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Polanyi and the Response to Biological Reductionism

Abstract & Thesis

The application of Polanyi to various forms of reductionism is a perennial question, and has elicited some thoughtful and compelling responses. Accordingly, I will not attempt a novel application but rather put Polanyi in conversation with contemporary expressions of reductionism in an attempt to understand what unique options Polanyi brings to the table in terms of a viable alternative ontology. Polanyi's response is unique in that (i) he does not challenge the soundness of scientific inquiry, but rather interprets it in a new light through the principle of *tacit knowing*, (ii) he avoids positivism without abandoning realism, and (iii) he proposes a convincing substitute for mechanism in his hierarchy of reality through the principle of marginal control. Further, Polanyi's career experience as a scientist distinguishes him from his peers in the science of philosophy. These distinctive features of Polanyi's philosophy also offer a rhetorical advantage to those who aim to open constructive dialogue about the need to reevaluate the primacy of scientific positivism in the contemporary context. I will use Robert Sapolsky as an example of an advocate of contemporary biological reductionism, however this paper is intended to explore the issue of contemporary biological reductionism more broadly.

Sapolsky as a Representative of Contemporary Biological Reductionism

Unless we reject the explicatory powers of scientific inquiry, it is only a matter of time until we realize that "...free will is just the biology that we haven't learned yet."¹ Robert

¹ "Revising the Fault Line | Radiolab | WNYC Studios." wnycestudios. Accessed May 4, 2018. <https://www.wnycestudios.org/story/revising-fault-line/>.

Sapolsky, Neuroendocrinologist at Stanford, made this assertion in his 2017 interview on the popular NPR radio show, *Radiolab*. The hosts were conflicted, and Sapolsky himself admitted that he could not conceptualize of a world described in purely mechanistic terms. Responsible agency is so deeply ingrained in our conceptualization of the world, he suggests, that we lack the tools to express ourselves outside of that framework. When someone complements his choice of shirt, Sapolsky responds, “Thank you!” “Oh my God, the hypocrisy!” he exclaims.² Sapolsky’s view is not a new one, but it is increasingly popular within the scientific community and seemingly bolstered by findings in neuroscience and biology more broadly. The term the “scientific community” is usually so broad that attempting to assign it a single trajectory of opinion is usually a futile undertaking. In this case, the trajectory seems to be a clear and steady move towards reductionism across fields of scientific study.³ If this understanding of the world is true, then we have mistakenly believed in a figment called “responsible agency” for all of human history thus far. While not impossible to be sure, there are reasons to be skeptical of this claim.

Sapolsky anticipated this resistance in his book, *Behave: The Biology of Humans at Our Best and Worst*, released the same year as the interview. This kind of resistance is a normal response to feeling deprived of responsible agency, he says, but that response is irrational. From the point of view of a scientific positivist, Sapolsky seems correct on this point. By way of illustration, he points out the intense public backlash when Daniel M’Naghten was acquitted by reason of insanity for the attempted assassination of British Prime Minister Robert Peel in 1842.

² “Revising the Fault Line | Radiolab | WNYC Studios.” wnycestudios. Accessed May 4, 2018. <https://www.wnycstudios.org/story/revising-fault-line/>. (38:34 – 39:47).

³ Even a fairly brief review of literature makes this apparent. See the Stephen Cave’s 2016 article in *The Atlantic* for a good overview of the growing consensus in this area. Cave, Stephen. “There’s No Such Thing as Free Will.” *The Atlantic*, June 2016. <https://www.theatlantic.com/magazine/archive/2016/06/theres-no-such-thing-as-free-will/480750/>.

The legal precedent this set became known as the M’Naghten rule.⁴ In today’s legal system most juries would readily acquit someone suffering from a level of psychological pathology similar to that expressed by M’Naghten. Sapolsky’s point is that our understanding of neuroscience – and an increase in scientific knowledge more broadly – continually decreases the level of responsible agency we assign to individuals. Yet, Sapolsky points out, there is a general unwillingness to acknowledge the viewpoint that all of human action can be explained in terms of physical and chemical processes that we do not yet understand. In other words, the ontology of biological reductionism is simple on a conceptual level, but a difficult one to wrap one’s head around in real terms. Most, he contends, attempt to align with the compatibilist camp, which attempts to reconcile biological determinism with higher forms of human function like free will. This, he says, is a mistake, and here it is worth quoting him at length – if for nothing else, for the entertaining imagery he uses to summarize the compatibilist position:

There’s the brain – neurons, synapses, neurotransmitters, receptors, brain-specific transcription factors, epigenetic effects, gene transpositions during neurogenesis. Aspects of brain function can be influenced by someone’s prenatal environment, genes, and hormones, whether their parents were authoritative or their culture egalitarian, whether they witnessed violence in childhood, when they had breakfast. It’s the whole shebang, all of this book.

