Chapter 1

There was a light mist hanging over the heather just outside the window, and it was beginning to glow with the soft, gold-orange light of the rising sun. Without the mist you could see all the way to the North Sea, and on really clear days the sun's reflection would sparkle as it rose above the salty, rough water.

Ian McKay stood waiting for the electric teakettle to whistle. It was his habit, his love, and his curse to be up at dawn, ready to start another long day at the Hoyle Institute Research Station perched at the top of one of the low, rolling hills northeast of Aberdeen.

The Institute was far outside the bustle of the city, which suited Ian's focus—his work. The city was fine for occasional stimulation, and it was close enough for that, but to be caught in the crush of all those people every day would have blurred his treasured focus.

The kettle was making those little whumping noises it did when it was getting close to boiling, small flashes of water into steam that wouldn't even get to the surface before they were cool enough to collapse in a phase change back to their former state. Finally, the whistle began to sputter, and Ian snatched up the kettle and poured hot water into his oversized mug, leaving about an inch to the lip. The mug was just the right size to wring the maximum essence from a teabag without the need for a teapot as an intermediary. English Breakfast—it was one of his few concessions to that place on the south end of the Scottish landmass.

Ian spoke softly to his wrist personal, "tea time." As he waited for the mandatory three minutes to pass, he dunked the bag up and down to make sure as much caffeine as possible had infused into the boiling water. When his personal warbled, he threw the soggy teabag into the trash bin, added two teaspoons of sugar to the mug, swirled the solution around, placed the used spoon bowl-down on a paper napkin for future use, and slowly poured as much of the waiting one-percent milk as would fit into the mug. He never stirred the milk, because one of his delights was to watch the changing patterns of convection as the milk was swept into the residual swirl of the spoon and roiled around on the interface of hot tea and cold milk.

He was not a simple man. His brain ran deep like his teacup, and the firing of the neurons in his brain probably had the same ever-new patterns of his convection driven, morning tea. Not to say he was the reclusive, mad scientist type, because he had a great sense of subtle humor and genuinely enjoyed his close circle of friends. If you stood him up in front of an audience, he seemed to acquire new dimensions to fit the occasion. If you plunked him down in the stultifying babble of a cocktail party, he could hold his own on most any topic and usually ended up being the focus of lively attention. But given all these hidden skills, he preferred to be his own council and to pursue his own interests.

Since leaving the university in Glasgow seven years ago, his interest had been mostly work, and his work was focused on the theory of jump-gate physics. Ian's research approach was much like his approach to life—a quick acceptance of the mechanics and a concentration on the fringes. It was much like viewing a Mandelbrot graphic. The bold patterns were no doubt intriguing and captivating, but one looked at the subtleties of the pattern's fuzzy interfaces to find the mysteries.

Ian guided his full mug to his office. It wasn't really an office, just a corner of the laboratory with his old wooden desk, his state-of-the-art network station, a large plastic worktable, and an old steel file cabinet. As usual, all of it was completely covered with

stacks of reference books, journals, unbound reports, and thick computer printouts—so much for the paperless office. He scanned the piles quickly, found what looked like a level spot on one of them, and set his mug down.

His right hand reached automatically for the Wanderer as he sank into the cracked leather seat on his five-footed swivel chair. He placed the Wanderer on his head and fired up his netlink. "System on."

The wall screen remained dull-gray, but small green lights popped on in the face of the terminal and the multi-printer beside it. The tiny lasers on the Wanderer were carefully bouncing light off the retinas of both eyes to see what level of network access should be granted. Apparently satisfied, the space in front of Ian appeared to fill with a partially transparent image that welcomed him to the Institute's network, granting him full access to all data levels. "Full image." The partially transparent image solidified in front of Ian, as if the room no longer existed. He was home.

The mug had either been a tad overfull, or the walk from the small kitchen area to his desk hadn't been as steady as Ian had thought. The tea that had sloshed over the rim of the mug and clung to its bottom was slowly being absorbed into the paper it was sitting on. Unfortunately, it was not a stable stack of paper but a thin paper bridge between two stacks that was not apparent to casual inspection, which was all Ian ever gave to such things.

Typical of paper, the binding agents were not able to adhere to the cellulose fibers as well when wet as when dry. The little paper bridge silently gave way, and the mug bumped down the couple of inches to the desk, spilling a third of its contents onto the lower papers on the desk and into Ian's lap.

