

THE MEME THEORIST

by Robert R. Chase

Can a theory fit reality *too* well?

Stumbling from his bedroom into the kitchen in the predawn dimness, Pelerin was surprised to find Werner Heisenberg at the breakfast table, reading the Santa Fe *Times* and sipping coffee. It was not the elder statesman of physics in suit and narrow tie who confronted him. Rather, it was a younger Heisenberg, circa World War II, his unruly hair already receding, dressed in an open-collared sports shirt and shorts. He looked up from the newspaper as Pelerin entered.

“But you’re...” Pelerin licked his lips, trying to force out the next word. “...dead.”

Heisenberg smiled. “You are a scientist,” he said, in barely accented English. “You should not believe everything you hear.”

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Norwich greeted him with her usual quiet courtesy despite the way he had brushed her secretary aside and barged into her office. “Delighted to see you, Theo. Please have a seat.”

Pelerin shook his head and remained standing. “This isn’t a social visit. I have come to submit my resignation. I’m leaving the institute.”

Norwich cocked her head to one side, an action that, together with her somewhat oversized nose, gave her the appearance of a puzzled bird. “I am very sorry to hear that. Has there been anything unsatisfactory in your contract, or the support given your work?”

“Nothing like that. The institute has been very generous. I am leaving for personal reasons.”

Her look of silent concern and perplexity created a mounting pressure for more. “I have had a ... a breakdown,” he said reluctantly. “I’m afraid I am not quite sane. You don’t want the institute’s work associated with a nut case.”

It hurt to admit this most personal and embarrassing of weaknesses, especially to Norwich. He had objected vociferously to her appointment as director. By her own admission, she had only the most vague

understanding of the sciences being studied by the fellows of the Da Vinci Institute.

All she knew was people.

“Theo, I am so sorry.” Norwich’s sympathy was instant and genuine. “I know how hard you have been working for the past few months. If you just need rest...”

“It is not that sort of breakdown. I see things that aren’t there. Ghosts.” An unexpected wave of relief washed over him. For weeks he had been living a lie, pretending to be sane—worse, pretending to lead and guide the scientists working the noosphere project. There was no telling how deeply flawed his work had been, how far he might have led them astray. Now he would be cast out, as was only right, and the project would proceed untinged by madness.

He had been looking at the floor, unwilling to meet Norwich’s gaze. Raising his eyes, he was astonished to see neither repugnance nor patronizing pity in her eyes. Instead, there was only concern, the worry one would have for a friend in trouble.

“These ghosts,” Norwich said, “are they frightening?”

Pelerin forced a smile. “Most of them are scientists. All they do is talk.”

“Do they ask you to ... do things? Bad things?”

“Much of the time they talk among themselves as if unaware of my existence. When they do talk to me, it is about my work. This morning, it was Werner Heisenberg.”

“How long have you been having these, uh, visions?”

“More than a month. Almost six weeks.” He winced, feeling a new surge of guilt. Obviously, he should have confessed this at the beginning.

The expected rebuke did not come. Norwich was silent for a moment, as if he had said something worthy of deep consideration.

“It is very self-interested of me to say so, but three months ago you began making a series of breakthroughs which have your colleagues almost dumbfounded with astonishment. If this is insanity, I could wish the

rest of my staff similarly afflicted.”

“I don’t know if it has affected my work,” Pelerin said. “The problem is, I can’t prove that it hasn’t. I can’t trust myself and you shouldn’t.”

He dropped his eyes again and, wrapped in his own misery, waited for his dismissal.

“Do you know the story about benzene?” Norwich asked.

“Excuse me?” It was such an apparent jump in the discussion that Pelerin wondered if he had somehow tuned out a minute or more of conversation.

“Back in the 1800s, there was a chemist trying to understand the structure of benzene. According to the story, he dreamt one night of a snake devouring its own tail. When he woke, he realized that the atoms formed themselves in a circle, a benzene ring.

