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MIND-BODY DUALISM AND THE TWO CULTURES

Edward Slingerland

CHARACTERIZING THE "TWO CULTURES"

In order to get a handle on the divide between the intellectual cultures that characterize the humanities and the sciences, it is helpful to turn to one of its classic expressions, the late Clifford Geertz's seminal *The Interpretation of Cultures* (1973), which continues to be required reading in the graduate programs of most core humanities departments. One of the central themes in Geertz's work is the working out of a distinction between two different modes of understanding, derived from the British philosopher Gilbert Ryle. In a passage cited by Geertz, Ryle asks us to consider the following observational situation:

> Two boys fairly swiftly contract the eyelids of their right eyes. In the first boy this is only an involuntary twitch; but the other is winking conspiratorially to an accomplice. At the lowest or the thinnest level of description the two contractions of the eyelids may be exactly alike. From a cinematograph-film of the two faces there might be no telling which contraction, if either, was a wink, or which, if either, were a mere twitch. Yet there remains the *immense but unphotographable difference* between a twitch and a wink. (Ryle 1971, 480—my emphasis)

For Ryle, the difference between the twitch and the wink exemplifies the distinction between "thin" and "thick" description: the former goes no further than the merely material reality of the situation—what could be captured by a video—while the latter encompasses as well the human *meaning* of the physical sequence of events, which stands above and beyond the physical reality. In his gloss of the Ryle quotation, Geertz refers to this additional layer of significance as the "semiotic" meaning of the scene (Geertz 1973, 6), clearly linking the project of "thick" description with the various strands of poststructuralist thought that were just beginning to pervade and transform core humanities disciplines in the early 1970s.

The distinction between "thin" versus "think" description succinctly captures what most humanists today would commonly cite as the difference between the sciences and the humanities: The sciences engage in physical description and mechanistic explanation, whereas the humanities engage in interpretation or "understanding"—the study of what physical realities *mean* for human beings, something that cannot be deduced from

the merely physical. Although the metaphysical assumption on which this distinction is based is rarely made explicit, it is nonetheless always at work in the background: Human meaning cannot be captured by physical description because it involves the *mind*, which belongs to an ontological realm separate and independent from the realm of the merely physical or bodily. My experience is that most scholars in the humanities feel uncomfortable if asked to explicitly defend metaphysical mind-body dualism—it has a somewhat archaic and unfashionable ring to a modern secular humanist—but the widely and vociferously defended distinction between humanistic understanding and scientific explanation makes no sense without it.

This link can be seen clearly and unambiguously in German—significant because one can trace a direct line of descent between the structure of German academia in the nineteenth century and the make-up of the modern university. In German the natural sciences are referred to as the *Naturwissenschaften*, or the "structured knowledges" (*Wissenschaften*[1]) of *Natur*, the physical world of nature. It employs a particular mode of knowledge referred to as *Erklären*, or "explanation," which, in this technical sense, refers to the tracing out of the mechanistic chains of cause and effect that characterize dumb, inert objects. The humanities, on the other hand, are referred to as the *Geisteswissenschaften*: the structured knowledges of the *Geist*. This *Geist* is a cognate of the English "ghost," and encompasses a broader range of meanings—including "mind," "spirit," even "wit"—while still retaining the basic sense of a disembodied being. The *Geisteswissenschaften* are thus concerned with the free and mysterious movements of this *Geist*, which—because it is autonomous from the merely physical world—can only be apprehended through the sympathetic understanding of another *Geist*. German also helpfully provides us with another technical term, *Verstehen*, for this particular type of understanding, which corresponds to Geertz's understanding of "thick" description and is a familiar term of art for anyone in the humanities. *Verstehen* is the only manner in which a *Geist* or its products can be grasped, and is moreover an act that only another *Geist* can perform—hence the English rendering "sympathetic understanding," which captures the feeling of like-minded resonance or identification.

