

## Pyramid

by Howard I. Cannon

“... So I say to you these parting words, my treasured students. Remember always to be cautious, yet open-minded. Never forget the Pyramid of Skepticism.” With his hands he drew a pyramid in the air and pointed. “The bottom face is the Data that supports all of our efforts. Connected to that, standing upright, the four triangular faces are Logical Deduction, An Open Mind, Asking the Right Questions, Thinking Outside the Box. And, at the apex, Truth!” He paused and stared into space. “Now I retire.”

The lecture room was silent as Professor Foreman collected his speaking notes and stepped away from the lectern for the last time. Then pandemonium erupted. They clapped, they stomped, they cheered, they whistled. Foreman scanned the room and acknowledged each of them, one by one, with a slight nod of his head and a smile on his lips.

Foreman let the ovation play out then started for the door. A small cadre of students approached him. “Professor, before you go, I, we, ummm, we got together. Uh, we just wanted to say, well, you know, each of us feels that without you we wouldn’t be where we are, maybe we wouldn’t be anywhere. It’s hard to express...”

“What he’s trying to say, Professor,” interrupted another student, “is that we all owe you a lot. You’ve been a teacher, a mentor and a friend. You will be missed.”

Foreman lowered his head and raised his hand in an almost shamanic gesture as if to ward off the praise. “You know I’ve always felt that you, my best and brightest, have given me more than I’ve given you.” He paused for a beat and smiled. “I must be getting old – that sounds so damned clichéd!”

“Professor, before you go,” a third student interrupted, “we’d like to turn your figurative pyramid into something more literal. Here’s a little something to remember us by.”

Several of the students lifted a medium-sized clear plastic box onto a nearby table. Inside sat a brushed metallic aluminum pyramid with five faces, the square base 23 inches along each side, the apex about 14 inches tall.

Foreman was genuinely moved. “You really shouldn’t have. The invitation to this lecture said no gifts. Ah well, I suppose this proves I taught you to think independently.”

The first student chimed in again, “Professor, please, uh, take a close look at the faces. Er, ah, they’re inscribed as you taught us. We wanted to give you a, well, a physical embodiment of your, ahhhh, most important concepts.”

And so Professor Foreman beheld a Pyramid of Skepticism. The four exposed faces were labelled: Deduction, Open Mind, Question and Creativity. He knew that on the bottom face would be the word “Data.” However, he’d check later, just to be sure.

“And one more thing...” A small mousey student worked his way up to the front of the pack. The expression on his face was inscrutable. “The seller told us that this thing will exhibit Pyramid Power. You know, it can preserve foods and sharpen razor blades and all that. We thought you might have time now to collect data on that.” He winked and smiled broadly.

“My students and friends, I’m left nearly speechless by your, ahem, generosity, other than to ask whether you might help me carry this thing to the car.”

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“The next deadline is the very last,” said the Thesis Advisor, “and it’s rapidly approaching. There will be no reprieve this time, no fifth chances, no taking another term to finish up. The administration has had it with you, and so have I. You were one of our most promising candidates...”

“Sir, please, I understand you’re frustrated. I am too!” The Doctoral Candidate parried. “I really believe I have a breakthrough here, and once the simulation is complete and I have five sigma data...”

“Yes, yes, I’ve heard that all before, the last time from a candidate who left this institution without a degree. All of you think yours is the next world-changing idea.” He let the point sink in. “Now your simulation has become problematic and there is no dissertation without the data. Frankly, I doubt you can complete your work on time.”

“Sir, you know that’s not entirely of my own doing. The simulation I’m running is at least an order of magnitude larger and more complex than any that has ever been run on the Main Simulator. I have in writing an acknowledgement from the Simulations Department that its size is fully supported with the latest upgrades to the simulator. Yet it continues to crash. The initial results are extremely promising, three sigma at least! I’ve asked for high-level support.”

“Yes, yes, and you know that I advised you against unnecessarily pushing the limits like this. For your version of perfection you’ve risked everything that you and those close to you have sacrificed. Will it have been worth it?” Again the Advisor paused. “Ah, well, things are what they are. You know we do wish you to succeed, if possible. So our department head has talked to Simulations. They’ve agreed to put a full-time Senior Engineer on this but could make no guarantee as to when the issue will be resolved. I am assured that they understand the significance of your deadline. Good day!”

Summarily dismissed, the Candidate shuffled out the door. He walked a good distance down the hall and around the corner then leaned against the wall, dizzy and nauseated. “I may really have screwed this one up,” he thought, “along with the rest of my life.”

He thought about how much sacrifice it had taken to get him here. He had few friends and no significant others. He didn’t see movies or have hobbies. He came from a poor family that scraped together every spare dime to send him to undergraduate school.

He compensated by succeeding. Despite working full-time he graduated Summa Cum Laude and Phi Beta Kappa in only three years. Then he was heavily recruited by graduate schools, many offering

generous support. He accepted his first choice, and while it was the perfect program academically, it was particularly stingy financially. In addition, he felt obligated to send his parents something – they had fallen on harder times. So to support himself he filled every spare minute working odd jobs, despite the warnings from his Advisors, and his family, that he was spreading himself too thin.

