

## *Hanging On To The Edges:*

# *What we talk about when we talk about biology*

Version 2.0 of April 2017

The radio network NPR titled a 2013 written piece about an interview with scientist and author Adrian Raine as follows: ‘Criminologist believes violent behavior is biological’<sup>1</sup>. Sentences like this pose a problem. The problem is that they ought to be clearly nonsense; but somehow they are not. Somehow they seem, despite all reason to the contrary, to mean something. They manage to mean something to most of the people most of the time, and perhaps even to all of the people some of the time. The same is not true in equivalent cases not involving humans. Imagine the headlines: ‘Ornithologist believes bird song is biological!’; ‘Microbiologist believes bacterial infection is biological!’. You take my point.

What is violent behaviour? The unwelcome violation of the body of one or more victims by one or more aggressors. The aggressors do this with their feet, or their hands—hands in fists, or more commonly hands on weapons, on electronic components, on signature lines of documents, on joysticks in remote bunkers. Sometimes hands are not needed; but here, larynxes are required, larynxes wired up to brains in a particular way. And what aggressors do changes the victim’s body: her knees, her kidneys, her face, or just the state of her nervous system. The thing is that I am pretty sure feet, hands, larynxes, brains, knees, kidneys and faces are biological. Surely, if The Almighty did not want violent behaviour to be biological, He wouldn’t have made us out of meat.

Alright, smart-arse, I hear you say. Of course the *implementation* of violent human acts is done using biological stuff. But what we are interested in is the *reasons* violent acts occur. And to give a useful account of the reasons we need to appeal to processes of quite a different kind to ‘biology’. Compare an example: US presidential elections are implemented in some districts using paper ballots, in some using voting machines. These ballots and machines are physical objects. They, or similar devices, were necessary for the implementation of the 2016 presidential election, but they aren’t an interesting part of the story of the outcome of that election (unless you think there were some pretty strange election irregularities). Explaining why the outcome was one way rather than the other requires discussion of: US demography; contemporary US social, economic and political institutions; ideologies; narratives; decisions of individual campaigns; and so forth. Election results are delivered using physics, but there is a coherent sense in which it would be controversial and rather strange to claim their outcomes *are* physics.

In the social sciences, we find ourselves in an odd quandary regarding the explanation of human outcomes. A *standard position* might go something like this. Humans are biologically implemented creatures, but they have special properties. In virtue of these properties, the outcomes of their lives have *reasons* and *meanings* rather than *physical causes*; are influenced by *culture or society*, not

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<sup>1</sup> <http://www.npr.org/2013/05/01/180096559/criminologist-believes-violent-behavior-is-biological>.

*nature or genes*. The special properties (we can argue about what they are) have a natural, biological origin. But once the special properties are in place, they are merely and equally permissive of an infinite range of possible social histories, whose explanation is to be couched in constructs that are not, in any interesting sense, biology. They float free of the substrate. These constructs are themselves quite varied, but they include talking about (choose your favourites and pay for them at the checkout): social structures, cultural contexts, institutions, discourse, individual meanings, response to incentives, agency, values, and so on.

You could defend the standard position's division of labour on the basis that social structures, meanings and agency were *ontologically* different from biology, but that would be a bit hard to justify. More plausibly, you could defend it *pragmatically*. Sure, in principle if we had complete, accurate models of how biological systems worked, then maybe social processes would start to be expressible 'biologically'. But, hell, the nematode *Caenorhabditis elegans* has only got 959 cells (302 of which are neurons), and despite decades of research we are currently unable to predict exactly what an individual *C. elegans* will do next when put, on its own, in a flat dish<sup>2</sup>. What hope, therefore, the Dutch tulip mania of 1637? In practice, we may as well stick with our familiar analyses in terms of social norms, values, supply and demand, or the madness of crowds. Either way, we end up with a division of labour in the academy where biologists and social scientists don't get to share the same coffee room.