...in a concrete bunker tucked away in the brain, sits a little man (or woman, or agendered individual), a homunculus at a control panel. The homunculus is made of a mixture of nanochips, old vacuum tubes, crinkly ancient parchment, stalactites of your mother’s admonishing voice, streaks of brimstone, rivets made out of gumption. In other words, not squishy biological brain yuck.

⁴ J. Quen, “An Historical View of the M’Naghten Trial,” *Bull of the History of Med* 42 (1968): 43.

And the homunculus sits there controlling behavior. There are some things outside its purview – seizures blow the homunculus’s fuses, requiring it to reboot the system and check for damaged files. Same with alcohol, Alzheimer’s disease, a severed spinal chord, hypoglycemic shock.

(...)

But other than that, the homunculus makes decisions... A homunculus in your brain, but not of it, operating independently of the material rules of the universe that constitute modern science.

...Even if 99.99 percent of your actions are biologically determined (in the broadest sense of this book), and it is only once a decade that you claim to have chosen out of “free will” to floss your teeth from left to right instead of the reverse, you’ve tacitly invoked a homunculus operating *outside the rules of science* [emphasis my own].⁵

I am aware of attempts to reconcile this problem through “soft compatibilism⁶,” but I find them unconvincing, as I believe is also likely to be the case for Sapolsky and others in his camp. The fact remains that one inevitably has to confront Sapolsky’s homunculus; there does not seem to be a rational way to assert the existence of operations that are explicable in non-mechanistic terms without invoking just such an intuitively irrational workaround. Here the philosophy of Polanyi, rooted as it is in a deep respect for the value of scientific inquiry, shines as particularly well-suited to address this problem. Polanyi’s approach is made even more original in that it is

⁵ Sapolsky, Robert. *Behave: The Biology of Humans at Our Best and Worst*. London: Penguin Random House, n.d.

⁶ Pereboom, Derk. "Determinism Al Dente." *Noûs* 29, no. 1 (1995): 21-45. doi:10.2307/2215725.

Pereboom’s argument is one of the most famous examples, but there is no shortage of extremely nuanced stabs at soft compatibilism. Yet, as Pereboom points out himself, these are typically far from satisfactory. One cannot help but sympathize with Sapolsky’s simple “either-or” approach; anything else suggests splitting hairs motivated by a fear of abandoning responsible agency.

devoid of any of the “social intuitionism” popular amongst Haidt and others, which is characterized by attempts to explain deontological reasoning in terms of intuition, post hoc analysis, and other irrational forms of deontological judgment.⁷ Polanyi’s notion of biological hierarchies consisting of a series of boundary conditions offers a new route to explaining this difficult problem. More than a defense of free will, Polanyi’s ontology provides a means of acknowledging the explicatory power of science as unlimited *within the context of its boundary conditions*. No matter how much we explain the world scientifically, we will never make it entirely explicit.

Biological reductionism comes in a number of varieties, and Sapolsky is merely presenting a garden variety of biological reductionism that resides somewhere between the ontological and methodological approaches. The particulars of his argument are actually not important and, in fact, only a portion of his (very lengthy) book actually deals with biological reductionism and its implications for responsible agency. I specifically chose Sapolsky to put in conversation with Polanyi for this reason; he is representative of a growing number of people exploring this issue and drawing similar conclusions. Brilliant in his field, Sapolsky is not a philosopher, nor does he wish to be. The version of reductionism that he touts is clear, simple, and rooted in an expert’s knowledge of neuroscience. His views represent those of a growing portion of the scientific community, as well as an increasing portion of the intellectual community more broadly, and I want to show that Polanyi offers an overlooked framework for softening claims of absolute biological determinism *without* resorting to traditional soft compatibilist approaches or abandoning the realist position.

⁷ Haidt, Jonathan. *The Righteous Mind: Why Good People Are Divided by Politics and Religion*. London: Penguin Books, 2012.

That Polanyi's approach preserves some of the values that scientists – and a society increasingly enamored with science as a means of explaining the world – hold most closely is a significant help in rhetorical terms. Polanyi's philosophy has a sort of Rogerian rhetorical advantage in its maintenance of common ground with those who view science as the be-all and end-all of rational inquiry. As the primacy of the scientific outlook continues to grow, as seems to be the trend, Polanyi's philosophy has the potential to impact everything from policy and law to the ethics of things like artificial intelligence, genetic enhancement, and much more.

Polanyi as a Convincing Response

Polanyi's answer to the positivist claims that have dominated Western culture from modernity onward is unique for several reasons. To restate an earlier point, Polanyi (i) does not rely on a denigration of scientific inquiry, (ii) avoids positivism without abandoning realism, and (iii) proposes a convincing substitute for mechanism through his hierarchy of reality through the principle of marginal control. These unique approaches afford Polanyi the opportunity of an audience where there might otherwise be resistance to attempts to modify reductionist claims, particularly within the scientific community.

