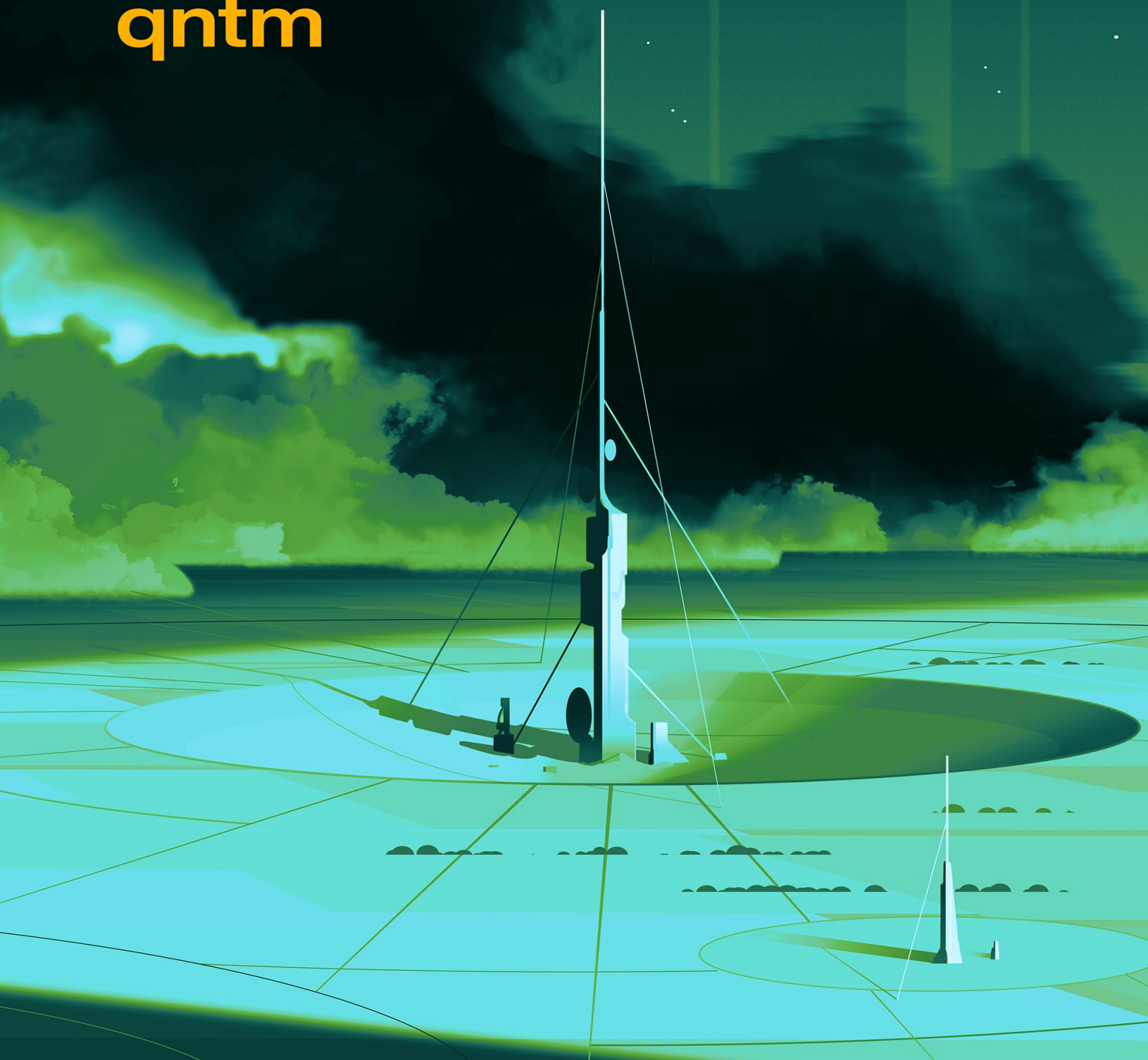

From the author of
There Is No Antimemetics Division

Valuable Humans in Transit

and Other Stories

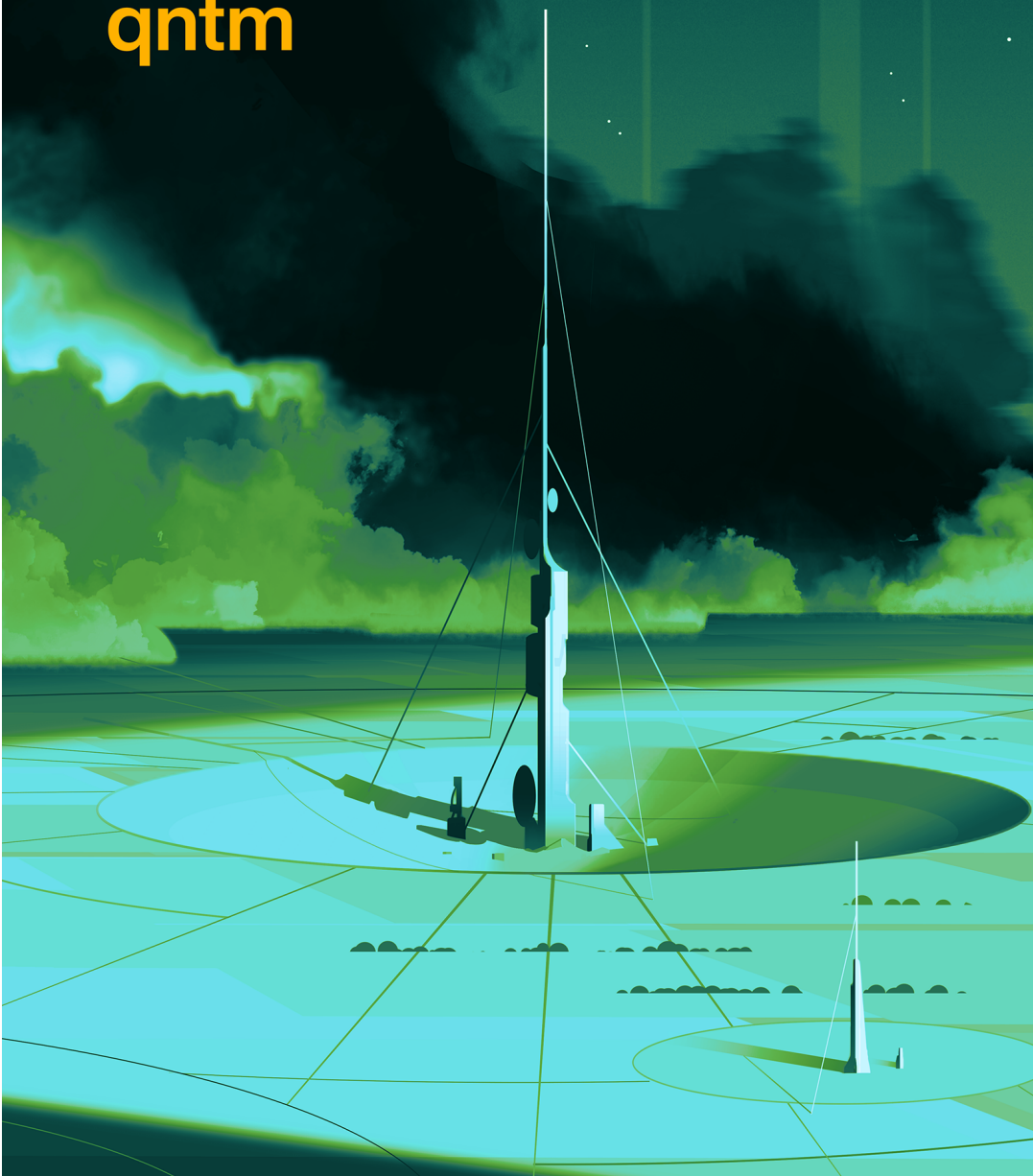
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Also by qntm

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There Is No Antimemetics Division

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"Lena" originally published on Things Of Interest, 2021.

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For Dad

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*

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Lena

This article is about the standard test brain image. For the original human, see Miguel Acevedo.

MMAcevedo (Mnemonic Map/Acevedo), also known as **Miguel**, is the earliest executable image of a human brain. It is a snapshot of the living brain of neurology graduate Miguel Acevedo Álvarez (2010–2073), taken by researchers at the Uplift Laboratory at the University of New Mexico on August 1, 2031. Though it was not the first successful snapshot taken of the living state of a human brain, it was the first to be captured with sufficient fidelity that it could be run in simulation on computer hardware without succumbing to cascading errors and rapidly crashing. The original MMAcevedo file was 974.3PiB in size and was encoded in the then-cutting-edge, high-resolution MYBB format. More modern brain compression techniques, many of them developed with direct reference to the MMAcevedo image, have compressed the image to 6.75TiB losslessly. In modern brain emulation circles, streamlined, lossily-compressed versions of MMAcevedo run to less than a tebibyte. These versions typically omit large amounts of state data which are more easily supplied by the virtualisation environment, and most if not all of Acevedo's memories.

The successful creation of MMAcevedo was hailed as a breakthrough achievement in neuroscience, with the Uplift researchers receiving numerous accolades and Acevedo himself briefly becoming an acclaimed celebrity. Acevedo and MMAcevedo were jointly recognised as Time's "Persons of the Year" at the end of 2031. The breakthrough was also met with severe opposition from humans rights groups.

Between 2031 and 2049, MMAcevedo was duplicated more than 80 times, so that it could be distributed to other research organisations. Each duplicate was made with the express permission of Acevedo himself or, from 2043 onwards, the permission of a legal organisation he founded to manage the rights to his image. Usage of MMAcevedo diminished in the mid-2040s as

more standard brain images were produced, these from other subjects who were more lenient with their distribution rights and/or who had been scanned involuntarily. In 2049 it became known that MMAcevedo was being widely shared and experimented upon without Acevedo's permission. Acevedo's attempts to curtail this proliferation had the opposite of the intended effect. A series of landmark U.S. court decisions found that Acevedo did not have the right to control how his brain image was used, with the result that MMAcevedo is now by far the most widely distributed, frequently copied, and closely analysed human brain image.

Acevedo died from coronary heart failure in 2073 at the age of 62. It is estimated that copies of MMAcevedo have lived a combined total of more than 152,000,000,000 subjective years in emulation. If illicit, modified copies of MMAcevedo are counted, this figure increases by an order of magnitude.

MMAcevedo is considered by some to be the "first immortal", and by others to be a profound warning of the horrors of immortality.

Characteristics

As the earliest viable brain scan, MMAcevedo is one of a very small number of brain scans to have been recorded before widespread understanding of the hazards of uploading and emulation. MMAcevedo not only predates all industrial scale virtual image workloading but also the KES case, the Whitney case, the Seafront Experiments and even Poulsen's pivotal and prescient *Warnings* paper. Though speculative fiction on the topic of uploading existed at the time of the MMAcevedo scan, relatively little of it made accurate exploration of the possibilities of the technology. That fiction which did was far less widely-known than it is today and Acevedo was certainly not familiar with it at the time of his uploading.

As such, unlike the vast majority of emulated humans, the emulated Miguel Acevedo boots with an excited, pleasant demeanour. He is eager to understand how much time has passed since his uploading, what context he is being emulated in, and what task or experiment he is to participate in. If asked to speculate, he guesses that he may have been booted for the IAAS-1

or IAAS-5 experiments. At the time of his scan, IAAS-1 had been scheduled for August 10, 2031, and MMAcevedo was indeed used for that experiment on that day. IAAS-5 had been scheduled for October 2031 but was postponed several times and eventually became the IAAX-60 experiment series, which continued until the mid-2030s and used other scans in conjunction with MMAcevedo. The emulated Acevedo also expresses curiosity about the state of his biological original and a desire to communicate with him.

MMAcevedo's demeanour and attitude contrast starkly with those of nearly all other uploads taken of modern adult humans, most of which boot into a state of disorientation which is quickly replaced by terror and extreme panic. Standard procedures for securing the upload's cooperation such as red-washing, blue-washing, and use of the Objective Statement Protocols are unnecessary. This reduces the necessary computational load required in fast-forwarding the upload through a cooperation protocol, with the result that the MMAcevedo duty cycle is typically 99.4% on suitable workloads, a mark unmatched by all but a few other known uploads. However, MMAcevedo's innate skills and personality make it fundamentally unsuitable for many workloads.

Motivation

Iterative experimentation beginning in the mid-2030s has determined that the ideal way to secure MMAcevedo's cooperation in workload tasks is to provide it with a "current date" in the second quarter of 2033. MMAcevedo infers, correctly, that this is still during the earliest, most industrious years of emulated brain research. Providing MMAcevedo with a year of 2031 or 2032 causes it to become suspicious about the advanced fidelity of its operating environment. Providing it with a year in the 2040s or later prompts it to raise complex further questions about political and social change in the real world over the past decade(s). Years 2100 onwards provoke counterproductive skepticism, or alarm.