“Nobody supposes that there was anything supernatural about this. The general understanding is that the chemist’s mind kept working the problem while he was asleep and provided the answer symbolically in a dream.

“Couldn’t this be what you are experiencing? You have been working this problem for half a year now. It shouldn’t be that surprising that you would find yourself dreaming about it.”

She was offering him a way out. Only honesty prevented him from taking it. “I wasn’t dreaming. Heisenberg”—and the others, though he still could not bring himself to speak of any others—“appeared as real to me as you do now. Right up until the moment he vanished.” And he found himself in an empty room, with the feeling that it had always been empty.

Norwich sighed and looked at him sadly. “Theo, it’s a free country and you can certainly leave if you feel you must. Would you do one thing for me, however? Would you please see Dr. Joyce before you go? He has been very helpful to other members of the staff. And if you are right ... well, he has the sort of expertise you will need.”

* * * *

“And what does this one look like?”

Pelerin squinted, desperately trying to find something in an apparently random set of inkblots.

“They are two Siamese twins. They hate each other. You see, they are pushing away from each other, even though that is tearing them apart at the base.”

Joyce flipped the paper over and frowned with mild incredulity. A fringe of hair surrounded a bald head so pink it appeared to glow. Chipmunk cheeks covered by mutton chop sideburns made him appear more like an extra in a revival of *A Christmas Carol* than a psychologist for a private research institute.

“Really? I would have said something like two old maids with absurd hair styles playing patty cake. You geniuses have such imaginations. I guess you are supposed to see things invisible to us mere mortals.”

“Doctor, we have been going through test after test for more than three hours,” Pelerin said. “Haven’t you been able to reach a conclusion?”

“Eh? Oh yes, but it’s not one you will like.”

“Tell me. Please.” Pelerin found that he was holding his breath.

“You are not insane. Under stress, yes, but this is a high stress environment at times, even if most of that stress is self-induced.”

“I am seeing ghosts!”

“An interesting datum,” Joyce said, “but hardly a pathology by itself. They are not even real hallucinations. Since you recognize them as unreal, they are at most pseudohallucinations.

“Furthermore, the tests you complain of have established that your powers of abstract reasoning are as good as ever. You are better oriented to external reality, as measured by everything from knowledge of current events to institute politics, than half the people in this building.

“Julie asked you the crucial question. She’s quite insightful, you know. Quite the perfect pick for director. It’s not the appearance of ghosts so much as what they do, or want you to do, that is crucial. From what you tell me, all they want to do is talk shop. This appearance of Heisenberg, for instance. You have been rather vague about what he had to say.”

“He told me not to be too certain of myself.”

The corners of Joyce’s mouth began to twitch.

“Yes, I know that sounds like a Heisenberg joke,” Pelerin said hotly. What else would you expect from the man who had made the Uncertainty Principle a cornerstone of physics? And as he thought back on it, Heisenberg—or his ghost or hallucination or whatever—had seemed amused at his own wit. “But it is exactly what he said.”

“Advice which should stand every scientist in good stead,” Joyce said, “whether in evaluating a hypothesis or one’s own mental state.

“Look, for some reason you seem to think that if I certify you as insane, or at least suffering from some multi-syllabic mental disease, that it will act as a sort of get-out-of-jail-free card, that it will somehow make whatever is bothering you no longer your fault. And we know you have unresolved issues stemming from Terri’s unfortunate accident—”

“Totally irrelevant, even if it weren’t five years ago,” Pelerin snapped.

Joyce raised his eyebrows in polite skepticism. “But suppose I were to certify some mental condition and you were to leave the institute, what would you do then?”

It took Pelerin a few seconds to realize that Joyce expected an answer. “Well, I don’t know, exactly, I imagine...”

“Exactly. You have no earthly idea what would come next. I do, though. You would sit in your room bemoaning your fate, feeling more and more miserable, in an ever tighter and deeper spiral of narcissistic self-pity.”

“That’s hardly fair,” Pelerin objected. “I thought you were supposed to show me some sympathy and help me feel better.”