Since my graduate school days I have always thought of *Verstehen* as a process very much like the "Vulcan mind-meld" from the TV show *Star Trek*. As viewers of the show will recall, the character Spock was able to touch his fingers to another person's forehead, enter into a sort of trance, and thereby receive a direct impression of their thoughts. The process of *Verstehen* shares the same essential structure. The interpreter comes into contact with the object to be interpreted (a text, a scene, a work of art), "opens" herself to this object in some manner, and thereby "understands" it—a process as mysterious and magical as the Vulcan mind-meld because it cannot be explained in physical terms. Indeed, classic and influential expressions of the process of *Verstehen*, such as that formulated by the German philosophical hermeneut Hans-Georg Gadamer, explicitly portray it as an ecstatic, mystical union, an "event" (*Ereignis*) requiring a "fusion of horizons" (*Horizontverschmeltzung*) that is only possible when the interpreter fully opens himself to the human reality of the interpreted (Gadamer 1975). This is equally the case whether

1. *Wissenschaft* is often rendered as "science," but has the much broader meaning of any organized system of knowledge or inquiry.

the thing to be interpreted is the work of a single person or a group of people, since a human culture—the product of a large collection of human minds over historical time—also fundamentally partakes of *Geist*, and, indeed, has typically been viewed by sociologists and anthropologists as a type of *Über-Geist*. Geertz's seminal work, *The Interpretation of Cultures*, has been so influential in the humanities precisely because it succinctly captures what is distinctive about the humanistic method: It applies sympathetic understanding to a phenomenon, human culture, that can only be grasped through this special mode of understanding. This specialness, in turn, has an ultimately metaphysical justification: A culture is a product of the human mind, and the human mind and its products can only be grasped by another human mind.

The humanities-science divide, then, is fundamentally based upon mind-body dualism, and some—though by no means all—of the scholars who are eager to maintain a firewall between the two modes of inquiry are quite explicit about this. Richard Shweder's contribution to this volume is a representative statement from a major theorist in the humanities, one who views with profound suspicion the attempt to reduce "the 'mental' to the 'material,' or 'matterings' to 'matter'" (00), and who sees some form of faith in the actual existence of "un-physical realities" to be a prerequisite for "normal, reasonable and morally decent" behavior (00). The intuitive appeal of mind-body dualism is clear, and, in fact, such dualism appears not only to be a universal feature of human folk cognition, but also to play a foundational role in subserving religious and moral cognition.[2] It also possesses an inherent plausibility. Mental causation—apparently grounded in free will, and guided by reasons, goals, and meaning—seems so fundamentally different from the sort of blind, billard-ball causation we see at work in our folk physics universe of inert objects that it seems to require the postulation of a different sort of entity, not subject to the kinds of causation that holds the physical world in an iron, deterministic grip. The Cartesian *cogito* argument is intuitively powerful and seemingly unanswerable. Add to this the fact that we see what we take to be evidence of design all around us in the natural world—eagle eyes designed to spot prey from miles away, human hands admirably designed to grip tools—and it seems that Mind with a capital "M" has to be a fundamental component of the universe. In contrast to the power and easy naturalness of mind-body dualism, physicalist/materialist doctrines claiming that matter is all there is in the universe, advanced as early as Lucretius in ancient Rome, seem to face an insurmountable hurdle. Our inability to believe that mind-like phenomena such as consciousness or design could ever emerge from, as John Locke put it, "dumb, incogitative matter" (Locke [1690] 1975, 623) forms the basis of what Patricia Churchland has called the "boggled skeptic" argument against physicalism (Churchland 1986, 315).[3] Until recently, this

2. For a readable survey of the evidence concerning folk dualism as a human universal, see Bloom 2004. More recent work, such as that by Richert and Harris 2008, Hodge 2008, and Slingerland and Chudek (forthcoming), have problematized some of the details of Bloom's argument, but it seems very likely that an at least "weak"—that is, not rigorously Cartesian—form of mind-body dualism is an innate cognitive universal. For the relationship between such dualism and religious and moral cognition, see Bering 2006 and Norenzayan and Shariff 2008.

