A PARTICULAR COLLISION: ARENDT, CERN, AND REFORMATIONAL PHILOSOPHY

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The materialist is sure that history has been simply and solely a chain of causation, just as the [madman] is quite sure that he is simply and solely a chicken. Materialists and madmen never have doubts.

- G. K. Chesterton, *Orthodoxy*, 29.

In this paper, I will explore how recent discoveries in particle physics that are part of the pursuit of a so-called "unified theory of everything" play into a worldview that has the potential to poison ethical life. I will explicate Hannah Arendt's critique of modern science's pursuit of knowledge by means of (what she calls) "acting into nature," and I will place the groundbreaking experimental research at the European Organization for Nuclear Research (CERN) in Switzerland, as well as the theoretical search for a unified "theory of everything," within the scope of Arendt's critique. In order to maintain Arendt's concept of unprecedented newness inherent in human action (or what she calls "natality") as a response to a scientific reductionism that tends to accompany these claims and pursuits of theoretical physics and to expose what is at stake in Arendt's critique, I will turn to the anti-reductionistic Reformational philosophy of Herman Dooyeweerd and D. H. Th. Vollenhoven, which offers a model that resonates with Arendt's critique of modern science, while also allowing for a potentially viable way forward for considerations of the scope of scientific knowledge. Finally, I will conclude with the implications of this Reformational anti-reductionism on Arendt's concern that human action, with its power to create new and unprecedented historical situations and natural processes, must be held accountable by reflection. What is learned from Arendt and the Reformational philosophers is that giving ground to the possibility of a unified theory of everything carries with it a determinism that disallows the recognition of both newness and irreducible complexity, both of which are essential to the ethical life.

Towards a Unified Theory of Everything

July of 2012 saw one of the most publicized breakthroughs in particle physics since the splitting of the atom. This was likely because the name "the God particle" was attributed to the newly confirmed Higgs boson, causing a stir among the religiously and scientifically minded alike. The name stuck because of the way Higgs boson is at work in all other particles, so to speak, giving them their mass.[1] The Higgs boson was theorized 50 years ago by physicist Peter Higgs, who proposed the necessity of this particle to the functioning of a complete Standard Model in modern physics.[2] In July, Peter Higgs' prediction was experimentally confirmed. Currently, in the wake of this groundbreaking discovery, the data is still being interpreted, but it

[1] Jon Hembrey, "Why the Higgs boson 'God particle' matters," *CBC News* (March 15, 2013).

looks like the Peter Higgs was right. Yet the implications of this discovery are still unfolding.

In order for physics to tighten its grip on the universe, conflicting theories need to be made compatible and able to account for the beginning moments of the universe. If the Standard Model is to move towards the elusive "theory of everything," it has to take four fundamental forces into account for both subatomic particles and large-scale bodies: electromagnetic force, weak force, strong force, and gravity. Up until this point, all but gravity were well accounted for in the Standard Model.[3] Because of this major hole in the model (and other difficulties), while quantum mechanics describes the behavior of subatomic particles, it is incompatible with the theory of general relativity, which best accounts for gravity's effect on larger bodies but cannot account for the behaviour of subatomic particles.[4] Now, with the confirmed existence of the Higgs boson, physicists perhaps can begin talk about gravity on the level of subatomic particles in a way that was only guesswork prior to this discovery.

Though many physicists hold to the pursuit of a "theory of everything" with a grain of salt, others feel the ultimate goal of the physical sciences is to move toward increasingly accurate mathematical depictions of the universe. In the words of Stephen Hawking, "Ultimately, we would hope to find a complete, consistent, unified theory that would include all these partial theories as approximations and that did not need to be adjusted to fit the facts by picking the values of arbitrary numbers in the theory." This, according to Hawking, would lead to the possibility of "a complete understanding of the events around us, and of our own existence."[5]

Echoing this sentiment, particle physics continues to reverse engineer the universe, traveling further back in time and deeper into its microstructures. With each new discovery, it comes closer to understanding the most fundamental pieces that make up the fabric of the physical universe and closer to the moment of its birth. Discoveries such as the Higgs boson most recently (or earlier discovery such as that of the quark-gluon plasma, which is supposed to have existed 10 microseconds after the Big Bang[6]) bring us closer to feeling that the universe is laid bare before our eyes.