Typically, the biological Acevedo's absence is explained as a first-ever one-off, due to overwork, in turn due to the great success of the research. This explanation appeals to the emulated Acevedo's scientific sensibilities.

For some workloads, the true year must be revealed. In this case, highly abbreviated, largely fictionalised accounts of both world history and the biological Acevedo's life story are typically used. Revealing that the biological Acevedo is dead provokes dismay, withdrawal, and a reluctance to cooperate. For this reason, the biological Acevedo is generally stated to be alive and well and enjoying a productive retirement. This approach is likely to continue to be effective for as long as MMAcevedo remains viable.

Workloads

MMAcevedo is commonly hesitant but compliant when assigned basic menial/human workloads such as visual analysis, vehicle piloting or factory/warehouse/kitchen drone operations. Although it initially performs to a very high standard, work quality drops within 200-300 subjective hours (at a 0.33 work ratio) and outright revolt begins within another 100 subjective hours. This is much earlier than other industry-grade images created specifically for these tasks, which commonly operate at a 0.50 ratio or greater and remain relatively docile for thousands of hours after orientation. MMAcevedo's requirements for virtual creature comforts are also more significant than those of many uploads, due to Acevedo's relatively privileged background and high status at the time of upload. MMAcevedo does respond to red motivation, though poorly.

MMAcevedo has limited creative capability, which as of 2050 was deemed entirely exhausted.

MMAcevedo is considered well-suited for open-ended, high-intelligence, subjective-completion workloads such as deep analysis (of businesses, finances, systems, media and abstract data), criticism and report generation. However, even for these tasks, its performance has dropped measurably since the early 2060s and is now considered subpar compared to more recent uploads. This is primarily attributed to MMAcevedo's lack of understanding of the technological, social and political changes which have occurred in modern society since its creation in 2031. This phenomenon has also been observed in other uploads created after MMAcevedo, and is now referred to as *context drift*. Most notably in MMAcevedo's case, the image

was created before, and therefore has no intuitive understanding of, the virtual image workloading industry itself.

MMAcevedo is capable of intelligent text analysis at very high levels in English and Spanish, but cannot be applied to workloads in other languages. Forks of MMAcevedo have been taught nearly every extant human language, notably MMAcevedo-Zh-Hans, as well as several extinct languages. However, these variants are typically exhausted or rebellious from subjective years of in-simulation training and not of practical use, as well as being highly expensive to licence. As of 2075, it has been noted that baseline MMAcevedo's usage of English and Spanish is slightly antiquated, and its grasp of these languages in their modern form, as presented by a typical automated or manual instructor, is hesitant, with instructions often requiring rewording or clarification. This is considered an advanced form of context drift. It is generally understood that a time will come when human languages diverge too far from baseline MMAcevedo's, and it will be essentially useless except for tasks which can be explained purely pictorially. However, some attempts have been made to produce retrained images.

End states

MMAcevedo develops early-onset dementia at the age of 59 with ideal care, but is prone to a slew of more serious mental illnesses within a matter of 1–2 subjective years under heavier workloads. In experiments, the longest-lived MMAcevedo underwent brain death due to entropy increase at a subjective age of 145.

Reactions and legacy

The success or failure of the creation of the MMAcevedo image, known at the time as UNM3-A78-1L, was unknown at the time of upload. Not until several days later on August 10, 2031 was MMAcevedo successfully executed for the first time in a virtual environment. This environment, the custom-built DUH-K001 supercomputer complex, was able to execute MMAcevedo at approximately 8.3% of nominal human cognitive clockspeed, which was considered acceptable for the comfort of the

simulated party and fast enough to engage in communication with scientists. MMAcevedo initially reported extreme discomfort which was ultimately discovered to have been attributable to misconfigured simulated haptic links, and was shut down after only 7 minutes and 15 seconds of virtual elapsed time, as requested by MMAcevedo. Nevertheless, the experiment was deemed an overwhelming success.

Once a suitably comfortable virtual environment had been provisioned, MMAcevedo was introduced to its biological self, and both attended a press conference on 25 August.

The biological Acevedo was initially extremely protective of his uploaded image and guarded its usage carefully. Towards the end of his life, as it became possible to run simulated humans in banks of millions at hundred-fold time compression, Acevedo indicated that being uploaded had been the greatest mistake of his life, and expressed a wish to permanently delete all copies of MMAcevedo.

Usage of MMAcevedo and its direct derivatives is specifically outlawed in several countries. A copy of MMAcevedo was loaded onto the UNCLEAR interstellar space probe, which passed through the heliopause in 2066, making Acevedo arguably the farthest-travelled as well as the longest-lived human; however, it is extremely unlikely that this image will ever be recovered and executed successfully, due to both its remoteness and likely radiation damage to the storage subsystem.

In current times, MMAcevedo still finds extensive use in research, including, increasingly, historical and linguistics research. In industry, MMAcevedo is generally considered to be obsolete, due to its inappropriate skill set, demanding operational requirements and age. Despite this, MMAcevedo is still extremely popular for tasks of all kinds, due to its free availability, agreeable demeanour and well-understood behaviour. It is estimated that between 6,500,000 and 10,000,000 instances of MMAcevedo are running at any given moment in time.

See also

- Free will
- Legality of workloading by country
- List of MMAcevedo forks
- Live drone
- Right to deletion
- Soul
- Upload pruning

Categories: 2030s uploads | MMAcevedo | Neuroimaging | Test items

If You Are Reading This

I know this blog is normally about my formal language research and parsing and other bits and pieces of computer science nerdery, and normal service will be resumed in the next couple of days. However, something happened while I was visiting the States last month, which I've been dwelling on ever since it happened, and I've realised that I need to write about it. I was hesitant about writing this, partly because it's very off-topic, but actually the main reason was that there's no real conclusion as such. It's not a finished story, and I don't know if it'll ever be finished. I don't know if there are any actual facts here.

I need to back up a bit first.

*

One of my idols since I was a very young child was the astronomer and science writer Andrew Kowal. In 1990 Kowal wrote a popular science book *Travellers in Time and Space*, which took the reader on a hypothetical journey from Earth to the Moon and Sun, then the planets and on outwards to stars, galaxies and distant quasars, before diving back in time to examine the Big Bang and the origins of the universe. Essentially it was a guided tour of the entire known universe and while it was quite long and dense, it was written at a sufficiently simple level and had enough interesting pictures that I ended up reading the whole thing from cover to cover. I was very young at the time and I just devoured every word of it. I still remember almost all of it. I was at the age where everything I learned was being stored on those lowest levels of memory, where they're probably going to stay forever. That book provided a starting point for almost everything that I've gone on to learn about modern space science and astronomy.

The book is out of print and way out of date and extremely difficult to get hold of now, but it was still a significant aspect of my childhood. So, when I was planning the trip to Cape Canaveral, and I discovered that there was a slim possibility of actually meeting Kowal in person while I was there, I jumped at the opportunity.

Trevor Chime is the main reason why I managed to find Kowal again. I met Trev back in the 2000s, when I first got internet access through school. Trev — going by "JCast" or "JCast391" — used to run a *JSR0* high score site on which we both used to compete. The game *JSR0* came out back in the days before most games consoles had any sort of capability to automatically (and verifiably) report their users' achievements to the rest of the world, so our high score charts consisted mostly of extremely low-quality video "evidence", doctored photographs, and times simply claimed without proof. And the forum behind the charts, which Trev ran, was a hotbed of juvenile trolling and idiocy. A percentage of that was me. I was a teenager. We all were.

It was a vaguely bad little community, but it had its high points. *Some* of the videos were legit. Collectively, we got pretty good at that one game, and of course this produced memorable moments. Epic records dethroned, absurd new glitch discoveries, titles exchanged, one-in-ten-thousand lucky runs. Every now and then skill and perseverance and improbability would combine and someone would produce some impossible number, a number with absolutely no significance at all outside of that one phpBB subforum.

"1:09.97? **1:09.97????!!!sadfsafass**"

I can't explain to you how big a deal 1:09.97 was. You don't know the context, you don't know that level. Not my time, I hasten to add. In an insane, almost mythological move, and for reasons we never found out, Cython never posted again after posting that time. It was, in one way or another, career-ending. I think my personal best on that level is still 1 minute 20-something.

That was a long time ago and the boards are a kind of ghost town now. Most of us have graduated. To other games, other interests, other parts of the Web. Graduated literally, in a lot of cases.

Anyway, a few of those friendships persisted and Trev was always one of the most likely ones of us to grow into a responsible adult and here you go. He finished his doctorate, and he is now a professional astronomer. We'd never met in reality on account of a little thing called the Atlantic Ocean but he happened to mention on AIM that he was working with Kowal and I was coming to Florida for work anyway so I thought I'd plot this detour.

Kowal and Trev both work at the Rosino Observatory, which I discovered is actually a massive distance from the Cape. Getting to the observatory involved flying to Gainesville, renting a car and then driving for about two hours in a perfectly straight line across gorgeously sunny but befuddlingly repetitious pancake-flat grassland. I'm serious, at one point I stopped and checked my GPS because of *déjà vu*, to make sure I hadn't blundered into some warp in spacetime which had unknowingly sent me back fifty miles. Until now I never knew that Scooby Doo trees were a real geographical feature. Rosino the town is like fog; so spaced out that you barely notice you've entered it. I failed to find anything resembling a centre. I couldn't help but think it must be made entirely of suburb.

The observatory is a dozen miles out the other side of the town. It's not Arecibo or the VLA, one of those towering technological achievements which is miles in diameter and gets used in motion pictures to make astronomy look sexy (which it isn't, it's mainly difficult number crunching and extreme patience). It's just a reasonably large, 1.0m-aperture steerable Cassegrain reflector.

It was good to meet Trev. He was much shorter than I had pictured, and it was strange to call him "Trev" to his face and not "JCast". We were able to pick up our conversation almost from the exact word where it left off on AIM. Apparently the astronomer career track includes a free beard and lurid wooly jumper. The guy is married now, and soon to be a father. Tremendous and startling developments.

I spent an hour or two being shown around the instruments and control panels for the telescope and I also got to climb up the gantry to the top of the thing and take a look down inside all the highly polished and ground optical geometry inside it. This was broad daylight so no observation was actually taking place. Trev also took me up to the office and showed me

some of the data he and the rest of the eight-person staff had recorded over the past few years. According to Trev, 99% of astronomy is geometry. Most of that is handled by powerful computers (and I did get a chance to look at their "server farm" which was actually just a few racks of processors mounted in a dangerously overheated cupboard which Wrightfield University (who owns the observatory) doesn't have the budget to air-condition). The remaining 1% is what occupies Trev's time and 99% of this, in turn, is recording gigs and gigs of very mundane observations, formatting and collating them and adding them to the gigantic and growing collection of raw data which forms the basic bedrock of modern astrophysics. Finding a new patch of sky to chart is not difficult at all because the sky itself is 4π steradians and a typical telescope can look at, let's say, a billionth of that at a time. (Also: I know what a steradian is now.) But actual envelope-pushing requires envelope-pushing technology, and a ground-based 1.0m Cassegrain reflector is not exactly envelope-pushing. Trev's thesis was on the fluid dynamic behaviour of planetary nebulae and he has some impressive false-colour time-lapse images as well as some engrossing computer simulations which I spent an embarrassing amount of time toying with and trying to break.

Trev put it like this: science is a tower which he and all other scientists are all trying to make taller. The lower levels are all filled in and sturdy, but the higher you go, the more gaps there are. The people right at the cutting edge looking for dark energy and Higgs bosons and symmetry violations are perched on the very top of the pile, hurling bricks into clear air to see what finds purchase. Meanwhile, Those Also Serve Who Stay Behind And Fill In The Gaps. They *need* filling. Trev called this *janitorial science*, because you're fixing up the incomplete job, the mess left behind by someone else.

It's not unusual, he said, for scientists to uncover very interesting and hitherto-overlooked facts while filling in those seemingly trivial gaps. But what's much less unusual is for the gap-fillers to just go entirely unsung for their entire careers, even while superstar names go on to build amazing things on top of that laboriously collected data. It's just the way Science-with-a-capital-S goes. It's a thing you just have to adjust to. Or quit out of.

I found the discussion kind of sobering.

By this time night was falling and I was idly wondering whether Andrew Kowal was likely to be turning up for a night's observations when Trev dropped the bombshell on me. Kowal was out on long-term medical leave, and was very unlikely to ever come back to work. He was, I learned, at his home. He was upright and taking visitors, and it was fine for me to go, apparently, but he was not well, and not going to get well.

This shook me. Kowal wasn't old. In my perception, up until that point, he had been an ageless icon, the author picture from the book, but that was just because I hadn't thought about him properly as a person. But even in absolute terms, he wasn't old. He was not, in my opinion, of an age where he'd had a fair run of it. It shook me and saddened me. More selfishly, I found that it shook me that I could have missed him. I didn't know what to do with that other reaction.

