

How to Empirically Confirm a Rational Theory of Fundamentals

Fundamentals seem beyond our reach. This is both a matter of technological limitations (due to physical limitations) and evolved cognitive and perceptual limitations. What is “more” or “less” fundamental is subject to a frustrating circularity because the limitations of the latter easily confuse and stagnate efforts in the former. As a result of this many have concluded that we are cognitively absent an important insight about the ontological structure of reality that would allow our epistemology to make its next significant gain. Hence the outlook we currently have is very much composed of those incompatible or even contradictory theories expressly referred to in the “What is Fundamental” contest guidelines.

In this article, I will argue that rationalism (pure reasoning without experiential input) must have a vital role when it comes to revealing fundamentals. This isn't because knowable 'hard' physics has nearly ended but rather stems from an ontological placement of reality that seeks to remove the confusing circularity currently encountered. What is interesting about the return to rationalism needed to reveal fundamentals is that empirical confirmation will still be available, but not in the way (and where) we currently promulgate.

To explain why this is, I will begin with a simple ontological flowchart. 'v' simply means 'which explains' and I will alter the chart as the discussion develops.

A Rational theory of quantum fundamentals.

v

B Empirical evolved (Darwinian) cognition.

v

C Our rational theories matching our evolved cognitive perception of reality, empirically confirmable (e.g. Greek mathematical representations such as Pythagoras, Euclid, Newton, Einstein etc.).

v

C1 Our theories of quantum physics (the best way of saying what it is we don't know) based on quantum empirical experiments.

D An empirically confirmed theory of quantum fundamentals by quantum data.

Now, what's the difference between A and D? Well, firstly D is impossible to confirm *directly*. We have no empirical way to confirm fundamentals from this lens *and* we are restricted by our evolved cognition in B to understand laws at this level from experimental observation, hence C1. However, we do have the empiricism for which our A (rational theory of fundamentals) must meet. It is B. Therefore, we need to use empiricism, not with regards to proving a theory of quantum reality directly (by physical experimentation at this level) but with regard to the empiricism of our evolved cognition, B, as to prove our rational theory of fundamentals, A, which will indeed explain quantum reality.

So, the next question is how do we repurpose/think about our B (the empiricism of evolved cognition) in such a way as to give us a clue about how to construct our rational fundamentals? Well to get to this we first need to examine what I really mean by B. And I mean, as Friedrich Nietzsche realised, that our Newtonian etc. world is nicely wrapped up inside our evolved Darwinian cognition. Or as Brian Ellis posits the Euclid, Newtonian, Einsteinian etc., empirically confirmable world-view is basically genetic.

What is *truth* under this view? Truth is the Euclid, Newtonian, Einsteinian etc. modelling of reality, empirically confirmed (as it currently nearly completely is), *and* a rational quantum theory of fundamentals A, empirically confirmed by B, *with* a 'translator' theory through understanding consciousness. Now, that is the whole kit / 'theory of everything', but an empirically confirmed rational theory of the fundamentals is in reach without knowing what consciousness is. We will return to this shortly.

To get to where A is proved by B, do we need to step outside our conceptual limits made of B? The great philosophical problem of *priori*. I do not think that we do. Rather, we are inherently stuck with B and indeed for physical reasons our experiments reveal 'weird' quantum phenomena, and in turn, we don't really know what we are dealing with or how to describe it in our C terms- hence C1. I argue that we don't need to step outside our limits in B here because we have a way of empirical confirmation for our rational theory, that isn't quantum, even though the theory is. We must approach the problem of fundamentals from the empiricism we do have available, not the one we can't probe (direct physical testing of quantum reality) or everything will I think, necessarily, remain weird or just get weirder.

Toying with a rational theory of quantum fundamentals that must be proved by evolved cognition is initially mind-boggling from both ends - and it should be - its crossing two enquiries that aren't normally connected in this way. However, I argue that this approach does not fall prey to the same kind of problems we face with our current empirical approach to the quantum level. Along these lines, I will now defend the approach suggested.

Firstly, some may attack the ontology by arguing that we would need to know what consciousness is. I disagree. Consciousness certainly provides *our conception* of the Euclid, Newtonian, Einsteinian etc., world so theorised, but the empiricism behind consciousness, that is powering it *causally*, is what really matters- and that is B. We can return to our flowchart to appreciate this point clearly.