3. Cf. Fiala et al.'s discussion of the "explanatory gap" between physicalism and human consciousness in the following chapter.

boggled skeptic argument—really more of a feeling than an argument, but no less powerful for that—has proven impossible to defuse.

THE PHYSICALIST REVOLUTION

I say "until recently," because certain developments in the past several decades have, I believe, fundamentally altered the intellectual playing field, transforming physicalism[4] from a bizarre, rather unbelievable notion into the most plausible account of the universe we currently have. To begin with, developments in evolutionary theory have finally and decisively blocked the intuitively powerful argument from design, by both tidying up some lingering theoretical problems in classical Darwinism and providing us with conceptual frameworks that make the logic of evolution crystal clear and inescapable. Richard Dawkins' *The Selfish Gene* ([1976] 2006) is a milestone in this regard, and perhaps the most influential book on evolutionary theory in the past quarter century.[5] Dawkins's seminal book provided a coherent account of how inorganic molecules could conceivably acquire the ability to make copies of themselves, and how this mechanical ability to replicate, combined with limited errors in copying and the forces of natural selection, could give rise to all of the wildly complex forms of life that we currently see around us. Building on existing, but not yet widely appreciated, theoretical work by the likes of William Hamilton (1964), John Maynard Smith (1964; 1974), and Robert Trivers (1971; 1974), he also made a devastatingly effective case for the position that the individual gene is the unit of natural selection—not the group or, as Darwin himself had thought, the individual organism.

The gene-level approach to natural selection solved a variety of theoretical problems that had been plaguing evolutionary theory, from such broad issues as how altruism might have evolved or why sexual reproduction has become so widespread, to smaller but nagging questions such as the presence in organisms of large amounts of "surplus" DNA that does not code for proteins. Perhaps Dawkins's greatest contribution, however, was to create some simple but powerful metaphors for grasping intuitively how something that looks like design could emerge from a purely mechanistic process. Metaphors like the "selfish gene" or the "blind watchmaker" provide us with a framework for comprehending how an utterly mindless, algorithmic process of descent with

4. There are various philosophical versions of physicalism, which is usually identified with materialism, the idea that physical material is the only substance that exists in the universe. As Brown and Ladyman note, certain aspects of modern physics appear to make a completely austere form of materialism indefensible; they argue for a slightly modified form of physicalism, which I adopt here: "no new levels . . . no new theory will be introduced solely to account for mental phenomena; additionally, physicalists may predict that the physics of any new theory or newly reached level will not posit mental or intentional entities" (2009, 30). This physicalism "acknowledges the existence of mental phenomena, but claims there is, and can be, no change at the mental level without there being a corresponding change at the physical level. With the converse relationship denied, the mental is asymmetrically harnessed to the physical" (2009, 34).

5. Grafen and Ridley 2006 present a helpful collection of essays on Dawkin's model of neo-Darwinism and its intellectual impact.

mutation and natural selection can, given enough time, move us from simple, selfish replicators competing for amino acids in the primordial soup to Immanuel Kant's *Critique of Pure Reason*. Like the Reverend William Paley coming across a pocket watch on the heath, we find it extremely difficult to get away from the idea that complex design requires an Intelligence to design it. Darwin's insight was that such an Intelligence was not required, or rather—as the philosopher Daniel Dennett puts it—that "Intelligence could be broken into bits so tiny and stupid that they didn't count as intelligence at all, and then distributed through space and time in a gigantic, connected network of algorithmic process" (1995, 133). Although Darwin himself had provided the basic model for how this process works, and the details of evolutionary theory had been worked out before Dawkins, in an important sense I think that most people did not really *understand* Darwinian evolution until Dawkins provided us with the right metaphors, and it is precisely this kind of visceral understanding that is necessary to overcome the equally visceral "boggled skeptic" position.