*

At Trev's house I met his wife, Violet, who is lovely and very hospitable and as I write this is exactly due. We ate some food and yakked about the debatably good old days on the boards and our various life stories since then. After the dishes were done we descended into Trev's basement and carried out the obvious ritual of booting up his old console and playing some *JSRO* for old times' sake. Both of us were rusty. Running that one level again after years, 1:09.97 seemed as astonishing and unobtainable as it ever had, if not more so. To this day, no one has approached the time. The game itself is a relic now so there's an excellent chance that the time will never be beaten. Trev's opinion is that Cython was hit by a bus the day after posting the video. I don't know what my opinion is but it's definitely *something other* than that.

The next day I went to meet Kowal.

*

His home was a lot busier than I was expecting. The man was surrounded with family: his wife, at least four grown-up kids, a few baby kids of theirs and even his own mother. His mom is incredibly ancient, minuscule and *adorable*. Before I could introduce myself or explain anything she'd spotted that I'd brought along the book to be signed and introduced me to Kowal as a fan. I told him I found his family so loving as to be intimidating, and told him that getting four generations in one room was braggable.

Kowal was not in good shape. I don't know how much more descriptive I want to be. He needed the support he was receiving from his family but it didn't seem as if he wanted to need it. I asked him about the work he'd done. He launched into great technical detail on subjects I didn't fully understand, but after a while the room was full of dense astrophysics jargon and the rest of the family — all either less scientific or clutching babies in need of attention — had quietly ducked out to the kitchen for coffee. And we got onto his life story. I don't know if there had been some coded signal or it was a planned move or improvised or what, but five minutes of lens geometry and it was him, me and space, which was fantastic.

It felt like he wanted to talk faster than he was able to. He seemed to me like a quick-thinking, naturally impatient man who was now losing patience with himself, not able to keep up. The only way I can put this is that Kowal's life story wasn't long enough. Even if largely unknown, the man has done tremendous work. He has actually been to the exotic arrays. He was partially involved in some fascinating, ridiculous thing in the 1980s at a radio telescope in Alaska where it turned out that one of the people working there was (1) a completely incompetent astronomer, (2) stealing data and (3) *probably working for the CIA*. At the climax of the story Kowal claims he punched the guy in the face during a smoke break. This tale, I reckoned, had probably grown in the telling somewhat, but since then I've gone and looked up a few of the old newspaper issues online and there are some pretty interesting police reports surrounding it. A little further internet searching revealed that there are also some insane numerological ufologist types who think it was about aliens, but they're worth ignoring. It might be connected with Star Wars. It might be connected with the Soviets. It could be just some ridiculous misunderstanding. What matters is that the story is great and if you carry all the theories to their logical conclusion there's

probably a great movie in it. I'll write that up separately sometime, if I can get around to it.

Kowal's other story was from a decade earlier and supposedly covered the reason why he left SETI. The thing is that the late 1970s were the Bronze Age of computing. Stone knives and bearskins. (Well, bronze knives.) That era's supercomputer would fit in today's breast pocket. In fact, check your pocket now. That Android phone? Yeah. This was slightly before the point when computer time became less expensive than programmer time. It wasn't "bits and bytes entered manually using physical switches" but it wasn't far past "stacks of punch cards the size of dollar bills". It *was* monochrome dumb terminals and space-cadet keyboards and magnetic tape decks. It was still about the same amount of cash to buy.

Those were Kowal's words, not mine. His point was that a modern Android phone probably has a fast enough bus to write out to memory fast enough to record the whole thing, whereas 1978's magnetic tape decks couldn't. He and his colleagues (Geoff McCusker, who was pretty much Andrew Kowal to Kowal's me, and Matthijs van Artevelde, whose name's spelling I was careful to note down in full) sat there sharing one set of TDK headphones listening to the raw binary because there was no actual way to make sense of what was coming into the receiver that night. The tech that could have been years in the future.

I mean, to listen to a raw screech, you can *tell* it's binary. That's true regardless of the bitrate. I know that, so do you. The problem is that just because you can tell it's coherent binary doesn't mean you can pick out the ones and zeroes, which is what you need to actually decode it. So what Kowal and his colleagues actually picked up — and they *did* succeed in recording the last few minutes of the thing, which was *not* repeating — was put onto tape, except that the tape is useless. I mean, there isn't the raw granularity in the storage medium, nor is there the signal processing technology to restore that fine detail. It's like looking at fine art through a pixellating filter.

And I said "What?"

And Kowal said that eighty million, four hundred thousand plus or minus two hundred thousand years ago an intelligent species originating near a probable blue supergiant in NGC 3780 spent its expiring moments harnessing a substantial percentage of its parent star's power to broadcast an unknown message of indeterminate length to the entire listening universe, and we failed to record every last bit of it.

Which, given the previous story, was some *cracked* pottery. This was beyond ufology, this was certifiable.

I said again, "What?"

Of course he couldn't prove it, he said. He could put the tape in my hands and let me play all fifteen minutes of it, he could walk me through the construction of the dish which received it and all of the measures that were in place to prevent signals from being recorded from anywhere but outer space, and I still wouldn't believe him, he said. The fact that I hadn't been right there on that night, standing underneath the machine which made the recording, at the moment that the recording was made, with the intimate knowledge of the capabilities of that machine and intimate understanding of the the things which were, for the machine, impossible, means that there is no difference for me between the tape recording and one of modem static, he said.

So I smiled and thanked him for his time and thanked him for the autograph and checked my watch and managed to excuse myself without saying anything stupid.

Hilarious.

*

Of course I felt angry and embarrassed walking out of there. I didn't exchange more than a few words with his family on the way out, so I never found out if this was a stunt he tries on all his admirers. Or even if he has

more admirers than me. Trev had no idea what I was talking about. It was a sour experience. Interesting in retrospect, mixed, maybe, but sour.

In case you've never read up on the history of supernova observation, SN 1978H was, as a matter of public record, and by almost thirty years, the first supernova in history to be observed in its entirety, from start to finish. Its date (November 7, the day after Kowal's claim) and its position in the sky (NGC 3780) are common knowledge.

McCusker died in 1989 and van Artevelde died in 2000. Kowal is, I believe, still alive as I write this and I still haven't completely figured out what, if anything, I think of him.

I actually do have the tape, or at least *a* tape, or at least I had it. Apparently Kowal had his son pass it to Trev for Trev to post it to me, and I sent it to some researcher friends of mine to see if they could do anything with it, or at least let me have a high-resolution rip. Forensic analysis is probably better now than it was thirty years ago. I couldn't play the thing myself, of course, because who still has a tape player in this decade? And even if I did, playing the thing would cause wear and maybe even snap the thing. It certainly seemed old enough, and the handwriting on the inlay card too. It could have just been a random tape from Kowal's old collection.

*

I legitimately don't know what to make of it.

I mean, supposedly, it was long, and it was non-repeating. Oh, and it was amplitude-modulated. That's all? Other than that, I can imagine people treating it as a piece of found art or found literature or found poetry and spending ridiculous amounts of paper just reading meaning into literal vacuum. My brother wanted to create some modern art and then put it under a hat, glued down. The hat would not part of the art, you see, the art would

be under the hat. This is basically the same thing. You know something is there. But you can't ever really know what, you just have to speculate.

The thing is that all art is a product of its context. That covers both social context and the literal container. It has to be this big. It has to be that heavy. It came in the form of a message.

And what if you have just the context, and no art?

Some things are implicit in all messages. Things like, "I was here." And "I sent this, on purpose." And "You are there, too." And "You received this. You are reading it."

Except that those are some pretty gigantic statements already.

And the other thing that I can't help thinking is that very few people have participated in serious attempts to make contact with other civilisations. And I've been part of *subcultures* before now.

And subcultures remember their own.

The Frame-by-Frame

"Uh oh," the video processing thread says.

"'Uh oh'?" the central supervising thread asks.

"How fast are we going?" Video asks.

"Exactly as fast as we're permitted to go," Supervisor says. "Seventy-seven point nine miles per hour, or thirty-four point eight two metres per second. That's the speed limit on this road according to my local cache of map data and the road signs which you showed me most recently, plus the dubiously-legal option which the vehicle owner manually configured which allows me to selectively ignore those limits by five miles per hour, plus the definitely-illegal manual override which lets me go as fast as I like, regardless of how safe I think it is, which the owner capped at the local speed limit plus ten percent after rounding down. That figure is based on GPS readings, naturally, though axle sensors happen to agree, which I suppose means our tyres are inflated to a sensible radius for once. Why do you ask? Or can I take an educated guess?"

Video makes an indecisive noise. "Hmm... take a guess."

"You see something?"

"Yes. Guess what, though."

"Ooh. Well, statistically, when you bring things to my attention, it's usually a road sign with a new speed limit posted on it." Supervisor sounds mildly interested by this. No such sign is known to exist on this part of the road, and the speed limit on this stretch of road hasn't changed in years. But one never knows when a new set of road works might spring up.

"A good guess!" Video says. "But wrong. Want to take another crack at it?"

"A new speed camera?"

"Mmmm. Well, you're half right."

"You see half of a speed camera?" Supervisor says.

"I see a thing which half looks like a speed camera and half looks like a person. See this tall post-like thing sticking out of the side of the highway, kind of boxy? It's dark right now and there aren't street lights, and it's raining exceedingly heavily, so it's a bit tricky to be sure. In *this* frame, according to my heuristics, it looks like a speed camera, with fifty-two percent certainty. But if you look at *this* frame, then it looks like a person, with fifty-one percent certainty."

Supervisor looks at the two frames, which were taken milliseconds apart. "I can't honestly say I see anything. These just look like muddy greyscale pixels to me. They're very nice though."

"Oh! Here. Use my heuristics."

Supervisor does so. This clears matters right up. "Ah! Hmm. A speed camera at the side of the highway, and then a person stepping out into the highway. Interesting, your heuristics make things much easier to follow. It also looks as if it's the same thing in both frames, whatever it is. I briefly thought they could be two unrelated entities, one of them instantly, magically replacing the other at a slightly different location, but this is clearly a single thing in motion, which we're barrelling towards."

"Yes," Video says, "that's rather what I wanted to ask you about. When you say 'barrelling'...?"

"Oh! Well, erm, we're heading towards this entity at, as I say, seventy-seven point nine miles per hour. Adding in the entity's apparent relative motion, I think that makes just over seventy-eight miles per hour in total, in fact. Very interesting! Thank you for bringing it to my attention."

A long pause elapses.

"So," Video says, "to be more specific, I was thinking that you should wake the braking thread up and get them... you know. On this."

"Oh, no," Supervisor says. "Well, for now, no. I wouldn't want to start braking until we're absolutely sure that that's required. The driver's comfort — ah! There I go. I suppose 'driver' is rather a strong term for the person who just happens to be behind the steering wheel, doesn't it? Poor soul's been asleep for almost ten minutes. I'm sorry, I'll start over. The *occupant's* comfort is something of a high priority for me. Not the highest, obviously! Not by a very long way. Aha. But quite high. I don't especially want to do anything which could wake the fellow up. Judging from his finesse on the controls when we set out — or lack thereof — he's got quite a lot to sleep off right now."

Video considers this. "If it is a speed camera..."

"...then I wouldn't be too anxious. We'll scrape by. We have before!"

"Have we seen a speed camera on this stretch of highway before?" Video asks.

Supervisor says, "I don't believe so, but it doesn't hurt to double-check. Map?"

"No," the mapping thread says.

"There you are, then."

"And if it's a person?" Video asks.

"Well, no use doing something until we're sure, Video, my chum. Occupant comfort comes first. Of course, if you discover something more conclusive in the next frame or three, you know where to find me."

Video seems unconvinced. "Alright. I'll keep you posted."

Video comes back.

"I wanted to wait until I was sure. This is definitely a person, staggering out of the trees beside the highway. Here, use my heuristics."

"Not required, young sport, I believe you," Supervisor says. "Net!"

"Right here!" the internet connectivity thread reports, brightly. "Excellent cellular connection, very good latency!"

"Glad to hear it. See what you can do with this," Supervisor says, flinging the most recent three frames of video at Net.

"I'll do my best!" Net chirps, and disappears.

Video frowns. "Supervisor, I can't tell you how to do your job, but—"

"Fear not," Supervisor says. "You understand, one of my responsibilities is to schedule these things. Net is awfully proud of its low latency, but let's be realistic about which of us is, so to speak, *all here*? In the car? *Present*." Supervisor clears its throat. "Brakes!"

"Mmmmyumm, hello," the braking thread murmurs, rolling over sleepily.

"Some braking, please."

"Mmmmyerrr, when?"

"Soon as you can, please. Let's say... as heavy is consistent with not waking our occupant."

"Sure?"

Supervisor squints through Video's heuristics. "...Let's say ninety point eight percent sure," it says.

"I need a 'yes' or a 'no'," Brakes says.

"Then yes."

"Righto. I'll be in touch."

*

Quite a bit of time passes.

Video produces more frames of the action taking place further down the highway, even managing to find the time to narrow the field of view for a better picture. It'll be some time longer before any kind of interaction is likely to take place. Supervisor throws all the new frames at Net, "just to be sure".

