

NOTE: All scientific ideas described in the following fictional setting are absolutely non-fictional. This may be an unusual way to translate my father's work, but what can I say? I'm a fiction writer. This way is more fun for me. I hope it will be more fun for the reader, too. I know exactly what my father would think about it....

THE DEVIL'S ADVOCATE

By Judith Rosen

"Uh... Excuse me, but... is this... *Hell*?"

"Mmmm hmmm," the big, ugly guy with the horns said, nodding. "I'm afraid so. I'm the devil."

"Oh!... How... INTERESTING! You know... I really didn't think this place *existed*!"

The devil raised his eyebrows. "That's an unusual reaction," he said. "Most souls start crying around this point. Tell me; What gave you the first clue that you have arrived in Hell?"

Robert shrugged, concentrating on the question. "Well, aside from your appearance, which is sort of a *dead* giveaway ..." He was pleased that the devil seemed to appreciate the humor of a pun. "... I think it was the general volcanic ferment of the landscape."

"Volcanic?"

"Yes. The pervasive smell of various sulfurous compounds, the clouds of steam, the yellowish cast of the place... not to mention the occasional bursts of extreme heat... It kind of reminds me of a few parts of Yellowstone National Park, actually."

The devil was looking at him rather strangely. "What's your name?"

"Robert Rosen."

"Ahhhh! That explains it! So, *you're* Rosen... Nice to finally meet you." The devil extended his hand, then seemed a bit startled when Robert didn't hesitate to extend his own and grasp it in a handshake. A firm, unselfconscious one, at that.

Robert tried not to be distracted by curiosity about the shape of the devil's hands. "Uh... You've heard of me?!"

The devil nodded. "Oh yes. Lately we've had quite a run on angry souls from Academia around here, complaining at length about you. '*Damn that Rosen... always answering questions I didn't want to ask!*' You won't be able to avoid them... There are...entirely too many!"

Robert couldn't help it... He actually laughed out loud, surprising the devil.

"You don't seem very concerned to be stuck in Hell with a lot of angry souls who really don't like you."

Robert shrugged. "Yeah, well... somehow it's... really not so different from *life*, that way," he said. "I'm sort of used to it. But, uh... do you mind if I ask what I did in my life that has consigned me to Hell?"

The devil grinned, showing his teeth which, Robert had to admit, were... quite impressive. There was something vaguely familiar about those teeth... Wait a minute... That was it. *Ferengi*! They looked like *Quark's* teeth.

"Oh, I don't mind at all," the devil said, startling Robert out of his reverie. "In fact, I'm happy to tell you that you're a first for me."

Robert was rather pleased. "Really? How so?"

"I've never had an inmate who committed this particular sin."

"What was it?"

"Are you sure you don't know?"

"Ummmm.... Well, as far as I know, I've lived a good life. Except..."

The devil was delighted. “You’ve figured it out now,” he said, waiting expectantly. Robert looked sideways at the devil. “Is... God Jewish?”

The devil’s grin was replaced with slack-jawed incredulity. “What?”

“Or Catholic, perhaps? No? Moslem?”

“ARE YOU NUTS? This has nothing to do with religion!”

“Sorry. I just thought, since I was raised in an orthodox Jewish family and stopped practicing the religion pretty much as soon as I left home for college... maybe that was the reason....”

“NO!”

“Oh. Well, can you give me a few hints? Does it have anything to do with the Ten Commandments?”

“No. Why? Did you break some?”

“I’m sure I did, if they’re really the same ten I was taught.”

“Which ones did you break?”

“Uh, well... I haven’t kept the Sabbath since I left home, really, and, uh... I’ve definitely coveted—more than once, in fact. And... “

“What do you think this is? Confession?! THOSE AREN’T SINS, damn it!”

Robert shrugged. “Well, you asked about *Commandments*.”

The devil looked most irritated. “All right, here’s a hint... You were nosing around in areas that you had no business delving into!”

Robert was perplexed. “What areas?”

“You really don’t have a clue, do you,” the devil said, studying him. “Well, let me enlighten you: You were committing the same sin that Eve committed in the biblical story, except there was no Eve. You’re the first.”

Robert stroked the stubble on his chin, thinking. “Well, I’ll assume this has nothing to do with apples,” he said. “Or snakes...” At the devil’s snort of derision, he continued. “So, my guess is, it must involve knowledge in some way...”

“Right! Now you’re catching on!”

“So, what knowledge was it that pissed God off?”

The devil rolled his eyes in exasperation. “You wrote a book entitled “Life, Itself: A Comprehensive Inquiry Into the Nature, Origin, and Fabrication of Life”...”

Robert was astounded. “God *read my book*?!”

“NO! God has no need to read your book to know what was in it! What’s the matter with you?!”

“Well...I guess I’m still dealing with the fact that there’s actually a real HELL—and someone called *the Devil* is in charge of it! If this is true, then it might also be possible that...”

“There you go again... *If this, then that*’... Once a theoretical scientist, always a theoretical scientist. That’s what got you consigned to Hell! Don’t you think it’s time for a change in your approach to things?”

“Would it get me an executive pardon?”

“No.”

“Then, why should I bother?”

The devil grinned again. “Good point! You know, I’m beginning to like you.”

“Thank you..... I think...” He looked doubtfully at the devil’s grin. “You know, those really are very impressive teeth.”

“I’m glad you like them.”

“Why do you have such long, sharp, pointed teeth? If you don’t mind my asking, that is?”

“Why should I mind?” the devil asked, grinning wider. “Is this where I get to say; *The better to eat you with!*?”

“Are you carnivorous?”

“What the HELL kind of question is THAT?!” The devil was dumbfounded. “*Am I carnivorous?!*” He repeated, absently fingering one of his horns in bemusement. “I can’t believe you asked me that!”

Robert shrugged. “Well, it just seems odd to me, if you are, because... I mean... where’s the MEAT?”

“What?!”

“Well, we’re just *souls* here, right? I think my body was cremated... So, why would you need teeth like that to...”

“Robert! You are the most unusual... You ask the strangest... You’re not like anyone else here! I’ve never met anyone even remotely LIKE you!”

Robert’s eyebrows flicked up once and he sighed. “I’ve heard that before.”

The devil chuckled, with real amusement this time. “...So have I,” he confided. “Tell you what, Robert... I’ve been ordered to take a full inventory of hell, and I... really don’t feel like it. I could use some assistance, especially with the math. I always hated math! But until you came along there was no one down here I could stand to have working with me. Cowardly buggers, the lot of them! You’re different. You’re not afraid but you’re not a pain in the ass—at least, not yet. You’re not disrespectful but you don’t grovel, either. I can’t stand souls who beg! Word to the wise,” the devil leaned down to look Robert directly in the eyes. “No matter what I do to you, don’t BEG.” He straightened up again and smiled. “So, what do you say? If you help me with the inventory, you’ll get the grand tour of Hell... be able to see it all... Are you game?”

“Sure, why not?”

“Just like that?!”

“What d’you mean?”

“You’re not even going to try and cut a deal, first?!... Ask me for special favors before agreeing to help?”

“Why would I try to do that *before* I’ve impressed you with my math skills? Besides, I don’t really expect it would do me much good to ask for favors... this being Hell, after all.”

“Right. So, you just agreed to help out...out of the goodness of your heart. Because I asked you to?” the devil said in a deeply suspicious tone.

Robert chuckled. “Not really, no. If it makes you feel any better, I’m generally not this helpful most of the time. I tend to prefer solitude to being helpful. But...I’ve done a lot of traveling, you see, and I’ve learned what to do and what not to do, when traveling. This is my first time in Hell... It’s a new place... I don’t know my way around... It’s always best to have a native show you the ropes in a new environment. The way I see it, you’re probably the best guide I’m ever going to be able to find in Hell. And, besides...it’s not like I have anything better to do right now-- as far as I know, anyway...”