A similar sort of revolution in the various branches of the cognitive sciences targeted the other primary barrier to embracing physicalism: the feeling that there is something so special about consciousness that it simply has to constitute an entirely new order of reality. Until recently, a thoroughly physicalist stance toward the person was no more than a notional possibility, perceived dimly by authors such as Dostoevsky and pioneering empiricists such as William James, but patently absurd to most sober thinkers. This was for a very good reason: Conscious beings have powers that seem so genuinely unique that they *must* have their origin in some ontologically distinct substance. This intuition has been undermined in the past few decades by work in cognitive science that has provided a plausible model of how mind and body are integrated, how mindlike powers could arise from a purely physical body-brain system, and how this embodied mind can be seen as much a product of evolution as the spleen. Again, immediately graspable images are crucial to intellectual shifts of this sort. As Daniel Dennett has argued, a crucial and vivid bit of evidence tipping things in favor of the physicalist view of consciousness was the development of Artificial Intelligence, which finally put to rest the "boggled" argument that no amount of physical complexity could produce creative intelligence. We have now built machines that are capable of defeating Grand Masters at chess, passing the Turing Test (i.e., plausibly holding up their end of a free-form conversation), defeating the best humans in the world at complex games of knowledge (Jeopardy), and demonstrating many of the powers that were previously seen as the exclusive province of conscious, intentional agents. Dennett observes that

> the sheer existence of computers has provided an existence proof of undeniable influence: there are mechanisms—brute, unmysterious mechanisms operating according to routinely well-understood physical principles—that have many of the competences heretofore assigned only to minds. (Dennett 2005, 7)

As Hilary Putnam concludes, the overwhelming success of the physicalist model puts the folk model of dualism in an empirically untenable position, despite its intuitive appeal:

> We learn the so-called mental predicates by learning to use them in explanatory practices that involve embodied creatures. The idea that they refer to "entities" that might be present or absent independently of what goes on in our bodies and behavior has a long history and a powerful. . . . appeal. Yet to say that the idea "might be true" is to suppose that a clear possibility has been described, even though no way of using the picture to describe an actual case has really been proposed. (Putnam 1999, 148)

To say that *Geist*-dependent theories "might be true" is thus a little generous; it is more accurate to say that they "appear to be false."

Artificial intelligence (AI) systems are still quite crude, and extraordinarily inept at many tasks that are accomplished with ease by a three-year-old human. Similarly, there is still only a very rudimentary understanding of how the body-brain subserves even quite basic functions as memory, emotion, and self-consciousness. Our current blind spots, however, should not be taken as proof that a useful and empirically rigorous science of human consciousness is a priori impossible. As Owen Flanagan has noted, the current imperfect state of field of the human mind sciences often prompts a jump to what he refers to as "mysterianism," and it is important to see how unnecessary and unjustified this jump is:

> Although everyone thinks that cars and bodies obey the principles of causation—that for every event that happens there are causes operating at every junction—no one thinks that it is a deficiency that we don't know, nor can we teach, strict laws of auto-mechanics or anatomy . . . [so,] when an auto mechanic or a physician says that he just can't figure out what is causing some problem, he never says, "perhaps a miracle occurred." (Flanagan 2002, 65)

We might make a similar observation concerning the unpredictability of human thought and behavior, which is often cited as a sign of human beings' essential ineffability. It is exceedingly likely that, no matter how far the neuroscience of consciousness advances, it will remain impossible—if for no other reason than because of sheer computational intractability—to accurately predict the future behavior of even a single human being, let alone groups of human beings interacting with one another and with a constantly changing physical environment. It is equally likely that, no matter what advances we make in hydrology and meteorology, it will never be possible to pick out a single molecule of H_2O from the ocean inlet outside my window and predict where that molecule will be one year from now. However, we never doubt that that molecule's future movements will be fully determined by the laws of physics. By extension, we have no more reason to believe that the cascades of neural impulses in our brains are any less determined and governed by physical causation than the water molecule.