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So human biologists mostly talk about things like genes and brains and hormones, while social scientists mostly talk about a separate set of processes like social capital, economic growth, stratification and identity. As a division of labour goes, it works up to a point. Both parties have come up with a lot that will stand the test of time. In human history, boundaries have often been set up in ways that are, taking the long view, indefensible: by ambitious men carving up territories in smoke-filled rooms; emerging *de facto* when each of two adversaries is too exhausted or demoralised to advance; or simply when no-one is much interested in the land in the middle. In the long run, though, if you have badly conceived boundaries, you are going to keep having boundary problems. Individually, any one of these might be soluble *ad hoc*, but, like the famous anomalies that lead, in the history of science, to revolutionary paradigm shifts, they accumulate and unsettle<sup>3</sup>. In the end, the only way to solve them is going to be by abolishing the boundary—on the ground, and in people's minds. That is where we are with the boundary between 'biology' and 'non-biology' in the human sciences.

It's not that the standard position puts humans on one side ('non-biology') and all other kinds of creatures on the other ('biology'). That would be more straightforward in some ways, though prone to falsification in G. E. Moore-like fashion, by holding up one hand. The problem is that the standard view puts humans *partly* in 'biology' and *partly* in 'non-biology'. For example, Tourette syndrome feels like a biological kind of thing, and I don't think 'Researcher believes Tourette syndrome is biological' would garner any headlines. In fact we don't know of any single genetic cause of Tourette syndrome, the environment appears to be very important, and the manifestations are largely behavioural. Indeed, people can suppress the symptoms of this 'biological' phenomenon through voluntary effort, to some extent (in Tourette syndrome, the intriguing term 'semi-voluntary actions' is used).

But violence, call violence biological, and that's worthy of a headline, though in fact the kind of individual violent acts of which Raine writes are often committed impulsively without intention. It's

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<sup>2</sup> This example is due to Noam Chomsky.

<sup>3</sup> Kuhn, T. (1962). *The Structure of Scientific Revolutions*. Chicago: Chicago University Press.

controversial to call violence part of biology, because you have moved the ill-defined boundary. Somewhere between semi-voluntary swearing, and impulsively getting into fights, approved biology has stopped happening, and approved non-biology has begun. Then you get to the 1637 tulip mania and the outcome of the 2016 US presidential election, and that's *definitely not* biology.

The dual view of humans with a 'biological' part and a 'non-biological' part is not new, of course. It is found in Descartes' view of humans as ordinary biological animals in their bodies, with an extra-biological soul, not shared with other animals, bolted on. It is also found in the 'restricted naturalism' of the great evolutionist A. R. Wallace<sup>4</sup>. Wallace saw humans as the joint product of natural forces (evolution) and some higher power. Other animals were produced by the natural forces alone. Thus, within human experience, there were both animal bits (pain, hunger, thirst, presumably sexual attraction) and non-animal bits (spiritual, moral and aesthetic values, for example). We are hybrid beings. We lie in the gutter, but we are looking towards the stars. I contemplate the eternal, fastened to a dying animal<sup>5</sup>.

The hybrid view causes absolute chaos once you take it at all seriously. Which aspects of human life go into 'biology' and which into 'non-biology'? And for the important aspects that end up partly in each, how do the 'non-biological' bits of the story interact causally with the 'biological' bits? When Berlin was divided in 1961, families and businesses found themselves with one part on one side, one part on the other. The boundary ran down the middle of some streets. So, the 'biology'/'non-biology' division runs down the middle of all the most important questions. Health: indubitably biological but profoundly affected by social-structural factors and policy decisions; agriculture: a set of socially-organized processes and practices that centrally involves an ecosystem of other species. Like the wall going down the middle of a single street, we end up with really strange claims, like 'depression can have both social and biological causes'. (The division between 'social factors' and 'biological factors' is commonly made in medical teaching.) Surely it's a bit cumbersome to hold that the very same configuration of the brain can be arrived at for two ontologically distinct, unrelated kinds of reasons. More to the point, the unity of the phenomenon, its integrated nature as the end-state of individuals with particular genetic and somatic inheritances developing through particular kinds of experience in particular societal contexts, is necessarily closed to us whilst the boundary remains in place.