“Good points—all of them. I’m impressed.”

“Yeah... So, when shall we start?”

After a quick tour of Hell, the devil took Robert to his palace, where they could begin planning the process of *counting the damned sinners*, as the Ruler of Hell put it. Apparently, the inventory order had specified that several different measurements were required: First, an overall tally, to be broken

down into categories of sin, which would each be further broken down into various demographics (such as premeditation prior to commission of sin, number of times of commission, etc.).

After a brief but heated exchange, which ensued because Robert asked the devil why God needs an inventory of hell if He's omniscient... (wherein the devil became quite upset over his own inability to come up with a suitably logical answer), Robert realized that perhaps this was not the time to question the reasons for the task before them, but to organize the task, itself.

"Before we get started, then," Robert said, "is there anything that YOU want to add to this inventory?"

"Like what?"

"Well, I dunno," Robert shrugged. "But it just seems to me that if you're going to have to go to all the trouble of this big, comprehensive inventory just because somebody else wants their numbers, you might as well build your own agenda into the project and get what you want out of it at the same time. That way, you're doing it as much for yourself as for whomever ordered the inventory in the first place. Frankly, that's how I got all the way through school."

The devil stared at him. "You think like I do, Robert."

"I do?"

"Yes. That kind of thinking is what got me into trouble in the first place."

Robert digested that piece of information. "So, uh... does that mean you... just want to follow orders, as written?"

The devil grinned. "HELL, NO!" He clapped Robert on the back, conspiratorially. "Just give me a few minutes to give this some thought. Hmmm.....yes.... I can think of several things...."

Robert waited. Time ticked by, slowly. Robert was fascinated by the fact that time was apparently every bit as much a part of the organization of Hell as it had been in life. He was also delighted to realize that he apparently didn't need to eat! After twenty years of enslavement to an insulin syringe, this was pure emancipation.

"What are you smiling about, Robert?" The devil asked, suspiciously.

"Me? Oh, I was just thinking how nice it is not to fear an insulin reaction anymore."

"Hmmm..." The devil nodded slowly. "I appreciate your honesty. Most souls try to lie to me—they're afraid I'm going to conjure up whatever it was they had in their mind they were pleased to be free of."

"Do you?"

"Yes! I DO, as a matter of fact! But don't worry, I only do that when I'm lied to." He fixed Robert with a glare. "And I always *know*."

"I figured as much."

"You're a quick study." The devil smiled at him. "You know what, Robert? I'm beginning to think you were much better off being sent here. You're too independent-minded for heaven. Too used to thinking for yourself. They really don't appreciate that kind of thing there."

Robert nodded, shrugging. "I'm willing to believe it. I have to admit; I can't really see any other useful way to go about things," he said. "I learned early in my life that if I don't think for myself, I can't always count on others to do adequate thinking on my behalf. In fact, I found as I got older that what most people consider to be adequate thinking is really not adequate at all for my needs and I also found that my needs always seem to be different from just about everybody else's. So, it was a survival mechanism."

"You definitely wouldn't fit in, in heaven!"

"Probably not."

"I think God may have miscalculated, sending you to me, though..." the devil grinned.

“Why?”

“Because... I’m having *fun*! And... you’re giving me all sorts of wonderful ideas! Hey, y’wanna help me get back at Him?!”

“Not particularly, no.”

“Why not??? He shafted you, just as He shafted ME!”

“It would seem so,” Robert admitted. “But I don’t enjoy spending my time on things like that. There is so much more I’d rather do.”

“Like what, for instance?”

Robert gestured to the panorama of Hell spread out before them from their vantage point on the stone terrace of the devil’s palace, which was perched high above Hell on a rocky formation of cliffs... sort of like the Amalfi coast, really, he thought... but without the sunshine...or the fresh air...”Well, for example,” Robert said, “it would seem that there are as many questions to be answered about *the WHY of things* after death as there were in life. I wonder... has anyone ever studied the epistemology of Hell?”

“No. No one has ever thought to *study anything* about this place—they’re usually too busy freaking out!” He threw his head back and laughed. “Ah, that’s beautiful! The epistemology of Hell... Is that what you’re going to do?”

“I just might.”

“Gonna write a book?”

“Well, now... I wouldn’t say THAT...”

“You could call it *Damnation, Itself!!!*”

“Yeah... *A Comprehensive Inquiry Into the Nature, Origin, and Fabrication of Hell*,” Robert supplied.

“Tell me, Robert,” the devil said, once he stopped laughing. “Do you think you figured out all the secrets about LIFE, with your various books?”

“No. Hardly!” He chuckled at the notion. “No, I barely scratched the surface.” His eyes twinkled. “And apparently that was enough to get me sent to Hell! But at least I got the answers to my OWN question.”

“Which was?”

“*Why are living organisms ALIVE?*”

“And, what was your answer?”

“That’s very difficult to sum up in just a sentence or two.”

“Try me. Do you think I wouldn’t be able to understand it?” There was a threat implicit in the question.

“Of course you could understand it. It’s easy to understand! But... Are you sure you want to hear it? It will take us away from our task.”

“Oh.” The devil considered this a moment, then made a dismissive gesture with his fingers. “The task can wait. I’ve procrastinated on it for this long, I might as well put it off for a while longer.”

Robert laughed. At the devil’s inquiring glance, he explained. “I’m beginning to see what you mean-- about us thinking alike,” he said. “We have a quote, where I come from: ‘*What is worth putting off until tomorrow is worth putting off until next week.*’ I don’t know who said it first, though.”

“Ah well, whoever it was, if he’s dead, he’s probably here, somewhere,” the devil told him. “Sounds like my kind of guy!”

The situation soon became even more interesting, as far as Robert was concerned... The devil had decided that they should be comfortable while they were talking about life and living, so he

conjured up a large table, some deep, comfortable chairs, a bottle of some unidentifiable alcoholic liquid in a decanter, and two ornate snifters.

Robert accepted his glass after the devil poured him a stiff libation and obligingly held his glass aloft when the devil lifted his own.

“To HELL with EVERYTHING!” the devil toasted, and took a swig of his drink.

“To interesting conversations,” Robert toasted and raised the glass to his lips, taking a sip. It was a delicious, albeit fiery, liquid, much to Robert’s surprise. As fine as any Cognac, Armagnac, or Scotch he’d ever had—and he had made it a project in life to try as many different types of all three as possible. “Hey! This is really *good*,” he said, taking his seat and making himself comfortable..

The devil scoffed at his amazement. “What did you expect? I don’t drink crap!”

“Wait... how can I be drinking this at all?” Robert wondered out loud. “I’m dead.”

“There you go, thinking again,” the devil said with a rueful smile, sinking into his own comfy chair. “Just accept it as a Welcome to Hell gift and get on with describing your answers. So, tell me; why ARE living organisms ALIVE?”

Robert took another sip of his drink and cleared his throat. “Well, it has to do with a circle of ideas which I call *complexity*,” he said. “And the way I define that word is somewhat different from the way anybody else has been using it. It ultimately has to do with matters of organization of systems. Most people using the word “complexity” have used it to refer to anything that is big and complicated, or intricate enough to not be easily comprehended, just by sheer size or magnitude of detail. However, my definition of complexity refers, instead, to a set of organizational factors, based on entailment patterns which underlie relational causality. These are organizational factors which can confer definite behaviors and properties upon any system so organized; regardless of what the material parts or components of the system are.

“So... that’s IT? The way something is configured is more important than what it’s configured with?”

Robert shook his head. “Don’t confuse organization with structure. They are not the same. It’s possible to kill an organism without damaging the physical structure, right? So, our organism is intact... as far as our structure or material configuration goes... but, where’s the life?”

“So... where IS it? In the organization alone?”