Hannah Arendt in Critique of Modern Science

At the outset of the nuclear age when science lept dramatically forward, Hannah Arendt located modern science's desperate thirst for reliable knowledge of the universe within the realm of the human capacity for action. According to her, this capacity has both constructive and destructive potential in the natural and historical world. The invention of the modern experiment signifies for Arendt the emergence of a mindset that understands knowledge to be retrievable from nature only by *acting* into it, starting comprehensible processes; that is, we must understand how to start the processes that have led to the nature of the universe at present, if we are to

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[2] Adrian Cho, "Discovery of the Higgs Boson," *Science 338* (21 Dec 2012), 1524.

[3] Ibid.

[4] R. B. Laughlin and David Pines, "The Theory of Everything," *Proceedings of the National Academy of Sciences of the United States of America 97, no. 1* (1999), 28.

[5] Stephen Hawking and Leanard Mlodinow, *A Briefer History of Time* (New York: Bandam Dell, 2005), 117-118.

[6] See CERN's February 2000 press release: http://press.web.cern.ch/press-releases/2000/02/new-state-matter-created-cern.

understand it at all. However, Arendt suggests that this pursuit ultimately ends in failure; when the scientist acts into nature, creating artificial worlds within the experiment, the scientist ultimately only encounters himself/herself.[7]

In critique of the modern scientific project, Hannah Arendt points out that the physical sciences have become concerned primarily with processes, with *how* things came to be as they are more than *what* is out there. "This shift in emphasis is almost a matter of course," Arendt goes on to explain, "if one assumes that man can know only what he has made himself, insofar as this assumption in turn implies that I 'know' a thing whenever I understand how it has come into being."[8] So according to Arendt, the modern scientific mindset says that knowledge is only valid if it can be reproduced in an experiment; this means that we can only speculate about the true nature of the universe until we hold in our hands the power to create it.

What we need to remember, Arendt cautions, is that when we *act*, when we start processes, scientific or otherwise, we can never really predict the outcomes beyond a best guess;[9] as much as we think we know about how things unfold, we can never really know what they will become when all the creases flatten out.

In the aftermath of the Second World War, Arendt grapples with the fact that something so *unthinkable* as the Holocaust or Hiroshima actually happened. Arendt says that we have this ability *act* in a way that starts new things that have never been seen before, terrible but also beautiful things. Something as unprecedented as the Holocaust or splitting the atom could never have been prepared for before they happened. Only in hindsight do we see how they emerged.

For Arendt, our present moment is not contained within our past, and our future is not the simple continuation of a cause and effect trajectory. The unfolding of history is something much more surprising and more complex than the plugging in of variables to a mathematical equation. We have the ability to act in new ways that are not dictated by the past or by the future, creating a world that could not have existed without our interference.[10] This means we also have an enormous responsibility to contribute to the birthing of our shared future. The moment we give up the unprecedented uniqueness of our historical situation is the moment we give up our sense of responsibility to our world and, as Arendt cautions, allow for the possibility of the unthinkable.

Reformational Philosophy and Irreducibility

In support of Arendt's critique of modern scientific knowledge, I turn to the anti-reductionistic philosophy of Herman Dooyeweerd, Dirk H. Th. Vollenhoven and the Reformational tradition of Christian philosophy. Their system of modal ontology may prove useful in shedding some light on the epistemological failures of reductionist modern science and also in providing a foundation from which Arendt's thought can move forward in a productive way.

Dooyeweerd suggests that all phenomena that exist manifest themselves in a variety of distinct aspects, each irreducible to all others (e.g. quantity, position, shape, aesthetic value, social significance, and so on in increasing complexity). This becomes coherent only through an

[7] Arendt, *Between Past and Future*, 89.

[8] Arendt, *Between Past and Future*, 57.

[9] Ibid., 85.