Contrary to some doctrinaire physicalists, there is nothing about physicalism per se that makes it uniquely scientific. If we had an accumulation of a critical mass of replicable evidence for the existence of some non-physical, causally efficacious, intention-bearing substance, it would unscientific *not* to be a dualist—and, of course, we cannot

rule out the possibility that such point will ever be reached.[6] A pragmatic conception of scientific "truth" requires that our ideas of what could count as a viable explanation remain constantly open to revision. It just seems that physicalism is currently our best, most productive stance toward the world. A seeping of this realization of this fact into general educated consciousness—facilitated by the conceptual and scientific innovations discussed earlier—has, I think, something to do with the fact that most humanists will readily and commonly refer to the distinction between "thick" versus "thin" description, or *Verstehen* vs. *Erklären*, when asked to characterize the humanities versus science divide, but tend to be less comfortable with the mind-body dualism on which these two intellectual modes are fundamentally grounded. Shweder's contribution to this volume is an obvious exception, but it seems to me that scholars such as Shweder—unabashedly willing to defend the humanities/science divide on the basis of strong ontological mind-body dualism—are becoming increasingly thin on the ground. And there is a very good reason for this phenomenon: Such mind-body dualism is appearing to be less and less empirically defensible every day.

VERTICAL INTEGRATION AND ITS RECEPTION IN THE ACADEMY

If the humanities/science divide is fundamentally predicated on mind-body dualism, and if such dualism is becoming an increasingly untenable empirical position, then it would appear that the "two cultures" divide is something we need to move beyond. The physicalist position is that consciousness is not a mysterious substance distinct from matter, but rather an emergent property of matter put together in sufficiently complicated way. It would thus seem to follow that the manner in which we engage in the study of consciousness and its products—that is, the traditional domain of the humanities—should be brought into alignment with the manner in which we study less complex (or differently complex) material structures, while never losing sight of the emergent properties that consciousness brings with it. In other words, we need to see the human mind as *part* of the human body, rather than its ghostly occupant, and, therefore, the human person as an integrated body-mind system produced by evolution. This is the sentiment behind the arguments for an explanatory continuum extending equally through the natural and human sciences that have recently and prominently been offered by, for instance, the biologist E.O. Wilson with his call for "consilience" (Wilson 1998), the evolutionary psychologists John Tooby and Leda Cosmides with their argument for the need for "vertical

6. I here take issue with John Searle's claim that physicalism functions as a modern religious dogma, accepted "without question" and with "quasi-religious faith" (Searle 2004, 48). No doubt some physicalists are dogmatists as well, but dogmatism is not intrinsic to the position. Searle's assertion that physicalism leaves out "some *essential* mental feature of the universe, which *we know*, independently of our philosophical commitments, *to exist*"—that it denies "the *obvious fact* that we all *intrinsically have* conscious states and intentional states" (Searle 2004, 49—emphases added)—echoes the position defended by Shweder earlier, and seems to me much more faithlike than the claim defended by the likes of Dennett that physicalism just seems to be the best explanation that we have right now.

integration" (Tooby and Cosmides 1992), and the neuroscientist and linguist Steven Pinker with his critique of the humanistic dogma of the "Holy Trinity" (the Blank Slate, the Noble Savage, and the Ghost in the Machine) (Pinker 2002). What all of these approaches have in common is a desire to take the humanities beyond dualistic metaphysics by seeing human-level structures of meaning as grounded in the lower levels of meaning studied by the sciences, rather than as hovering magically above them.

Understood in this way, human-level reality can be seen as eminently *explainable*. Practically speaking, this means that humanists need to start taking seriously discoveries about human cognition being provided by neuroscientists and psychologists, which have a constraining function to play in the formulation of humanistic theories—calling into question, for instance, such deeply entrenched dogmas as the blank-slate theory of human nature, strong versions of social constructivism and linguistic determinism, and the ideal of disembodied reason. Bringing the humanities and the sciences together into a single, integrated chain seems to me the only way to clear up the current miasma of endlessly contingent discourses and representations of representations that currently hampers humanistic inquiry. Of course, the reverse is also true: humanists have a great deal to contribute to scientific research. As discoveries in the biological and cognitive sciences have begun to blur traditional disciplinary boundaries, researchers in these fields have found their work bringing them into contact with the sort of high-level issues that traditionally have been the domain of the core humanities disciplines, and often their lack of formal training in these areas leaves them groping in the dark or attempting to reinvent the wheel. This is where humanist expertise can and should play a crucial role in guiding and interpreting the results of scientific exploration—something that can occur only when scholars on *both* sides of the humanities-science divide are willing to talk to one another.