Joyce gave a sharp bark of laughter. “Sympathy is the worst thing I could give you. It would just encourage your moping about. My job is to keep you tethered to reality. That can be painful sometimes, as it appears to be for you now, but that’s not my problem.

“Here is what you can do, however. Go back to your office and get to work. Not because DARPA and Madison Avenue are salivating over your work and trying to press more money on us than we can possibly spend.

Not even because your colleagues are comparing your last three papers to those produced by Einstein in his 'miraculous year' of 1905.

"You should do it because while you are working, you will not be thinking about yourself. If you succeed in focusing on the work, rationality will percolate from the outside in. Your mind, if it is not already rational, will become rational as it conforms itself to a rational universe."

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Pelerin slammed the door behind him as he entered his office. *What a complete quack! Joyce should never have been granted a degree, much less been hired as staff psychologist.* He pulled a briefcase from a small closet and began stuffing it with his few personal effects.

So much for the work he was going to do on his sabbatical, the work that would bring him more fame and fortune than he could have dreamed of teaching philosophy at a backwoods college. So much for giving intellectual rigor to memetics and the noosphere.

The term "meme" had been coined to refer to units of cultural information transferred from one mind to another. The hope was that it could do for ideas what the concept of genes had done for biology. Both Mather & Crowley, the advertising firm paying half their research expenses, and the Defense Department protested that their only interest was in basic research. It had become quickly obvious, however, that the true goal of both was memetic engineering: developing memes through splicing and synthesis, which could then be used to alter human behavior.

This would have bothered Pelerin but for the fact that it seemed so unlikely to produce practical results. He had been chosen for the Meme Team because Andy Goldsmith, the primary researcher before his untimely death a year ago, had thought his PhD in epistemology (how do we know that we know what we know) might be useful. The money had come in the form of a grant and Andy, even then very sick though nobody knew it, had let each member of the team attack the subject in his own way. Trying to envision a space within which memes acted, Pelerin unintentionally reinvented the concept of the noosphere, the sphere of human thought previously postulated by Vernadsky and Teilhard de Chardin. It was, for Pelerin, mental recreation, a way to refine models that existed on their own without worrying about any actual relation to reality.

He had been working in the institute cafeteria one afternoon when Jeffers came by and stopped, transfixed by what he saw scrawled on

Pelerin's yellow pad.

"I didn't know you were into quantum mechanics," Jeffers said.

Pelerin looked up in surprise. Jeffers was part of the institute's physics contingent, one of the young theorists who would either create a Theory of Everything or blow up the planet. Pelerin had met him once before and remembered his name only because he had a fancied resemblance to Beaker, one of Jim Henson's Muppet creations.

"I know absolutely nothing about quantum mechanics," Pelerin said.

"Then why are you using Bronson's equations for waveform collapse? Not that they will get you that far. Bronson himself has admitted that."

Later, searching the internet, Pelerin discovered that Bronson was a mathematician at the University of Sydney, who had devised a new form of mathematics to describe certain quantum mechanical operations. Commentary was mixed, some researchers saying that it added nothing to the understanding of the field, others that it was simply wrong. Bronson agreed that the structure he was trying to create was incomplete.

It should have nothing to do with Pelerin's work. Yet there were intriguing parallels, suggestions for lines of investigation that never would have occurred to Pelerin on his own. He followed up on them like a dog drawn by an enticing new scent. And found to his surprise that people were reading what he wrote and muttering words like "genius."

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His computer hummed to life, jarred out of sleep mode by the vibrations of the slammed door and the opening and closing of desk drawers. Light from the screen spilled onto the desktop, illuminating a series of equations he had begun to scrawl on a legal pad the day before. He frowned, irritated by the feeling that there was something not quite right about them. There was the merest wisp of a memory, of something Heisenberg—or his own disordered subconscious—had said that morning.