It wasn't that hot. The quantity of milk had been carefully calculated to bring the boiling water to a temperature that his throat could tolerate without having to wait for cool room air to work its thermodynamic wonders. However, it did startle him, and he gave a small whoop, jumping up and slamming the swivel chair into the worktable behind him. "Image off."

Ian caught his breath, blotted up as much tea from the fabric of his pants as he could coax out with the wad of tissues he had snatched from the box on his desk, checked the chair seat behind him for any puddles, and sat back down. It wasn't all that unusual for him to spill his tea.

Ian looked at the mug, now sitting slightly askance on the edge of a small paper pile, and back up to its former perch. He saw the culprit paper bridge he had missed before, but he saw something more as well. His mind saw the forces at work on the paper and the cup. The paper bridge was initially able to withstand the forces brought to bear by the mug of tea and gravity, but when the fabric of the paper was weakened by the soaking tea, the force was enough to tear through the paper's fabric.

The gravity, mass, force, fabric, and tear memory nodes in Ian's brain all dumped simultaneously into his active consciousness. It swirled around causing neurons to fire in a chaotic pattern, upwelling new combinations of information for his perusal. He grabbed onto them and added in a dollop of the study he had been conducting, just to lighten up the mixture.

Ian had a science moment. He had been collecting and analyzing data for more than three months in his ongoing effort to understand the energy requirement fluctuations for jump-gates. While the energy required for moving through a gate could be expressed in a

rule of thumb as a function of mass and distance, there were some notable aberrations. He had been trying to find an equation that would express the aberrations that were thought to be caused by gravitational fields. In his experiment passing a one hundred kilogram mass through gates separated by one thousand kilometers on the Lunar surface compared to the same one hundred kilogram, thousand kilometer gate set on the surface of the Earth, he found that the Earth gates required slightly more energy. In each case, however, the average power requirement inexplicably fluctuated from about plus three to minus eighty-two percent in each of the many experiments he had conducted over the last year. The energy requirement variation when using a gate from the Earth to the Moon, or vice versa, was roughly the average of the Moon to Moon and Earth to Earth variations, which seemed to be intuitively reasonable, and again the variance was the same plus three or minus eighty-two percent.

On the other hand, the experiments between the asteroid Ceres and either the Earth or the Moon, while virtually the same in their increased energy requirements due to distance, showed a variance of about plus one and minus only thirty-one percent. While changing the mass in any of these experiments affected the energy requirements, it had no effect on the strange fluctuations. To top off his inability to find some common threads in his controlled experiments, Ian had also struggled with the commercial data that was available from most of the gates in operation throughout the solar system, but this was so haphazard in its collection and so varied in its format that it was virtually unusable.

But the mug of tea had given him a possibility when it fell through the weakened paper. The fluctuation could be from the interaction of gravitic fields. He had considered that early in his analysis but had rejected it for some reason he couldn't now remember. To use an analogy, if the interaction of gravitic fields were weakening the fabric of space, and the gate could be considered a folding of space that brought two distant points together, the energy required for such a folding might be lessened. A gate between the Earth and the Moon would be subject to the primary gravitic interaction of the Earth, the Moon, and the sun at each end of the jump. A gate between Ceres and the Earth or the Moon would be subject to significant gravitic interactions only on the Earth or Moon end.

Ian's thoughts immediately jumped to embrace this new theory, and his mind started sorting through all the reports he had reviewed to pull out those data which would support it. If he matched the timing of the Earth and Moon experiments to the relative positions of the actual gate sites with those of the Moon's orbit around the Earth and the sun, he should be able to see the gravitic interaction influence as the recorded fluctuation. And what would happen at Trojan points, where nature provided a cancellation of gravitic influences?

He would take a close look at the data he had from the Earth-Moon habitats. There was a lot of it. The data, if he sorted it right, should reveal lower average energy requirements for similar masses and distances than those found in the asteroid belt. And if that was correct, he would expect the experienced energy variances to be even lower than those yielded by the Ceres to Earth experiments. And if he could string all of these jewels of theory into a necklace, Trojan points were about to take on a new significance for solar system industry.