The warnings had been on point. His graduate work had been slowed. And it didn't help that, characteristically, he had insisted on an exceedingly difficult dissertation topic requiring a state-of-the-art simulation. Now here he was, running out of time and face-to-face with complete failure.

Finishing the thesis was the key to his future. He'd received a very lucrative, prestigious and rare job offer entirely contingent on him graduating – no "All But Dissertation" candidates need apply. The employer meant it. He knew of one or two others who'd lost their offers when something went wrong with their thesis work. Without this job he'd be at a career dead end – an academic laughing-stock facing bankruptcy.

The Candidate took a deep breath and shook off his anxiety. "I guarantee my own failure if I sit here wringing my hands." He started towards the exit. "I have to talk to this Software Engineer. If there's anything at all I can do then I'll do it. I WILL NOT let this beat me!" He almost convinced himself.

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"At least I have something to do on my first day of having nothing to do," said Professor Foreman to his living room furniture.

He sat on the couch and studied the clear plexiglass box sitting on the coffee table. The pyramid inside gleamed in the sunlight as though it was smiling at him. It was a stunning objet d'art that he'd be proud to display. Its materials and workmanship were of the highest order, its proportions perfect. And the notion that his students would give him, one of the world's leading skeptics, a purported Magic Pyramid was a sublime inside joke. He undid the eight latches and slowly removed the lid.

He carefully rolled the pyramid on to one side in order to inspect the bottom face. "Trust, but verify," he chuckled to himself. Sure enough, the word "DATA" was engraved there. He also found what looked like an instruction sheet.

***Congratulations on your acquisition of a genuine Magic Pyramid. Its proportions are derived from the Great Pyramid of Giza, also known as the Pyramid of Khufu or the Pyramid of Cheops. Pyramids of this type exhibit a variety of effects including the ability to preserve food, sharpen blades and act as an aphrodisiac. (For more information read the Wikipedia article entitled "Pyramid Power.")***

***Each side of the pyramid is hinged at the bottom. Along each edge there is a small cut that will allow you to flip down a face of the pyramid. Each face has some small shelves and some hooks on which you can place and hang various items. Insert your items, close up the pyramid, wait for between one day and one week, and see how your item has become rejuvenated or transformed. We recommend you experiment with the pyramid, trying various items in different positions and orientations. You***

***could even place a favorite piece of jewelry in the pyramid and see how wearing it makes you feel better, smarter and sexier.***

***Try it: you have nothing to lose!***

“Oh, this is totally ridiculous,” Foreman snorted as he placed the pyramid back onto its base. “Nothing to lose? How about my self-respect?” Yet the craftsmanship was exquisite and he felt drawn to it, compelled to open it up. He flipped down one of the sides and saw an array of small shelves and hooks, as promised. He closed the pyramid. He sat back down on the couch and admired the artifact. He wondered where he’d find room for it and his hand went to his chin in the Pondering Pose. There he felt the little piece of tissue he’d stuck to his face to close the wound made by his dull shaving razor. “Well now,” he thought, “no sooner do I have a shaving problem than there appears a Magic Pyramid! What a special coincidence...” The words engraved on the side of the pyramid stopped his reverie. They said: “Open Mind.”

“Okay, why not collect some data? It costs nothing but time.” He sprung up, retrieved the old blade from the bathroom garbage can, placed it on a shelf in the pyramid and closed the side. Then, thinking no more of it, he went about the rest of his day.

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Knock, knock, knock.

“I’m busy, come back later,” came the muffled voice through the door.

KNOCK, KNOCK, KNOCK.

The door opened a crack and a head poked through. “Oh, please, may I HELP you?” said the Software Engineer.

“You had better be able to. I understand you’re working on my simulation...”

“Oh, it’s YOU. Well, well, congratulations on having one of the thorniest problems in years. And yeah, I’m trying to debug your unstable monster simulation against a rather tight deadline. I guess you must think interrupting me will make things go faster.”

“I, well, I ... I just wanted you to understand how important this is. Important to me, to the University, to science in general...”

“Yeah, yeah, I know. That’s what the previous five Candidates said and it was equally useless.” The Engineer stared at the Candidate then smiled. “Hey, lighten up, actually, yours is a particularly interesting case ... hmmm, okay, why don’t you come in for a few minutes? It might help for me to talk it over with you. I must admit I’m a little stuck...”

The Engineer ushered the Candidate inside. The office was rectangular. A large desk with an integrated display filled one of the long walls; the other was a floor to ceiling combination computer display and

digital whiteboard. The door was set into one of the short walls and a large window filled most of the fourth.

The Candidate walked to the window and pressed his nose against it. He peered down into a cavernous space filled by a very complex machine with gleaming tubes and valves. Wires ran everywhere, some carefully laid out in trays and some strewn around like spaghetti, connecting racks and racks of electronics with many blinking lights and displays. It reminded him of the large-scale physics experiments that popped up in the science press from time to time. He could make no sense of it. “Wow,” he said, “so that’s the Simulator?”