Examining the paper more closely, he saw the error. Similar terms had been transposed, the result of trying to finish up this segment on insufficient sleep. Pelerin sat down to correct the mistake.

When he looked up, it was almost two o'clock. His hand was numb from clenching the pen. He had been working for more than three hours. On

the table before him lay page after yellow page of symbols that had flowed from his pen as effortlessly as musical notes had flowed from Mozart's.

He had been too upset that morning by Heisenberg's appearance to have any breakfast. Now he was ravenously hungry and the cafeteria lunch line was about to close. He hurried down the hallway, grabbed a tray, and filled it with bowls of beef stew and salad.

The cafeteria was mostly empty at this hour. Pelerin took a seat by the glass wall that looked out over the edge of the mesa. Once, when he had been working late, he had come into the cafeteria for coffee. The light had been dimmed so that he could see the stars bright overhead. On the horizon, a thunderstorm crawling over Santa Fe discharged eye-searing lightning, all the more impressive for being completely silent. His coffee had cooled as he sat entranced by the combination of beauty and raw power.

Now, as he started in on his salad, he noted the presence of two men deep in discussion at a far table. Their clothing seemed curiously old-fashioned.

"But even as an artist and a poet, you must admit that you are over-estimating the importance of imagination," one of them said. "When the Sun rises, do you not see a round disk somewhat like a gold guinea?"

"Oh, no, no!" his companion said. His demeanor was agitated, but happily so. "I see an innumerable company of the heavenly host, crying Holy, Holy, Holy is the Lord God Almighty!"

Pelerin turned quickly, surprised to hear such talk in a building full of scientists. The table was vacant. The person closest to him was a cafeteria worker who looked up curiously from the table she had been wiping. Pelerin turned back to his tray. His hands shook.

"Theo! Thank God I've found you. I'd heard that you quit." Dave Hancock hurried over to his table. Dave had been put in nominal charge of the Meme Team after Goldsmith's death. Ever since then, he'd had the frazzled expression of a man who knows himself to be out of his depth.

Pelerin blinked, still trying to focus on a single reality. "I have quit. I am just clearing up a few things before I leave."

"That's terrible. But you can't quit this afternoon. We have the briefing!"

“The briefing?” From far back in his mind, a memory tried to surface.

“Our sponsors. The quarterly report. When we tell them how great we are so they keep the money gates open.”

“I don’t know if I can help you,” Pelerin said. “I have not been feeling well. I just came from talking to Dr. Joyce.”

“Oh, dear,” Hancock said. “And?”

“He says that I am under stress but otherwise okay.”

“Well, then, come on,” Hancock said. “You’re putting me under stress.”

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Meeting room lights went down as Hancock brought up the presentation on his laptop. *Give me PowerPoint, and I will rule the world.* Or so it seemed after you attended enough meetings with businessmen and government officials.

The sponsors sat across from him, now hardly more than silhouettes. Emma Brand, a short, plump woman with graying hair, represented DARPA. Jim Reed came from Mather & Crowley. He was probably the only person in the building wearing a coat and tie. In the past, Pelerin had been amused by their interaction. Brand had security concerns. Reed wanted to treat anything useful as a trade secret for his company. But the ground rules of the contract, not to mention the charter of the Da Vinci Institute itself, mandated that all research be freely publishable. If the clients wanted to develop it further on their own and keep that secret, that was their business.

Hancock brought up the first slide. “Our expenditures for the last quarter. As you can see, we are still under budget—”

“Dr. Hancock, I have repeatedly explained to you that the piddling sums being expended on this project are too small to catch the attention of cost-cutters.” Brand sounded irritated, though that was probably the result of a long, uncomfortable flight from Washington. “In fact, our main money concern is that the institute has been so slow in invoicing its costs that we won’t make our disbursement goals.”

“Uh, right,” Hancock said. Like many taxpayers, he could not become

used to the idea that the sooner money was spent, the better. “In any event, I can demonstrate that all your funds have been well spent. Let me start by explaining the advances we have made in connecting memes with information theory.”