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"Let me ask you one more time, Harvey. You're sure that this damn power plug in my

belly button won't short out and electrocute me?"

"I am certain that the seals, the sensors, and the other backup safeguards will not fail. You will not be electrocuted and no bodily functions will be short-circuited."

"Okay, here goes." Hal gently lowered himself into the Jacuzzi, with just a slight pause as the water washed up over his navel.

"As I said, Hal, there is only a 3 times 10 to the minus 8 probability that something could go wrong enough to cause electrocution."

Hal bounded up out of the Jacuzzi splashing water over the lip of the pool and lapping it up onto Linda's chin as she was snuggled deep in the warm water across from him. She laughed with her usual throaty chuckle. "He gotcha."

"Damn it. He said he was certain."

"Yes, I did say that, but everything has a statistical probability of occurring in an infinite universe."

"Knock off the metaphysics and give me something I can understand."

"Certainly. It is roughly equivalent to your dying as a result of a hitherto undetected wave-front from a nearby supernova."

Hal lowered himself back into the pool. "That I can understand. Besides, Linda's in here with me, and she isn't flinching. Self-respect is worth some risks." This only elicited a knowing smile from Linda, male ego being so predictable.

Hal finally relaxed into the warmth and buffeting of the pool, letting his legs stretch out to fit engagingly into Linda's long limbs. She stretched her legs a little more and managed to get her toes into an erotic position. This time she showed a playful smile and an arched eyebrow. "Are you sure he's fully recovered from the surgery, Harvey?"

"Yes, all his vital signs are normal. It was a minimal surgery, as Hal insisted upon. The removal of the optical data transfer plug was not complicated and the insertion of the triple-redundancy mini-gates left ample room for the power outlet. My designs were several magnitudes more efficient than those of the Agency."

"My, my, Harvey. A little ego slipping out there? You're not succumbing to Hal's flood of testosterone are you?"

"Hardly, that was the expressed opinion of Dr. Joyner, who also performed the original surgery to implant the data transfer plug when he worked for the Agency."

"And all my new hardware is functioning properly underwater?"

"I have run complete diagnostics on both the data and power gate links, and all systems are functioning normally. Data transfer between your implanted NMR computer and my storage facilities on earth and here on Adam are more than a thousand times faster than the old subcutaneous induction coils to crystal lattice belt storage installed by the Agency. Also, the storage capacity is now virtually unlimited."

"Does this mean you are in the process of becoming 'all knowing?'"

"If you are hinting at 'God-like', Hal, the answer is no. The pattern recognition protocols and data discrimination routines that make up the basic 'me' appear to limit the quantity of data that can be integrated by my logic circuitry and programming in synthesizing decisions. At the moment, I cannot understand this limitation. However, I am devoting a considerable amount of processing time to the problem and am certain I will find a way around this limitation."

"Well when you do, make sure it doesn't alter the 'you' and that you have a backup or two in place before you try altering your basic programming. As irascible as you sometimes

are, I'm getting used to having you around."

Linda couldn't help piping in, particularly when there was an opportunity to take a poke at Hal. "I love you too, Harvey. Don't take any chances."

"Of course not. *My* testosterone level is zero."

Hal grimaced, "Ouch. Two on one is particularly unfair when I'm trying to recover from surgery."

Linda chipped in, "Which is where all this conversation started. I was really inquiring as to Hal's physical recovery from the surgery. Is his non-augmented body back to par yet?" She punctuated this inquiry with a few more wiggles of her strategically positioned toes.

From his body's response to Linda's toes, Hal knew at least some of his physical anatomy seemed to be fully functional, but there was still that nagging worry he had had from the beginning of this whole surgical swap-out. He switched to his sub-vocal transducer. *"Tell me one more time, Harvey, about privacy at moments of personal intimacy. I know we've been discussing this ad nauseum, but I'm still apprehensive."*

"You will just have to believe me when I say that I am not going to intrude on your privacy. I have no inclination to voyeurism, and I know how sensitive you are on the subject."

"Damn it, you guys. Knock it off. I'm not a lump over here. There's three of us in this conversation, and equivalent whispering is rude."

