

ALMOST AN ANSATZ

But what, therefore, am I? A thing that thinks?

René Descartes (1641)

When the great innovation appears, it will almost certainly be in a muddled, incomplete and confusing form.

Freeman Dyson (1958)

So when some fool physicist gives a lecture at UCLA in 1983 and says, "This is the way it works, and look at how wonderfully similar the theories are," it's not because Nature is *really* similar; it's because the physicists have only been able to think of the same damn thing, over and over again.

Richard Feynman (1985)

Niels Bohr lived in a house with a horseshoe on the wall. When people cried, for God's sake Niels, surely you don't believe a horseshoe brings you luck!, he said, no, of course not, but I'm told it works even if you don't believe it.

Tom Stoppard (1988)

Harold bursts into his bathroom and immediately grabs his toothbrush. He looks up, expecting to hear the voice. He puts toothpaste on it. He runs water. He begins brushing his teeth, and with each move he pauses in the hope the voice will return.

HAROLD: Why won't you say anything!?

Zach Helm (2001)

The absence of an explanation is one thing, but the absence of any imaginable form that an explanation could take is something else.

Kathryn Schulz (2012)

He and I are living in a small world that seems in some way outside of our surrounds. It has an unreal air. How can ordinary things go on out there while here the universe unfolds before our eyes? Carl Sagan is said to have said, 'Somewhere, something incredible is waiting to be known.' I feel like right here could be Sagan's somewhere. It's been weeks since Quetta. Most days she's not here. If she's traveling I don't know where. When she does show there's this bubble. How can she not see it? But she shows no sign of noticing that anything's amiss. She doesn't say a word about her Frank.

How is the writing? she asks yesterday as if she wants to know, or maybe she's just saying something as she leaves. She's edgy but she's trying not to let it

show. I tell her, swell, voice level, or as near as I can do. And swell it *is*. But if she knew my thoughts she wouldn't think so. So I try to banish *this* thought so she cannot see it in my eyes. As she turns toward the door I have a premonition: Does she know? Well, if she does it's clear that once again she doesn't care.

How can she not care? She should sense it, smell it, feel it in her bones! A Theory of Everything? In this dilapidated room, her so-called office, he and I are close to closing in. A quantum theory of the Beginning, if the physicists can find one, will become the ToE. And if there *was* such a Beginning, can there *not* be such a theory? It should unfold into QM and GR as it subsides into the low-energy limit, which is jargon for the notion that the laws of physics settle in as temperatures drop toward the lowly range we see today. Same old same old. At which Feynman, tongue in cheek as usual, takes a cheeky shot. I know his tongue is in his cheek because he's dissing his own lecture, given at UCLA across the way a quarter century ago. But Feynman knows that the objective's not to ditch the same old, it's to fathom why it works.

Stripped—as it seems to be—of its detective, this tale is taking on a scientific mien. It's almost turning into what's known as an *Ansatz*. *Ansatz* is a German word that might mean onset, seen from the onsetting not the onset side. It has become a term of art in physics. It's an educated guess to help begin to solve a problem. My growing purpose here—the scientific one though pedantry would say it's metaphysical—is to provoke some study of his problem-solving view to see if it in turn provokes new physics. So I try to wrap myself in all that he has left me. It seems new and yet so much of it is not. Almost all of it has been proposed or studied, one time or another. But no one sets it up as he has as a whole. Many study manifolds. There's a book—a bestiary, no less—on the kind that's called Calabi-Yau. But no one seems to think of one that turns into the universe. String physicists pursue the properties of ten-space that has six Compactified dimensions. But none of them seems to think of ten-space that's a 3+1 space built of 6-D Manifolds that are compact and so don't need to be Compactified. These two approaches tally the same numbers of dimensions—ones we see and ones we don't—but they are different.

Physics says four forces order all the business of the world. In case he's listening off-line and knows them not, I list them one more time. They are electromagnetic, strong and weak forces and gravity. Theory says there is a particle to bear each force and like the forces the four particles are disparate. Yet physicists dream of uniting them and in this way discovering a higher law. The dreamers make some progress in the seventies. The first three, Glashow helps to show, arise from symmetry. He gets a Nobel Prize. He says his theory will not survive. It does. Like many he expects it will lead to a ToE that merges gravity into the other forc-

es. But a half a century goes by and it leads nowhere.

The Beginning says it never will lead to a ToE. It gives a reason: Gravity, it says, is not a force. It's just a bias in the way space is connected. It's like the way the bank makes money when the ball falls in the double zero. Up close at Fleck scale it is obvious there's nothing *pulling* particles around, any more than the roulette wheel pulls the money. There is just a likelihood of more twists Moving through more Windows. If the roads all lead to Rome expect a traffic jam. This—if I understand him—is the way that he sees gravity.

To me it's odd that most of those who work on the four forces say so little of the fifth. Measurements confirm that antigravity's non-zero. If it's a force, it's number five. So why not unify it? His almost-Ansatz says that it's not a force. He rescues the force people from explaining how it can get stronger as things move apart. He says the phrase 'repulsion of dark energy' is not exactly wrong but certainly not right. I imagine it may come in time to seem a little quaint. The Ansatz says the simple process that began the universe can gently hurl the galaxies apart by manufacturing new space between them. At Fleck level it is almost effortless.

Mind roaming over his creation, I rotate my wrist. I try to grasp how many computations such a simple move requires of the UC. They number more than all the atoms in the universe. It takes about a second's worth of Tocks. Multiply this by the vast multitude of Flecks my hand is moving through, though almost all of them are far from any part of any particle at almost every Move. He says that solid matter is exceedingly thin business. My hand is made of twists observing random pseudo-discipline. They wander, widely scattered wisps of far-flung fundamental particles. Emerging rules arrange them in their almost-empty atoms, organized in solid-seeming molecules, which I could see with a good microscope. These organize in turn in organelles and cells and tissues that all function. Well, they function while *I'm* here to make them do it. What am I? Let's not go into that. To turn my hand is trip enough. All orchestrated by three forces and the changing shape of space, and Rules that oversee the odds for every Link at every Move. All tracked by the UC like cosmic Microsoft Kinect. All the computers in the world could not, in weeks or even centuries, confirm what I already knew before I made this move—that hand and fingers would arrive just so. Somehow this observation brings it home to me: The way he fits the jigsaw all together is beyond an Ansatz. It's the ultimate gestalt.

But even a gestalt is less than a first step along the road. I am alone and yet we have a ways to go.