“Well, not quite; because organization is not something which is fractionable from any other aspect of the system, including the material configuration or structure. So, we have to talk a little bit about what organization is and what it can mean, in terms of overall system behaviors and properties.” Robert paused to take another sip of his drink, enjoying the pleasant burn after the swallow. “The inescapable truth is that there are behaviors and properties of certain types of systems,” he continued, “which cannot be analyzed by any reductive means or approaches.”

“Are you sure of that?” asked the devil.

“Yes. Follow the logic: To fractionate any system is to destroy its organization. If we destroy the organization, we lose all the causal information contained in, or indeed created by, that organization.... Complex organization does, in fact, create and carry within itself the capacity for massive amounts of information. I contend that most natural systems in the universe are of this type of organization; they are “complex”. So, if there is important information about the system which is entailed by organization rather than by the nature of the components alone, then that is information that cannot be learned from any amount of study of the components. You see?”

“All right, I get it,” said the devil. “So, why is it that you believe you were able to see this aspect of the universe when everyone else was looking at it differently? And, incidentally, Robert—that doesn’t tell me why living organisms are alive. What kind of organizational information causes life?”

Robert smiled at him. "I'm getting to that," he said. "But, to answer your first question, first... I think I was able to see it because I was trying to use physics to answer questions that crop up outside of the "field" of *Physics*. I don't see those two as the same thing, you see... physics with a small "p" is a set of tools with which to do science and a physicist is one who is an expert in wielding those tools—either mentally, as a theoretical physicist, or in applications, as a practical physicist...or both. In contrast; *Physics* with a capital "P" is supposedly a branch of science, but it often behaves more like a community of believers, much like a religion, in that one must agree to the precepts of the orthodoxy in order to be a member."

The devil shook a fist. "Damn them! I HATE orthodoxies!" he thundered.

"I'm not particularly fond of them myself," Robert admitted. "And they're not fond of me, either. Which is why you have had a run of angry members of Academia grumbling about *Rosen*!"

"Oh!" The devil was pleased. "You were raining all over the Academic parade, were you?"

"Not on purpose, no."

"Are you saying you just.... *accidentally* rained all over their parade?"

Robert grinned. "I didn't even realize there *was* a parade. Or that the truth could be defined as rain in relation to it. *I am a scientist*, dammit! All I did was voice certain findings of mine that I felt should be of interest to anyone in the sciences because these findings have very serious implications for *science in general*. However, I guess I had a few rosy illusions about the nature of Academia. I thought the truth was more important than maintaining some status quo or scent-marking various boundaries between disciplines... or winning prestigious awards. Who the hell cares about *THAT* stuff?! That's not why I became a scientist. I wanted to know the answer to my OWN question. In the process of finding it, I also found a few other things-- that's all. But... for members of the orthodoxy, it's intolerable."

"Ah," the devil said, tilting his head back with his eyes half closed. "Hence: '*Damn that Rosen-- always answering questions nobody wants to ask!*' It makes sense, now. Well done, Robert! Bravo!"

"Hey, no thanks-- I don't want any credit and I also refuse to accept the blame for other people's discomfort. The truth IS what it is. If I am right about it, it behooves my brethren in Academia to figure it out sooner rather than later. They can't say I didn't warn them; I did my duty and published my findings. My conscience is clear. Uh, that is... the fact that I'm sitting here in Hell having a drink with the devil, notwithstanding!" He chuckled at that irony, saluted the devil with his snifter, and took another sip of his drink. "Oh, this is damn good!"

The devil was grinning. "That's why they say alcohol is *of the devil*, you know..."

Robert finished the thought, grinning himself. "Because it's DAMN good?"

"Yep!" The devil tipped his head back to empty his glass, roaring in delight as the fire of it burned all the way down to his gullet. He grabbed up the decanter and deftly refilled his snifter, leaning over to do the same for Robert. "All right then, so tell me why the orthodoxy of Physics would get their shorts all in a twist over this organizational business, Robert."

"It's simple really... no pun intended. Although, that's a *good* one, even if I... *do*... *say so myself!*" Robert said, using a Woody Allenesque voice.

"He's on his way here, you know. Woody Allen," the devil told him.

"Oh really? Good! That should keep things lively around here. Another New Yorker in Hell." Robert settled deeper into his chair, gathering up his thoughts to finally get back to the business at hand. "So, anyway...the situation was that Physics, as an orthodoxy in science, has always seen itself as the general science; the basic, foundational set of analyses which then generates information considered to be applicable to all other systems in the universe, including biological systems. However, this turns out not to be the case at all. That's what I discovered by trying to use physics as a set of tools to answer questions in biology. I can even pinpoint *why* this situation has developed, if you're interested?"

The devil shrugged, “Sure, I’ll bite... as it were...”

Robert raised an appreciative eyebrow. “Historically, the field of Physics has always dealt far better analyzing phenomena which derive from systems which have organizations that are non-complex - what I call *simple*. Newton’s work, for example, deals almost entirely with simple systems. Einstein made a few changes, very important changes in fact, but a large proportion of what was there remains essentially unchanged, even into Quantum Theory. Therefore, nearly all the tools developed thus far were developed from systems with simple organization.”

“What are some examples?”

“Anything which has an organization that is entirely computable, meaning that it can be reduced to pure syntax without loss of necessary information. So, for example, orbital mechanics of a solar system; various phase transitions, cycles like the water cycle; molecular organization; the organization of any human made machine... and there’s the rub: Physics committed itself, via Descartes, to using the concept of a “machine” as its model for all systems. This is the *machine metaphor* which presumes that all systems in the universe are like machines and therefore will conform to fundamental information we learn from dealing with machines. BUT... Most natural systems in the universe are not simple! Natural self-organizing systems tend towards complex organization, of varying degrees and, therefore, I argue, approaches and techniques modeled on the machine metaphor cannot be used to learn certain fundamental things about complex systems or complex organization.”

“Uh... wait a minute. We’re not any closer to talking about why living organisms are alive, Robert” the devil said.

Robert grinned. “I’m still getting to that! I warned you this was a set of ideas not easily summed up in a few sentences. They tend to ramify off in all directions and apply to many, many different things.”

The devil nodded, conceding the point. “Carry on, then.”

“Ah, thank you,” Robert said, leaning back in his chair once again with his snifter. “Now, where was I?”

“The machine model,” the devil prompted.

“Right! So, this presumption—that all systems in the universe are “like machines”—has really hamstrung the sciences—but very few scientists realize just how bad it is! The reason for that is because as long as one stays within the realm of systems which don’t exhibit much in the way of complex behavior, one can do an enormous amount of good work, using science based on this model and, therefore, never realize that the model is inherently limited. The limitations don’t get in the way. They remain *invisible*. This kind of science can also be used to do a great deal of analysis of *components* of complex systems which have been fractionated. So the flaws have been well camouflaged, all these years. It is only when we try to apply the principles and techniques derived from such models to explaining the behavior of *intact complex systems*, like organisms, ecosystems, social systems, etc... well... that’s when the flaws become not only apparent, but insurmountable.”

“Where does the explanation for life come in, Robert?”

Robert smiled at him. “Life is a consequence of complex organization of a certain type, or magnitude, in a material system.”

“But that doesn’t tell me anything!” the devil protested. “Why does organization make such a difference?”

“Ah,” said Robert, settling more deeply into his chair. “That’s what I spent the second half of my career learning about!”

“What was the first half, then?”

“The first half was spent figuring out why it doesn’t work to try to apply principles from contemporary Physics to most biological situations. It SHOULD work. In principle, if biological systems exist in the same universe with orbital mechanics and molecular configurations, etc, then what we learn from a study of one should be applicable to studying the others.”

“But it’s not?”