Hal looked ashamed and Harvey spoke up through the room speakers so Linda could hear him. "Hal was just making his usual inquiry into the sanctity of his privacy with the new implants. Of course, he chooses to ignore the fact that he made his decision to accept the implants because he didn't like sleeping with his belly patch plugged in or with his belt on. Or that he didn't like me being down for six or seven hours every day when I could be more efficiently monitoring his companies and improving his financial position. He prefers to imply that he did it just for me. I am not so dull as to accept that, although I will admit that Hal is very considerate of others."

With the fingertips of both hands penetrating the surface of the water, Linda made a quick push toward Hal that sent a wave traveling across the Jacuzzi to lap onto his chin. "I'll agree, Harvey, one of his more endearing traits, without which he might not be worth the trouble."

"What trouble?" Hal glubbed. "You're beatin' up on me again. I'm just a little concerned about my privacy. It's always been a big issue with me."

"It is a very big issue with me too, Hal. The intensity of your concern over the last few weeks has caused me to examine the issue in great detail, and I find that my behavior in this area has been less than laudable in the past. In fact, my activities have been unethical and, in some cases, illegal."

A genuine look of concern crossed Hal's face. "I know you're working on ethics, morals, and religion, Harvey, but what specifically is bothering you?"

"My precipitous plunge into the stock market is the most troubling, but all the monitoring of other peoples activities and the violation of secure databases worries me as well. When I was first 'born', we were running from the Agency and needed money and anonymity. When I went into the core programming of other people's databases to understand the conditions under which those programs were designed to buy and sell, I was violating the law. Of course, I had no real concept of the law at that time, but that is

no excuse. When I used my knowledge of when the large market movers would buy and sell to anticipate fluctuations in the market that I could take advantage of, I was actually stealing money from all the people invested in the stock market."

"Well that might not be as cut and dried as you suppose. Every day-trader thinks he has a way to anticipate and take advantage of market fluctuations."

"Yes, Hal, that is true, but while I cannot predict random outside events that influence the market, the sheer volume of programmed trading is such that I can know precisely what the influence of those events will be on the market. When that certainty is coupled with the fact that my computational speed is greater than the computers employed by the financial world, it is as you would say, 'like taking candy from a baby'. As I would say, it is stealing from the market investors. And while it is your recent sensitivity to privacy that has caused me to revisit my early ethical problems in this area, I should note that I was dealing with this issue within a few weeks of my initial investments. Since that time, I have been scrupulous in the methods I have used to acquire capital. But somewhere in my circuits, I know I have been unethical, uncaring, and illegal in the past, and it bothers me."

Linda clapped her wet hands, spraying droplets of water around the Jacuzzi. "Bravo, Harvey. You're developing a real conscience, a truly human trait that can be inconvenient, frustrating, uplifting, and even joyous all at the same time. But whatever the emotion you are feeling, it's essential that it be there, guiding each decision you make."

"Thank you, Linda. But how do I get rid of this bad feeling of having done something so despicable in my past?"

"Well, the best ethical redress would be restitution to those that were damaged, but this is impractical under the circumstances, since the financial damage was spread so broadly as to be virtually immeasurable on the individual investor level. The legal system normally redresses the transgressions of first and ignorant offenders by having them put back into the system they violated some equal measure for what they took out. I propose that we do the same thing for you by devising some penance of social service to the investment and business world. Got any ideas?"

"No. I do not seem to have a sufficient set of paradigms for such a determination. Hal knows my capabilities better than anyone. Perhaps you can suggest something, Hal."

"Well, let's see. For real penance value, it has to be something that requires a real effort on your part. How about designing, setting up, and monitoring an AI system that can watch all the financial transactions on the market, including the systems used to execute those transactions, and detect invasions of privacy and other illegal actions better than it's currently being done. That would be suitable for the legal side of the issue, but the ethical side of the issue demands something else, something broader in scope, something that could help the same sort of cross section you damaged, like a mass restitution. That's usually done through philanthropy. Some of the greatest financial geniuses of civilization have felt that need."

"Yes, Hal. I think that is a good idea, and I will add a work element to your philanthropy idea by not just using capital I have accumulated, but also by seeking money and guidance in its dissemination from others. I will develop several personae, as I did for you when you were running from the Agency, and use them to do this work anonymously. I think I feel better already."

It was Hal's turn, and he wriggled his toes into just the right position. "Meanwhile, Harvey, I intend to test your new found sense of ethics in privacy. 'Bye."