In Berlin's railways between 1961 and 1989-90, several ghost stations were created, where trains could pass by but not stop because the above-ground exits were in the wrong sector. At Bornholmer Strasse station, trains from *both* East and West Germany passed through, but no-one from either sector could get out. How many places are we collectively failing to explore because the standard position of social science doesn't provide the skills, incentives, or encouragement we need to do so?

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I am as interested in the reasons the boundary continues to exist as I am in campaigning to abolish it. Many intelligent interlocutors will concede that the division into 'biological' and 'non-biological' makes no real sense when you talk to them about it in detail. But then, when they are tired, when they are talking to a lay audience, when they need a convenient shorthand, suddenly there it is again. There on their presentation slide, or in their written summary, or in something they say: 'Here we outline a biological explanation', they say; or 'as well as individual biological factors, social context may be important'. Put a penny in the swearing jar! All that is human is biological, and social context

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<sup>4</sup> See Benton, T. (1991). Biology and social science: Why the return of the repressed should be given a (cautious) welcome. *Sociology*, 25, 1–29.

<sup>5</sup> It feels increasingly like that.

is a biological factor. What you have just said makes about as much sense as: 'As well as numbers, addition can involve 1, 3, 7 and 9'. Even Adrian Raine, in the interview cited at the head of this essay, says of his research: "I've got to be careful here....Biology is not destiny, and it's more than biology, and there's lots of factors that we're talking about there". So in fact, Raine *reproduces* the 'biology'/'non-biology' boundary; all he has done is partially moved one phenomenon—violent behaviour—a little further into biological territory, whilst endorsing the view that it is a hybrid phenomenon, subject to two categorically distinct kinds of causes.

Historians of science tend to situate the origins of the persistent 'biology'/'non-biology' dichotomy in particular influential academic ideas and positions, themselves the products of the concerns of their times. Thus, on the one hand we have nineteenth-century Biology's hard division between the immortal germ-line, to which slow, evolutionary, genetic processes happen, and the transient soma, which comes into the world from the germ line, but once there is off the leash in a short-timescale world of contingent environmental processes. It only has to report back at the end in the form of lifetime reproductive success. This hard disjunction within Biology made our processual understanding of genetic evolution tractable under the Modern Synthesis of the early twentieth century, but if we don't deploy it with care, it opens up an apparent space between nature/biology (supplied by the germ line as factory standard) and nurture/non-biology (happening to the somata). In this space, dualism can fester<sup>6</sup>. On the social science side, we have figures like Weber and Durkheim, wanting to carve out a terrain on which legitimate and distinctive social enquiry could be conducted, as well as those in the tradition of Wallace wishing to salvage deeply-held spiritual or moral beliefs despite a growing understanding of our kinship to other species. It was in the interests of all these people to reproduce and reinforce some version of the 'biology'/'non-biology' boundary<sup>7</sup>.

These intellectual-history accounts are all well and good, but given the extraordinary and widespread persistence of the biology/non-biology dichotomy (including amongst people never exposed to Weissman or Weber), I am tempted to give it an explanation that's a bit more, well, biological. Maybe the distinction between 'biology' and 'non-biology' maps onto some deep-seated way of thinking that humans are predisposed to develop and find intuitive to deploy. This would make some kind of 'biology'/'non-biology' distinction a 'cultural attractor'—that is, a cultural convention prone to emerge recurrently and persist in diverse human communities, because of regularities in the way people think, remember and communicate<sup>8</sup>. An appealing feature of this idea is that it would explain why: (a) at the individual level, people who have been thoroughly disabused of the 'biology'/'non-biology' distinction often reproduce it nonetheless, especially in moments of distraction or fatigue; and (b) at the cultural level, discursive traditions that initially contain no 'biology'/'non-biology' distinction often acquire one over time. I think for example of Marxism here: Marx was an enthusiastic endorser of Darwinian naturalism, and his theorising founded social relations on humans as 'active natural beings' engaging in productive interactions with the rest of the natural world. Very soon, the biological naturalism was

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<sup>6</sup> Fox Keller, E. (2010). *The Mirage of a Space between Nature and Nurture*. Duke University Press. The dualism of germline/genes vs. soma/environment is not quite the same as that of 'biology' vs. 'non-biology'. Most obviously, for all other species, we think of both the 'genetic' and 'environmental' bits as being 'biological', whereas for our own species, exceptionally, we tend to call the somatic/environmental bit 'non-biology'.