A Rational theory of quantum fundamentals.

v

B Empirical evolved (Darwinian) cognition.

v

B1 Consciousness.

v

C Our rational theories matching our evolved cognitive perception of reality, empirically confirmable (e.g. Greek mathematical representations such as Pythagoras, Euclid, Newton, Einstein etc.).

v

C1 Our theories of quantum physics (the best way of saying what it is we don't know) based on quantum empirical experiments.

And where is D now? D is theoretically revealed by A, as empirically confirmed by B. We can't have our cake and eat it- we can't have original D proved in the way we are currently trying but we can still arrive at its workings via A. Furthermore, C1 remains because our quantum experiments can't improve and our empiricism at B won't assist them because it is a different empirical ensemble that confirms A. Nevertheless, we will understand what occurs at the quantum level from A. This relation / ontological structure requires some thought to digest.

Some would suggest that the human brains quantum elements are as unknowable as quantum reality (of course!). But this argument misreads the ontological structure presented in terms of what B and A invite. A is one of quantum operation, not the cognitive empiricism that validates it in B. We can tackle A with our pure rationalism. Does this mean we can predict, using our theory of fundamentals we develop in A what occurs at the quantum level? Yes, but our confirmation will come in the form of our evolved cognition. B is entirely empirical, and it, in turn, causes B1 consciousness (just ask the materialist) but it also *in itself*, can prove A. Proven A, by B, allows us to confirm what happens at A, by its means, however we will never be able to prove it via our original D as we would like to, given what B has allowed us to do with C. Our conception of approaching D is what must change. B is the empirical way forward.

We don't need to worry (yet) about how such a theory as A matches macroscopic Euclid, Newtonian, Einsteinian etc. theories in C. They won't, unless we know what B1 consciousness is. Hence the required 'translator' I mentioned when I talked about what a complete universal 'theory of everything' *truth* entails.

"More" or "Less" then, as conceptual products of B, giving us C, are actually constrained conceptual terms when it comes to C1, leading to a frustrating circularity amongst macroscopic and microscopic observations. Rather, the empirical B will govern the correct conception of A. So, we must then return to pure rationalism in math and philosophy, and concurrently have physicists, chemists and biologists explore how B may fulfil its role. This a job for many professions.

- Bennett, Maxwell & Hacker, Peter (2003) *The Philosophical Foundations of Neuroscience*. Blackwell Publishing.
- Chalmers, David (1995) "Facing Up to the Problem of Consciousness". *Journal of Consciousness Studies* 2(3): 200-219.
- Darwin, Charles (1850/2003) *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. Reprint, Signet Classics: New York.
- Dawkins, Richard (1976) *The Selfish Gene*. Oxford University Press.
- Ellis, Brian (2017) *On Rationalism: A Critique of Pure Theory*. Australian Scholarly Publications: Melbourne.
- Ellis, George (2013) "View from the Top". *New Scientist*.
- Gould, Stephen Jay (2002) *The Structure of Evolutionary Theory*. Cambridge, MA: Harvard University Press.
- Hintikka, Jaakko (2013) *On Gödel*. Wadsworth.
- Lange, Marc (2013) "What Makes a Scientific Explanation Distinctively Mathematical?" *Brit. J. Phil. Sci.* 64: 485–511.
- Lynch, Tony (2016) *John Locke's Theory of Knowledge*. *Philosopher.io*: Australia.
- Newton, Isaac (1687/1964) *Mathematical principles of Natural philosophy*. Citadel Press: New York.
- Savitt, Steven (2013) "Being and Becoming in Modern Physics" in Zalta, E.N (ed.). *The Stanford Encyclopaedia of Philosophy*.
- Strawson, Galen et al. (2006) *Consciousness and Its Place in Nature: Does Physicalism Entail Panpsychism?* Imprint Academic.
- Tegmark, Max (2014) *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality*. Vintage Books Random House.
- Todhunter, Isaac (1933) *Euclid Elements*. Dent: London.
- Valiant, Leslie (2014) *Probably Approximately Correct: Nature's Algorithms for Learning and Prospering in a Complex World*. Basic Books: New York.
- Wilson, Edward (1998) *Consilience: The Unity of Knowledge*. Random House: New York.