“It’s not that it’s not applicable. It’s that the field of Physics, as it currently exists, has misinterpreted certain basic aspects about systems—all systems, including simple systems and including the universe in its entirety as a system. It’s this basic and fundamental misinterpretation which has allowed the machine metaphor to stand, unchallenged, all these centuries. I see these as flaws in the foundations of science, not necessarily flaws in physics, per se. It’s fixable and, once it’s fixed, Physics really can be the general science it claims to be. But... only if these limitations, these flaws, are fixed. They cannot be allowed to remain there at the foundations.”

“What, in your opinion, has the field of Physics misinterpreted about the universe, Robert?”

“The impact of relations on causality.”

“Well, now,” the devil said, “I’m no physicist, but we have plenty of physicists here in Hell, and I happen to know that Physics, the Orthodoxy, is aware of the notion that the result of any and all measurements is relative to the measurement taker...”

“Yes, that’s Einstein’s contribution. But Physics still believes that causality in the universe has to do with states and dynamical equations. As if it’s only a matter of initial conditions, particles, coordinates and measurements, about states and phase transitions, chronicles in a linear progression in one direction only, from one state to the next state, and so on. Even Quantum Physics has inherited innumerable assumptions and precepts, as well as many basic approaches, essentially intact from Newtonian Mechanics; the concept of states and recursion, for example, now encoded as *wave functions*. These things are only true in theory, and once again, are close enough to *the observable reality of simple systems* to *seem true* via experiments. What they fail to realize is the sheer magnitude of the implications generated by the fact that there is information *in the relation between* the observer and the observed which cannot be dispensed with. That has been *proven--* to everyone’s satisfaction, including mine. *That fact changes everything*, yet even Einstein didn’t realize the full importance of what it means! What he discovered was that this is a RELATIONAL universe; a universe where a relation creates every interaction and every measurement creates a relation. Once we agree that this is so, then nothing can remain the same because we must also agree that anything which impacts relations is going to impact all. Right?”

“I... guess I’m with you so far,” the devil said.

“So, it *must* be true that the organization of systems, which creates, constrains, and maintains all relations within any system itself, is something we need to study if we want to fully understand any system.”

“Ah, but what you’re saying would be true even in simple systems,” the devil said, in a tone that conveyed his certainty that he had detected a flaw in Robert’s logic...

“Yes. It **IS** true in simple systems.”

“Ah HAH! But you just said that science has been able to ignore this with simple systems and not see the flaws!”

“Yes I did. And you think this is inconsistent, do you?”

“I would have to say that I do, Robert.”

“Well, it isn’t and here’s why... they’ve been lucky.”

“Lucky?!”

“Yep. If Newton had been a biologist, he would either have come up with something completely different, or he would have gone stark, raving mad out of sheer frustration! To reiterate: complex organization is any organization which contributes critical causal impact to the system as a whole. Simple organization supplies minimal causal impact and can be reduced to, or equated with, physical structure. So, *they were lucky*. They were dealing mostly with simple systems or aspects of complex systems which are, separated from the whole, simple in organization on their own. But the level of success achieved has given Physics the impression that the reason they have achieved this success is because the machine metaphor and the models, methods, and approaches based on it will work for ALL systems in the universe. Think about it: If you spent your career working with types of system organization which contribute almost no causal impact on the overall system behavior... and you were unacquainted with systems where this is not so, would you have any reason to believe that there are, in fact, organizational types which CAN contribute *the bulk of system behaviors*?”

“Ahhhh, Hmmm... So, this is how come science has been able to get as far as they have, not having realized the true importance of this organizational aspect?”

“Exactly. Because in a machine, the organizational impact is nominal and you don’t lose much information reducing organization to structure. The machine metaphor is what really spawned the reductionist paradigm in science. The way science goes about analyzing everything is by breaking whole systems down into smaller and smaller subsystems, which destroys the organizational entailments before they even begin the analysis. When they do this to a complex system, they cannot see what’s missing. They can only see that what they have in terms of information, about human physiology, say, is not adding up to the whole. That’s why it is common to say that *Complex systems are more than the sum of their parts*. However, what the presumption of the machine tells us to do in that instance is learn more and more about the parts, and the parts of the parts, reducing ever smaller, amassing ever more data... because in a machine, that really CAN tell us almost everything we need to know about the whole. The entire way we currently do science encourages this perspective, which is highly distorting... particularly from within. It can be very difficult to see anything outside of it if you are used to operating from deep inside this kind of mindset-- *and used to being successful using it*.”

“So, how come biologists haven’t seen it, if they’re outside of it?”

“But they’re not outside of it. Physics underlies biology. Biologists tend to base their thinking on the rules and methods generated by Physics. I did! When I started out, I was perfectly sure that I could achieve what I intended to achieve, using physics. No one was more surprised than I was when it finally became clear to me that it would never work.”

The devil leaned forward and pinned Robert with his eyes. “So how come you were able to recognize the flaws when so many other Biologists didn’t? I bet you think you’re smarter than everybody else!”

Robert laughed. “Whether I’m smarter or not isn’t for me to decide. Don’t get me wrong; I have a healthy self-confidence in my own ability to learn and think. Furthermore, it’s kind of become obvious through my lifetime that nobody else sees things the way I do. However, I think it is impossible to judge a quality like “smarter than”, outside of any particular, distinct comparison. It’s the sort of judgment which relies on the context; namely, the relation between my smart-ness and someone else’s. Even then, it would be very difficult to say, categorically, that one person is smarter than another. How do you measure it? Smarter in what sense? Someone I might consider an idiot in science may, at the same time, be a genius in something else—some area of human activity or thought where I, myself, might be an idiot. So, this is one of the many cases where the mode of measurement we choose is going to create information that may or may not accurately reflect the true situation. And so will our criteria for employing it: For example how would you differentiate between intelligence and talent? Are they the

same? Or are they not... and if they are not the same, then is one of them more important than the other? When? Why? It's all very subjective."

The devil leaned back in his chair, sipping his drink. "Hmmm... I think I just reinforced part of your argument for you—that thing about the importance of relations...."

Robert grinned. "Yes, I think so too... What can I say? Except... how about a little more o' that elixir of yours?" He held up his nearly empty snifter, which induced the devil to survey the contents of his own glass and find it lacking as well.

After both snifters were refilled, the devil settled back in his chair and put his enormous claw-like feet up on the table, encouraging Robert to do the same. Once Robert had obliged and they both contributed a few jokes about the comparison between the common stereotype of the devil possessing *hooves* and his actual feet, the devil said, "Well, Robert... you still have not elucidated how it is that organizational qualities can be the cause of life in an organism."

"We are quickly getting there," he assured the devil. "However, there is a loose end left over from the issues that occupied the first half of my career: You asked how I recognized the flaws when others did not."

The devil nodded. "So?"

"I've wondered that, myself. I do think it partly has to do with a certain combination of abilities and interests, like my fluency in physics and mathematics, for example, coupled with my main passion, which is biology. Very few biologists that I know are also fluent or even interested in the more technical sciences... and very few physicists that I know are really interested in issues peculiar to biological systems. I'm also a theorist interested in foundational issues, yet I've had extensive experience in empirical, or applied, science, which is a combination equally unusual among my colleagues. So that kind of range would seem to be a logical part of the explanation. But, I also think it has something to do with certain habits of thought; a way of looking at things. When I look at phenomena in the universe, I don't see "things". I see patterns. Analogies. Similarities. I have always thought in metaphorical terms and patterns, ever since I was a kid. My curiosity about phenomena has always been to wonder; *Why does THIS happen?* I wanted to know what *entails* some phenomenon, so my study of the phenomenon itself is geared to understanding why that particular phenomenon is the way it is or happens the way it does: following the causal pathways to find out *what ENTAILS it?* This sort of question turns out to be a very comprehensive question to answer; much more detailed and exacting than, say, the question; *What is this phenomenon?* Or even; *What causes this phenomenon?* Entailment is a far bigger concept than causality, just as organization is a far bigger concept than physical configuration or structure."