<sup>7</sup> Benton, T. (1991). Biology and social science: Why the return of the repressed should be given a (cautious) welcome. *Sociology*, 25, 1–29; Meloni, M. (2016). The Transcendence of the Social: Durkheim, Weismann, and the Purification of Sociology. *Frontiers in Sociology*, 1, 1–13 is particularly interesting on the idea that biology and social science historically colluded in boundary-making.

<sup>8</sup> Sperber, D. (1996). *Explaining Culture: A Naturalistic Approach*. Blackwell.

washed out, and biological and Marxist theory seem to have rather little to do with each other, either in rhetoric or in practice, thereafter<sup>9</sup>.

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So perhaps the ‘biology’/‘non-biology’ distinction has been built by our culture along a natural fault line in the psychological landscape. Does that help us understand people’s intuitions about where the boundary of ‘biology’ lies in human affairs? Does it, in short help us understand what people are talking about when they *don’t* want to talk about biology?

In life, people are understandably concerned to distinguish processes that could not, through any sequence of our actions, come out any differently, from those processes where it matters what we decide to do. For example, it doesn’t matter whether or not I try to persuade people that human hearts should be on the left side of the body. I don’t need to bother. Nearly all human hearts are going to be there, for a long time into the future, regardless of what I do. On the other hand, the level of social inequality in Britain is related to specific actions people decided to perform at particular times. It is related to these actions in a really complex way; the actions are many, the consequences are subtle and at times unforeseen; the people performed them under exposure to particular discourses encouraging them to think in particular ways (discourses that were themselves the consequence of people’s actions). But nonetheless, I could take actions that might have some effect, somewhere down the line, on the level of social inequality in Britain.

Thus, it feels like there is useful intuitive distinction between the stuff that you just have to accept, and the stuff why that could come out differently (it was different at other times, it is different in other places, or it could be different if we organized things differently). You can see how this fixed/non-fixed divide could be useful to think with, in all kinds of human contexts. Which aspects of my potential spouse do I need to just put up with (her height, for example), and which ones might I manage to negotiate or shape so they are different in the future? And reasons play a different role in the fixed and non-fixed cases. It’s not pragmatically important for human societies to reason well about why hearts are on the left. They might figure out a reason why, and that would be interesting. But it’s not important to the outcome how they reason about it. Not so social norms, laws, taxation and so forth, where the quality of the reasons we come up with affects the social outcomes we get.

The spatial metaphor of inside and outside, or body core versus body surface, often gets fused to the concern with fixity and non-fixity. So we say things like ‘Deep down, he’s always going to be selfish’; ‘is this really *in* her nature, or is it just something *on* the surface?’. This spatial translation of the fixed to the middle and the malleable to the edges recalls some diagram of essence and accidents from Medieval philosophy. It is very intuitive, even if it makes no literal scientific sense.

As well as fixed/non-fixed and inside/surface, people find it useful to distinguish between voluntary and involuntary actions. This distinction is intricately connected to ideas of dissuasion and moral culpability; again it is related to what it is worth bothering trying to change, and to the role of reasons. If you are going to go voluntarily to Sunderland, I might try to dissuade you with reasoned arguments. I might even threaten you with diverse punishments if you follow through on your intention. If,

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<sup>9</sup> Marx in the *Economic and Philosophic Manuscripts of 1844*: ‘Man is directly a natural being. As a natural being and as a living natural being he is on the one hand endowed with natural powers, vital powers – he is an active natural being’. Gramsci in the *Prison Notebooks* (written between 1929 and 1935): ‘Philosophy cannot be reduced to a naturalistic “anthropology”: the nature of the human species is not given by the “biological” nature of man’. Of course there is a great deal more to be said about the difference between Marx and Gramsci, or indeed early and late Marx, than this glib observation.

however, you go to Sunderland involuntarily, for example by your train being re-routed, I would not hold it against you<sup>10</sup>.

