POSTERMINARIES

Toward a Comfortable Existence

Do you sleep better knowing that the quantum prevented the ultraviolet catastrophe? Does the twin paradox keep you awake at night?

Well, you are only human after all, and we humans are bothered by things we can't explain. In fact, we have been doing everything we can to eliminate the vexing unknowns of our universe. With "I think, therefore I am," Rousseau offered an existence postulate that, at least subjectively (which is of course the only way we can ever do anything), is confirmed by its own enunciation. All such propositions, trapped as they are between religion and natural philosophy, can be considered exercises in introspection meant to fill the hollow prospect that we and all we perceive are here for no reason at all.

It follows naturally that the human need to fill in blanks permeates modern science. Actually, it defines science itself. Not surprisingly, there are many more objects of curiosity besides ourselves which exist by postulate, objects required to bridge observational gaps to satisfy a satisfying theory.

Traditionally cited are such things as neutrinos, which rescued conservation of momentum for the weak interaction. Quarks, another charming example, were themselves needed to rationalize known properties of known hadrons, but then went on to require yet more subatomic particles to exist. Of course, you say, there were subsequent experiments that "saw" neutrinos and other predicted particles, so they must be "real." Indeed our ability to find phenomena after their prediction brings the comfort of internal self-consistency. We can be fickle, too, when a once-embraced myth runs afoul of a more powerful story. Remember the light-propagating ether which rose to explain experiment and fell for the same reason. And speaking of light, we should note that electromagnetism in general has also moved us to postulate the photon, forever mired in a wave-particle duality, the field line, drawn to guide the mind's eye, and magical action at a distance.

Sometimes these new objects sneak up on us under the guise of mathematical artifice. We were not told that object X must exist for theory Y to hold. Instead we were told that the mathematical exposition of the physical theory may be visualized in terms of things (like field lines) as a pure fiction to aid our limited human intuition and enable us to apply the theory. But don't be lulled into thinking these are physically real, we were taught! Then came the magnetic vector potential, which more than fulfilled its potential by turning out to be at least as real as its field.

Another handy attribute invoked to explain fine structure caused by magnetic fields in the splitting of atomic spectral lines is spin. It, however, could not leave well enough alone. Along with it came the statistics of spin as a bonus. It is as though the phenomenon created its own mathematics rather than the elegance of the math moving us to postulate the phenomenon. Faults can develop, however, as physical theory strives to salve the human condition. For example, it was science fiction, not fact, that posited time travel as a vicarious reprieve for our imaginations from the inexorable consumption of that precious commodity. Knowing no better and reacting too literally, the four-dimensional representation of relativity theory then retained the fictitious attribute by factoring in the highly imaginary square root of minus one to the axis of time. And, we are forever prevented from going back to repair the damage.

It may seem we are trying here to label all such discoveries of modern science as attempts at self-fulfilling prophecy—human delusions, albeit sophisticated, created by us to complete the subjective reality we crave. Not entirely so! There is evidence that an agency beyond our consciousness can respond on our behalf to satisfy a mathematical exigency. Witness how Penrose tiling caused the discovery of quasicrystals—a form of matter needed to explain nothing.

What does it all mean? That, of course, is the question that caused this whole mess in the first place, so it would be too circular to postulate an answer. But we can ask another question. Is this a perpetual cycle—needing something to be, postulating it, and then seeing it willingly discovered—or will we see an end? Soon we may find that gravity waves have been detected, that the dark matter of the universe has been seen (i.e., become dim matter),* and that all the hidden variables of quantum theory have shown themselves. This last will certainly decimate the Uncertainty Principle. One might then predict that without uncertainty, our thirst for the reassurance provided by ever more postulation of new physical constructs will have been satisfied, but can we be sure?

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*The working title of this article was initially "The Lightness of Incredible Beings," but, not unlike the hapless ether, it was scrapped, in this case in the face of the massive example of dark matter which simultaneously swamped the near masslessness of the neutrino and extinguished the photon's particular glow.

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