3/29/26 – Knowing the Ultimate Form of Reality

Physics and the study of it is likely sufficient to complete metaphysics. However, there are still some unknowables beyond that, past one can rely on Bayesian reasoning over a prior that prioritizes some measure of simplicity, like Kolmogorov complexity. One such unknowable is that of the "collapse" in quantum mechanics. In typical teaching, the outcome of a measurement of a quantum system is that it collapses into a "point" (up to the fundamental measurement uncertainty of the environment in the case of momentum and position) on the wave-function. However, in Schrodinger's equation, the outcome of an outcome making a measurement is that the wave-function evolves into a superposition of multiple environments, correlated but distinct in the measurement with each other. Obviously, in our experience, only one of these environments is actually present.

So then what happens to the other environment, with the different measurement? When we, as humans, observe a particular result of the measurement, we become entangled with the environment that contains the particular measurement we see. We are forever separated from the parts of that other environment that are entangled with the different measurement outcome. You could then imagine that the timelines have split: in one, the outcome of the QRNG makes us stand up to go for a walk, in the other, we remain seated. The one that has "split" "away" from us is a different entity from us.

Ethically, practically and personally, such an interpretation does not matter much. We need not care about the world that is not ours.

Such an interpretation, where there are many worlds represented in a density matrix, is known as the "many-worlds" interpretation; the name is slightly misleading. It is centered around the idea of a universal wave-function that describes the evolution of quantum systems. It is fully deterministic, among having some other nice properties. It also has some particularly knotty, and to my knowledge, currently unresolved, technical issues regarding the non-circular derivation of the Born rule, as well as the interpretation of wave-function "collapse" as probabilities.

There are philosophical problems too. In what way do the normed, squared amplitudes of the coefficients of each outcome correspond to probabilities? Such a question is probably philosophically intractable, and it may be better to interpret Schrodinger's equation as a generalization of probabilities, rather than trying to interpret QM through the lens of probabilities.

A deeper question this then brings up, is that of the nature of the universal wave-function itself. This is perhaps the question of existence itself. If everything really is described by a universal wave-function, then is the wave-function the sum of our existence in itself? As in, rather than the function modeling reality, are we literally the function?

There is the idea of the Mathematical Universe, advanced by Max Tegmark. It supposes that existence is literally mathematical – that the computable instantiations of self-consistent mathematical structures literally exist. Among other things, this would imply, for

example, that computable statements in peano arithmetic on the natural numbers, apart from merely being a consequences from some ideas (i.e. axioms) in our heads, literally are in a universe.

The idea extends to, as stated above, every self-consistent system. This includes other self-consistent axiomatic systems that are not ZFC.

The idea is at once extremely odd, and yet pleasant to think of. It neatly resolves the idea of "why", when considering existence, by then supposing that everything that can exist does in fact exist.

So if all of our future exists at once, then why do we feel time? It is because our universe is time-dependent, that we cannot have causality in reverse. So all of the emergent processes in our universe must operate under this constraint.

But there still remains the question of conscious experience, which is why I think that reality has more of a computational, "running" aspect than is suggested by the MUH. However, that may simply be a different way of looking at structures in math – like the turing machine and the lambda calculus are different formalisms for the same "thing". The MUH also seems somehow to be "confusing the map for the territory." Additionally, many of the arguments of MUH seem like they are taking anthropic reasoning much too far.

We may never know the true nature of reality. Perhaps the best course of action is to be at peace with our ignorance.