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It seems, then, that we have plenty of intuitive raw material for the cultural emergence of a 'biology'/'non-biology' distinction. We take what seems to us fixed and we stick that in a category. We call this bit 'biology' to the exclusion of the rest. This is supported and made more compelling by the intuitive relation of the fixed/non-fixed distinction and the inside/surface metaphor. Inside a body you find muscle and blood and viscera (and if you look closely enough, genes), stuff that you don't know how to change, that looks just like the insides of other animals, that looks really, really...biological. On the surface of bodies you find all kinds of things you can take on and off like clothes and ear-rings and smartphones, and these don't look biological at all.

The voluntary/involuntary distinction often gets mixed in here, but not always, and its relation to 'biology-ness' is complex. In popular parlance, the voluntary is never 'biology'. I didn't do it because of my genes, I did it because I wanted to! But many processes that are very definitely involuntary also end up discussed in the 'non-biology' category. I speak of subtle forms of normativity and acculturation. These influences are involuntary but nonetheless seem somehow 'outside' and 'non-fixed'; they end up in the Social Science Building, and the category of 'non-biology'. But when the involuntary is also cast as internal, then that gets characterized as 'biology': inner genetic urgings, hormones, and so forth. These get wheeled out and cast as the villain playing against the hero of free choice (in lay talk) or sociocultural process (in the professional academy).

With this rather muddled set of distinctions culturally available, 'biology' becomes the category for everything we don't want our destinies and our social arrangements to be. 'Biology' becomes the place where all the fixed stuff lives, so if you are interested in change or contingency, you define what you did in opposition to the 'biological'. This is why, in social science, the bad word that follows the bad word 'biological' is usually 'determinism'. 'Biology' is the bit of you that is a mere zombie, compelled to follow preordained urgings. You would naturally want that bit to be as small as possible if you valued your autonomy. Finally, 'biology' is somehow inside you, with all the disgusting smelly stuff you only look at in medical contexts, whilst most of things you enjoy in life involve your outer surfaces exchanging energy with the world around you. This may explain the tremendous media air-time you can get with neuro-imaging studies showing with pretty maps how activity in the brain differs between people who are and are not X, where X is suffering from schizophrenia, falling in love, growing up in poverty, or listening to Mendelson. 'Gosh!' we say, 'I didn't realise that was actually happening *on the inside*'. Of course those activities involve being different on the inside. How could they possibly not be? But showing that something is going on inside in no way constrains the importance of stuff going on outside for what makes those experiences happen the way they do.

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Once the two receptacles of 'biology' and 'non-biology' have been made, incoming traffic gets diverted into either one or the other. Genes – 'biology'; environment – 'non-biology'; innate –

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<sup>10</sup> Cross-cultural and developmental research suggests that the voluntary/involuntary distinction in reasoning about human actions is widespread, and voluntariness has an intimate connection with moral culpability, and hence with dissuasion and sanction. Interestingly, the strength of the connection between intention and culpability appears to vary substantially across societies: Barrett, H. C. et al (2016). Small-scale societies exhibit fundamental variation in the role of intentions in moral judgment. *Proceedings of the National Academy of Sciences*, 113, 12–14.

'biology'; learned – 'non-biology'; evolved – 'biology'; acquired – 'non-biology'; nature – 'biology'; culture – 'non-biology'. Maybe that's not such a bad thing, you say, at least as a first approximation. I've argued that fixed/non-fixed and voluntary/involuntary are actually useful to distinctions to make in everyday life—that's why they exist. So maybe the conventional biology/non-biology description is heuristically useful in scientific discourse too, at least as a rough framework for starting out? If it didn't exist under the labels 'biology' and 'non-biology', we would have to invent it anyway using different terms.