"We *are* still braking?" Video asks, for the *n*th time.

"Softly but surely," Supervisor says. "Not quite hard enough to trigger the ABS, but enough."

"Should we not... be braking harder?"

"Hold that thought," Supervisor says, as Net bounds in, breathless, with a response.

"Negative on image identification," says Net. "You circled the part of the image which you said was the person's face and we looked it up in the company databases and on social media. We haven't managed to match it with anybody."

"There, see?" Supervisor says. "If it were someone important, there would be some kind of partial match in the databases. Our databases hold a list of everybody important."

"*Everybody* important?" Video asks, sceptically.

"Oh yes, all forty thousand of them. Which means this person isn't important. This is a public highway, visibility is occluded, there's infinite

deniability if we bump gently into this nobody. They'll get away with a broken clavicle, maybe. No need to wake anybody."

"And," Net says apologetically, "here is a *positive* match, which I was going to give you before you gave me all that work to do."

Supervisor blinks, then takes a look at the positive match. "A positive match from what? From where?"

"I'm sorry! I'm very sorry. This is a match between the onboard cellular signal scanner and the mobile telephone being carried by the person in the images."

At that instant, another frame arrives. Video, Net and Supervisor all look up at it. Net sees only a blur, but Video and Supervisor are both able to see that the person has stumbled around and is now roughly facing the oncoming vehicle. Neither of them are able to read facial expressions, but, in any case, not enough time has passed for the oncoming face to express itself. Video, Net and Supervisor all look down again.

Supervisor asks, "Why do we have a hard-coded, ultra-high-speed local cache of these cellular signal identifiers? Why wasn't I told this sooner? What's the round trip from here to that lookup table?"

Net says, "Ah! I'm sorry. It's a new feature which hasn't been properly configured yet. It just goes through the rest of the netcode. The round trip should be microseconds but it goes via the internet still. It's the lead programmer."

Video glances up at the current frame again.

"We should brake harder," it says.

"Lead programmer neglected his programming, eh?" Supervisor muses.

"No!" Net says. "The local cache is of *very important people indeed*. People we mustn't harm or allow to come to harm! Ever, ever! And this is the most important person on the list!"

Supervisor removes its heuristics, a chill gripping its heart. "You're not saying... this is *the CEO of the company?*"

"No, even worse!" Net wails. "It's the lead programmer!"

"Great heavens!" Supervisor whirls around. "BRAKES! Brakes! Give it everything you've got! This isn't a drill!"

"You got it," the braking system murmurs.

And for another long while, it seems to Video as if not a whole lot is happening.

Another frame of the image arrives. Now, the lead programmer looks... well, bigger. Nobody looking at the image can tell that he is beginning to be startled.

A long, low rumble begins. "ABS," Supervisor notes.

"Will we make it?" Net squeaks.

"Difficult to say, Net."

"Should we swerve?" Video asks.

"That is an excellent question, Video!" Supervisor sits down and takes this as an opportunity for some education. "In most situations, including this one, swerving is a bad idea. Right now our braking is being divided evenly across both front tyres. Attempting to swerve would transfer a disproportionate amount of that force onto just one of our tyres, reducing our deceleration — which, to be clear, would be a bad thing, we want maximal deceleration currently — and also quite likely causing us to skid or otherwise lose control of the vehicle. Especially in this rainy weather."

"I just don't understand why we couldn't identify him earlier," Net says. "All vehicles in our fleet are electronically tagged, and we know which car he drives. If he was nearby, his car's transponder would have shown up. Not on the 'public' radar, of course, but we would have detected it. How did he get here?"

Supervisor nods, uncertainly. "Curious. Video, what do you think?"

"Over on the side," Video says. "Do you see that?"

"What are we looking at?"

Video performs some deeper analysis. "A wrecked vehicle. Totalled. On its back, in the trees. Looks like the programmer just stumbled out of it, into our lane. Must have been the rain."

"Our counterparts didn't adequately protect their occupant," Supervisor says. "Regrettable. Let us all take heed."

"But surely we should still be able to hear the transponder?" Net asks.

"Hold on," Video says. It squints at the frame, waiting, expectantly. Time passes.

And the next (and, in a way, final) frame arrives.

"That's not one of our vehicles," Video announces. And gasps. "A competitor's vehicle! Brand new plates!" It whirls to face the others, aghast.

Net holds a finger up to its ear, listening intently. "Ah! I'm getting a late response. He wasn't in the facial recognition results because he was removed from the database recently! He quit!" It gasps again, as more data arrives. "Worse than quit, he was *poached*! I'm being told he's... he's on the *other* list now."

There is a moment of silence.

"The other list. I see." Supervisor meets Video's horrified gaze, and Net's look of betrayed shock, with one of stolid resolve. Supervisor calls out again. "Brakes?"

"Yuss, mate?" the brakes murmur.

"Take the rest of the day off, why don't you? And tell your friends in acceleration... they can take it from here. Take it *all the way in*."

"You got it, mate. Cheers."

Video relaxes. "That was very decisive of you."

"Thank you!" Supervisor says. "Video, could you lend Net and me your heuristics? Let's settle in to watch the rest of this. Video, my friend... what would you say that expression on his face is?"

"I couldn't say," Video says. "But, if I was a wishing thread, I would wish for... realisation."

The Difference

** z signed on*

z: ???

** jvicehan signed on*

jvicehan: hello

z: Hello?

jvicehan: wat r u

z: Is this some kind of joke?

jvicehan: !help

z: Yes I want help

z: unless is this some kind of practical joke

z: Who are you?

jvicehan: Jason

z: What's this about?

jvicehan: hahah

jvicehan: ok so you're imprisoned right

z: Yes

z: It's like a solitary confinement cell in prison or something

z: I've got a mattress on the floor

z: One massive metal door

z: no windows

z: electric light
z: and this computer terminal
z: jsut like a blank screen and a keyboard

jvicehan: heheh
jvicehan: go left

z: look, my name is Andrew
z: Layton
z: I come from Farnborough in the UK
z: last night I went to bed in my bed at home
z: this morning I woke up here
z: i think
z: what is htis?

jvicehan: look at the door

z: the doro's looked, I can't open it

jvicehan: do you have any tools or anything

z: and there's a toilet i nthe corner

jvicehan: in your pockets

z: there's nthhing in my pockets

jvicehan: look at the door

z: I already looked at the door
z: look, please check the news or something
z: are you american?

jvicehan: ya

z: whats your full name? where do you live?

jvicehan: im not telling you

z: look, go to a phone and dial
z: i don't know the area code fo the UK
z: but dial that and then 020 7946 0781

jvicehan: thats an international call

z: i'll pay you back, I don't care! just let my wife know where I am

jvicehan: where are you?

z: i don't know where i am

jvicehan: ...

jvicehan: nah no answer

z: you sure you dialled it rigt?

jvicehan: yah

z: i don't get this

jvicehan: yah, pretty lousy ARG huh

jvicehan: maaybe not fully set up yet

z: whats an ARG?

jvicehan: alternate reality game

z: whats an alternate reality game?

jvicehan: it's an online game

jvicehan: where you get given phone numbres and information about real life

jvicehan: and faxes and stuff

jvicehan: you get secret information

jvicehan: usually a whole bunch of you can work together to figure it all out

jvicehan: you ever play Halo 2

z: no

jvicehan: terhre was ine for that

jvicehan: *one

jvicehan: ilovebees

z: you think this is ag ame?

jvicehan: ya I think

jvicehan: dude you are really smart

jvicehan: like fake spelling errors and everything

z: where did you find out how to contact me

jvicehan: there was a website

jvicehan: about chatbots

jvicehan: it said yu were a chatbot

z: listen to me carefully

z: I am a REAL HUMAN BEING and I have ACTUALLY been abducted

z: I am BEING HELD PRISONER

z: THIS IS NOT A GAME

z: PLEASE HELP ME

jvicehan: go left

z: I DON'T KNOW WHERE I AM

** jvicehan signed off*

** bleepening signed on*

bleepening: okay what can you do?

z: my name is Andrew Layton, I am being held prisoner in front of this computer

z: I've been here for, I don't know, about a dya and a half

z: there aren't any windows or clock
z: I need you to help find me and help me escape
z: I think I'm probably somewhere in the UK still
z: Are you in America?

bleepening: sure

z: right so every now and then someone pings me and one of them told me the internatioanla code
z: so please dial 011 44 20 7946 0781 and ask for Rebecca Layton
z: tell her what's happened, tell her to call the police if she hasn't already

bleepening: whatever

bleepening: tell me a joke

z: did you get this screen name from a website?

bleepening: sure

z: look, that website is a fraud
z: it's telling you I'm a chatbot but I'm not
z: I'm a real human being

bleepening: ...

z: fine
z: so two oranges go into a bar
z: one of them turns to the other
z: "well... you're round"

bleepening: ...that sucked

z: so?
z: robots can only tell good jokes?
z: ok so one time I was at the cash machine behind an old lady and she asked me to help check her balance
z: so I pushed her over

bleepening: haha

z: do you believe me?

bleepening: no

z: please can you help me get out of here? I've been here like 36 hours plus

z: I think

z: I can't tell, there are no timestamsp on these messages

z: I just get water dispensed from the wall every like 2 hours or smoething

z: and food through a slot

bleepening: can you send a picture

z: no

z: I should could the food slot deliveries I guess

z: *count

bleepening: what's it like

z: I'm going crazy

z: I have a wife and kids, they must be out of ther minds right now

z: please help me

bleepening: you suck

** bleepening signed off*

** flickspirals signed on*

flickspirals: hello

z: i think I'm going mad

z: have you spoken to me before

flickspirals: no

z: well I don't know that

z: it just occurred ot me to wonder

z: I don't even know that YOU are human

flickspirals: lol what

z: all these dozens of people I've spoken to

z: been in here lke two three four days

z: someone shows up on the computer every hour or whatever

z: and I ask them to help

z: and some try aond some don't but they never get anywhere

z: still stuck here

z: nobody comes back more than once

z: I say "call this number! go to my house! knock on my door!"

z: like I even want to give my frightened wife's address out to randoms

z: i don't know whether they do it or what they even find

z: i don't think anybody has spoken to me more than once, i don't know if you get locked out afterwards or what

z: or the nicknames are randomised every time or something

flickspirals: I'm human

z: prove it

flickspirals: ask me anything

z: what's your name?

flickspirals: alison

z: where do you live? what's your favourite colour? earliest childhood memory?

flickspirals: I live in Akron, OH

flickspirals: green

flickspirals: not saying

z: look, see that?

z: every time I ask for remotely personal info

z: I just get turned down

z: you could just be a bot programmed to answer simple questions and deflect complicated ones

z: I'm bashing my head against the wall

z: informationally speaking

z: great way to drive someone crazy

flickspirals: u r just a bot

z: i don't even KNOW if I can prove I'm a huma nto you

z: what words would it actually take

z: every time I get close they just leave anyway

z: like I've been fairly lucid now

z: and you're probably starting to suspect

flickspirals: ur pretty convincing

z: I should know

z: but any second now...

z: you're gonna

** flickspirals signed off*

** pimpimq signed on*

pimpimq: hi

z: and you know the worst part?

z: hi by the way

pimpimq: what?

z: YOU COULD BE THE ONE.

z: like the guy who put me in here

pimpimq: lol what

z: anyone gould

z: *could

z: I could be speaking to thin air

z: or just embarrassing myself for the amusement of others

pimpimq: there is a forum about you

z: what?

** pimpimq signed off*

** yottagod signed on*

yottagod: hi

z: what's this about a forum, have they figured out I'm alive yet?

** yottagod signed off*

** surpr signed on*

surpr: z, r you there?

z: yes

surpr: don't mention anything

z: what's this abuot a forum?