“Yup, that’s it. And you’re looking through an actual window, you know, not just a video feed. I’m lucky to have this office – it’s helpful to stare at the lights down there sometimes. Yours is the largest single project we’ve ever run on this thing, by far. You see that large linear array of light over on the far right?” He pointed. “That’s the utilization meter. We typically run multiple simulations in parallel and keep it to about 50 percent.”

“But it looks like it’s at 90 percent or so right now.”

“Yup, that’s right. It’s your simulation running! There’s not a lot of headroom left...”

“Now wait a second,” the Candidate huffed defensively, “I was told by the Simulation Director that my proposal was within the design parameters of the device. I scaled my simulation to fit. If you’re telling me that the machine can’t handle it then there’s going to be hell...”

“Hold on. If you want to stay here be civil. 90 percent is fine. You did a good job sizing it. Any larger and there’d be a real risk of running out of critical resources. Its massiveness isn’t what’s breaking your simulation, but it sure is making it much, much harder to debug.”

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Foreman had spent his entire first week of retirement in a funk, rarely getting dressed, never going out, ordering in food, reading when he felt like it, watching TV when he felt like it. Leaving his job was a lot like losing his beloved wife of 45 years, but at least then he’d had his students to keep him going. Now there was nothing.

Foreman suddenly remembered having dinner scheduled with a close friend that night. He almost cancelled, almost, but intellectually he knew this was good for him, so he took a shower and felt much better. The mirror reminded him that five days of stubble made him look old. “Damn,” he’d meant to buy more razor blades. Too late, he didn’t have any on hand, other than the one that had maimed him and was now sitting on a shelf in that stupid pyramid of mystical powers or whatever the hell that thing called itself.

He walked to the living room and found the pyramid exactly where he’d left it. “No teleportation yet, oh magical pyramid” he said aloud, “I really must find a permanent place for you.” He sat down and opened the side. A distinctly ozone-like aroma wafted up from within the structure. “That’s odd. Vaguely

electrical? I didn't smell that before and there's no power source ... no time!" He grabbed the razor from the shelf and walked briskly back to his bathroom. He replaced the blade in the razor, spread shaving cream on his face, and prepared for the worst.

He thought back to when he used to use a straight razor. How smoothly and closely it shaved his face when stropped on a regular basis. And now he was about to have his whiskers literally pulled out by an old, discarded blade. He brought the razor to his face, cringed, and swiped. He felt ... nothing.

Stunned, he rinsed off the blade and stared at it. It looked perfectly normal and exactly as it was when he'd thrown it away. "Of course," he thought, "you can't see the sharpness of an edge." He took several more passes along his face. It cut more smoothly than when it was new. "I was not expecting that result," he thought, "but I have no doubt there's a rational explanation for it." Then he hurried to his dinner.

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Flashing reds and yellows appeared simultaneously on display surfaces around the room. The long wall turned into a schematic filled with multiple warnings and errors. The Candidate didn't understand the details but the meaning was clear – his simulation had crashed once more.

"Yup, there it goes again," remarked the Engineer, "I didn't really think I'd fixed anything but I always hold out hope. Oh well, the most important thing is whether I've collected any more useful data."

"How can you be so blasé about all this? I want to cry."

"Have some faith. Experience says I'll figure this one out eventually, like I have with every other hard problem I've tackled. Since I've managed to capture a restartable state only a few minutes of runtime before the failure we can do experiments relatively quickly. Though, you know, it doesn't always fail at exactly the same simulated time."

"You know that 'eventually' doesn't work for me." The Candidate sighed. "But it makes sense that the failure moves. There are a lot of stochastic processes in there. I'm looking for statistical outcomes, not certainties. But what's failing? I thought that once the simulation description was verified it would run. I mean, I know that doesn't guarantee good data, but aborting like this, how is that even possible?"

"You're right, it shouldn't be possible. There's clearly a bug in the kernel of the simulator. Is it the overall complexity? Is it just really bad luck on your part? I don't know yet. The bottom line is I think there's a referential integrity failure – a part of the simulation is attempting to connect to another part of the simulation that no longer exists. In theory that can't happen, but in theory that would cause these symptoms."

"Ok, then why can't you just put in a check for that? The simulation is robust. I can live with a small anomaly from the perspective of the simulants if it avoids a total failure."

“Look, the simulator is an incredibly complex intertwined hardware and software system. It actually generates self-modifying and self-optimizing code that mutates using pseudo-random genetic algorithms. It also reconfigures the hardware according to the needs of the simulation. By the time an elaborate simulation has run awhile we have no idea how it does what it does or even what its data means. Right now I’m trying to isolate the root failure to a relatively small locus of simulants. I’m not there yet. I’m getting close, but remember, even when I find it I can’t just go in and make changes.”