This is a reasonable view, but, I think, wrong. The 'biology'/'non-biology' distinction of the standard position has only bad features that I can see. It cuts natural continua, such as fixity, into artificial dichotomies, leading to pointless and unproductive contestation about boundary cases. Everything *could* be different; the question is more 'what would it take to make X different?'. It puts into the same category concepts that are in fact quite distinct. 'Genetic' is not the same as 'evolved'. And finally it puts into different categories things that are not exclusive. Learning, for example, is something done by genes. Yes, genes, the product of a history of natural selection, are not just enabling of learning by their presence, but intimately involved, through their expression, in how learning actually works. So when you appeal to learning, you are appealing to a genetic process (and, indirectly, to evolution). More generally, any attempt to mark the 'inside stuff' off from the 'outside stuff' is a dual disservice. It ignores how profoundly environmental processes become embedded in the body, and how things like genes can exert effects outside the body envelope<sup>11</sup>.

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My thesis, then, holds out both good and bad news for the standard position demarcating social science. The bad news is: it's all biology. Everything social scientists do is biology. It's not that it will be replaced by biology in the future, in some *Who's afraid of Virginia Woolf?* nightmare scenario. Everything social scientists do already is, and always has been, biology. Why? Because biology is the study of living things. Humans are living things, and so whatever they do, however they organize themselves, whatever extraordinary technologies they create, whatever meanings they entertain, reasons they give or tastes they develop, these are all biological processes.

All you have done, you might respond, is to *define* biology so as to include all of the things the social sciences are interested in. We do not immediately understand social phenomena any better by doing this. Has anything actually been gained by this move? I might retort: well, it was the standard position that started this, by defining biology in a restricted and artificial way so that the things social scientists are interested in would *not* be in it. All I am doing is restoring the status quo ante. But more positively: the redefinition doesn't change anything overnight, but in the long run it might help us do better research. As scientists, we are *bricoleurs* (tinkerers), using whatever materials and ideas we have lying around in new ways to try to solve new problems, or better solve existing ones. And if, by erasing boundaries within the academy, we expand the set of techniques and ideas which individuals can access, then we are all going to progress more quickly.

So the bad news is: it's all biology. But here's the good news: biology is not what you think it is. The resistance to 'biology' in the social sciences is founded on the fear that certain things we really value would be foreclosed by joining up to the biological sciences. I believe this fear is largely groundless.

A first version of the fear opposes law-like determinism to a world of influences and historical contingencies. In natural science, this argument goes, there are absolute laws. If you drop a cannonball from a tower on earth, there is no doubt about the outcome. In the social sciences, we have

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<sup>11</sup> Dawkins, R. (1982). *The Extended Phenotype*. Oxford University Press.

general tendencies and patterns, but these always have exceptions and specificities in their realization; we have historical processes that are explicable in retrospect but could not have been predicted prospectively. We social scientists just can't fit what we do into a world of simple natural laws.

This fear is easily dismissed, since its view of how natural science works is wildly wrong. That science consists in uncovering a few simple and absolute laws holds, if it holds at all, as a description of physics. Philosophers of biology are pretty clear that Biology is not like this. Biological evolution is a contingent and path-dependent historical processes. There are certainly regularities in the way it has operated—selection gradients that recur, for example. But the course of evolution is a complex resultant of the selection gradients in operation, the varieties of living mechanisms that were already there, chance, and time. What evolution produces is an astonishing diversity of inter-linked systems: cellular systems, organ systems, organisms, social groups, ecosystems. These are all dynamic; their dynamics depend where they start from, and feed back into the selection pressures of the future. Although sense can be made of how these different kinds of systems work, no-one believes you can simply read off all their specific properties from a few very simple laws, either of an evolutionary or biophysical kind.