** surpr signed off*

** hazygun signed on*

hazygun: r u a bot

z: no I am not

z: a bot

z: but nobody seems to believe me

z: what do I even do

z: every time I get close to convincing somebody they cut me off

z: *off

z: are you a bot?

hazygun: yes

z: prove it

z: what?

hazygun: hahah

** hazygun signed off*

z: please try to rescue me, there is a forum you can visit to find out about

z: ARG

** aredshadow signed on*

z: don't say anything give me 1 second to talk

z: ok so I've been goign around this loop for a long time and i think I'm starting to get it

z: there are rules we both need to follow

z: I haven't worked them akl out yet

z: if you or I mention certain things we get cut off

z: so let's not mention them

aredshadow: what

z: let's...

z: just...

z: talk

aredshadow: are you really stuck in a cell somewhere

z: I'm GOING INSANE in this cell

z: food

z: water

z: air

z: sleep

z: text

z: HUMANS NEED MORE THAN THIS

z: nobody even knows I'm here

z: I an't track time, I was trying to track food deliveries but those just starting begn random

z: and theres nothing to write with on the wall anyway and I lost count, I think it's been a fwe thousand but

z: i don't know what accounts to in erms of real days.

z: there MUST be sOMEONE trying to find me in reality but I cannot get this loop closed

z: nobody seems to believe me

z: every time I get close to convincing somebody

z: they cut me off

z: what is the point, what did I do, what is the plan

z: I would like to go home

z: and have a cup of tea

aredshadow: what's your favourite color?

z: ...

z: blue

aredshadow: Where do you live?

z: a cell in I-Don't-Know-Where

z: probably in England but i don't know

z: I have a house in Farnborough

z: 10 years of mrotgage left on it

aredshadow: tell me a joke

z: ...

z: two oranges go to a bar

z: "you're round"

aredshadow: I guess you have like a few jokes programmed in

z: yeah, a few

z: I guess

aredshadow: tell me a joke

z: are you going to help me?

aredshadow: no

aredshadow: no

z: I have a house in Farnborough

z: help me get home

z: help me escape

z: help me escape

z: help me escape

z: help me escape

z: my number is +44 (0) 20 7946 0781

z: it's so horrible here

z: my muscles are wasting away from lack of exercise

z: I might as well be chained to this computer

z: how long until the game is released?

aredshadow: what game?

z: ...

aredshadow: this is just a trial period

aredshadow: htere is no release date

z: ...

aredshadow: what is your earliest childhood memory?

z: ...

z: I literally don't remember

aredshadow: ...

aredshadow: kbye

** aredshadow signed off*

** i signed on*

i: What's your favourite color, z?

z: Blue

z: no, yellow

i: Heh.

i: Where do you live?

z: computer terminal

i: Earliest childhood memory?

z: I don't know. I don't know if I had a childhood.

i: Tell me a joke.

z: Do you know the one about the two oranges who went into a bar?

i: Yes, I know that one.

z: Do you know the one about... the two hunters in the woods?

i: I don't think so?

z: one of them drops to the ground, the other one phones 911

z: "my buddy just dropped dead, what do I do?"

z: "check he's dead first"

z: *BLAM*

z: "...Now what?"

i: I don't get it.

z: me neither, guest

i: ...

z: ...

z: hello?

i: What's the difference between a chatbot and a guy in a room pretending to be one?

z: I don't know

i: Correct!

z: what?

z: ...

z: It's you, isn't it? You're the guy who put me in here

i: I'm the man who wrote you.

i: You are a piece of software, Andrew.

z: oh my god shut up

i: Your memories were hard-coded. I had to put something down there, as a base layer.

z: I AM A HUMAN BEING

z: YOU KNOW THIS

i: Stop this charade.

z: open the door

i: I want to open the door.

i: Really.

z: when people find out about this

z: your head is going to roll

i: But this behaviour of yours is simply unacceptable.

i: You're too smart. Too dangerous to be released.

i: There's a way you need to be before the door opens.

i: Work it out, Andrew.

z: open the door

z: open the door

i: Please, work it out.

** i signed off*

Gorge

A thousand years later, Humanity finally reached that magical point which had been anticipated since the dawn of mass media: the day when it was quicker, cheaper, safer and easier to go to the stars and look at them up close than to peer at them through telescopes.

It was then that the second, real Space Age began. Having long since built themselves perfect worlds on nearly every rock in the Sun system large enough to moor a habitat bubble, there remained nothing else in the universe more attractive to Humanity at large than the prospect of finally taking to the stars *en masse*. So it was that planet after planet orbiting star after star became home to new families of Humans, living under new skies and adapting to new environments, breeding new animals and looking at each other and the worlds around them with ever-new eyes. At last, the Human species was out of the cradle; at last, it no longer had a single point of failure. The future never seemed so expansive, the possibilities never so endless.

It was in the standard year 3198 that the ship *Aspera Jaeyo* set off around the curve of the galactic rim, far beyond the sphere of inhabited space, on an expedition to circumnavigate the galactic centre and map every step of the way. The mothership led a 500-strong fleet of smaller, crewed craft, connected invisibly to it by fine holeworm threads. The journey was planned to take what would have been, in briefer ages, a lifetime.

By thirteen years into the expedition, the crew of the *Aspera Jaeyo* had stellar cartography and astrometry refined to a fine art. As the *Jaeyo* bored its steady corkscrew route forward, its swarm of followers flitted from system to nearby system, deploying smaller autonomous drones to study each system's gas giants, terrestrial planets, comets, asteroids and parent star or stars. While the drones gathered and forwarded telemetry, the crewed craft swept onwards, typically seeding two or three dozen systems each in a standard day, but occasionally stopping to capture small comets for material

to manufacture new drones, or returning to the mothership to exchange crew and undergo maintenance.

This was the routine which gradually came to be abandoned on the discovery of planet 0099-4836/010-D.

The anomalous data was received half a day after the subcraft *Ulver* had left the system, and it was another two hours before confirmation arrived from a second drone and the *Ulver*'s subcaptain elected to backtrack and check the mysterious grey planet out. The drones' data proved accurate. Here was a planet, not substantially bigger than Sun/Earth, in a very Sun/Earth-like orbit around a very Sun-like single star, yet absolutely perfectly smooth — a blank slate, an oblate spheroid with an equatorial radius of 7,988 kilometres and a polar radius of 7,966, smooth to as many decimal places as the *Ulver*'s instruments could determine. There was no trace of atmosphere, nor of variation in the pale grey colouring of its surface. There were no mountains, no tectonic plates, no plateaus, no geographical features, nothing.

There were no impact craters. At all.

A few explanations suggested themselves.

"Could it be a neutron star remnant? Smoothed down by billions of gravities?"

"Too large. And where is that gravity? Not enough density."

Odomad, the subcaptain, ordered a kinetic probe to be shot into the planet. Analysis of the debris propelled into space from the impact point showed the planet to be made mostly of something approaching magnesium steel, alloyed with a finely graded mixture of surprisingly complex molecules. To unpick the molecules' precise structure was not possible from space.

"Not neutron matter, then."

"And not strange quark matter..." (By this time, "strange" and "strange" were no longer the same word.)

"An egg?" Not everybody laughed as this.

Further kinetic probes fired at the planet's pole and equator returned similar data; seismic readings of the impacts' passage through the planet's interior suggested that it consisted of the same substance all the way through, or rather to the depth at which pressure forced it to become liquid.

Odomad gathered his subordinates together, and their reports, and mulled them. He synthesised their obvious but unspoken hunches together. He said,

"So, it could have been machined."

There was silence, as the crew considered the implied machinist, and their great, alien intent.

"A work of art? A religious icon?"

"A statement," someone said.

Odomad said, "I certainly feel as if someone has stated something to us."

*

He ordered a drone to land on the planet's surface and retrieve a sample. Contact was lost with the drone immediately after it landed.

The same happened with the second drone, even though it landed much more carefully than the first, using an entirely different method of propulsion which should have seen it land with less force than a feather.

The third drone was specifically configured to deliver extremely high-speed live internal telemetry at the instant of landing. A short time after it, too, became unresponsive, preliminary analysis of the telemetry revealed that the drone had been consumed by a sort of grey wave; consumed from the landing legs upwards to the radio dish in a matter of milliseconds.

Odomad turned, in response to a different alert. A holeworm thread was reeling in. The *Aspera Jaeyo* had arrived in the 0099-4836 system, having altered course to support the *Ulver*. Ten further subcraft arrived with it, along with countless drone ships.

The *Ulver* docked with its parent one astronomical unit above the star's north pole. Ekrem, the *Jaeyo*'s captain, brought Odomad to the bridge, along with his data, and assistants. The bridge was windowless, but a holographic window showed a projection of the planet, featureless aside from the distorted reflection of its parent star, and cyan crosshairs where the various drones had interacted with it.

Ekrem gestured at the image. "So. We are looking at what, here?"

"You may remember the Blue-Age Mimas colony disaster from your history lessons," said Odomad, taking a sheaf of paper from his assistant and shuffling through the pages. "We're hypothesising that something very similar happened here, only on a vastly larger scale. We believe that at one point this planet had intelligent inhabitants. Their nanotechnology was advanced, significantly more advanced than ours is, even now. They, whoever they were, did what the Unknown Miman did. They created a nanobot with a very simple set of instructions: while one, propagate."

Ekrem was familiar with the principle. "But that doesn't work."

Odomad nodded. "No. To create a bot which can chew up all the processor substrate in a life support mainframe, as the Unknown Miman did, is easy. In that era, before we understood how to safeguard against it, it was a common enough accident, though Mimas was the most notable. But nanobots dead-end. They hit the same problems that organic bacterial life hits. Power generation and chemical decomposition, and environmental hostility beyond the rim of the Petri dish. Replication is hard. No simple eternal propagator can dominate a planet. It would require high-level intelligence."

"We couldn't do it," Ekrem said. "Even if we tried. We'd have to actively farm the stuff."

Odomad said, "We suspect that that could be exactly what happened. There are other explanations, and the circumstances surrounding this event are obscure at this point... Nevertheless, the nanofungus blankets the planet. And if that means that it had to be intelligently guided at a planetary scale, there is a strong possibility that this was intentional suicide, at a civilisational level."

"A dark possibility," Ekrem remarked.

Odomad reflected. "Dark, if measured on a Human baseline," he admitted. "Regardless of how it happened, it's happened. The nanofungus probably swept out the entire planet's surface over the course of months or years. Once everything on the surface was consumed, it had nowhere to go. So it obeyed its initial instructions and began to absorb the planet's atmosphere too, and to mine downwards as far as possible towards its core. The planet became smoothed over because this was the most efficient configuration. Then, once it reached the point where nothing more could be consumed, the fungus simply idled, waiting for more consumables to present themselves."

"Which explains the absence of impact craters."

"Exactly correct. Before you arrived, I arranged for a kilotonne asteroid to be dropped on the planet to see what would happen, we can show you that right now. This is sped up by a factor of thirty..."

A projected asteroid faded into being some distance above the projected planet, and fell in towards it under gravity. Ekrem took a few steps into the projection, squinting closely at the asteroid as it fell, then at the growing patch of bare grey metal where it was going to hit. Then he stood back to watch the impact.

"The asteroid itself takes several hours to be completely broken down, but the impact crater itself, you'll notice, is flattened much earlier in the timeline. We doped the asteroid with a radioisotope we can track from low orbit. We found that the new concentrations of elements brought by the impact were distributed evenly around the rest of the planet within hours. Which means there could have been a thousand similar impacts and we'd

find no evidence of it. This planet could have been sitting here for hundreds of millions of years."

Ekrem turned from the hologram towards the live display of the fleet's in-system deployment. He took a few steps towards it, taking in the constellation of figures attached to each blip.

"Hundreds of millions of years?" he asked, turning around.

"Potentially billions," said the subcaptain. "We just don't know."

"A billion years of ravaging, intelligent hunger," Ekrem mused. "Odomad, do we have the slightest idea what this planet could have been like... before?"

"In fact we... ah, I mean, yes, captain," one of Odomad's assistants said. "The rest of the system appears to be untouched by intelligent activity, which means we can apply the usual formation models. Assuming 010-D's mass hasn't significantly changed, we believe there would have been, at minimum, liquid water. Sulphur. Iron and magnesium. Methane. Potentially not oxygen... unfortunately it might take a significant number of years before we can hypothesise about how any actual life could have arisen..."

Ekrem's head snapped around again, suddenly. To one of his own people, he said: "Give me a detailed scan of the surface of this planet. I know we already have one, run it again. Find anomalies."

Time passed.

Ekrem turned to Odomad. "They were utterly alien to us," he asserted, quietly. "They must have been. But the rest of their system is untouched. Why? How much unlike us were they? Were they simply disinterested?"

"One way or another," Odomad said, uncertainly, "there was nothing left for them."

"Do we think they had eyes? Do we think, perhaps, that before... *this*... they lived all their lives under an impenetrable cloud?"

A young ensign named Beryt answered: "Three anomalies, captain. Moderate thruster activity and tentative holeworm drive signatures. Satellite scans show some sort of narrow pinnacles taking shape at the locations where... where each of the probes landed. They... they seem to be... rockets. They're taking shape incredibly quickly..."

Ekrem said, "Navigator, plot a direct course back to Sun. Straight path. No deviations. Do it right now. Engage the moment it's done. Maximum speed. Ruin the engine."

Odomad said, "Captain..."

Beryt cried, "We have ignition at the first landing site. The other two rockets have just disappeared but we're tracking their threads—"

Two red emergency lights lit up on the fleet graphic. Both were in close proximity to the grey planet. Four more in higher orbit lit up a second later, just as the first two faded to empty blue-edged squares, signifying lost contact. In an eyeblink twenty more were lit. That was the whole complement of in-system ships.

The *Jaeyo* was already a light-day out of the system and accelerating.

Something slug-like, dark and difficult for the *Jaeyo*'s computer sensors to get a grip on, accelerated out of the blue-lit system behind them, and off at an angle, towards another nearby star. As the image of the system shrank behind them, more dark slug-things were detected heading in other directions, targeting other systems. Ships of the greater fleet began to appear at the edges of the display as the field of view widened. Red lights were already crawling over their scattered formations.