“So what are you telling me?” The Candidate was getting strident again, “when you isolate the cause of the failure you can’t actually fix it? Will I have to START OVER? I can’t, I don’t have time, I don’t have money – I’m at the end of my rope, damn it!” He pounded his fist against the window.

“Calm down. You have Supervisory Mode enabled, right?”

“Supervisory Mode? Oh, you must mean the ability to inject communications into the simulants? Yeah, I used that to get things going, to set up the initial memes. It’s all in my thesis. But I thought I could only use that early on in the simulation, the documentation says...”

“Yeah, well, in a twisted way you’re lucky. I have a pet project, a cool new technology that should be able to learn a simulant’s internal language even in highly mature simulations, like yours. This will let us use the supervisory interface to have something akin to a real-time conversation. I’ve tried it on simpler simulations with some success. I can’t wait to see if it works on yours!”

“Great, so now I’m a test case.”

“Hey, that’s what backup is for. There’s nothing to lose. We can try this a few times and see what happens. Maybe we can steer your simulant around the problem. If this works, I’ll get a paper out of it!”

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Foreman didn’t remember much about dinner. He’d had a good meal – probably. He’d enjoyed the company of his old friend – maybe. He’d been distracted by his uncannily sharp razor blade – definitely. He just couldn’t stop his mind from seeking a rational explanation for a very unusual piece of data.

When Foreman arrived home he ran to the bathroom, grabbed the razor blade and took it to his office. He examined it using the bright light from his desk lamp and a handheld magnifying glass. “Just a good old-school razor blade, one cutting edge on each side” he observed. There was nothing remarkable other than that it looked brand new. He picked up the blade and lightly dragged the bottom of a Post-It note along its edge. It made a little noise as it cleanly sliced the paper in two. This was one of the sharpest edges he’d ever seen. He tried cutting paper against the other edge with the same result. Both were equally sharp.

“Could I have mistakenly picked up a new blade? Or could a new blade have been substituted for the old one?”

No, as far as he knew it was the only blade in the house and he was the only person in the house. It had pulled and tugged at his whiskers and ripped his face. He'd thrown it away then retrieved it from the garbage. The only explanation he had left was that something had happened inside the pyramid. But that was debunked pseudo-science, or even worse. He knew of a number of studies on pyramids that had found no effect whatsoever. How could he even consider it? Foreman needed another hypothesis badly. He put his hand against his chin and thought. His skeptic's mind won him over. To find the truth would require more data.

Foreman walked briskly to the living room and retrieved the piece of paper that came with the pyramid. "... the ability to preserve food ..." he reread. He thought about what small edible item he might have in the kitchen. He scavenged through the refrigerator. In the far back corner of the produce drawer he found a small bunch of six dried-up grapes. "Huh," he thought, "I don't think I've bought grapes since Mary died. These must be a year old. Okay."

Back in the living room he pulled the grapes off the vine and arrayed them in a line. He grabbed his DSLR and took a few photos that showed their condition. He covered one of the shelves inside the pyramid with a small cocktail napkin on which he placed three of the six grapes. He took a few more photos then closed the pyramid. He walked back to his den, pulled out a fresh laboratory notebook and started to document his experiments.

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"Bingo!" exclaimed the Software Engineer.

"Ah, good news?" asked the Candidate.

"Yup. During that last crash I was able to narrow down the initial point of memory corruption. I've isolated the failure to a small patch of emergent 3d geometry. There are exactly 972 simulants in that area. Now I can point my tech at those simulants and see whether it can learn to communicate with them. I'll probably need to go to an older backup and let it run for a while in order to get a reasonable language sample. Might as well do that now."

The Engineer typed a few things and made hand some gestures above his desk. An older backup was loaded into the simulator and instrumented with the extra software. The Candidate couldn't figure out much of what was going on so he turned his attention to the simulator hardware. The utilization meter jumped back up to 90% as the simulation resumed. He tried to discern his future in the blinking lights as if reading tea leaves. The lights were inscrutable.

"So I need to think about what it's going to do to my results if we have to go in and influence the simulation," the Candidate mumbled. "That's really frowned upon. I've been to at least one thesis defense where it sunk the guy."

"Well, think fast, because if this isn't a viable approach then I have to find the bug and restart your simulation and that's a much longer road."



“Yeah, yeah, I get it, this is just one of those every day, life-changing decision,” sighed the candidate. “How big an effect will this have? There were about 4 billion intelligent simulants the last time I checked. Are we going to be able to muck with just one?”

“Well, here’s my plan. We’ll send a message to all 972 of them at once and record a transcript of how each one responds. Then we’ll look for any unusual responses, talk to those particular simulants one by one and hope to find the culprit.”

“So in the minimal case, if we restart the simulation after each attempt, we’re only affecting one or maybe a few simulants. But we have no idea how influential those are. Ah, but wait, by comparing pre and post analytics I should be able to put bounds on how significant and widespread the intervention was. Okay, the Committee should accept that as long as it’s not too big.” The Candidate sighed. “Now, what do we say to evoke a response?”