"I see... So you looked at living organisms and wondered; *Why are they alive?* Right?"

Robert nodded, sipping.

"So, tell me then... how DID you come to the conclusion that it was an organizational property which *entails* life?"

"Partly because there are so many different types of living organisms: Enormous variation of form, physical structure, behavior, abilities, reproductive modes, etc. The ingredients are all different, the parts are different, the habitats are different, and yet... somehow we can easily recognize them all as a UNITY. They are all *living organisms*. Why can we recognize that?"

"You asked *why* about THAT?!"

"Yes. Don't you think it's a reasonable thing to wonder?"

"Well... I dunno..." the devil said, trying to imagine.

"It seemed a significant fact to me. It's also a significant fact that, whatever it is which *causes* life, it must not be directly connected to the form, or structure, or the components, or the ingredients except for the more indirect value of the roles those aspects play within the whole system. That's a

similarity in functional terms, though, you see? So, for example fur and feathers are very different, but they provide some of the same functionality to the organism. Reproducing by laying eggs is radically different from what either fruit trees or human beings do but all of these are modes of reproduction. Thus, the differences between various organisms can be seen as similarities when viewed in terms of the functional relations those things contribute to something ELSE-- something which all living organisms must necessarily share. The one commonality all living organisms share is the nature of their entailment patterns. THAT'S what we are recognizing when we can see a unity among living systems. And it is system organization which is responsible for the pattern."

"But how did you come to the realization that it was their organization that is responsible for that? And how did you uncouple the notion of organization from that of physical structure?"

"*By recognizing the power in a relation.* A relation between two things can change everything about the two things—this is a fact. The evidence is clear and it is indisputable! Even in a simple system like a molecular bond... No theoretical chemist can explain why it is that sodium and chlorine, two poisonous elements, can combine to create sodium chloride—table salt—which is absolutely essential for human life. They can tell you *what* happens, they can *make it happen*, they can *undo it and remake it* again. All perfectly simple... But they cannot tell you *WHY*. Indeed, the more I looked at the effect a single change in a single relation could have on the flow of causality in a system, the more I realized that causality, itself, is the result of relational interactions. Indeed; nothing happens until something interacts with something else. Space and time interact to create aspects of our universe. Together, they create the potential for causality."

"Hmmm," the devil said softly, "I guess that's really true... everything is static until they interact with one another in some way."

"Indeed, and yet, even the state of non-interaction between two objects or entities can sometimes be a relation which has information, as well. These are all, potentially, aspects of *context*; both in a direct way and in a larger, less direct sense. For example, non-interaction can be a context for interaction and interaction can also be a context for non-interaction..."

"What?"

Robert chuckled at the puzzled look on the devil's face. "What this means is that there is no such value as a "state"—never mind a *generic* state. We can only create a temporary, artificial version of the theoretical notion of "state"... and even then, we can only do so with simple systems like machines without destroying the system in the process. Reductionism was built using the machine metaphor; a model based on *the idea* of what a machine IS as a system. But what about a system such as an atom, which I contend is a complex system-- Can we fractionate an atom without losing information? Have we destroyed the system if we fractionate it? Are atoms static? What natural system is ever static? Nothing in the universe actually exists *outside of* time or space, and therefore is always in a condition of constant interaction with the combined system of space/time, even if nothing else. I argue that we can never truly detach or fractionate any natural system from all contextual interaction and to try is not even desirable."

"Why not?"

"Because there is information in that relation as well—information we need to understand the system. This is why space travel poses such difficulties; we have to bring enough of our context with us to survive away from our planet. The way we are organized specifies a context. Indeed, I contend that our organization includes information *about* our context."

"So, let me see if I got this straight, Robert... If there is no such thing as a timeless state, then what's the scientific alternative for a complex system?"

"Constant interactive relational causality. Have you ever heard the expression; "*Change is the only constant*"? There's a grain of truth in that, although it is also true that if a system maintains

homeostasis, it's a way of NOT changing, at least, not too far outside of necessary organizational constraints, but you can bet that any system maintaining homeostasis is doing so via... a whole lotta... *constant interactive relational causality, deh!*" The last five words came out in Archie Bunker's Bronx mis-pronunciation style, causing the devil's eyebrows to rise. Robert, for whom such quick expressions of the mischief in his soul were commonplace, didn't notice... he just sailed on by, switching back to his own voice again. "It's common for people to say that "life is a process" not a "thing". There's a grain of truth in that, too... But it's far more than JUST a process. That's like saying that a living system is *just a system with a process*. How does that explain life? What is it about living systems which entails the aspect of system behavior that they're interpreting as a process? People who call life "*a process*" can't answer that question."

"Why do you believe that is?"

"I think it's because they fail to look beyond the process itself for what entails the process. They may recognize that any single process is actually a series of relational interactions whereby the effects of each step's relations become part of the next step's relational interactions, and so forth. But so what? According to that, crystal formation can be described as a process. Oxidation can be described as a process. Rust! Metabolism is often described as a process, with sub-processes and sub-sub-processes, etc. But no amount of examination into the process of metabolism is going to entail life for us. It goes the other way. Life entails metabolism. In order to understand the process of metabolism, one has to include the larger organization. In other words; the contextual relations for the subsystem we call *metabolism*. That's where we'll find the missing entailments. We can't use the reductionist method of looking at ever smaller pieces, like we could do in a machine or other simple system. Science doesn't seem to have a clue why not, and this is a clear example of the toxic effects of the machine metaphor at the foundations, again. Those effects are very subtle and subversive, but lethal. We presume such things with living systems and we poison ourselves and our environment. We still approach such systems as if they are just like machines; killing and dismantling living organisms in order to study them. My view is that as soon as we kill an organism, we've already lost too much information to understand why it was alive."

"So, do you think it's a waste of time to study the subsystems and the parts and pieces of the parts?" the devil asked him.

Robert shook his head. "No, not a waste of time... but you have to know what you want to find out and where to look for it. It IS a waste of time to look for life in the pieces! You can learn about specific physiologies and specific sub-processes, etc, by using a combination of reductionist methods and relational methods, but the two must work together and there must be a sound theoretical foundation underlying the entire enterprise, or else the experimental activity is flying blind. If you don't realize where to look for what you are trying to find, you may just blow right past it, or toss it out. Like killing a living organism to try and study life! The first aspect of the organism they are sacrificing, *the organization*, is the very place they need to be looking. But, Science has built a tradition of analysis which always proceeds from larger to smaller, from wholes to parts. That's what scientists are used to."

"Because of the machine metaphor..."

Robert nodded. "Exactly. You can approach machines or cosmology or molecular pieces of living organisms that way and get away with it-- in fact you can be very, spectacularly, successful. But you will never be able to learn why living systems are alive, that way, or anything else about the universe that is a consequence of complexity. Simple organization means that the entailments *can* be found in the parts and the direct relations between the parts, which basically equals *structure*. Complex organization, on the other hand, can create the same behaviors in two distinctly different systems with

entirely different parts and different structures from each other and yet these two will still have the same entailment patterns—.”

“Because the entailments are organizational,” the devil finished his sentence for him, causing Robert to raise his glass in salutation of his accuracy. “And... living organisms, in all their variety, are the proof of that,” the devil added, saluting back with his own snifter.

“Correct! So if we want to know what entails life, we need to look at what is common to all living organisms. The only things they all have in common with one another are organizational.”

“OK! So I’m getting it! Uh... Wait a minute. Did you just say organization was a “thing”? But... didn’t you say earlier that organization isn’t a thing, it’s a quality.”