As Amaryta Sen points out in the introduction to a 2009 rerelease of *The Tacit Dimension*, the fact that Polanyi began his career in the sciences had a number of influences on his later philosophical work⁸. One was that his background played a role in keeping him an “outsider” in the realm of professional philosophy, and perhaps partially because of this outsider status his arguments have been frequently overlooked. Yet, Polanyi's background no doubt played a role in his respect for scientific inquiry and the authoritative tone with which he discusses the process of scientific discovery. While other philosophers of science, Thomas Khun

⁸ Polanyi, Michael. *The Tacit Dimension*. Chicago: University of Chicago Press, 2009. vii-xvi.

for example, may have gained more recognition within the field, Polanyi stands alone because of the sheer magnitude of his scientific career prior to taking up philosophy. Where Polanyi is often treated as an outsider looking in on the field of philosophy, when he writes about the process of scientific inquiry and discovery the roles are reversed. Professional philosophers are the ones looking in from the outside while Polanyi speaks as the definitive voice of experience.

It is precisely because of this experience, I contend, that Polanyi's concept of tacit knowing is so forceful. Polanyi's epistemological argument is rooted in the idea that "one can know more than one can tell."⁹ Scientific effort is an interpretive effort. Discovery is the process by which meaning is inferred from our sensory input and the interpretive screen through which we pass that input. Here Polanyi employs the example of one's finger viewed through a pinhole in a sheet of paper.¹⁰ One's perception of one's finger will be distorted by the elimination of the contextual space that would normally be present in one's field of vision. As Polanyi points out, one does not usually actively attend to this peripheral field of vision, yet it is responsible for how one perceives one's finger. Thus, the perceptual and interpretive 'filter' through which we perceive the world has significant bearing on our understanding.

However, Polanyi is not claiming that *all* meaning is derived from the interpretive effort, but rather that this is simply part of the process of tacit integration that leads to tacit knowing. As Polanyi explains, "all meaning tends to be displaced *away from ourselves*..."¹¹ This fact, Polanyi claims, justifies his designation of the terms *proximal* and *distal* to describe two varieties of tacit knowing. The former may be understood as that which is "nearer to us" and the latter that which

⁹ *Ibid.*, 8.

¹⁰ Polanyi, Michael. "On the Modern Mind." *Tradition and Discovery*. Accessed May 22, 2018. <http://www.polanyisociety.org/MP-On--the-Modern-Mind-1965-ocr.pdf>. 17.

¹¹ Polanyi, Michael. *The Tacit Dimension*. Chicago: University of Chicago Press, 2009. 13.

is “further”, in the broad sense.¹² “It is the proximal term, then, of which we have a knowledge that we may not be able to tell,” Polanyi explains.¹³ These are those things of which we may have an intimate, yet incommunicable, knowledge – for instance, the experience of scientific discovery. Polanyi (i) does not denigrate the process of scientific discovery by claiming it is not important to one’s discovery of those things which cannot be made explicit, but rather elevates it.

This concept actually carries particular force in the contemporary setting, where the study of intersectionality has brought questions of epistemic access in the form of identity-based knowledge to the forefront of public *and* academic conversations – even infiltrating into the sciences. Empirical studies often factor in the power of direct epistemic access in their interpretation of findings. One of the best examples of this is the general distrust of ‘empirical’ social science data collected throughout most of the twentieth century. This is due to the tendency of researchers to focus on those with identities similar to their own, namely white males of a privileged socioeconomic class. There is a concerted push to incorporate intersectional perspective into the interpretation of empirical data because of a seeming recognition of the existence of a kind of “proximal” knowledge. Inherent in our contemporary interpretation of the process of scientific discovery seems to be an acknowledgment of something akin to Polanyi’s tacit knowing – it is just rarely credited as such.

As interesting as tacit knowing is, I bring it up primarily to point out that it is not likely to solicit a particularly ungenerous response from the contemporary scientific community. The idea that some knowledge is unable to be completely articulated by language, and therefore transferred from one party to another, is more or less widely accepted. I believe the more meaningful contribution Polanyi makes to the contemporary debate is that (ii) he avoids

¹²*Ibid.*, 10.

¹³*Ibid.*, 10.

scientific positivism without abandoning realism. That is to say, he clearly articulates a process of scientific discovery in *The Tacit Dimension* (and the earlier works that precipitated it) that does not claim scientific knowledge as the only form of genuine knowledge, while maintaining that truth is discoverable through inquiry more generally. Approaches that attempt to abandon realism are also abandoning any hope of entering into dialogue with the scientific community, that field being foundationally based on a belief that fundamental truths about the universe are discoverable.