A second fear is that Biology involves a kind of explanatory monoculture, whereas explanation in the social sciences needs to be more heterogeneous. The social sciences involve identification of many different mechanisms of rather different types, at different levels: individual-level mechanisms like response to incentives or psychological biases; social-level mechanisms like stratification or spatial assortment; cultural-level mechanisms like diffusion of innovations; or even symbolic and discursive-level mechanisms. Critics of social science see the diversity of this bewildering menagerie as a weakness. A field with such an undigested diversity of explanatory strategies must just be a conceptual mess. But a lot of social scientists would respond that they value this very diversity. In complex human social phenomena, you can't just deduce the historical outcome from properties of the individual psychologies, or the social organization, or cultural diffusion, alone. You need all of these things, and whilst you need to understand how they inter-relate, you can't eliminate them from the stock of things we need to appeal to, and should not try.

The fear of Biology that comes from this somehow assumes that Biology, in contrast, only admits of one type of explanatory construct. That explanatory construct, in this straw Biology, is usually molecular (either molecular genetics, or, for example, hormones or neurotransmitters as *the* cause of a phenomenon). This is why the second bad word that often follows the bad word 'biological' in social science-speak is 'reductionism'. Once again this is a gross mischaracterization. Biology is a diverse enterprise involving people who work at many levels. Almost all of the levels involve systems thinking: from cellular systems, physiological systems, whole organisms, swarms, hives, communities, populations to ecosystems. Though researchers are centrally concerned with how the functioning of the systems at one level relate to the dynamics at another level (e.g. individual cells to whole organisms; individual organisms to populations), the traffic goes both ways, and there is certainly no simple theoretical monoculture. The stuff that goes on inside the individual is not, in principle, theoretically privileged over population processes. There is no sane proposal to eliminate the organism, the population, or the ecosystem as levels of analysis, or to deny that there are complex dynamics at these levels we cannot simply deduce from the dynamics at more molecular levels. In fact, explanation in biological science looks somewhat like explanation in social science: it is not a matter of reducing everything to the molecular level, so much as the identification of various kinds of mechanisms, operating at different scales, in slightly different ways in different contexts, to shape the outcome of complex and variable systems through time.

The cause has not been helped here by the writings of certain zealous ‘biologizers’ from the humanities and social scientists. Look at the social sciences, they say, a complete hodge-podge of unintegrated, theoretically incoherent sub-disciplines, not really getting anywhere. Now look at Biology. It’s the most successful science of the twentieth century. It is conceptually unified by the theory of evolution. If the theory of evolution did that for Biology, then given that we too are evolved beings, it can now do the same for the social sciences and humanities. I have sympathy with many aspects of this view, but it is important not to over-simplify for rhetorical effect. Inspired by Biology, they ascribe it all manner of positive properties they feel they don’t currently have, like simplicity, unity, and theoretical elegance. But a lot of these turn out to be overstated once you start actually swimming in biological waters. There is widespread human tendency to underestimate the complexity and internal heterogeneity of categories we don’t have much direct personal experience of. I suspect there is an inverse correlation between how unified you think Biology is compared to social science, and how many hours you have ever spent in a Biology lab or field site.

The truth is that Biology, viewed from closer up, is also something of a hodge-podge; less so than social science, but a little bit hodge and in some respects podgy nonetheless. It is unified by the theory of evolution only to a point. Most working Biology is cellular and molecular, and here the theory of evolution usually plays rather little role either in techniques, explanations, or the kinds of questions people ask (it probably should do more, but it doesn’t at present). And then even in the parts of Biology that are more explicitly evolutionary, such as whole-organism biology and ecology, there’s a great deal we don’t know about how it all works out in detail. The biologizers sometimes imply that it suffices to read *The Genetical Theory of Natural Selection*, maybe coupled with William Hamilton’s seminal 1964 papers on kin selection, and then you can simply deduce kidneys, or star-nosed moles, or what happens in Yellowstone National Park. You can’t. That’s what biologists do all day. They don’t agree about it all. It is going to end up involving a great diversity of processes, and a lot of detailed understanding of specific mechanisms.