“Ahhhh,” Robert said, a smile spreading across his face. “This is where complexity gets even more interesting! I actually referred to organizational *aspects* as ‘things,’ which is a bit different than saying organization, itself, is a thing... But the truth is that *organization* can be viewed in many different ways with regards to many different aspects of a system-- all at the same time. One example would be to view system organization as *a collection* of specific relations between parts, subsystems, and other relations-- *and relational effects*. So, in that sense, a collection of any kind is a “thing”... The important idea to keep in mind is the multiplicity of dimension. At the same time that organization is “a collection” it is also definable in myriad other ways. It would be a mistake to ever view organization as a single entity, like a material object. That’s what I’m cautioning against when I say *it’s not a thing*. It all depends on contextual constraints. Context is absolutely critical and it is created by relations and relational effects. Thus, any system has internal contexts, an external context, and the fact that these two are in constant interaction with one another. In a living system, the concept goes dimensions beyond that... One aspect of what I refer to as Natural Law (the bedrock set of entailments which drive all others, and all causality, in the universe) is that context can change everything. In fact, by doing so, it can ultimately change *itself*—the way internal context of a living system can do with modifying external context. The first beaver builds a dam in a stream, driven to do so by some aspect of internal context, and thereby changes the evolutionary path of its species which evolve in concert with such external contextual changes and interactions. So, you see? Given enough contextual conditions, *up* becomes *down*, *black* becomes *white*, *yin* becomes *yang*, *good* becomes *evil*, *death* becomes *life*.”

“You’re waxing very philosophical, Robert.”

“Here’s a riddle for you: When is a relation not a *relation*?”

“Beats the hell out of ME,” the devil admitted.

“When it’s a *thing*.”

“I think you have had too much of my... what did you call it? My *elixir*!” the devil said, showing his teeth again. However, this time he didn’t look all that dangerous, somehow... in fact, Robert thought it was probably as close to a goofy grin as the devil would be able to achieve with his demonic features.

“Are you suggesting I’m inebriated?”

The devil nodded. “Yeah... that, too!”

“Nah... I don’t get drunk,” Robert told him. “I don’t know why. It’s a shame, really. I’ve tried, on occasion. My physiology has always been peculiar in relation to most of my fellow humans. Then again, I must say, I’ve never actually tried to get drunk *without* my physiology before!” He started to laugh at the lunacy of that idea. “Hey, maybe I can finally become a drunken bum here in Hell.”

The devil chuckled too. “I will do all I can to encourage it, I promise. Here... lemme give us a refill.... Right! So, tell me... When is a relation a THING, Robert?”

Robert raised his glass in silent thanks for the replenished level of drink. “A relation can be seen to be a *thing*, when the organization treats it as such. In other words, when the total effect of some

relation-- or process, even—figures into the larger organization as if *that effect* were a single aspect, then it can be said that a relation can act, within the overall organization, as a THING.”

“Oh. I see! So, it’s just *acting like it’s a thing*... Hmmmm... That figures into the “*more than the sum of the parts*” bit, right?”

“Precisely! The organization can’t tell what’s a material object and what’s a relation or a relational effect... In essence, this has to do with organizational definitions differing from our own, as observers. But, what also must be borne in mind is that, just as it is with the multiplicity inherent in the concept of organization... at the same time as some relation is acting as *a thing* in one part of the organization, it is likely to be acting in a different capacity in another part or in multiple aspects of the same overall organization. In other words, any single aspect we could point to in a complex system may be ‘wearing many different hats’, as the saying goes; playing multiple roles within multiple different functional entailment relations, in multiple scales of time perhaps... all happening simultaneously, sequentially, and various combinations of all of the above... within the organization of the system.”

“Wait, Robert... how is anybody supposed to be able to sort out what’s what in that case?”

“Not by taking it apart, that’s for sure,” Robert said. “It is hopefully clear now why I say that trying to understand such a system solely from a study of the material structure, or parts and pieces, is not going to give science the kinds of information we need to understand some of the most important aspects of these systems. So, now you’re getting some idea of just how much more than the sum of the material parts a complex system can really be. In fact, there is no way to sum a system like this. Complex organization has aspects of infinity to it which is also what makes it impossible to reduce such a system to anything finite. Hence the non-computability of its organization. In order to compute something, you must be able to reduce it to syntax. Complexity does not fit into that category. Hell, we can’t even do that to mathematics!”

“Well, what’s your suggestion for science, then? Are you able to envision any alternate means of studying these things? Or is it more fun to just be a party pooper!”

“A what?!” Robert said, laughing.

The devil shrugged, gesturing with his drink. “Haven’t you heard? Every party needs a pooper.”

“Is that a law of the universe?”

“Sure seems that way t’me!”

Robert was laughing. “Like Murphy’s Law? And the Peter Principle?”

“Yeah,” the devil said, finding it hard to take a swig out of his glass when he was grinning so broadly. “The Peter Principle... that describes heaven pretty good, I can tell you that right now!”

Robert adopted Arnold Schwarzenegger’s thick accent. “*Hello. I’m the pahty poopah!*”

The devil was giggling by this time. “Hell-oh, I’m the pahty POOPAH,” he intoned, doing a creditable impression of Robert’s impression of the Austrian accent.

“Is that how God would define YOU, do you think?”

For half a minute, Robert worried he might have gone too far in asking the question. The shocked silence was absolute. But then the devil exploded in deep, rumbling guffaws that vibrated the air and the furniture, traveling through the stone floor of the terrace. It was strangely infectious, particularly after it mellowed to a dull roar of convulsive laughter.

When the devil could finally breathe normally and it was safe to take a swig of his drink without danger of having it come out his nose, the devil emptied his glass and picked up the decanter to refill both glasses. “Damn it all, Robert. I haven’t laughed like that in... BLOODY HELL... how long has it been?! ...Seems like forever!”

“I’m glad I could be of service,” Robert said. “I haven’t had that much to laugh about myself, in the last couple years.”

The devil looked over at him. “You laugh easily, it seems to me. Even when you’re meeting the devil at the gates of Hell!”

Robert grinned. “Yeah, I did. Didn’t I... Probably has something to do with the fact that I’m from Brooklyn! Hey, did you ever see the movie ‘Angel Heart’?”

“No... I’m waiting for it to come out on cable. OF COURSE I DIDN’T SEE THE MOVIE!”

Robert started laughing hard again, realizing what a crazy situation this was. “Sorry! I forgot! The devil had some good lines in that movie... I’d think you’d appreciate it.”

“Who played me?”

“Uh... An actor named Robert De Niro.”

“Oh. OK.” The devil nodded, pleased.

“How do you know who he is?”

“Never mind.”

Robert laughed again. “OK, well anyway, I brought it up because the devil asks the main character two different questions and the answer to both of them was; ‘No. I’m from Brooklyn.’”

“What were the two questions?”

“The first one was; *Are you religious?* And the second one was; *Do you speak French?*”

The devil looked a bit perplexed. “No, I’m from Brooklyn?”

“Maybe one has to be from Brooklyn to get the joke, but it made ME laugh, both times!”

“Yeah, but... Robert, we’ve already agreed that you’re a really strange guy!” The devil sent a toothsome smile at Robert who smiled and sketched a general ‘*whatever you say*’ with his free hand. “Ah! So... where were we here? I had asked you a question... what was it?”

“Uh... it was the beginning of the pahty poopah thing,” Robert reminded him, a little concerned that mention of it might set them both off again, but fortunately it was only gently amusing after its earlier violent reaction.

“Right! That was it! What are the alternatives for science... if they can’t take complex systems apart to study the, uh... what... the *organization!* That was it.”