This was Hancock’s field, and his demeanor became steadily more confident as he spoke of source coding, data compression, and channel capacity. In the dimly lit, overheated room, with the projector fans making a relaxing whirr, Pelerin’s attention began to wander. His thoughts drifted back to the work he had been doing earlier. How easily the ideas had flowed, faster than his pen could put them on paper. So quickly, in fact, that he had no time to assess their value. You could add columns of figures almost automatically, but only when you understood the context would you know, for example, whether or not you were facing bankruptcy. It seemed to Pelerin that each line he had written was like a brick, and each line led to its successor. But he was too close to see the structure, or even if there was an overall structure. He needed to step back.

“How does any of this help me strengthen my message?” Reed asked. “It seems to me that at most you have a way of quantifying what most advertising men learn through experience.”

“That’s ... there’s certainly some truth to what you are saying,” Hancock replied, thrown off his stride by the question. “However, you should not disparage the quantification. Maybe biology will provide a helpful analogy. Antibodies work in part because their physical structure is such that they fit invading bacteria the way a key fits a lock. So to construct the right antibody, you have to know the shape of the invader.

“The collection of memes that constitute a human personality give rise to what may be considered a surface, at least in the sense that certain free-floating memes are more or less likely to be accepted based on their structure. Using the tools we have developed so far, we can determine which ideas will be accepted and motivate which types of personalities. It is to be expected that this will parallel what you already know, but will allow to understand the interactions much more precisely.

“Let me put it this way. With the tools we are providing you, you will always be able to craft commercials that will induce large numbers of people to try, say, New Coke. But we can’t make them buy a second time if they don’t like the taste.”

“All very interesting,” Emma Brand said, “and potentially invaluable to our PsyOps people. But from what I can understand of his work, your

colleague has been exploring a very different line of research. I would appreciate it if he would brief us on his progress.”

Pelerin had once watched a television nature special about exotic sea creatures. At one point, he had seemed to be watching seaweed attached to a rock, when it moved and he suddenly realized that he was looking at a skillfully camouflaged fish. Now he had much the same shock as Brand turned her gaze on him. She wore her unprepossessing body as a disguise, hiding an extremely sharp mind.

“Dr. Pelerin has not been feeling well today,” Hancock said quickly. “I don’t think he can—”

Pelerin stood up and waved Hancock to silence. “I think I can at least give our guests a synopsis of my work,” he said, forcing a smile as he stepped over to the whiteboard. Hancock looked worried, wondering what he would say.

Well, I’m wondering, too.

“Science begins with close observation, with a profound humility before the facts. We do not endlessly debate the number of teeth in a horse’s mouth; we go out to the paddock and count them.

“As the number of precise observations increase, something marvelous happens. We discover underlying relationships that allow us to explain and even predict phenomena.

“Even more remarkably, we come to realize that apparently disparate phenomena are merely different faces of the same underlying reality. Maxwell’s unification of magnetism and electricity laid the groundwork for Einstein, who in a deceptively simple equation defined the relationship between mass and energy.”

Pelerin wrote $E=mc^2$ on the board and stared at it, as if seeking inspiration.

“I’m sure your undergraduates find this fascinating,” Reed said, “but I don’t see what—”

“Hush, James,” Brand said. “I’m sure this is necessary groundwork for what Dr. Pelerin has to say.” The words were encouraging. The tone, though, seemed to carry an implied threat.

Pelerin nodded, still not sure himself where he was going with all this. “Einstein, and those who followed, have since that time endeavored to formulate a unified theory, a theory of everything. Although not yet successful, they have made incremental progress. Except in one area.

“That area is the mind. For centuries, people believed that we were dealing with the intersection of two separate realms: that of the body, which was governed by scientific laws, and that of the spirit, which was not. Reductionists, claiming that all mental phenomena could be ultimately explained by physics, derisively referred to this as the ‘ghost in the machine’ theory. However, after all these years, the reductionist view is still a statement of faith. We know that biological changes affect mental processes, but we also know that strictly mental changes, such as aversion therapy, can trigger biological changes. Cause and effect switch places in ways disturbing to reductionists.

