Ethics and the Theory of Everything

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"From womb to tomb, we are bound to others, past and present, and with each crime and every kindness, we birth our future."
- Somni 451 in Cloud Atlas (2012 film).

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 discovered Higgs boson, causing a stir among the religiously and scientifically minded alike. The name stuck because of the way this particle "goes out and touches every other particle and gives them their property, which is their mass" (see http://www.cbc.ca/news/technology/story/2013/03/14/f-god-particle-higgs-boson-why-matters.html). The Higgs boson was theorized 49 years ago by physicist Peter Higgs, who proposed the necessity of this particle to the functioning of a complete Standard Model in modern physics (Cho 2012, 1524). In the wake of this groundbreaking discovery, the data is still being interpreted, but it looks like the Peter Higgs was right.

In order for the Standard Model to move towards the elusive "theory of everything," it has to take four fundamental forces into account for objects on length scales of both nanometers and light years: electromagnetic force, weak force, strong force, and gravity. Up until this point, all but gravity were well accounted for in the Standard Model (Cho 2012, 1524). But because of this hole in the model (and other difficulties), quantum mechanics explains the behavior of subatomic particles but is incompatible with the theory of general relativity, which accounts for gravity's effect on larger bodies (Laughlin and Pines 1999, 28). Now 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 most physicists hold to the pursuit of a "theory of everything" with a grain of salt, not assuming that it will be available in the near future (if it is even a possibility), the goal of modern science nevertheless is to move toward increasingly accurate mathematical depictions of the universe, and 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," which would lead to the possibility of "a complete understanding of the events around us, and of our own existence" (Hawking 2005, 117-118).

Echoing this sentiment, particle physics continues to reverse engineer the universe, traveling further back in time and deeper into the microstructures of the universe. With each new discovery, we come closer to understanding the most fundamental pieces that make up the fabric of the universe and closer to the moment of its birth. Discoveries such as the Higgs boson most recently and the discovery of quark-gluon plasma, which is supposed to have existed 10 microseconds after the Big Bang (see CERN's February 2000 press release: http://press.web.cern.ch/press-releases/2000/02/new-state-matter-created-cern) bring us closer to

feeling as though the universe is laid bare before our eyes.

Hannah Arendt has this idea that the science of our time is primarily concerned with processes, with *how* things came to be as they are rather 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" (*Between Past and Future*, 57). So for Arendt, our science 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 says, that when we act, when we start processes, scientific or otherwise, and we can never predict the outcomes (*Between Past and Future*, 85); 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, Hannah 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 and horrific, but maybe beautiful things too. 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. 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 (The Human Condition, 231). 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.

I want to be clear, though; modern physics is clearly not incompatible with ethical responsibility. The search for a unified theory of everything is not typically used as a static claim about the nature of the universe and the predetermined nature of the future. The field of modern physics changes at breakneck speed, moving toward better and better ways of describing the behavior of what exists, but despite our most elegant equations and sharpest observations, the universe shatters our confidence that we might have the future figured out. Last year's discovery of the Higgs boson leaves us marveling at the complexity of the universe, and as comprehensive and substantiated our mathematical models of the universe might be, they do not answer all our questions.

So in all our speculation and calculation about the nature of the universe, our ethical responsibility means that we cannot lose sight of the reality that we are all active participants involved in building our shared future.

Now how do we begin?