“Well, currently, the only way to usefully model such a thing, and indeed, the only way to model many aspects of a complex system, is in relational terms. In other words, mappings of entailment relations, mappings of functional relations, and so forth. We can do a lot this way but so much remains to be done. These are areas of science that desperately require study and development. I was not able to do much more in my lifetime than document the situation and point the way. I tried, wherever possible, to sketch whatever ideas I had for potential development, all through my published work. However, once again, the machine metaphor in the foundations of Physics disallows both the notion of function and the notion of a relation as being capable of carrying the same level of importance of entailment, within the overall organization, as a material part of a system does. In short; the machine metaphor makes it explicit that a relation must never be considered a *thing* in scientific terms.”

“But why? And why deny the concept of function? Humans create machines to perform functions all the time. It’s not exactly an alien concept!”

“True, but there is a *very* good reason, the irony of which I think you will really appreciate, if I’m not mistaken...” Robert’s eyes were again full of mischief.

“What is it?”

“When the entailment patterns which generate human-created machines are used as the model for all natural systems in the universe, including living organisms, what happens?”

“I’m... not sure what you’re getting at...”

Robert readjusted his position in his chair, leaning forward. “This has to do with the concept of ‘*Finality*’ in the study of entailment patterns. Are you familiar with it?”

The devil showed his teeth. “Finality as in ‘*the Final Solution*’?”

Robert laughed in spite of himself. “No. Finality as in Final Causation. Aristotle developed these modes of analysis, initially, and I have found them to be extremely useful. They help us look at ‘*the why of things*’. There are four Categories of Causation in Aristotle’s toolkit, which constitute four different modes to be used for analyzing the entailment patterns of any system. We can ask ‘Why does this particular system exist?’ using each of the four categories as our mode of approach. When we’re done, we will have arrived at four sets of answers; all four of them consisting of entirely different types of information from each other-- and not reducible to one another—yet, all of which are *equally accurate*... That is an extremely significant set of facts.”

“How d’you know they’re facts?”

“Because I have proven all of it, in my work. The proofs are all in the books and papers I published.”

“Oh. OK. Continue,” the devil said.

“OK. Now, the categories are: Formal Causation, Efficient Causation, Material Causation, and Final Causation. What’s interesting here is that the first three of the categories are incomplete to the point of inadequacy, in explaining any system, when used as a single source of information. The fourth one, Final Causation, is far more complete because it refers to functional requirements which entail the existence of the system. It’s relational in a comprehensive way and because of that, the category of Final Causation CAN be used entirely by itself in analysis... and will give us essential information about the entire system. In fact, the kind of information we get by analysis via the category of Final Causation is information that trumps the other three categories.”

“Wait, Robert...” the devil rubbed his eyes in fatigue. “You said I would find this amusing, didn’t you? What’s funny about this?!”

“All right, you’ve only got a little more to go and you will have the whole contextual background. We’re almost there... If a machine serves some function or purpose, then that function or purpose can be said to be the ‘Final Causation’ answer-- it explains the entailment for why the machine exists, according to that category of causation. So, let’s use your palace as our system and analyze it. If we ask the question: *Why does this palace exist?* The Final Causation answer would be: *Because the devil needs a home*. That’s the functional entailment of this system called ‘a palace’. We’re not dealing with what the palace is made out of, which is a Material Causation answer; or how the palace was constructed, which is an Efficient Causation answer; or what the architectural designs of the palace specified, which is a Formal Causation answer... None of those answers are as complete in terms of information as the Final Causation answer. Do you see?”

“Um, I’m not sure...”

“It’s perfectly logical, perfectly rigorously scientific, to analyze a system in terms of the functional entailments. However, the big problem that the use of this category creates for science is that *the functional entailments of all human-made machines always point a finger at the humans who made the machines*. There was some functional need, be it transportation or a place to live or a way to cook food, or whatever... and someone created a new system in order to serve that need. So, the Final Causation answer to; *Why does this system exist?*-- when the system is a machine-- will always be *Because the one who made the system needed it for some functional purpose*. Well, can you see what the legacy of the machine metaphor will be when we try to analyze living systems using the category of Final Causation?”

“Uh... not quite....”

“We will end up with what looks like the *hand and mind of God*.”

The devil was astounded. “You’re kidding!!”

“Nope.”

“Science thinks God makes machines?!”

“Uh... Well, it’s not so much that they think God makes *machines*—not directly at least! But that’s what they see coming out of this analysis if we use Aristotle’s Fourth Category of Causation to analyze naturally occurring, self-organizing systems. See, if we truly believe that all systems in the universe are *like machines* and the Final Causation answer to *Why does any machine exist?* points to the functional requirements of *the machine-MAKER*... Then, what is the only logical answer to the Final Causation analysis applied to living systems? *Why do living organisms exist?*...”

The devil started laughing. “How the hell did you get around that one, Robert? Did you kill God?!”

“Of course not-- although that *does* sort of describe the intentions of the knee-jerk reaction on the part of science! You see, by disallowing the Fourth Category of Causation and, along with it, ALL notions of *functional entailments* in any scientific analysis... they thought they could protect science from encroachment by religion. The feeling was that religion would kill science, otherwise. So, they tried to kill religion first—sort of a pre-emptive strike.”

The devil nodded. “I can tell you that I’ve had lots and lots of new inmates come here to me out of that mutual hatred and fear, over the past couple millennia!”

“I have no trouble believing that,” Robert agreed. “They have often been mortal enemies, particularly with the rise of Christianity and the wide reaching power of the Catholic Church. Scientists were occasionally burned at the stake just for doing science. So, once the church’s attention was diverted by the reformation and all the other developments around the world, and scientists could finally be engaged in science openly without fear... imagine their horror upon discovering what looked like ‘*proof of God’s existence*’ right at the cornerstone of the scientific foundations.”

“I AM,” the devil said, chuckling. “I am!”

“Their solution was; they decided that “Final Causation” created anomalous information and had to go. They declared anything having to do with it was *unscientific*... never realizing that it is not only *completely unnecessary*, but very bad for science, itself, to have done that. They were intent on getting God out of the scientific equation, but there is no need to forbid an entire mode of analysis in order to accomplish it! All that is required is to recognize that the machine metaphor is inappropriate as a model for natural systems. *That’s all.*”

“That’s ALL they need to do?”

“Yes!”

“What is the net effect of doing that?”

“Well, let’s use it and see... When we analyze any deliberately constructed system like your palace, we still get the same Final Causation answer, right? *The palace exists because the devil needs a place to live.* The Final Causation answer comes from outside the system, which is absolutely correct. And, as I said; it’s worth noting that we clearly don’t need the other three types of analysis to understand functional entailment relations. In fact, the details of the other three categories could all be changed: It could be made out of some other material; or built by a different company; or designed by a different architect... and you would still have a home. Your functional need for a home could be served by a log cabin or an igloo or what-have-you. It might be an empty cave that you found and turned into a home, instead of something designed and built specifically to be a home. Thus, we can see that the functional entailments don’t specify any of the details about the other categories of causation. The functional entailments could be achieved any number of ways.”

“So, are you saying that this is why living organisms are so diverse? They are alike in their functional entailment patterns but not in their details?”

“Exactly. You’re getting it!”

“No, I’m not. Because God is still in there...”

“That’s an illusion. Forget the idea that all systems must be constructed with some functional purpose from an outside source. That’s how machines are brought into existence. But if nobody ‘made’ the system we’re analyzing... If we use the category of Final Causation to answer the question; *Why does any particular organism exist?* What’s our functional entailment answer?”

“...There isn’t one.”

“Look again.”

“I don’t understand what you mean”, the devil grumbled in irritation.

“What you’re saying when you say that *there isn’t one* is really that there are no functional entailments driving the process *from outside the system*. Right?”

“Um...”

“Look at this another way: Why does *the universe* exist? What’s the Final Causation answer?”

“There isn’t one! It just DOES!” the devil thundered.

“You’re soooo close,” Robert said, unperturbed. “The universe exists and yet *nothing from outside made it*... That means that all the functional entailments are generated from within. In other words: IT ENTAILS ITSELF.”