“There have always been indications that their ideas were, at best, incomplete. Quantum superposition collapses when an observer takes a measurement. Why should a human be a better observer than the cat itself, or than a rock?

“Our work on memes allows us to deal with mental entities in a way that is scientific without being reductionist. We are beginning to see how they grow and multiply in their noosphere. We perceive, though dimly as yet, how they form into the architectures we know as human personalities. What I hope to do is to express the relationship between the physical and mental worlds as precisely and succinctly as Einstein did with the relationship between mass and energy.”

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“Well, they were certainly impressed, even though I doubt they understood half of what you said.” Hancock gave a shaky laugh. “Not that I can claim much greater understanding myself.”

“There may not be anything to understand,” Pelerin said. “I told you earlier that my mental state is ... suspect. The preliminary equations I put up—they seem meaningful to me, but maybe they are no more than chicken scratches.”

Hancock put a reassuring hand on his shoulder. It took all of Pelerin’s self-discipline to keep from flinching away.

“I can’t claim to follow everything you put on the board, much less to

understand all the implications,” Hancock said, “but I can see the pattern, the progression as you move from one step to the next. They are not chicken scratching.”

Pelerin nodded his thanks, unable to say anything.

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It was dark by the time Pelerin returned to his apartment. He reached for the light switch—and stopped, as he inhaled the slight scent of what had once been a familiar perfume.

Slivers of light from the parking lot escaped the shades to fill the apartment with a dusky half-light. In the dimness, familiar objects took on unfamiliar outlines. The eye insisted on imposing patterns on randomness.

Someone faced him on the opposite side of the room. *Terri...*

Pelerin opened his mouth to speak, but no sound came. His hand trembled above the light switch. The shadowed figure was motionless, waiting for him to make the first move.

Fear crescendoed, collapsed into despair, settled into something like fatalism. Anything was better than this continual flight, this constant guilt. Bring ‘em on, whether ghosts or the men with the straitjackets, and end it one way or another.

He hit the switch. For an instant he was helpless, blinded by the light. He blinked away tears as his eyes slowly adjusted. The full-length mirror on the opposite wall reflected the coat rack behind the door. A coat on a hanger and a hat atop the central pole could easily give the impression of a person in the dark.

Only there was still that almost imperceptible scent....

It changed nothing. No more hiding, no more denial. Work it through to the end, no matter what that might be.

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The next morning, he drove up to the institute, half convinced that he would find his office locked and his belongings stacked in the corridor. Hancock would shake his head dolefully and say, “We took another look at your math after the meeting and, man, it’s total bullshit. We’re pulling the

plug.”

His door opened to his key. His papers were just as he had left them. For the time being, at least, he was a researcher in good standing. After getting a cup of coffee from the cafeteria, he settled down to work.

It was a frustrating morning. The equations kept spawning infinities. Renormalization techniques could eliminate the infinities, but even after that was accomplished, he ran into a series of dead ends.

Finally, he just gave up and left them in. And, astonishingly, the dead ends vanished. Infinity, in this context, was not a nonsense answer. Indeed, it fit perfectly and allowed him to continue piecing together the components of the structure.

He came back to his office after a restroom break to find egg rolls steaming on a plate on his desk. It was one of his favorite lunches because he could eat with his left hand while working a keyboard or a pencil with his right. A note in small, precise handwriting accompanied them.

“It looks like you have had a productive morning. Glad to have you back with us. -Julian.” A kindness typical of Julian. He grimaced. It was the sort of thing that would never occur to him.

He sat down, took a bite from an egg roll, and reviewed his progress. Hancock, for all his dexterity in manipulating the mathematics involved in information theory, did not really believe that information was ... real. It was just a way of keeping score as you tried to eliminate static or speed up computers. Many physicists had behaved the same way in the early days of quantum mechanics, utilizing the equations in their work while denying their real world implications—until experiments confirmed the actuality of, for example, single photons creating interference patterns with themselves.