A final fear that social scientists might have about changing the sign over the office door to ‘biologist’ is that they would lose the opportunity to speak about agency, and related notions of responsibility, reasons and the moral life<sup>12</sup>. The non-human biological world may exhibit complexity, but it is not a world whose inhabitants have agency. This is why human affairs are different, and we need to hold on to this fact in the ways we talk about it. Now I agree that agency, and the things that go with it, are distinctive features of human life that need to be accounted for, not down-played or ignored. But ‘distinctive’ need not mean ‘not biological’. In fact, some of our existing *social science* theoretical frameworks do a bad job with agency. Social constructionism would be one example. If our very personhood is a cultural construct, originating in social discourses we were exposed to but did not choose, then what sense can we make of responsibility, moral justification or voluntary action? Are they not just shams? The more I think about agency, the more I feel that it is not so much that agency *can* be reconciled with seeing us as biological beings. It is that *only* by seeing us as biological beings can we rescue any coherent notion of what human agency is or the uses to which it is generally put. Joining up with Biology certainly does not make the problem of agency any more difficult than it already is. If anything, it’s the key to progress<sup>13</sup>.

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<sup>12</sup> For some discussion, see Scruton, R. (2017). *On Human Nature*. Princeton: Princeton University Press.

<sup>13</sup> See Mercier, H. and D. Sperber (2017). *The Enigma of Reason: A New Theory of Human Understanding*, for a thoroughly biologically-grounded account of human reasons and hence, of moral justification.

Redesignating social science as one of the biological sciences should not be a case of *restricting* the types of data or explanatory entities to which social science is entitled. And it is certainly not a case of seeing humans as *just the same* as monkeys or mongooses. After all, monkeys are not *just the same* as mole rats or slime moulds, yet they are all totally biological. It's more a case of feeling free to pursue the theoretical and empirical connections between different types of data, types of description, types of process, without getting held up at the border post. It gives us a greater library of options to improvise with, connections to make. So the goal of abolishing the 'biology'/'non-biology' distinction is worthy. Can we succeed? I don't know. There are institutional and organisational issues here that are going to be slow to unpick, if they can be unpicked at all. And if I am right that the distinction is a cultural attractor, we are running into quite a strong psychological headwind. But folk psychology is what science is here to rise above, not something to which it is condemned. At least I hope that this is true. Admittedly, though, people have been trying quite seriously to dismantle the boundary between the biological and the social for at least fifty years, and yet there is still plenty of evidence of it on the ground.

Taken together, the folk psychology of the audience, and the ways institutions are divided up, can provide incentives for perpetuating the boundaries even amongst those who know much better. In my experience, when a scholar defines what she argues for as *not-just-X*, where X is, for example, biology, psychology, economics, or whatever, she is not usually interested in the actual contents of category X. She usually presents a partial or incorrect view of what such contents are, such as for example taking one token as essentially representative of the type. In fact, she almost *requires* such a limited view. If she admitted too much that is true about X, including its internal diversity, heterogeneity and potential for future change, her non-appeal to X would probably fail in its functions, which, alas, do not usually include characterising X in a constructive way. Her non-appeal is a territorial claim; a rallying point; a stoking of prejudice; a parochial code for fellow-feelers to identify one another; it is a kind of aesthetic, moral and financial self-justification; it is a signal of social distinction. The unfortunate thing is that scholars, like politicians, get rewarded for these kinds of moves, and misunderstood or ignored if they fail to make them.

We can try to do something about this, even if it is an uphill battle. As authors, we can catch ourselves every time we lazily or parochially use a phrase like 'Whereas biologists believe...', or 'Whilst economists see...'. Which biologists? And why call them biologists at all? Why not just use their names? As readers, we should be as critical and sceptical of parochial claims from our scholars as from our politicians. We should see ourselves as citizens of the whole wide intellectual world, and demand reasons, expressed in clear language, that make sense universally, without appeal to the tribal affiliations of their originators.