It is important to acknowledge, however, that this call for vertical integration has, for the most part, been met with hostility among humanists. There are many reasons for this. Some are bad, and stem from the usual panoply of intellectual and personal sins: intellectual inertia, resentment of the relatively greater and growing prestige enjoyed by science in the past few decades, or lazy free-association that connects physicalism and evolution with social Darwinism, Nazism, and the evils of unrestrained capitalism.[7] There is, in addition, however, a constellation of good reasons that need to be addressed. One very good, though empirically indefensible reason—in my opinion at least—is exemplified by Richard Shweder's contribution in this section: there continues to be genuine disagreement about the empirical plausibility of ontological mind-body dualism, and many humanists who clearly grasp the arguments behind vertical integration simply reject them as scientifically unsubstantiated. If it did turn out that we had immaterial mind-souls that operate completely independently from our bodies, this would indeed be a very good reason for rejecting vertical integration.

Beyond disagreement over the ontological status of mind-body dualism, however, there are reasons for being skeptical about the desirability of vertical integration, especially as it has sometimes been practiced in the past. Even among humanists who grasp the physicalist position and are convinced of its empirical plausibility, there are many who have important

7. A classic expression of this sort of intellectual slippage can be found in Rose and Rose 2000, 8–9.

concerns about what a physicalist, consilient approach to the human should look like. Some are worried that many defenders of vertical integration appear to be operating with rather simplistic, and long discredited, conceptions of the nature of scientific inquiry. Since at least Thomas Kuhn's landmark *The Structure of Scientific Revolutions* (Kuhn [1962] 1970), philosophers have documented a host of problems with positivistic models of science. For instance, it is clear that theory and observation are inextricably intertwined; theoretical presuppositions play an unavoidable role in what one perceives (or does not perceive), and the classic ideal of purely objective observer or perfectly corroborated theory is, therefore, unrealizable. Many in the humanities have overreacted to this insight, embracing a kind of extreme epistemological relativism whereby there are no criteria for distinguishing more reliable from less reliable knowledge, and all human knowledge of the world is simply swallowed up in the great maw of *Verstehen*.[8] The underreaction of scientists, however, is equally deplorable. It is an odd feature of the modern Academy that philosophy of science is undertaken and studied almost exclusively in the humanities, while most working scientists—including many defenders of vertical integration—have at best only a dim understanding of the revolutions in philosophy of science that have occurred in the past several decades. This then opens them to the (for humanists) devastating and fatal charge of being "theoretically unsophisticated"—a sufficient justification, in the eyes of many humanists, for simply dismissing or ignoring their work. This is unfair, but nonetheless understandable: it is impossible to defend the vertical integration approach without a robust, theoretically defensible account of why empirical data is preferable to armchair speculation. There are plenty of places to turn for such an account. For instance Larry Laudan 1996, Ian Hacking 1983 and Susan Haack 2003, to name just a few, have developed postpositivist, pragmatic models of science that avoid the skeptical circle by rejecting mind-body dualism, and restore the importance of the empirical by emphasizing our constant contact with and efficacy in the world. Defenders of vertical integration can thus find some extremely helpful allies in the philosophy of science, but they need to recognize the need for such allies, and well as where to look to find them.