Too somewhat similar effect, there were now experiments showing light waves exiting a chamber before entering it. A violation of Einstein’s laws! No, because no information was transferred. So in an odd way, what had been thought to be an abstraction was now more real than matter or energy.

The universe was information. Complexes of information formed memes. Complexes of memes formed personalities.

He had been staring at the papers for fifteen minutes when the importance of the obvious finally impressed itself on him. The equations

were *equations*: they worked both ways. Matter gives rise to mind.

And vice versa.

His hands shook. He flipped through page after page, searching for the mistake that had to be there. Yet each step followed inexorably from the one preceding. There was no error.

Well, I will just prove it wrong. He took a self-consciously dramatic pose, standing with his hand extended. "*Fiat lux!*"

Nothing happened. His laughter was ragged with relief. *I don't think I could handle the responsibility of creating a universe.*

On the other hand, his failure to do so did nothing to disprove the equations. The conversion factors demonstrated that any transmutation would be at the low end of the energy curve. The easiest way for him to fill his office with light was to flick the light switch. Rubbing two sticks together was much less efficient, and so would take more personal energy. As for creating a universe...

An infinite universe, or set of universes, would need to be upheld by an infinite mind.

Pelerin held his face in his hands. It was too much to comprehend at once, and it might not even be true. He would turn the results over to Norwich. She would appoint a review committee. If the committee judged his work to be gibberish, no one would object to his departure. On the other hand, if they certified its validity, he would have time to consider the implications then.

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Without Pelerin noticing it, the day had progressed to late afternoon. Mid-December shadows had already swept across the desert below, leaving the institute and the mesa on which it stood floating in the last blaze of twilight. Coming to her office door, Pelerin thought Norwich had already gone home. Although the door was open, the room within was dark. He was turning to leave when he heard voices.

One voice was clearly Norwich's. The second was unfamiliar. Its tone was confident and friendly, occupying a range somewhere between low alto and high tenor. Peering into the office, Pelerin saw Norwich seated at her

desk. Her visitor was leaning over the desk, apparently holding something cupped in his hands. From it, a soft white light flickered over her face like ripples on a pond.

“What is it?” Norwich asked, her voice filled with wonder.

“It is all that has been made.”

Norwich looked more closely. “But it’s so small and delicate. What keeps it from just falling apart?”

“It lasts, and shall last, because I love it.”

Norwich’s face lit with delight. Pelerin felt an unexpected pang. *I could never make anyone that happy.*

“No need to be bashful, Theo. Come right in.”

The desk lamp spread a golden oval on her desk. Pelerin looked into the corners of the room, momentarily bewildered. “I didn’t want to interrupt your visitor.”

Norwich frowned. “What visitor? I’m the only one in here.”

“But there was. He was showing you something.”

Her eyes narrowed as she realized how serious and distressed he was. “Theo, please come in, sit down, and tell me what you saw.”

Pelerin did so, throwing in the previous day’s cafeteria vision for good measure. Norwich’s sudden, almost embarrassed, smile surprised him.

“Well, no one can accuse you of having boring hallucinations. Heisenberg, Blake, and my namesake.”

“Blake?” Pelerin asked.

“William Blake,” Norwich said. “Poet, painter, and all around oddball. And Julian of Norwich, fourteenth century English mystic. You just recounted one of her most well-known visions, casting me as that Julian.”

“I have never heard of either one,” Pelerin said. Though wasn’t there some silly poem about a burning tiger? “Who did I see talking to you?”

She seemed to color slightly. “That would have been God. Showing me the universe. Which is why it must have been a hallucination, of course. It isn’t the sort of thing I would forget.”