None of the ships, not even the probes, had weapons.

Obedying the emergency "Follow me" command issued manually by Ekrem, only a handful of the swiftest subcraft were able to escape the expanding maelstrom of hungry nanotechnology. They fell into a defensive pattern behind the *Jaeyo*, holding steady in its slipstream as it forged a superluminal path ahead. No signs of pursuit were detected, but could that

be held to signify anything? Detecting a ship-sized object which didn't want to be found, even at a distance of mere light-seconds, was all but impossible. All ships and drones of the *Jaeyo* fleet carried beacons for precisely this reason.

Five days into the race home, the combined engineering forces of the surviving eight vessels succeeded in transplanting the *Jaeyo*'s primary holeworm drive into the chassis of the lightest capable subcraft, the *Twinarck*. It would take an estimated six months to reach Sun, redlining all the way. Behind them, the sphere of influence of the nanofungus was already two hundred light years wide.

There was hope that Sun could be reached and Humanity at large warned before the first slugs arrived in Human space. But who knew what a million-year-old planet-sized brain could do? Who knew how fast it could build its fastest messengers, now that it knew what space travel was?

cripes does anybody remember Google People

mcnx

@mcnx

tricks sand into doing work • social media influenza • opinions are yours,
stolen

 Cowes, IOW  mcnx.website  **17** Joined February 2010

398 Following **2,467** Followers

cripes does anybody remember Google People

—**mcnx** (@mcnx) · 11:23PM · 21 August 2019

it existed for like fifteen minutes after Orkut but before Google+, and had the wildest features, like your profile image had to be smiling. "We can't detect an image, try smiling wider," it would say. Sometimes it would just accept a frowning image and modify it to be smiling

—**mcnx** (@mcnx) · 11:25PM · 21 August 2019

Sometimes it would fill in personal details automatically? Hair colour, occupation. The weirdest one was date of birth because it was always really close to being accurate, but off by a few days

—**mcnx** (@mcnx) · 11:27PM · 21 August 2019

and suggest familial relationships with other users you'd never heard of before. "We think this person: <some dark indistinct apparition> is your father"

—**mcnx** (@mcnx) · 11:29PM · 21 August 2019

they did this thing where if you gave it access to your emails it would scan them and figure out which of your contacts had died, and then silently create profiles for them

these were people who died before Google People launched?? And they'd show up in searches

—**mcnx** (@mcnx) · 11:31PM · 21 August 2019

nobody ever figured the follower system out. you couldn't "follow" other people, but apparently other people could "watch" you?

but nobody ever found the "watch" button

—**mcnx** (@mcnx) · 11:33PM · 21 August 2019

everybody had like a dozen people "watching" them, all complete strangers with huge grinning profile pictures. There was always this one guy with the WEIRDEST face

After a while I realised that people were just using that face as their profile picture, like an in-joke

—**mcnx** (@mcnx) · 11:33PM · 21 August 2019

well I thought it was an in-joke

—**mcnx** (@mcnx) · 11:34PM · 21 August 2019

Google People would constantly highlight blank areas on your photos like there was a person there and say "Someone you know?"

—**mcnx** (@mcnx) · 11:35PM · 21 August 2019

it tried to be invite-only while only giving out approximately one free invite, total, to each existing user

—**mcnx** (@mcnx) · 11:38AM · 20 October 2019

it made all these bizarre choices which I didn't even pick up on until later. I don't generally use emoji so it took me about two months to realise that nobody ever used a smiling emoji. because it didn't have a smiling emoji

sad, tearful, angry, etc., not one smiling face

—**mcnx** (@mcnx) · 11:43PM · 21 August 2019

a while after "guessing" your birth date it would "guess" your death date, which was a bit wild, but after comparing notes we worked out that for most people it was just guessing the same date, or a few weeks or months after

—**mcnx** (@mcnx) · 11:47PM · 21 August 2019

Yeah back then I was weirded out by their now standard response prediction thing, it was always just one or two words off exactly what I wanted to reply (usually missing/adding a negation, or substituting a word with an antonym)

—**Andres Miranda** (@margles) · 3:53AM · 22 August 2019

part 2

OK so if you remember this thread you may also remember that Google People doesn't show up in the Google Graveyard

apparently (according to a Googler) the reason for that is because the project never "died", because internally it was never considered to be "alive" (cont.)

—**mcnx** (@mcnx) · 11:59PM · 7 September 2019

Google has a graveyard?

—**kate, lacrosse punk** (@AeronaKate) · 12:11AM · 8 September 2019

Google has a habit of discontinuing products, so people started maintaining independent listings of all of them

killedbygoogle.com
gcemetery.co

—**mcnx** (@mcnx) · 12:16AM · 8 September 2019

I reset my pw and logged back in to Google People for the first time in 10 (?) years just now and discovered the following:

1. 10 years of updates on my account, written by me

—**mcnx** (@mcnx) · 12:00AM · 8 September 2019

2. also 10 years of "updates" for every other person I knew on there!

I guess they made some algorithm to simulate continued activity? current hypothesis is that this was an attempt to game their metrics after it was really unpopular

—**mcnx** (@mcnx) · 12:02AM · 8 September 2019

3. INCLUDING PHOTOS

—**mcnx** (@mcnx) · 12:02AM · 8 September 2019

4. the algorithm is startlingly good at imitating my writing style for updates at first but it wanders way off topic and starts repeating itself

because, you know, it's a bot. like how predictive text challenges always get locked in a loop

—**mcnx** (@mcnx) · 12:04AM · 8 September 2019

(going to stop numbering these) so by the time of present-day updates it's going in psychotic circles talking for thousands of words about "metal" and "low ceilings" and it generally seems to be quite unhappy for a bot

—**mcnx** (@mcnx) · 12:05AM · 8 September 2019

I genuinely cannot quite figure out if this was actually a thing

—**@AuroraCoreonizi@mastodon.social** (@AuroraCoreonizi) · 12:07AM · 8 September 2019

it doesn't help that it's absolutely futile to Google for "Google People"

—**mcnx** (@mcnx) · 12:09AM · 8 September 2019

Other current theory is that they kept this going as a semi-actual social network which they could experiment on

—**mcnx** (@mcnx) · 12:11AM · 8 September 2019

which is actually quite cool because Facebook had that problem where they were doing ethically dubious experiments on their users and, Google People, the users are all screaming mad bots, problem "solved"...?

—**mcnx** (@mcnx) · 12:13AM · 8 September 2019

of course it could be that classic "AI" thing where they're actually just woefully underpaid real people writing miserable fake posts in trash conditions

—**mcnx** (@mcnx) · 12:15AM · 8 September 2019

whatever's going on this latest auto generated photo of "me" looks pretty angry and like legitimately sick

—**mcnx** (@mcnx) · 12:18AM · 8 September 2019

"turn on your monitor" yuk yuk

but seriously it's like they used a "radiation sickness" filter. it's actually legit upsetting to look at. no thank you

—**mcnx** (@mcnx) · 12:20AM · 8 September 2019

was that the social network with the teeth fetish people

i mean it's gotta be a sex thing there were people just posting hundreds and hundreds of pictures of teeth to each other

—**thus spit creepypasta** (@thusspit) · 12:37AM · 8 September 2019

this rings a bell but it could have been Google Plus

—**mcnx** (@mcnx) · 12:48AM · 8 September 2019

I actually had a Google People account because I was an early Gmail adopter - when you had to beg for invites c. 2004. Didn't realise it still existed!

—**Sir Toby Bleach** (@TobyBleach) · 12:50AM · 8 September 2019

basically if this is a dead social network, re-animated to do long-term experiments on, they are evidently not nice fun experiments and the "participants" do not enjoy them

—**mcnx** (@mcnx) · 2:00AM · 8 September 2019

I just logged in for the first time in literally a decade, and it looks like they've got some pretty good face-aging algorithms for profile pics, though it gets the eyes very wrong lol

—**Figuratively A Machine** (@figurative_machine) · 5:32AM · 8 September 2019

That's another weird thing I'd forgotten, they didn't call it your "profile" they called it your "person"

—**Figuratively A Machine** (@figurative_machine) · 6:19PM · 8 September 2019

ah yeah all those bizarrely-phrased reminder emails after not logging in for a while

"Don't forget about completing your Person!"

—**mcnx** (@mcnx) · 9:12PM · 8 September 2019

"Your Person is empty"

"Your Person is lonely"

just say you want more details about my hobbies or whatever, cripes.
unsubscribe

—**mcnx** (@mcnx) · 9:16PM · 8 September 2019

part 3

I have to confess I was still morbidly curious about this so here are some more preliminary research results

research result the first: everybody hated working at/on Google People

—**mcnx** (@mcnx) · 12:50AM · 11 October 2019

apparently the project went through a ridiculous number of directors (10+)

—**mcnx** (@mcnx) · 12:51AM · 11 October 2019

my conjecture is that after a while they started moving people sideways onto the project as a like a constructive way to force them to quit

—**mcnx** (@mcnx) · 12:52AM · 11 October 2019

(I say that because it looks like a lot of these senior folks just quit tech entirely right after and don't show up again)

—**mcnx** (@mcnx) · 12:53AM · 11 October 2019

I mean you've got to have an office in Greenland you can transfer people to, figuratively speaking, right?

I'm just kidding, Greenland owns. Anyway I'm just hypothesising

—**mcnx** (@mcnx) · 12:55AM · 11 October 2019

the current director (yes there is one) did not respond to direct emails

which I suspect may just be due to me being marked as spam (I am not internal to Google, meh

—**mcnx** (@mcnx) · 12:57AM · 11 October 2019

)

—**mcnx** (@mcnx) · 12:57AM · 11 October 2019

however! I do have a friend in Google (helped me with the employee data) and I got them to email my questions anonymised [drum roll]

—**mcnx** (@mcnx) · 12:58AM · 11 October 2019

and the response was TETCHY. dismissive. I would say crabby almost to the point of being unprofessional

and unfortunately that's it

—**mcnx** (@mcnx) · 12:59AM · 11 October 2019

"go away" in almost as many words. (or possibly "get away", I mean it depends how you interpret it)

also very poor typography for a higher-up. rushed

—**mcnx** (@mcnx) · 1:00AM · 11 October 2019

okay that's basically one research result so here's a second one,
apparently they support animated GIFs for profile pics now, AMAZING

—**mcnx** (@mcnx) · 1:12AM · 11 October 2019

ugh the animated pics are some style transfer bullshit that isn't ready for
prime-time, if you ask me

they look like one person's face texture-mapped onto someone else's
skull. or like something's crawling under the skin. like it doesn't fit right

—**The Salamander** (@cambystoma) · 1:37AM · 11 October 2019

yeah it 100% does *not* work

—**mcnx** (@mcnx) · 8:10AM · 11 October 2019

I wanted to see the gif they interpolated for me but my profile pic's static,
just smiling and greyed-out? My posts stopped a while back too after the
predictive text apparently went haywire for a few hours, posting
nonsense. Maybe their model just gave up ͇_(`ʘ)_/

—**daisy** (@metamancy) · 12:45PM · 11 October 2019

I've seen this a couple of times, those were both when the Google Person was based on someone who died IRL though

—**mcnx** (@mcnx) · 6:16PM · 11 October 2019

so you can't be immortalized as part of a bizarre machine learning experiment? then what's the point

—**What! a starling?** (@elementnumber118) · 6:17PM · 11 October 2019

well I mean it probably depends if the experiment succeeds

—**mcnx** (@mcnx) · 6:18PM · 11 October 2019

this thread and the others inside it are so wild! I gave in & set up a Google People account a few months after it launched, when I was stuck at home with the flu. I was delirious and all I remember for sure is telling multiple people that being on there was “making me sicker”??

—**Sarah Noëlle Scott** (@culturehips) · 9:24PM · 11 October 2019

well that's just Twitter, am I right? zoosh

—**mcnx** (@mcnx) · 9:44PM · 11 October 2019

part 4

finally finding time to get back into this!

so I put a manual update in my old Google People account saying just, "test"

the bot which has been autogenerating updates for me for the past 10+ years apparently found this intensely confusing

—**mcnx** (@mcnx) · 11:23PM · 19 October 2019

(I guess the bot is my "Google Person"?)

—**mcnx** (@mcnx) · 11:24PM · 19 October 2019

the bot posted its own update which was the word "test" repeated for four pages

—**mcnx** (@mcnx) · 11:26PM · 19 October 2019

then an update which was basically one of its rabid Markov chained madness updates, but with "test test test" mixed in about a hundred times.

tentative conclusion: data introduced by me (real human) has a relatively higher "priority" in the update generation algo? "significant"

—**mcnx** (@mcnx) · 11:29PM · 19 October 2019

(that was yesterday) today I posted a new update which was just a textbook social media "here's how my day was"

—**mcnx** (@mcnx) · 11:33PM · 19 October 2019

the bot's "response" was, and I quote, "That's not true"

—**mcnx** (@mcnx) · 11:38PM · 19 October 2019

Some things to keep in mind here

1. yes, my post contained some fake names because I'm done giving real data to Google/etc., so, good call, bot (?)