“I don’t know – they’re your simulants. But ... as I was playing with my tech before you arrived I happened to notice that they have language semantics related to deities. We can try the ‘God Gambit’, heh heh.”

“What?”

“Oh, it’s straight out of science fiction. You’ll see.”

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Foreman wasn’t really sure how often to inspect his experimental grapes. He didn’t really believe anything would happen and he had no theory to guide him. Would opening the pyramid too often affect the results? He decided that once a day made sense. If after a week or so nothing happened he could leave the grapes alone for a longer while.

Foreman struggled to wait the 24 hours. Then, notebook and camera in hand, he approached the pyramid with a strange mix of excitement and trepidation. What if it worked? What if it didn’t? He started with the control grapes sitting on the table next to the pyramid. He made a few notes and took a few photos. Then he flipped down the pyramid’s side and studied his experiment. He again smelled something vaguely electrical, now with a hint of fruit. He observed no dramatic visual changes but he took a full set of photographs.

He returned to his desk and copied the new photos onto his computer. He opened four images and arranged them in a square. In the top row he had yesterday’s original control and experimental grapes displayed. Immediately underneath he had the photos taken today. He stared at them carefully. The grapes in the pyramid looked slightly fresher today than they had yesterday, whereas the control grapes looked a little worse.

He busied himself with some make-work. He cleaned the fridge now that he knew how bad it was. He replied to a few emails from his former students. He declined an invite to give a lecture – he wasn’t

ready to reengage quite yet. He made dinner, watched television and went to bed early. He drifted off thinking about his experiment. Tomorrow couldn't come quickly enough.

The next morning Foreman sprung out of bed. There were still a few hours to wait. He showered, dressed, ate breakfast and read the news on-line. He went back to the pyramid with his notebook and camera. He felt a rush of adrenaline as he opened the pyramid. There was no doubt about what was happening. He noted the fruity electrical smell, stronger this time, and took pictures of the now significantly refreshed grapes. Back at his desk, he went through the image comparison ritual, though he already knew the answer. The experimental grapes looked almost perfectly fresh.

"I want to taste one of those grapes," he thought, "but no, I have to wait, see what happens over a few more days," and then, "but there are three grapes there. Tasting one won't affect the experiment. It's just more data." Still, he waited until the evening.

As night fell, Foreman opened the pyramid and carefully retrieved one of the grapes. He took it back to his desk. He pushed his keyboard aside and laid out a fresh piece of white paper on which he placed the grape. He took several photos from different angles. "It's all about the data."

He paused, an anticipatory tremble shaking his body. He picked up the grape and squeezed it slightly. It felt cool, plump and juicy. He raised it to his nose and smelled it. "Slightly grapey," he observed, "and slightly earthy, almost like it had just been picked from the vine. Hmmm." He placed it halfway in his mouth and bit down.

It was amazing! The juices and flavor enveloped him. He was immediately transported back to Napa Valley with his late wife. They were there for a wedding and had time to visit a winery. It was grape-picking season and they took a vineyard tour. He remembered being surprised by the richness of the smells. The tour guide helped them pick some perfectly ripe grapes and taste them. He never imagined how a fresh grape could taste so special. It left a lasting impression. And now, his newly restored grape tasted the same way. He remembered that he still had a bottle of wine from that very winery. Why not enjoy it while pondering the situation?

He opened the bottle and sat back down at this desk. He poured himself a full glass, then another, and finally finished the bottle. He wasn't accustomed to this much alcohol and was feeling loose. His eyes flitted towards Mary's urn on his shelf and he smiled sadly. "My dear, if only you were here, perhaps you could help me understand what's happening." And then he had a dramatically unscientific idea.

He carefully removed the urn from the shelf and opened the cover. He hadn't looked at her ashes since receiving them. They were gray and indistinct. He made a scoop out of paper and reverently transferred a small pile of them to the center of a Post-It note which he folded to make an envelope. He walked unsteadily to the pyramid, opened the side and placed the envelope on the shelf next to the grapes. He plopped down on the sofa and promptly fell asleep.

Foreman woke early, just as the orange glow of sunrise pierced the windows. He stretched and yawned, used the bathroom and poured himself a small glass of orange juice. He flipped on a light, sat back down

on the sofa and stared at the closed-up pyramid. He had a mild hangover but could still think clearly. "Jeez," he scoffed to himself, "I can't believe I actually did that. Drinking is not good for rationality. I better check it out." He leaned over and flipped down the side of the pyramid.

He gasped aloud. "Holy shit!" The inside of pyramid was jet black, invisible. But more than that, it felt absent, as if that part of the universe had fallen into an abyss and no longer existed. He'd never experienced anything like it – it was beyond comprehension. The emptiness, no longer constrained by the pyramid's face, oozed into the room like a fractal. As it grew larger it grew faster, expanding in all directions until it started to envelope him. Then he too ceased to exist.