“No, of course not.” He wondered which should bother him more: having visions or the fact that Norwich was so at ease with them. “Look, I did not mean to get distracted. A little bit ago I completed the memetic synthesis. I believe the equations I have copied onto this disk define the relationship of mind and matter. It should go without saying that they will be subject to intense scrutiny and criticism, especially when word of my mental state gets out.”

Until that very moment, he had told himself that he would be able to keep things quiet, that he could retire from public life and lapse into insanity with private dignity. But the claims he was making with these equations, whether they turned out to be valid or not, would make that impossible.

“I want—I would appreciate it very much if you would appoint a review committee to evaluate the work. Right now, I can’t be sure there is anything to it.”

“Of course,” Norwich said, taking the disk from him. “I will start making calls this evening. Only—I have to apologize. Twice now I have accused you of having hallucinations. That may have been glib. I want you to consider a possibility very seriously. What if Dr. Joyce was correct? What if you are completely sane?”

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What if you are completely sane? Pelerin sat in his darkened apartment contemplating the question. If he was sane, the work he had turned in that afternoon was probably valid. The comforting determinism of the Newtonian universe would be shattered and gone, not just in some Planck constant sized indeterminacy, but on the everyday macro level as well. Free will was loose in the universe, and not necessarily the sole property of human beings or even of the living.

If he was sane, then there was no escape from responsibility when callousness and inattention drove someone to suicide. You could not say that the molecules just lined up that way because they had to line up that way.

If he was sane, then the ghosts he was seeing were real.

“I’m sorry.” It was astonishing how much that hurt. It wasn’t just guilt. It was allowing himself to remember how, for a brief time, he had been unbelievably happy. That a girl like Terri could be at all interested in him was a source of continual astonishment to everyone. That she would stay with him for a year and a half had been nothing short of miraculous. But then...

He had not grown tired of her. She had not walked out on him. But as his doctorate project took more and more of his time, Terri seemed to fade into the background. One of his classmates had once said that he was borderline autistic. It was certainly true that mathematics was simpler and less messy than dealing with people.

Terri had complained that he was ignoring her. He remembered that later. At the time, it was like the meaningless buzzing of a fly against a window. Even the tears and the slammed door made little impression. The intricacy of his thesis project took all his attention.

It was only when he answered the telephone and learned that her car had plunged off a bridge and into an icy river that the haze of concentration was broken. He was back in the real world, and alone.

The scent he had noticed the day before had returned. There was a gentle pressure on his shoulders. He knew that if he turned his head, he would recognize the polish on the fingernails.

“Why are you sorry?” The voice was hardly more than a whisper, the breath warm in his ear.

“I’m sorry...” It had been hard to tell Heisenberg that he was dead. This was exponentially more difficult. “I’m sorry I forced you to kill yourself.”

The silvery laughter, even tinged as it was with sadness, was as familiar as it was surprising. And infuriating. The ghost of someone driven to suicide should demand vengeance. Those long, cool fingers should be clamped around his throat. Laughter under those circumstances was patronizing.

“You know me better than that. I never wanted to kill myself. I was just angry that you had tuned me out. I got in the car to let off steam. The black ice on the bridge was invisible. The wheels slipped, the car spun, and I had less than a minute to lament my stupidity.”

“If this isn’t about punishment, then what?” Pelerin asked.

“You contributed to my death. Now you live without me. That should be punishment enough.”

It was, he realized. Beneath all the guilt and fear, there was a loneliness he had never allowed himself to feel until now.

“There will be more,” she continued. “Many will hate the implications of the work you will do. Insanity is one of the least accusations you will face.”

The fingers moved up from his shoulders, brushed the sides of his throat, and came to rest on his temples.

“Will it be accepted?”

“When you are long dead. And not by all even then.”

He stood and turned. He was alone in an empty room.

Professional respect was once the only thing he had wanted, perhaps because it had seemed the only thing he could have. Now, if he could believe a ghost, he would lose that.

It did not matter. He had been given a wider universe than he could ever have imagined, one filled not only with physicists and mathematicians but also with poets and mystics—and a ghost of a woman he had never really known.