The issue is that the underlying approach to this discovery is assumed to be a purely mechanistic one. If one can explain something in terms of its constituent parts, one can also explain its purpose more broadly, and any inaccuracy or perceived inconsistency with the external world is attributed to insufficient knowledge. Yet, a mechanistic approach consistently leaves us wanting more – craving answers to questions about meaning, purpose, and the inarticulable parts of the human experience. Biological reductionism, the mechanistic approach applied to life, can explain action but cannot explain the aforementioned questions. Per usual, the response from the scientific community has been to attribute this insufficiency to a lack of discovered knowledge, which can be rectified by time and further inquiry. The major mistake made by philosophers who take the reductionist approach has either been to join camp and wait on the scientists to answer these questions, or simply to conclude that the questions themselves are rooted in fantasy and not worth attempting to answer.

Polanyi makes a major contribution towards solving this problem by (iii) proposing a convincing substitute for mechanism in his hierarchy of reality through the principle of marginal control. This topic is covered extensively in the “Emergence” chapter of *The Tacit Dimension* and in his 1968 paper *Life’s Irreducible Structure*. In the latter, the first subheading is titled:

“Living Mechanisms Are Classed with Machines,” and, in typical Polanyi fashion, this is an apropos summary of what follows. Polanyi *does not doubt that organisms can be explained mechanistically*; rather he doubts that they can be *entirely* and *exclusively* mechanistic. This is a vital distinction. “Any coherent part of the organism is indeed puzzling to physiology – and also meaningless to pathology – until the way it benefits the organism is discovered,” Polanyi goes on to explain. “And I may add,” he continues, “that any description of such a system in terms of its physical-chemical topography is meaningless, except for the fact that the description covertly may recall the systems physiological interpretation – much as the topography of a machine is meaningless until we guess how the device works, and for what purpose.”¹⁴ In Polanyi’s understanding, organisms can only be understood according to the rules governing their various levels of control, the delineation between which he calls *boundary conditions*. “In this light,” Polanyi explains, “the organism is shown to be, like a machine, a system which works according to two different principles: its structure serves as a boundary condition harnessing the physical-chemical processes by which its organs perform their functions.”¹⁵ Thus Polanyi introduces systems of marginal control, whereby each level builds on the principles of that below, without dictating the attributes of that above.

This approach leaves open the possibility of answering the aforementioned “questions of purpose,” *without* imposing an ontology that requires abandoning crucial components of the scientific process. Thus Polanyi brings to the table an ontology unique in its ability to find a kind of Rogerian common ground with scientists who might otherwise fall, by default, into arguments of hard biological reductionism. Thus, Polanyi opens up productive dialogue where none might

¹⁴ Polanyi, Michael. “Life’s Irreducible Structure.” *Science* 160, no. 3834 (June 21, 1968): 1308. <https://doi.org/10.1126/science.160.3834.1308>. 1308.

¹⁵ *Ibid.*, 1308.

otherwise exist. By avoiding many of the problems of alternate approaches while still proposing a genuinely novel ontological approach, Polanyi has the potential for resurgence in significance in contemporary debates sure to be defined by major breakthroughs in the neurological understanding of human thought and action.

Conclusion

I began by pointing out that the questions to be addressed here are not new. Attempts at explaining all of life in mechanistic terms date to at least Galileo, and biological reductionism is just one more such attempted explanation. Robert Sapolsky's argument in *Behave* is not unique for its argument in defense of this explanation, but rather is representative of a growing trend in thought that advocates for changes in law, policy, and our understanding of ethics in deference to the 'rational' approach of scientific reasoning. This in itself is not a problem, and there have been numerous examples – like the M'Naghten rule, cited earlier – that demonstrate that science should have some bearing on these matters. Yet, Polanyi's philosophy provides a response to this scientific positivism that neither denigrates science nor elevates the mechanistic as the *only* level of explanation, avoiding a kind of mechanistic nihilism. "For..." as Polanyi puts it, "to regard a meaningless substratum as the ultimate reality of all things must lead to the conclusion that all things are meaningless."¹⁶ Instead, Polanyi's approach is unique in (i), (ii), and (iii), and preserves common ground with scientific positivists. This offers a rhetorical advantage when engaging in dialogue with those who would prefer to reject any non-mechanistic explanations of life as 'irrational,' thus, keeping dialogue open where none might otherwise exist. In short, Polanyi's unique philosophy will have an increasing relevance in contemporary conversations about these issues.

¹⁶ Polanyi, Michael. "On the Modern Mind." *Tradition and Discovery*. Accessed May 22, 2018. <http://www.polanyisociety.org/MP-On--the-Modern-Mind-1965-ocr.pdf>. 15.