Brain Me Not Big-Small Physics Like

Terry Bollinger
2022-07-30.10:58 EDT Sat
https://www.youtube.com/watch?v=31IYXDq4VKY&lc=UgzMhrJ6steM9p_4fqF4AaABAg

Comment on YouTube Sabine Hossenfelder post:
What's the difference between a brain and a computer?
https://youtu.be/31IYXDq4VKY

08:00 - "The Ascent of Woman" — I love it! Folks should let their non-physics friends know that Sabine Hossenfelder is worth watching just for her rapid-fire barrage of split-second and delightfully barbed humor.

12:06 - Biological encoding of classical locality and Newtonian physics in our cognitive neural structures makes sense from a survival perspective since these rules help us make fast predictive calculations with smaller numbers of lumpy objects and fewer dynamic variables. Notably, these built-in shortcuts work best within the narrow range of densities and temperatures found mostly on planetary surfaces.

Such regions are almost incomprehensibly uncommon compared to the total mass, volume, average object temperatures, and range of size scales of the universe. These unique environments are crucial because they generate Goldilocks-class (see "Big History"), lumpy-but-not-frozen, not-too-hot, not-too-cold situations in which even minimal cognitive systems can make sufficiently good predictions about their environments to survive.

This biological bias toward a narrow set of conditions creates difficulties when applying human brains to physics theory. It makes us biologically biased to accept certain precepts as evident and does this in subtle ways that are difficult for us to overcome.

For example, our brains have a built-in bias to interpret the quantum domain not as a constrained generative process but as a suite of "real" objects and superpositions of objects. Force-fitting of the "object" concept persists even in cases where the data does not support such an interpretation. Electron self-interference and infinite-energy Planck-uncertainty implications from assuming point-like particle states are just two examples.

16:11 - To be bluntly physical about it, there are _*no*_ significant differences between the biological, computational, and mathematical concepts of numbers like pi. All mentions of pi in these three domains translate in practice to finite applications of convergent algorithms. These algorithms then are carried out to whatever level of precision makes sense in a particular context. They _*never*_ require infinite elaboration due to the inherently granular nature of the physical world, e.g., atoms and particles.

In short, every mention of pi in human, mathematical, or computer literature is the name of a program for converging towards some naturally-occurring limit and _nothing more._

Interestingly and not coincidentally, two domains of theoretical physics exist that, by deep tradition, choose to pay almost no attention to the finite limits implied by the symbols in their math, matrix, and tensor equations. Instead, they allow algorithm symbols to iterate arbitrarily to infinity and only subsequently apply the additional complicated mathematical techniques needed to remove the resulting inevitable singularities. These two domains — which, not coincidentally, have resisted mutual integration for a century now — are general relativity and quantum mechanics.

Our emotional fixation on the idea that infinitely applied, infinitely costly algorithms are as least as real, and perhaps _*more*_ real, than experimentally observable reality is just that: An emotional fixation created by the same biological imperatives Sabina mentioned earlier for newborns. If folks genuinely want to move forward in some of the poorly resolved domains of physics, we need to stop acting like babies and refocus on an idea that worked extremely well for most of the history of physics: Things get simpler, not more complicated, as you get closer to the bottom.

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PDF: https://sarxiv.org/apa.2022-07-30.1058.pdf