[10] Hannah Arendt, *The Human Condition* 2nd Edition (Chicago: University of Chicago Press, 1998), 231.

antithetical analysis, which differentiates each aspect from all the others.[11] Though everyday experience perceives wholes rather than discrete aspects, analysis sets them in distinction from one another.[12] The whole cannot be fully explained by (or reduced to) its constitutive parts or modal aspects, but in analysis it remains possible to see the unique contributions of each aspect to the existence of the whole.

Vollenhoven takes up and clarifies Dooyeweerd's position, pointing to the failings of the Enlightenment's favoring of mathematical science. Analyzing the rise of an interest in fields such as art, history, ethics, language, etc. in the Enlightenment and the pre-Romantic era, Vollenhoven notices an attempt to expand the field of science to include these new fields of research, which could then be described in terms of or derived from mathematical and scientific principles. The problem, as Vollenhoven sees it, is that this indicates a reduction of all fields of research essentially to mathematics.[13] This reductionism severely handicaps those fields of research, leading to an understanding that, in the words of Reformational philosopher Hendrik Hart, "there can no longer be a universe except the universe of reason."[14]

The theory of modal aspects combats this reductionism, suggesting that a higher sphere is not derivative of a lower, and the reduction of all fields to mathematics will ultimately misrepresent those fields. For example, Dooyeweerd's model posits that even if one were able to understand all the physical and biological laws that governed a brain, one would still not be able to crunch the data in a way that fully describes the actual cognitive events in the "mental" or "psychic" mode. This is because the psychic mode operates within a different set of parameters, according to a separate set of laws. In opposition to the positivism of modern science, the theory of modal aspects implies that even if science were able to account for every valid variable in a given relationship, it would be unable to predict the newness of the whole.[15] In other words, there exists the possibility that a whole, at some point, can "transcend" the sum of its parts, becoming something substantially different that cannot be fully described by the analysis of its components.

This idea stands in stark contrast to the pursuit of a unified theory of everything in the physical sciences. Such a pursuit is characterized by an unwavering faith in mathematics and reason, or in Dooyeweerdian terms, the absolutization of the "physical" (or perhaps even "quantitative") mode. Hart reflects on Stephen Hawking's alleged search (in *A Brief History of Time*) for the "containment of both God and the universe within a single principle of physics."[16] Faith in an eventual unified theory of everything says that if only we could reduce the entire universe to a single mathematic structure, we could explain *everything*.[17] In the language of modal aspects, this would mean that if we could completely understand all the expressions of the

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[11] Herman Dooyeweerd, "Christian Philosophy: An Exploration," in Christian Philosophy and the Meaning of History, pp. 1-37 (Lewiston, NY: Edwin Mellen Press, 1996), 7.

[12] Ibid., 10.

[13] Dirk H. T. Vollenhoven, Dirk H. T. Vollenhoven Reader, translated by John H. Kok (Manuscript, 1998), 106.

[14] Hendrik Hart, "Conceptual Understanding and Knowing Other-wise: Reflections on Rationality and Spirituality in Philosophy," in Knowing Other-wise: Philosophy at the Threshold of Spirituality, edited by James H. Olthius, pp. 19-53 (New York: Fordham University Press, 1997), 29.

[15] See (Dooyeweerd, Roots of Western Culture, 45) for discussion of the irreducibility of the psychic aspect.

[16] Hart, "Conceptual Understanding," 29.

lowest mode (quantitative), we would be able to derive all the subsequent modes, indeed all of reality.[18]

Yet, if we were successfully to describe the first moments of the universe and its unfolding with a unified physical "theory of everything", what would it actually tell us? Reformational thought reminds us that the scope of a "theory of everything" cannot actually be "everything." It scope must be limited to a subset of aspects of reality; there are whole spheres of reality that cannot be mapped onto mathematical equations or physical theories.

Thus, the pursuit of a unified physical theory rests (less explicitly than Reformational thought) on a simple proposition of faith. In lieu of a complete mathematic map of all the structures and variables at play in reality, it trusts in the grounding of all things in mathematics and in the progress toward explanation in these terms. In contrast, Reformational thought deftly sidesteps the reductionist trap, proposing that the structures that exist in the world are categorially (and irreducibly) distinct and operate according to irreducible, underivable principles. At its deepest core, the issue becomes what seems a surprisingly arbitrary decision between, on the one hand, faith in the potential domestication of the universe by the human observer through the progress of science and, on the other hand, faith in the complexity and variety of the universe, with all its irreducible distinctions between modes of being.