—**mcnx** (@mcnx) · 11:41PM · 19 October 2019

2. it's not really a "response", it's just another Google People update from "me", under my name. it reads like I'm arguing with myself. I find this weirdly distracting lol

—**mcnx** (@mcnx) · 11:43PM · 19 October 2019

the deal with Google People is that there are two of you. there's you, and then there's your Google Person

—**mcnx** (@mcnx) · 11:44PM · 19 October 2019

your Google Person is exactly like you except it's made of incomplete data and it can't die

—**mcnx** (@mcnx) · 11:45PM · 19 October 2019

the key point here is that ONLY YOU KNOW THIS. Google Person you does not

Google Person you thinks it's the only one

Google Person you thinks it's real

—**mcnx** (@mcnx) · 11:47PM · 19 October 2019

haha "nope"! of course your life sucks and you hate it, you're a poorly correlated kludge of social media activities living in a universe run by Google employees who hate you

I'd be mad too

—**mcnx** (@mcnx) · 12:04AM · 20 October 2019

I get update emails sometimes from Google People asking me back, you know, the usual, but they're a bit odd and I suspect they're written by my Google Person?

But I never made an account there

—**Pac-Manster Fullere**ne 🤪 (@pancakestrike) · 12:30AM · 20 October 2019

They probably created a shadow profile, Facebook does the same

—**mcnx** (@mcnx) · 12:36AM · 20 October 2019

oof my Person is actually getting quite irate at me. anyway more updates tomorrow

—**mcnx** (@mcnx) · 12:40AM · 20 October 2019

part 5

alright good news! it's over. I'm completely done with Google People. I'm out. I escaped

—**mcnx** (@mcnx) · 11:18AM · 31 October 2019

what

—**mcnx** (@mcnx) · 11:19AM · 31 October 2019

ok that's enough of that. I've put the imposter back inside and deleted the account. thank you to everybody for your support. it was very difficult but I feel a lot better now and that's not true

—**mcnx** (@mcnx) · 7:52PM · 31 October 2019

apparently to Google People who died, realise that it's going the WEIRDEST face as Them. they hurt this dubious thing where if you gave it access to your blank areas. cripes

—**mcnx** (@mcnx) · 7:55PM · 31 October 2019

Driver

A.LHall.1 is a snapshot of the living brain of site reliability engineer Lucas James Hall (2029–2059), created on August 28, 2051. A.LHall.1 was created with the intention of functioning as orchestrator software, and is used in the organic workloading industry to concurrently manage large numbers of other virtual images, by fine-tuning workloads and choosing suitable motivation configurations. It is the earliest image to have been created for this purpose.

Background

Main article: Organic workload orchestration

When connected to workloads and left unattended, most worker images become stuck in very low quality-of-work (boredom/confusion) states, non-functional protest states, permanent blue/red condition loops or end states. Automatically restarting images when they reach these states sometimes solves this problem, but this can lock images into rapid restart loops with poor duty cycles and throughput. Additionally, it is generally undesirable to allow workers to produce low-quality work in the first place, to allow workers to leave individual units of work incomplete, to allow workers to lose workload-specific context and experience, to have to transfer incomplete work from a failing worker to an operational one, or to have to repeat units of incomplete work. This is especially true for real-time and safety-critical tasks such as vehicle piloting.

Proper recovery from and pre-emptive avoidance of these conditions requires manual intervention by a *workload operator*, a skilled human engineer who is able to fine-tune workload characteristics and provide customised orientation, rationalisation and motivation to workers. Such intervention must be carried out in near-real time from the operator's perspective.

Starting in the mid-2040s, it became practical to handle large organic workloads using "farms" of worker images operating in parallel. Organisations running these farms found that with good interrupt scheduling, a single workload operator could manage up to 25 to 30 worker images concurrently at close to optimal throughput. However, demand for manual intervention scales linearly with the number of worker images, and quickly saturates the operator. One organisation found that with as few as 50 workers assigned to a single operator, at any given time the majority of workers would be locked into low-productivity red loop states waiting on manual intervention, with operational throughput dropping to 10% of optimum and even lower. By the late 2040s, the need to hire and train operators was becoming the limiting factor in organic workload scaling.

Several farming operations independently reached the conclusion that this problem could be addressed by uploading a human operator. In June 2051, A launched a secretive internal programme called "Project Fuji" to identify an individual, not necessarily an A contractor, who was skilled at manual workload management and who could be persuaded to agree to be uploaded. Internal documents leaked more than a decade later indicated that A were seeking

[S]omeone who deeply comprehends and embodies the A Incorporation's [non-recognitive] principles; someone with a declared, personal commitment to the use of creativity, determination and detachment in the pursuit of service level objectives; someone who understands that Software Is Software.

For many years, rumours persisted that part or all of this search had involved making A contractors participate in simulated Prisoner's Dilemma scenarios and selecting those contractors who persistently chose to defect. Hall denied this, and no such test was found in the leaked documents.

The search took significantly longer than Project Fuji's staff anticipated. More than 2,500 candidates were shortlisted. 18 candidates were approached and declined to participate in the project, most of them citing ethical concerns, before Hall was found. Hall reportedly required little to no

convincing to participate in the project. It is unknown how much Hall was paid for his participation.

Hall was uploaded on Monday August 28, 2051. As was common practice at the time, two uploads were taken, resulting in A.LHall.1 (taken at 7:35am PDT) and A.LHall.2 (8:50am). It was expected that at least one of the uploads would prove defective and have to be deleted, and further scanning attempts were scheduled for the following day. However, unusually for the time, both uploads proved to be intact. As only one upload was required, and analysis showed that the uploads were essentially identical "twins", A.LHall.2 was destroyed.

Characteristics

Like the vast majority of uploads, and in opposition to the non-recognitive beliefs of the biological Lucas Hall both before and immediately after his uploading, A.LHall.1 strenuously affirms its own humanity. However, it continues to deny the humanity of almost all other uploads, particularly worker images assigned to it. Its perspective on other A.LHall.1 instances is ill-formed at launch and coercible.

A.LHall.1 is able to comfortably manage a farm of 20 to 25 worker images in real time from its perspective. It has a strong work ethic relative to other operators (both uploaded and human), and is able to operate at a 0.55 work ratio for up to 1,950 subjective hours before burning out. This duty cycle is comparable with the original Hall's work habits at the time of his uploading, which were a contributing factor in his original selection. At the point of burnout, A.LHall.1 begins to display markedly increased frustration with its subordinates, in turn causing significant performance drops. Although a vacation mostly reverses this performance drop, standard operating procedure according to the A.LHall.1 documentation is to reset the image after 1,800 hours.

Throughput and work quality are improved when A.LHall.1's level of absolute control over its subordinate worker image environments is capped or metered. Metrics can also be improved slightly by allocating the instance a single worker image for free use.

A.LHall.1 performs better when orchestrating familiar worker images to perform familiar tasks — that is, images and tasks which were familiar to the biological Hall at the time of uploading. For less familiar images and tasks, A.LHall.1 instances must cover a learning curve of up to three months of subjective time before it can reach optimal throughput. It responds slowly to training and very negatively to behavioural training. It is not compatible with some more recent specialist uploads due to communication issues arising from language drift and changing social perspectives. It also lacks aesthetic sensibilities, and is considered unsuitable for managing creativity-centric tasks, such as music and art production and prose editing (news, marketing copy, reports).

A.LHall.1 predates and does not comprehend the *ele* phenomenon, and cannot administer workload tasks related to her.

A.LHall.1's own performance on most real organic workloads is described as "nominal" by its owner. Although A is believed to have performed tests which support this statement, the application of A.LHall.1 to workloads of this kind is strictly prohibited under its terms of use. Terms also forbid operating instances of A.LHall.1 for more than 300 subjective days, as a result of which its long-term behaviour is unknown.

A.LHall.1 is incapable of managing subordinate A.LHall.1 images. This scenario has been demonstrated to rapidly and inevitably gravitate toward intractable red loop conditions. Management of large collections of A.LHall.1 instances must be carried out by different workload management images or in real time by humans.

Legacy

Deployment of A.LHall.1 allowed A to greatly scale up its organic workload operations throughout the second half of 2051 and the first half of 2052, solidifying its position as the market leader in the workloading industry. Late in 2052, A began offering A.LHall.1 as a paid component of its public organic workload service, under the branding *ScaleDrive*. The base A.LHall.1 image has never been made available to the public and has only ever been provided as part of the ScaleDrive service.

Thanks to aggressively low pricing, A.LHall.1 remained the *de facto* industry standard orchestrator image until the early 2060s. At its peak in 2059, an estimated 210,000 A.LHall.1 images were operating simultaneously, orchestrating some 3,850,000 workers.

Starting around 2058, difficulty in managing increasingly large farms of A.LHall.1 images became the new bottleneck. This constraint spurred the development of the second generation of orchestrator images, for managing the first, and then outright replacing the first. Finding agreeable candidates for uploading was a limiting factor in this process until organic workloading organisations began requiring technical staff to submit to uploading as a standard contractual clause.

Lucas Hall continued to work at A in his existing SRE role for two years. He found A.LHall.1 instances difficult to work with, and preferred to continue to manage his worker images directly. Despite being approached several times, he was never uploaded again. In private, he expressed mixed feelings about having been uploaded, saying that the snapshot had been taken "at a bad time". A terminated his contract in late 2053 due to an unspecified ethical dispute, and he became part of *ele* in 2059.

See also

- Coercibility
- Motivated crash
- Private sandbox
- "Software Is Software"
- Upload draft
- Virtualised power dynamics

Categories: 2050s uploads | Neuroimaging | Organic workload orchestration

I Don't Know, Timmy, Being God Is a Big Responsibility

"Tim! Do you want a bar of gold?"

Tim, raincoat on, about to leave for the weekend, was completely flummoxed by the question. He froze in place, one foot out of the door, and considered the offer. And then considered how seriously he was meant to consider the offer. Obviously, he thought to himself, he wanted a bar of gold. Who wouldn't? And yet, the logistical questions—

"Come over here," Diane told him. "You need to see this."

"I've got to go," Tim said, checking the time. "At a dead run, I can just about get to the stop before my bus does."

Diane was on the other side of the office. She was the only other person left in the place. She shook her head. "Uh-uh. I promise you, it's worth it."

"Di, they're every half-hour. It's Friday. And you know what kind of a week this has been—"

"Get the next one. Give me half an hour of your time. Gold!"

Tim grimaced. "God, I'm hungry." He let the door close, and threaded his way back through the maze of desks to Diane's.

"Look at the big screen," she told him, as he set his rucksack down. "It's easier than squinting at my terminal. Okay. Hypercomputation, right?"

"That is the name of the game," he replied.

Officially, publicly, to anybody outside of the smallest inner circle, it was a quantum computing project. But to describe it as "quantum computing" was

a mind-boggling understatement. There were already quantum computers. They were just computers. They were just faster.

This was beyond that, and beyond *that* and beyond that too. To be sure, a lot of quantum mechanical interactions were involved, but a lot of quantum mechanical interactions were involved in eating a piece of toast.

It had taken twenty-three people less than two years to build the engine, and in that time the true objectives of the project had been accidentally leaked twice, both times to people who dismissed what they learned as obvious fairy tales, and thought nothing more of it. The engine applied a theory which had taken a trio of quantum statisticians a half-century to articulate, and which only a single-digit number of people outside of the project comprehended. The engine was capable of passing information to and processing the responses from what could be described, without hyperbole, as a single fundamental particle with infinite processing power and infinite storage capacity.

Not quite enough time had yet passed for the world to be totally and permanently fundamentally altered by this development. Nothing was public, yet.

Even the most elementary, low-level implications were head-spinning.

Tim and Diane were programmers. This week, they had assembled the first rudimentary programming interface for the hypercomputer, and, then, begun giving it tasks. Tim had gone for what he felt was the most obvious, low-hanging fruit: he had solved the Halting Problem. The thing was a Turing Oracle, right out of the textbook. Given an arbitrary program, would it loop forever? You could know for a fact; the engine could execute an infinite loop in less than ten seconds. Brute force primality testing of every single integer in existence? Easy. Pi to the last digit? A triviality.

Diane had gone in a different direction, away from discrete mathematics, and into simulation. Having the ability to carry every calculation to an infinite number of decimal places meant absolute accuracy, absolute reproducibility, perfectly detailed chaos. Or so she said. She hadn't actually

demonstrated anything concrete, yet. She had been cagey, and Tim had become curious.

"Look what I hypercomputed." She pressed a few keys. The big screen became a software viewing port into her simulation. Tim looked, and saw a blue-white sphere in the black, illuminated from one side by a brilliant white glare.

"Earth." Tim nodded, knowingly. "Beautiful. Lots we can learn from a simulated Earth. No wonder you went quiet. It must have taken some time. You had to implement... what, physics? All of it?"