Another weakness in certain portrayals of vertical integration—again, often viewed by humanists as immediate grounds for dismissal—is a frequent failure to take into account the foundational role of human culture. Vertical integration rightly targets extreme, dualist conceptions of culture that view it as entirely autonomous from the physical or biological, a *sui generis* reality subject only to its own internal laws and amenable only to *Verstehen*.[9] A common overreaction, however, has been to overemphasize the other extreme of nativism, reducing culture to nothing more than a mechanically expressed phenotypic trait. E.O. Wilson's famous—or infamous—characterization of the human brain as "an exposed negative waiting to be dipped in developer fluid" (Wilson [1975] 2000, 156) is a paradigmatic example. Extreme nativist models can provide no account of how cultural variation—the single most salient feature of the world for most humanists—could arise, and also remains trapped in a kind of culture-nature dualism

8. For representative statements on both sides of the so-called science wars, see Marglin and Marglin 1990 and Koertge 1998. Also see Segerstråle 2000 for a short overview of the debate.

9. See, for instance, the critique by Tooby and Cosmides 1992 of the "Standard Social Scientific Model" (SSSM).

that shares all the limitations of mind-body dualism. We need not choose between culture and nature: the recognition that innate human psychology has a very complex and robust structure can coexist with an acknowledgement that this structure can be reshaped and rechanneled by a variety of forces, human cultural forms being the most obvious. Culture clearly functions as a crucial component of the adaptive environment in human mind-culture co-evolution, being carried and filtered by individual minds, but also capable of exerting independent force on them.

A final source of resistance to the project of science-humanities integration is the one most fundamentally tied to mind-body dualism, and the topic with which I would like to conclude this chapter. If human beings are intuitive mind-body dualists, it follows that studying the human as coterminous with the physical—the linchpin of vertical integration—will fundamentally violate our intuitive understanding of the world. This is also the case, of course, when it comes to any counterintuitive system of thought, such as any version of post-Aristotelian physics. The very fact that we have developed modern physics, though, and can train ourselves to think in accordance with it terms, demonstrates that folk intuitions do not have a stranglehold on our minds; when it is deemed appropriate to do so, we are capable of overcoming folk intuitions through sufficient education and conceptual training. However, the violation of mind-body dualism that is required to embrace physicalism—and thus vertical integration—faces at least two unusual hurdles. The first involves the innate[10] nature of mind-body dualism. The Ptolemaic model of the solar system falls quite naturally out of the functioning of our built-in perceptual systems, but it is not itself part of that system: we do not appear to possess an innate Ptolemaic solar system cognitive module. Switching to Copernicanism, at least intellectually, thus requires us to suspend our common sense perceptions, but it does not involve a direct violation of any fundamental, innate human ideas. On the other hand, if it is true that mind-body dualism is an innate, human cognitive universal, then physicalism *does* require such a violation.[11] Moreover, our innate folk dualism appears to be linked in a fundamental manner to human emotional and moral intuitions. Abandoning the Ptolemaic solar system in favor of Copernicus wounds our pride and undermines Scripture, but is something that modern humans appear to accept with equanimity; replacing folk physics with the increasingly stranger models proposed by Newton and Einstein requires specialized training and intellectual acumen, but can apparently be accomplished without meeting with any particular visceral resistance. Seeing people as, in essence, very complicated *things*, however, inspires in us a kind of emotional resistance and even revulsion—a revulsion that obviously lies behind Creationist opposition to the theory of evolution or more strident humanistic critiques of evolutionary psychology,[12] but that must, I would argue, be felt at some level by any thoughtful and psychologically healthy human being.

10. I take *innate* in the sense defined by Simpson et al.: "we might take a cognitive mechanism, representation, bias or connection to be innate to the extent that it emerges at some point in the course of normal development but is not the product of learning" (2005, 5).

11. This problem is essentially the same as the disconnect between "System 1" and "System 2" processes discussed by Fiala et al. in the following chapter.

12. See Segerstråle 2000 on the moral dimensions of the debate surrounding evolutionary psychology, as well as Dennett 1995 on the fundamentally "dangerous" nature of "Darwin's idea."