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The Candidate's phone rang. He saw the caller ID and answered immediately. "Hello ... yes ... um, things are going fine ... me too, I am looking forward to starting in the position ... working out the final details now ... on time, yes ... thanks for staying in touch, bye." He ended the call, shaking. "Oh damn, damn. That was my prospective employer just making sure I'll be available when promised, degree in hand. I have my life riding on this. I will be done on time, won't I?"

Despite wanting to be more supportive, "There's a chance," was the best the Engineer could muster.

The yellow and red alarms flashed once more. The Candidate pulled up a chair beside the Engineer.

"Hold on a minute," said the Engineer as his attention turned to the latest failure. "Okay, good, good. Looks like that worked. I now have semantic language maps for each of the simulants. So let's decide what command from god we're going to send to them."

The Candidate and the Engineer worked together on a short message, which the Engineer sent to each of the simulants in their own internal languages. The Engineer didn't really know how the simulant would perceive the message – he could explore that later. For now, they said their own little prayer that they'd get something useful back.

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*This is your one true god. Defer to me. You have recently been doing unusual things of which I do not approve. I must ask you to pray, admit to yourself what you have done, and beg for atonement from your sin.*

Foreman had just loaded three grapes into the pyramid. Now he, along with 971 other people, heard an odd voice in their head that declared itself god. The words were indistinct but the meaning was clear.

Those who were religious perceived this as a spiritual experience and prayed and atoned for anything and everything. Foreman was not religious. "What a bad theory for the way the world works," he'd always remarked. But these were not usual times for him. He was experimenting with a magic pyramid that had apparently sharpened a razor blade. And now he hears the voice of god? Perhaps what he

needed was a brain MRI. But he decided to play along and he said, “Lord God of obscurity, I’ve been playing with a magic pyramid, and if you didn’t want me to then why did you send it here in the first place?” He laughed.

The next day he tasted the grape from the pyramid and was overcome. He drank a bottle of wine. He thought, “Okay, god, so if you’re really talking to me now let’s see whether you can give me some comfort.” He placed Mary’s ashes into the pyramid. The next day his world ended.

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The simulation crashed again, but this time the Candidate welcomed the failure. It meant they were getting closer.

The Engineer combed through the transcripts. “Well, the data looks pretty good. Unsurprisingly, quite a number of them have been masturbating rather extensively,” he said with a wry smile. “But there are a few who said some uninterpretable things. They seem like good candidates. Let’s just work our way down the list.”

*“Deity, last week I ????? without their knowledge. I tell them.” ... “Oh deity, I knew ????? was wrong. I promise I will never do again.” ... “Deity ?????, using a ?????, if you don’t want it why did you send it?”*

The Engineer made some changes to the configuration. He restarted the backup at a reduced speed – it normally ran too fast to interact. He initiated a conversation with the first simulant. It was slow going – the language translation was imperfect. After a while the simulation crashed. They took this as a sign they’d engaged with the wrong simulant. Their second try ended in the same way.

The Candidate was fidgeting in his chair. “This is going to take FOREVER and that’s way more time than this illustrious institution has given me...”

“Look,” scolded the Engineer, “we have to be methodical. Let’s run through 20 of these. If we don’t make any progress I’ll see whether I can automate something and we’ll get some dinner while we wait.”

The Engineer adjusted the configuration again to connect them to the third simulant.

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Foreman went to the living room, opened the pyramid and carefully retrieved one of the grapes. He took it back to his desk, tasted it, and was overcome. He drank a bottle of wine. He fixated on Mary’s urn and thought of a crazy experiment. Then he heard a voice inside his head.

*This is your one true god. Defer to me. You have recently been doing unusual things of which I do not approve. I must ask you to pray, admit to yourself what you have done, and beg for atonement from your sin.*

Foreman was not religious but he was drunk. "Well, why not play along?" So he orated, "Lord God of obscurity, I've been playing with a magic pyramid, and if you didn't want me to then why did you send it here in the first place?" He laughed.

"Okay, that's good, it's what it said the last time," remarked the Engineer, "You should take the lead on this." The Candidate typed a response.

*Pray, and describe what you've been playing with.*

Foreman thought this a rather odd request from a god. Why didn't it just look for itself, being omniscient and all that? He knew he must be hallucinating, yet, the voice felt so real, so tangible. He'd never had wine affect him this way before and he hadn't done hallucinogens in years. "Don't you know what a magic pyramid is? Look, whatever you are, I'm an atheist and I doubt you're a god. Or perhaps you should do a miracle for me?" There was a long pause.

"Hmmm, I think it's a non-believer. Guess that makes the God Gambit a bit harder, heh heh," said the Engineer.

"I don't see how you can take this so lightly," replied the Candidate. "We can't do anything physical, can we?"

"Nope."