The Unprecedented Present and the Continuation of Physics

This seemingly arbitrary choice, however, has important social implications for Arendt's philosophy. In order for Arendt's concept of human action to make sense, we must assume an anti-reductionist position (such as that of the Reformational tradition) that allows for the emergence of the legitimately new. Our awareness of the present within which we live cannot be fully contained within historical or scientific analysis. According to Arendt, we have the ability to act in ways that are not dictated by the past or by the future, creating a world that could not have existed without our interference. The moment we fail to recognize our ontological (and historical) uniqueness and our active responsibility is the moment we allow for the possibility of the Holocaust. The implications of this are two-fold in Arendt's philosophy.

First, we are inevitably world shapers. Whether or not we acknowledge it, we, as humans who act, are necessarily involved in shaping not only our future but also (increasingly) the natural world in which we live. Our growing technological capabilities allow us to act into nature in ways that were previously impossible. For Arendt, however, the deeper we dig into nature, the more we bring our own unpredictability into nature;[19] we are making the world in our own image. Ultimately, this does not allow us to see the world more clearly. Rather it makes it

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[17] Hawking's closing thought of A Briefer History of Time (the 2005 updated and consolidated reworking of A Brief History of Time) is the object of Hart's critique. It encapsulates a certain characteristic faith in the progress of science for the general betterment of humanity: "If we do discover a complete theory, it should in time be understandable in broad principle by everyone, not just a few scientists. Then we shall all, philosophers, scientists, and just ordinary people, be able to take part in the discussion of the question of why it is that we and the universe exists. If we find the answer to that, it would be the ultimate triumph of human reason—for then we would know the mind of God" (Hawking, A Briefer History, 142).

[18] While Vollenhoven affirms that the meaning within a given sphere is informed by and connected to other spheres through anticipation and retrocipation, this does not allow for a blurring of distinction between spheres nor does it allow for higher spheres to be reducible to lower spheres (Vollenhoven, Introduction to Philosophy 39-45).

[19] Arendt, Between Past and Future, 61.

impossible to see past ourselves.[20] This problem, located within physics itself by the Uncertainty Principle (as Arendt suggests), shows that we have a tendency to operate blindly in our world shaping: "man can *do*, and successfully do, what he cannot comprehend and cannot express in everyday human language."[21]

Second, there always remains the possibility of legitimate newness in the world. If this is true, this means that no matter how well we understand the laws of physics, we will never be capable of predicting the future beyond a best guess. Rather, we should strive to build a robust and thoughtful political structure that can deal with the unpredictable when it arrives, and, if possible, one that has the capability to guard against the arrival of unwelcome occurrences in the first place.

The possibility of unprecedented newness, in turn, has retroactive implications, supporting anti-reductionistic claims of irreducibility in a given sphere of analysis. So while physics provides legitimate knowledge as far as it goes, its claims must remain confined to its sphere and cannot be used in an attempt to derive all of reality.

Arendt's cautionary critique need not be a buzz kill to the pursuits of the physical sciences. For Arendt, the initial danger is not in scientific pursuit itself but in unreflective interference with natural processes. We must constantly remain aware of the processes we are starting by our actions, historical and natural. But the search for a physical theory of everything presents another threat, namely the tendency toward scientific and potentially deterministic reductionism. Though our scientific theories are useful as far as they go, they cannot provide *comprehensive* knowledge of the physical world, let alone the historical, political, and social world in which we live. For Arendt's philosophy and Reformational thought, we ought not place too much faith in the "theory of everything's" ability to explain *everything*, and we would do well to remain open to the possibility of the unprecedented and the new in the unfolding of history. Arendt's philosophy and Reformational thought teaches us that we must never lose the expectation of surprise and the drive for discovery in our science and in our politics, as long as it is mediated by reflective accountability. We can discover and create new things we never thought possible, and we are making our world into something that has never been before, for better or for worse.

[20] Ibid., 89.

[21] Ibid., 264.

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