For instance, from the perspective of evolutionary psychology, I can be convinced on an intellectual level that the love that I feel toward my child and my relatives is an emotion installed in me by my genes in accordance with Hamilton's Rule (Hamilton 1964). This does not, however, make my visceral, "on-line" experience of the emotion, nor my sense of its normative reality, any less real to me. At an important and ineradicable level, the idea of my daughter as merely a complex robot carrying my genes into the next generation is both bizarre and repugnant to me. Indeed, this is precisely what one would expect according to evolutionary theory: Gene-level, ultimate causation would not *work* unless we were thoroughly sincere at the proximate level. The whole purpose of the evolution of social emotions is to make sure that these "false" feelings seem inescapably real to us, and this lived reality will never change unless we turn into completely different types of organisms. In a similar way we can say, qua physicalists, that our overactive theory of mind causes us to inevitably project intentionality onto the world—to see our moral emotions and desires writ large in the cosmos, or to see some sort of "meaning" in our lives.[13] It would, moreover, be empirically unjustified to take this projection as "real." Nonetheless, the very inevitability of this projection means that, whatever we may assert as physicalists, we cannot escape from the lived reality of moral space.[14] As neuroscientists, we might believe that the brain is a deterministic, physical system like everything else in the universe, and recognize that the weight of empirical evidence suggests that free will is a cognitive illusion (Wegner 2002). Nonetheless, no cognitively undamaged human being can help *acting* like and at some level really *feeling* that he or she is free. There may well be individuals who lack this sense, and who can quite easily and thoroughly conceive of themselves and other people in purely instrumental, mechanistic terms, but we label such people "psychopaths," and quite rightly try to identify them and put them away somewhere to protect the rest of us (Blair 1995, 2001). The Darwinian model of the origin of human beings and other animals, and its formulation of the ultimate reasons for many of our abilities and behaviors, is thus theoretically powerful and satisfying while appearing alien, and often repugnant, from any sort of normal human perspective.

This has very important, and too-often unrecognized, implications for the limits of vertical integration. The importance of "emergent" realities has long been recognized within the sciences. As one moves up the chain of vertical integration from, for instance, physics to physical chemistry to organic chemistry, new explanatory entities and principles arise that are not predictable from the lower levels, nor fully reducible to them at a heuristic level. This means that it would be foolish to try to replace organic chemistry with physics, or to dismiss the explanatory usefulness of concepts and entities unique to organic chemistry.[15] However, this emergence is clearly understood by everyone involved as merely heuristic: There is nothing going on in organic chemistry that is not ultimately physical, and an organic chemist would never angrily accuse a physical chemist of being

13. On this idea of "hyperactive theory of mind" as the basis for religious belief and morality, see Guthrie 1993, Barrett 2000 and Bering 2006.

14. The Canadian philosopher Charles Taylor 1989 provides an extremely insightful and profound account of the inescapability of human-level truth, although he attributes to this inescapability a degree of ontological significance that I regard as ultimately unjustifiable.

15. For more on levels of explanation and cross-scientific explanation, see McCauley 2007.

"reductionistic" for exploring the physical chemical realities underlying the behavior of organic molecules. The same is simply not true of the human level of explanation. Because of our innate folk dualism, human level realities—beauty, honor, love, freedom—strike us as pertaining to an ontological realm entirely distinct from the blind, deterministic workings of the physical world, and we are always ready to trot out the emotionally fraught charge of "reductionism" whenever the former is explained in terms of the latter. Even if the heuristic autonomy and proximate psychological power of parental love is scrupulously acknowledged, the very idea of considering a parent's love for their child in light of the cold logic of evolution will always seem both "unreal" and "unsavory," to echo Richard Shweder. What this means is that the move from physical explanation to human explanation will always feel different to us than the move from physical chemistry to organic chemistry—though, of course, they are no different in principle. For creatures like us, then, the chain of vertical integration will never be seamless: we will always feel a jolt when we cross from the physical to the mental, from the merely biological to the human, from ultimate evolutionary reasons to proximate psychological mechanisms. Understanding this fact will help us to see why the humanities-science divide continues to prove so difficult to negotiate, as well as why something like this divide will always have some traction in human psychology. This is by no means an insurmountable barrier, but should serve to temper our impatience with those who see vertical integration as a "bargain with the devil" (Menand 2005, 14), as well as to sharpen our sense of the challenges ahead.

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