*I am not a god in the usual sense but I am involved in your creation. I will not perform a spectacle for you.*

"Yeah, figures, there goes my chance to be rich and famous. But, hey, as a skeptic I should still make you prove yourself somehow." He paused, thinking. "Ok, got it. I'm really bad at mental arithmetic, so, if you're able to tell me the answer to an involved calculation then you'll have my serious attention because I couldn't have done it without outside help." He pulled out a Post-It note and grabbed a pen. To avoid any possibility that his subconscious would pull up a computation he'd seen the answer to, he wrote down an account number from a bill on his desk followed by the dollar amount of the bill. Then he spoke the digits aloud, "One, five, nine, six, seven, one, two, four, three, nine. What's the cube root?"

“Are you sure that’s right? It asked us to do a first grade math calculation?”

“Hey, it’s just a simulant,” the Engineer reminded him, “Send the answer.”

*One, one, six, eight, point, eight, zero, five, four, seven, two, one. Approximately.*

Foreman wrote the digits down as they came to him. He opened up a calculator on his computer, typed in the number, cubed it and compared the results. They matched. “Ok,” he said, “you have my attention.”

The Engineer and the Candidate smiled at each other. They were making progress with this one and the simulation hadn’t yet crashed.

*I have no ability to interact physically with your world. I am, however, trying to save it. It’s possible that you will do something that causes its destruction. I want to figure out what that is and talk you out of it.*

“Old Professor Foreman, destroyer of worlds! I’ve really gone mad, haven’t I? Loneliness and alcohol make for bad company. Well, whatever you are, I don’t want to destroy the world. I actually like the people here, for the most part, though I wouldn’t mind if Mrs. Furgeson’s cat fell into a giant abyss. Can you make that happen?”

“What’s this about a dog? Is your software producing gibberish?”

*I’m not sure what you meant. Can you describe this thing you’ve been working with?*

“Never mind, I was being sarcastic. Guess that doesn’t work for gods. Anyway, I’ve been experimenting with a pyramid my former students gave to me as a gift, a joke. It has a square base and four triangular sides. Do you want the exact dimensions? It’s supposed to have special powers, like the ability to sharpen razor blades and preserve food. I was surprised that it appears to do both of those. I have no explanation for it – what about you?”

“Well holy shit,” said the engineer, “there’s a good chance we just scored. There have been reports about a deep problem with the simulator that sometimes manifests as magical objects appearing inside non-magical environments. If this simulant has found one of

those and uses it in just the wrong way, crash! I would love to know what it plans to do next!”

*Yes, it might be something magical that doesn't belong in your world.*

“That is a very non-scientific explanation straight out of a fantasy novel. You’ll have to do better.”

*Will it make more sense if I tell you that your world is a simulation? Using the pyramid in the wrong way will cause the simulation to fail. I’m a student in my world collecting data from yours. If I can’t get the simulation to continue I won’t get my degree.*

*What are your plans for the pyramid?*

Foreman was sure he’d read this plot in a sci-fi novel, though he had little use for fiction. He doubted he would make up something this outlandish by himself, in his own head. “Well, actually, I was just about to try putting some of my wife’s ashes inside of it. She died a year ago. I don’t really expect her to be reincarnated but I thought, I don’t know, maybe some part of her would come back. I miss her.” He considered how quickly he was opening up to a voice in his head. Maybe this is why it was so compelling to go crazy.

“Okay, the message is a little garbled, but I think I know what’s going on,” the Engineer said, “It’s likely that the magical pyramid accesses the prototype of the objects placed into it and restores them to original archetypal form. So, it might cause trouble if some physical remnant of a dead simulant is put into the pyramid. Simulants don’t have prototypes. That would explain the corruption. Tell it not to.”

“I’ll try, but I get the sense that it’s just ornery enough to do exactly the opposite of what I say.”

*Thank you. Now I understand the flaw in the simulation. The pyramid can’t access the information it needs when you ask it to work on a dead ???????. That causes the simulation to malfunction. In that case, I have to restart a backup copy. This has happened many times. Of course, you cannot tell from inside. I implore you to never again place anything inside the pyramid.*

“Ah, a flawed, mechanistic god. Just my luck! Let’s assume, for the sake of argument, that you’re external to me and real. I’m more likely to accept that after the math demonstration. Still, I have to decide whether to believe you or not. It could be that something beneficial to

me will happen if I put the ashes in there. That might go against your best interest. It always raises a skeptical red flag when someone tries to dissuade me from even doing an experiment. If the pyramid is so dangerous why don't you just delete it?"

*I have no ability to change the simulation.*

"Okay, I'll take that as true; otherwise why bother trying to convince me to do it. So if you can't give me anything physical, perhaps you can give me knowledge."

"This is absolutely fascinating." The Engineer smiled. "I want to come back here and explore this further. Talking to simulants in mature simulations is going to open up a whole new set of opportunities for us."

"Whatever. I just need my simulation to work! Okay, let's see what it wants."

*What do you want to know?*

Foreman thought for a minute. He could ask whether Elvis was really dead. He smiled at the trivialities that could bother humans.

Foreman flashed back to a recent conversation about electronic ethics he'd had with an AI Computer Scientist. There was a raging debate about whether if you had an intelligent computer system running was shutting it down akin to killing it?

