatum were functionally intact. This case showed that different regions of the brain mediate declarative and nondeclarative memory systems, and that whether one has or lacks the relevant type of memory necessarily depends on functions in different brain regions. Behavioral evidence is necessary to know that one can or cannot follow rules involving procedural memory. But we also need to know why one retains or loses this capacity. In some cases, retrograde amnesia may be psychogenic. This may be due to the fact that episodic memory is often imbued with emotional content. But this etiology is unlikely in the loss of procedural memory, since it is not so sensitive to affective processes. Failing to know how to perform a motor activity likely has an organic cause and accordingly requires a neurobiological explanation.

Pardo and Patterson say that "in none of these varieties of memory is the criterion for whether one remembers that one has a particular neurological state. Rather, memory is the retention of knowledge (an ability) and, like knowledge, the criteria include the various ways that this ability may be manifested in behavior." This is correct as a far as it goes; but it does not go far enough. As the case of H. M illustrates, one's actions indicate whether one knows how to do certain things. But this knowledge and action necessarily depend on normal functions in the brain regions that enable them.

Damage to prefrontal cortical brain regions can render one unable to follow other rules that have implications for the criminal law. In the well-known case of Phineas Gage, damage to his ventromedial prefrontal cortex from a metal projectile in 1848 caused a radical change in his personality and severely impaired his capacity for practical and moral reasoning. He lost his capacity to conform his conduct to social norms [5, 6]. Given the critical role of the prefrontal cortex in reasoning and decision-making, his brain damage explained the loss of these capacities. On the basis of his behavior alone, we could not determine whether he lacked the capacity to conform his conduct to social norms, or whether he had but failed to exercise it. A more recent case of a person with brain dysfunction reinforces this point. A teacher in Virginia began to display uncharacteristic pedophilia. This was associated with a meningioma pressing on his orbitofrontal cortex, as revealed by structural brain imaging. A causal connection between the tumor and his behavior was suggested when the pedophilia resolved following resection of the tumor. This connection was confirmed when regrowth of the tumor again resulted in the same behavior, which in turn resolved with its removal [7]. Dysfunction in the teacher's brain undermined his ability to follow social and legal rules against pedophilia. Knowing how to follow social rules depends on human interaction and manifests itself in how one applies rules in one's actions. It also depends on normally functioning brain systems underlying the practical and moral reasoning that enable one to follow these rules. Pardo and Patterson state that "knowledge is an ability and not a state of the brain." Knowing how to perform a cognitive task does not have an exact location in a specific part of the brain. But it does not follow from this that practical knowledge does not have a neurobiological underpinning. Many neuroscientists would say that the neural substrate of cognitive functions such as knowledge is not localized in one region of the brain but is distributed throughout the brain. A more accurate statement is that knowledge is an ability that is manifested in behavior and necessarily depends on, but is not reducible to, distributed neural networks.

Many would agree with Wittgenstein's claim that "an inner process stands in need of outward criteria."[3] In addition to confirming an inner psychological process through its manifestation in behavior, though, we must know about the neural underpinning of that process in order to know *why* an agent can or cannot engage in the relevant behavior. We must also know about the neural underpinning in order to know *that* an agent has or lacks the relevant capacity. Pardo and Patterson say that, "as a conceptual matter, neural states of the brain do not fit the criteria for ascriptions of knowledge." Yet these criteria presuppose normal functioning of the neural states that ground the capacity for knowledge. An appeal to the brain alone does not make sense as a criterion of knowledge. But

[3] *Op. cit.*, n. 3 above, sec. 580.

behavior alone is not sufficient either, as the cases of brain dysfunction I have cited illustrate. The intelligibility of a conceptual explanation of knowledge and behavior rests on an empirical explanation of it. These should not be seen as distinct or competing but as complementary explanations. The point here is not that a neural explanation can be added to a conceptual explanation to strengthen the latter. Rather, a neural explanation is necessary for a complete account of knowledge and behavior

It is not brains but persons who follow rules, lie, and deceive. Persons perform these actions as social beings interacting with others. Yet failure to emphasize that persons' brains enable these actions comes dangerously close to the substance dualism the authors claim to reject. Persons and brains are not distinct substances. Conceptual issues pertaining to persons cannot be divorced from empirical issues pertaining to the brain in providing a satisfactory account of knowledge and behavior. A correct application of a rule involves a social judgment made by persons. But this activity is possible thanks to the fact that mental states are grounded in states and processes in the brain.

Regarding the influence of brain imaging on judgments of criminal responsibility, the authors note the ambiguity in interpreting correlations between brain images and behavior. They are visualizations of statistical analyses based on large numbers of images that are inferentially distant from and thus not snapshots of actual processes in the brain [8]. As such, the images do not establish a causal connection between the brain and behavior. In their discussion of lying and deception, Pardo and Patterson rightly argue that, "if there are discrepancies between the relevant behavior and neuroscientific evidence, the behavioral evidence will override the neuroscience." Given the ambiguity surrounding the interpretation of brain scans, behavioral evidence should have more weight than neuroimaging in assessing the legal significance of lies and deception, and in judgments of criminal responsibility in general. Still, as the cases of Phineas Gage and the teacher show, neuroscience can significantly inform these judgments as part of a broader explanatory framework based primarily but not entirely on behavior.

Persons are more than just their brains. But persons would not have the mental capacity to understand and know how to do things without their brains. This is consistent with a holistic view of persons as subjects who are products of interaction between and among the brain, body and mind. This interaction in turn is shaped by the subject's navigation in and adaptation to the social and cultural environment in which he or she acts and interacts with others. We should not overstate the role of the brain in our lives. But we should not understate it either.

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