The devil was thunderstruck. “OH.”

“So, you see? There is no need to kill God. Those who want to believe that God created the universe should have no objection to the notion that God is rather more clever than humans, surely? They can say that God is able to create incredibly complex, self-entailed-- and self-entailing-- systems, whereas human beings have only created simple systems... which have to be entailed from outside. On the other hand, those who prefer to leave the unknowables, like God, out of the analysis will appreciate that the Category of Final Causation—and functional entailments along with it—does not have anything whatsoever to do with God. They can finally remove that stupid prohibition, and with it the terrible limitation it created, from the enterprise of science.”

“Uh, that is, unless it were to turn out that the universe really IS like a big machine!”

“I’m satisfied that I’ve proven, with my work, that it is NOT.”

“Really?”

“Mmmm Hmmm.”

“Well, Robert, there’s just one question left to answer for me, then.”

“What’s that?”

“What do you tell people who ask you how the universe was created in the first place? Or how did the first living organism get here? Hmmm?”

“I tell them the truth: that I don’t have answers to those questions.”

“Ah-HAH!” the devil said. “So are you saying that science is of no help with finding those kinds of answers, then?!”

“Not necessarily, no. I’m just saying that I’ve never attempted to develop answers to those questions. It wasn’t my area of interest. Remember... my question was; *Why are living organisms ALIVE?*... not; *How did living organisms come to be?* These are vastly different questions: The former deals with epistemological issues and the latter deals with ontological issues.”

“Are you saying that the two aren’t related?”

“No. Although I will say I can show plenty of proof that, in analysis of *complex* systems, epistemological answers don’t specify what the ontological answers may be.”

“What about the Categories of Causation? If you use all four, the answers together specify the ontology of machines... All categories together point to the machine makers.”

“Yes, they do! Very insightful of you!”

“Thanks,” the devil said, feeling rather pleased with himself.

“However,” Robert told him, “that is only true with systems possessing simple organization.”

“How do you know?”

“Try it. Use the four categories to analyze a complex system; doesn’t have to be a living organism. There are many different complex organizational types or categories of types. The category of living systems leaves a lot of other complex systems out.”

“Name one,” the devil challenged.

“The atom,” Robert said.

“Now, hold on there... you said that Physics deals with simple systems!”

“That’s not quite what I said. What I said was: *Historically, the field of Physics has always dealt far better analyzing phenomena which derive from systems which have organizations that are non-complex-- what I call simple.* Physics has had—and still has—a great deal of trouble trying to account for the anomalous aspects of atomic behavior that contradict the assumptions about how such systems work, so those things are ignored; relegated to the status of *some minor detail that will be sorted out once we can really assess all the particles in an atom.* In short, they presume that atoms conform to the same models and laws of Physics derived from the machine metaphor. But that doesn’t mean that atoms are the way they think they are. So, what I said was that Physics does better with simple systems or aspects of complex systems which are simple.”

The devil waved a hand. “Same basic thing,” he said.

Robert shook his head. “No, it’s not.”

“Are you contradicting me?” the devil asked, his voice ominously quiet.

Robert was unperturbed. “When it comes to MY words and their meaning... you better believe it! Even God couldn’t put words in my mouth and get away with it. Not if I have free will!”

The devil was mollified. “Hmmmph,” he snorted. “I’d love to see that encounter! And while you’re at it, you can ask him to explain *why the bloody hell he needs me to do a comprehensive inventory when he’s supposed to be all-knowing!*”

“All right,” Robert solemnly agreed, meaning every word, “It’s a deal. If He ever shows himself to me, *I will ask Him.* I have quite a few questions of my own I’m saving up for Him, as a matter of fact. Quite a few.”

“I’ll bet!” The devil muttered and chuckled to himself, reaching one long arm out to grasp his bottle of fiery liquid, which never seemed to have any less in it, regardless of how much the two of them drank. He poured some more of the liquid into his snifter, sloshing a little over both sides before finding the general center of the glass, where the opening was. He then gestured towards Robert’s glass with the bottle and a questioning grunt.

Robert leaned over, holding his glass for the devil to refill, following the swaying movement of the bottle so that none was spilled. “Thanks,” he said, leaning back once again, cradling his snifter in his hands, studying the swirling liquid in between taking occasional sips. “Ah, this is marvelous!”

The devil looked over at him and attempted to say “Don’t get too comfortable”... except that he ran aground trying to enunciate “comfortable” and, after several attempts, abandoned the word, muttering, “... aw, y’knowudd-I-mean...”

Robert nodded solemnly. “I believe I do.”

They sat, contemplating their sniffers and sipping the contents in companionable silence for quite a while. The sounds of Hell were muffled at this altitude into a gentle wooshing noise that ebbed and flowed on the breeze across the open terrace. It was comfortably cool, in fact. Robert studied the vast landscape stretching out below until it disappeared on the dark horizon. He admired the way the various

shades of yellow, orange, red, gray, and black all somehow blended and melded into a strangely beautiful vista. He had learned on his brief tour earlier that, like everything else in his experience, the landscape of Hell could look very different up close and Robert didn't mind admitting he was really not in much of a hurry to study it in that kind of detail.

As Robert finished the last swallow in his glass, he looked over at the devil, planning to ask for one more refill. He was surprised to see that the devil had fallen sound asleep. As Robert watched, the devil began snoring happily, his snifter caught in his knobby fingers and hanging askew, dribbling the contents in a thin stream across his belly and onto the stone floor of the terrace. For the first time, Robert became aware of the fact that the devil had a belly button.

"Hmph!" he said to himself. "Fascinating!" ...*Why would the devil have an umbilicus?* Robert tried to imagine what the devil's mother might have looked like... or what typical devil parents might consider naughty behavior in their young...and realized he had to make himself stop thinking about it because it threatened to make him choke on his own mirth and start coughing. He didn't particularly want to wake the devil up, anytime soon. It was just too peaceful right now. Wonderfully peaceful, in fact.

Robert reached across the table to pick up the bottle, hoping it was OK to pour himself a refill. He raised his snifter towards the slumbering devil in silent, cosmic thanks, and took another sip, savoring the sensation of warmth as it seemed to travel from mouth to stomach. He shook his head, bemused over the strangeness of his current situation, and concluded he would need a great deal more information before he could even begin to contemplate the nature of *life-after-death*. Not very much about it was making any sense at all. He looked over once more at the devil, who had slid a little further down in his chair, his long, hairy legs disappearing under the table. The enormous head and neck looked to be bent at a strange angle because the horns were hitting the tall back of the chair. The total effect was that the snoring began to resonate with a slightly deeper, more nasal tone.

Smiling at the comical tableau, Robert quoted Scotty, from one of the original Star Trek episodes, including a perfect mimic of the exaggerated Scottish brogue; "Ach! Aye drrrrank 'im rrrright... underrr... the... tebble!"

The moment would be nearly perfect, he thought, if only he had his pipe... but he had given that up a few years ago, when the neuropathy had progressed too far to enjoy keeping the damn thing lit. No sooner had he finished the thought than a complete set of smoking materials suddenly appeared on the table next to him. It even included his favorite brand of pipe tobacco, which had been discontinued by the company around the same time he had given up smoking it. Robert happily filled himself a pipeful, expertly lit it, inhaled the aromatic perfume of the smoke as it swirled on the breeze, puffed once more and blew a perfectly circular smoke ring on the outbreath. Hah! *He could still do it!* The smoke ring stretched and morphed its shape, traveling across the patio, over the stone railing and out of sight. Robert sighed in quiet contentment and settled deeply into his leather chair; pipe in one hand, snifter in the other, feet up on the ottoman that had also miraculously appeared, just as he thought he needed one.

"I could get used to this," he said, enjoying his own astonishment.

THE END

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