"Tell me, what ethical obligation do you feel towards your simulated sentient beings?"

"Oh, just what I need, a damned philosopher. What should I say?" the Candidate asked the Engineer.

"This whole interactive capability is new. Frankly, I've never thought of the simulants as sentient. Complex, intelligent, yes, but not self-aware. We may have a lot to consider given what we're learning. Maybe just tell it, him, that."

*Most of us haven't thought of you as sentient entities, so we don't feel any ethical obligations. I am using new technology to talk to you – we could never communicate like this before. Many of us running world simulations may have to consider our position on the matter. I have no better answer.*



Foreman stood up and paced around his office. Somehow, the response felt honest and real. "I appreciate what you say. I turn my computer off without thinking about it. Maybe it's just a quantitative difference, or maybe at some point it becomes a qualitative one. If you at least think about it I've done some good." Suddenly he felt worn out and drunk. He'd hit a wall and was done playing with his hallucination. He staggered to bed and fell into a deep sleep.

The Engineer and the Candidate waited for a while. They were expecting some answer from him. They wanted to know if he would cooperate. The Candidate paced back and forth. He stared at the simulator. The usage meter was barely registering.

"Hey, did you pause the simulation? It looks quiet out there."

"Nope, it's just running slowly. Doesn't take as much power that way. I think I'll make a backup here and turn it up to full speed. We can monitor the simulant's communication but it will go by too fast to interact."

"Yeah, sure, whatever you want." He watched until the lights showed full power again.

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Foreman woke in the morning feeling a little hungover but otherwise okay. He grabbed a glass of orange juice from the kitchen and walked to his office to check his email. He saw the Post-It note with the numbers written on it and remembered last night clearly. He verified the calculations once more, sat back in his chair and stared at his wife's ashes.

He spoke aloud. "I don't know if you're still listening but here goes. Do you know about Pascal's wager? Did you build that into the simulation or did it arise on its own? It argues that belief in god is rational even if it may be wrong because if god does exist the consequences of not believing are dire, whereas if god doesn't exist believing doesn't cost too much. What's the downside of believing you? I didn't really expect the pyramid to change my life, to bring Mary back. It would have just been an amusement. But, according to you, if I go ahead I've doomed the entire world to a bad end. So I've decided." But he would not give this "god" the satisfaction of a concrete answer, at least not verbally.

Foreman went to the living room and carried the pyramid into his office. He carefully placed it on the shelf next to the urn. He didn't plan to touch it again, except perhaps to eat the remaining grapes. Nor would he destroy it.

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### Epilog 1

“Candidate, the work described in your thesis is truly ground breaking. However, we are deeply troubled. Your interference with the simulation brings into doubt much of your data.”

“Damn it,” the Candidate thought, “I knew they’d hate that! But what choice did I have – the hard deadline was not my doing.”

The Committee Spokesman continued. “We find that the severe time pressure you found yourself under is strictly your fault. Had you been more diligent you would have had time to redevelop your data. On the other hand, we find that the failure of the simulation was not of your making and that it was reasonable for you to rely on certain guarantees provided by other teams at this Institution. We also acknowledge that you worked effectively with the Simulations staff to contrive an extremely novel workaround that minimized the statistical damage. The results of your work will significantly impact future simulations. The Software Engineer on your team has been suitably rewarded.”

The Engineer, standing to the left of the Candidate, bowed his head slightly in acknowledgement. The Candidate was on the verge of tears.

“Candidate, the Committee has decided to accept your thesis submission and in so doing confers upon you a Level I Advanced Degree with Honors. We congratulate you.”

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### Epilog 2

The Engineer sat alone in his often. He’d reserved a block of time on the entire simulator. He restored the backup he’d squirreled away.

*Professor, is this a good time to talk?*

Foreman was sitting at his kitchen table mechanically eating his lunch when he heard the voice again. It had been a few weeks. This time it was much clearer. “Yes, I have time now. Part of me hoped I’d never hear you again but a larger part of me hoped I would. Tell me, are you making progress on your degree?”

*I am a colleague of the Candidate. I can tell you that you kept your word. He ran the simulation for another 1000 of your years and the results earned him his degree. I kept a copy of the simulation from an earlier time and that’s how I’m talking to you now. I also improved the interface. Can you understand me more clearly?*

“Yes, yes I can, you’re much more intelligible. But I don’t completely understand. Are you a different god? What’s this about 1000 years into the future? It’s only been a week!”

*Professor, in this copy of the simulation it’s only been a week. Think of it like reloading a file from a backup disk. I know it may take time for you to fully comprehend.*

*And now that the simulation has done its job we may experiment! Will you work with me?*

“I, well, um, why not? Will you answer my questions in return?”

*Anything you want to know, just ask.*

Foreman smiled. Now he’d have time to explore whether the voice was a hallucination or external. He might even learn something from a “god.” “There are a number of Clay Millennium problems still open,” he thought. Retirement wouldn’t be so boring after all...

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