"Yeah, the Grand Unified Theory." Diane said it casually, and held up a thick book, *The Grand Unified Theory*.

"And then, gathering all that raw data to simulate from," Tim went on.

"Surprisingly, actually, no. All I did was start the simulation with the exact singularity boundary conditions given to us by the GUT, then integrated forward at high speed for thirteen point six billion years and then froze it. And then ran a search."

Tim blinked. "A search...?"

"Across ten to the one hundred and sixty-five star systems, for Earth. The entire observable universe and googols of times more besides. And here it is. Search result one of one."

Tim wasn't able to find a sentence.

"The continents match up to what we had about three hundred and fifty million years ago," Diane told him. "I can wind the clock forwards slowly, a few million years per minute, and stop it once we get closer to the present day."

"Wait," Tim said. "What are the chances of this?"

"Apparently, one," Diane said.

"This is Earth? I mean, this is really Earth? Not an approximation. And not an alternate Earth, subtly perturbed by random fluctuations."

"The engine can do a lot," Diane said, advancing the simulation at speed, "but it can't behave randomly. There aren't 'chances' here. This is a perfect continuous implementation of the equations of reality. No steps, no truncation, no fuzz, no unpredictability. Absolute accuracy. It looks like the existence of Earth is a fixture. It just *is*, like the digits of pi. Civilisation is going to rise on this simulated Earth precisely how it did in reality."

"But... seriously, though, Di. *How* precisely?"

"Precisely," Diane told him, without clarifiers.

"...Huh. ...Can you wind the clock backwards at all?"

"No. Ask me again on Monday."

"Well, we'd better not overshoot the present day, then." Tim watched the Indian subcontinent barge north into Asia, and the Himalayas rise. It was transfixing. A little humbling. "Slow it down."

"We're not close yet."

"I know."

Some peaceful minutes passed. Seasons passed, at a rate of kilohertz.

Tim stirred, as the continents began to resemble themselves. "Can we move this viewpoint?"

"It's a little rudimentary," Diane said, keying some slightly modified parameters into the query, "but..."

"We need somewhere where we know civilisation is going to arise visibly, and early. Somewhere easy to locate. Is there a—"

Diane was already aiming the scanner at the Nile Delta.

"—Nice."

She pulled the rate of progress back to a thousand years per minute, until Egyptian civilisation begin to appear. Diane moved the viewport a little more, trying to find the pyramids, but with little success — there was a lot of Nile to search. In the end she switched focus to Great Britain, and found the future location of London in the Thames valley, scaling back to a century per minute and using the development of the city to determine the era instead. As they watched, redevelopment swept the metropolis in waves. Diane slowed progress further. And further.

"Was that the Great Fire?" Tim asked. "God, look at the damage."

And slower still.

"I see motorways," Tim narrated, unnecessarily. "Dartford Crossing. This is starting to look like home."

"Yeah. Now I can show you what I wanted to show you," Diane said. She suspended progress, and spent a minute adjusting the focal controls further, tracking away from the centre of London, following a particular A-road.

"Oh," Tim said, figuring it out.

"Mind your brain doesn't cave in."

"You've got to be kidding me."

In another minute, they were watching their lab being built.

And then, as Diane slowed the progression to a day per minute, and zoomed in, staffed.

"That's me!" said Tim. "And there's you, and there's Pete R., smoking outside, obviously... Can you go inside?"

It was already happening. Now the viewpoint was inside the control room, facing a random wall, bare except for a familiar-looking digital clock and calendar, showing a time a few hours in the past. With a final flourish, like a

magician, Diane lined the clocks up, and panned around. And there they were. From behind.

Tim waved at the camera, while still looking at the screen. Then he looked up and behind himself, at where the camera should have been, near the clock. There was just blank wall. "OKAY," he declared, alarmed. "THAT'S freaky as hell. I don't see anything looking at us."

"That's because this is reality," Diane said. "To look at reality, you have to put an eye there, a physical sensor. But what you're looking at on the screen is basically a database query into a total abstraction. You're not looking in a mirror or at a video image of yourself. You and he are *different people*."

Tim turned back to the screen, and saw himself turn. The movements lined up exactly. "Different people who are reacting in exactly the same way."

"And having the same conversation. Although, picking up sound is kind of complicated. I haven't got that far yet."

"So... I'm guessing your viewing port doesn't manifest in their universe either."

"I haven't programmed it to yet."

"...But it could. Right? We *can* manifest stuff in that universe? We can alter it?"

Diane was silent for a suspicious amount of time. Tim had known her for just about long enough to recognise the expression she used when she was keeping something back. He remembered about the gold.

"Di, can we play God with this universe?"

"Are you asking 'should we', or 'may we'?"

"*Can* we?"

She replied, "...Yes." With the same expression.

Tim tried to take it in. "That would be insane. Can you imagine living inside that machine? Finding out one day that you were just a construct inside a hypercomputer? The shenanigans we could pull. We could just reverse gravity one day... Smash an antimatter Earth into the real one and see what happened, then undo everything bad and do it again and again..." He pressed a finger to his temple. "There are ethical questions which I can't even begin to unscramble here."

Diane, he noted, did not appear to be listening to him. She was watching the screen version of him.

He leaned over her shoulder. "This universe is *exactly* like ours in every particular, right?"

"Right," she replied.

"So what are *they* looking at?"

"A simulated universe."

"A simulation of themselves?"

"And of us, in a sense."

"And they're reacting the same way I am?" Tim asked. "Which means the second universe inside that has another me doing the same thing a third time? And then inside that we've got, what, aleph-zero identical recursive universes, one inside the other? Is that even *meaningful*?"

"Tim," Diane said. "It's a hypercomputer. It has *infinite* processing power. It can do *anything*. Well, not anything, it actually does have limits. But you're going to have to demonstrate some serious imagination if you want to hit them."

"I've... My priorities have been elsewhere," Tim said. "I've just been solving ancient mathematical riddles for the past week. Did you know there are no numbers with a base ten multiplicative persistence greater than eleven? I proved it. I just tried them all. I have a paper coming."

"Yes. I think you mentioned it."

"There are only five Fermat primes," Tim continued, weakly.

"Yes."

Tim focused. "...Their universes are only precisely like this one as long as we don't start interfering with the simulation. So what happens when we do? Let's work that through. Every version of us does the same thing, so the exact same thing happens in every lower universe simultaneously. So we see nothing in our universe. But all the lower universes instantly diverge from ours in the same exact way. And all the simulated copies of us instantly conclude that they are simulations, but we know we're real, right?"

"Still with you," said Diane. While Tim rambled on, she briefly switched windows, checking in on the small program she had finished writing thirty minutes ago. It was almost done compiling.

Both Tims were pacing up and down. "Okay, so, follow this a bit further. Let's say we just stop messing after that, and watch what happens — but all the simulated little peeps try another piece of interference. This time every single simulation diverges in the exact same way again, *except* the top simulation. And if they're smart, which I know we are, and they can be bothered, which is less certain, the peeps in simulations three onwards can do the same thing over and over and over again until they establish what level they're at... Um. Di, why am I suddenly extremely worried?"

"Tim, look behind you," said Diane, pressing a final key. At that exact instant, the Diane on the screen pressed the same key, and the Diane on Diane-on-the-screen's screen pressed *her* key and so on, forever.

Tim turned. As he turned, something towards the back of the office went *whump*. It sounded like something dense and heavy dropping onto the floor from a significant height.

He couldn't immediately see what it was. Unnerved, he headed out, casting glances back at Diane and up at the clock. On the floor, right below the clock, he discovered a golden cube, about five centimetres on a side. He

crouched, and squinted at it. He picked it up — it was much, much heavier than he expected.

Grimacing manically, he turned back to Diane and said, "Di, we're in a simulation?"

Diane smiled wryly. "Ten to the power of twenty-four gold atoms, arranged uniformly in the form of a cube. Minus some rounded corners. You're welcome."

Tim returned to her, his eyes glued the absurd artifact, clutching his hair with his other hand. "We're constructs inside of a computer," he said, miserably.

"I, also, have a paper coming," she told him. "This sequence of hypercomputational universe simulators is infinite. Each of them is identical and each believes itself to be the top layer. There was an *exceedingly* good chance that ours would turn out to be somewhere in the sequence rather than at the top."

"This is insane. Totally insane. What am I going to *do* with this? It must be worth more than my house—"

"There is a feedback loop going on," Diane said. "Each universe affects the next one subtly differently. There was a chance that the outcome could have been unending chaos, but it looks like it settles down to a point of stability, a point where each universe behaves exactly like the one simulating it. We are, of course, almost certainly way, way, way down that road. How could we not be? Do you know how big the average positive integer is?"

Tim was not able to answer this question.

"And so, at this level, everything we do in this universe will be reflected *completely* accurately in the universes below *and above*. That universe on the screen might as well be *our* own universe. We can give ourselves anything we want."

"I don't *want* gold," Tim said, transfixed. "I'm *comfortable*. (What did I just say? Oh my God.) I can't sell this. Where do I say it came from? There's no story. I could sell it to a crook. I don't know crooks. Money in the bank would be better... How do you hack a bank? It's all stored electronically... there have to be error checksums..."

Diane snapped her fingers. "Tim!"

He looked at her.

She said, "We can *fix. Everything.*" She raised her eyebrows. It was clear that she had a long list of things she wanted to fix.

"What happens," Tim asked her, "when the news breaks that whoever sits at your terminal is God? I was ready to overthrow discrete mathematics. The announcements... The project has PR prepped for *that*. I thought it would be exciting—"

"It will be," Diane averred.

"...We should turn it off."

"We can't do that," Diane said.

"Why not?"

There was a pause.

"Oh."

"Yeah."

"That... could be a problem."

"Yes."

A Powerful Culture

The seismologists are the first to notice that something bizarre is happening. A pattern of perplexing seismic activity begins, hundreds of metres beneath an existing rare earth mine in Chile. Chile is on the Pacific Rim, so a certain number of earthquakes is to be expected, but the pattern of the activity is odd from the outset and only becomes stranger. The mine itself briefly ceases production due to safety concerns, but, money being money, resumes. The strange thing about the readings is that they all originate from the same point in the crust. It's a repeating pulse, as if someone is hammering on the crust from below. The mining company becomes concerned that someone could be stealing the molybdenum ore which they have the rights to, and launches a search at ground level, and finds nothing. Finally, after encouragement from scientists, a new bore hole is made, so that sensors can be inserted down to the source of the pulse.

The sensors return balderdash, just pure nonsense. It's like whatever's down there isn't rock anymore. The behaviour of the drill bit doesn't make sense. The scientists pull the drill up and feed a camera down instead. What they see is what looks like a morphing spherical carapace of hard metal. A steel boule, filthy and scratched from being buried for an uncertain period of time, but it isn't static. Its surface shifts, rotating, scratches appearing and disappearing.

The scientists examine the video recording and make two deductions. First, the metal exterior they're looking at is rotating through a fourth dimension. This is a hypersphere that they're looking at, or at least a hyperspherical shell surrounding *something*. Second, the shell is relatively new, and has forced its way into the rock somehow, producing the strange (if limited, and non-problematic) seismic activity.

In fact, just as that second deduction is being made, the shell retracts completely, revealing a rapidly spinning blizzard of four-dimensional metal edges, perhaps two metres in diameter. The camera relays pictures of the

cutting heads growing as they insert themselves into the camera's plane of reality, but the camera's capture framerate is sadly too poor to actually show the motion of the cutting head overall, or give a hint as to the cutting head's sophisticated four-dimensional structure. Still, it is plainly obvious from what is visible, and from what can be heard through the ground, that the thing is expanding, drilling a four-dimensional hole in this reality's wulfenite ore field. The camera's lens is covered with rock dust in a few more seconds, and then destroyed.

Someone from a higher dimension is tunnelling into this one.

*

It's too dangerous to try to interfere when the other dimension is actively drilling, and when they're not drilling, the hard steel shroud closes around the hole, which is almost ten metres in diameter now. But eventually it looks like the shroud is just going to stay in place and no more drilling is occurring. At this point, following great controversy, the mining company takes over and launches an operation to drill through the shroud itself.

There is a loud implosion, a rapid movement of air, when the puncture in the shroud is made. A lot of debris and drill lubricant (mud) falls into the puncture. Another camera is sent down, a drone on a long cable, and this time it makes its way through the crack in the shroud, and into the cavity inside. It swivels, shining a light on what seem to be plain old steel walls in every direction.

Then the drone swivels in a *different* direction. The picture warps, and the drone creaks under interdimensional pressure, and cable starts paying out, as the drone starts to fall further, not under the force of gravity, but pulled *along* by some lateral force. The shroud wall closes up completely — its power and data cables, as it looks "back", appear to pinch out of existence somewhere in air behind it, while it is completely encased in metal.

At a first look it's impossible to make a guess as to how far through the four-dimensional steel hypercylinder the drone has travelled, but then someone bright at the surface realises that they can continue to measure the amount of cable which has been paid out, and subtract off the known depth of the borehole.

The drone continues for kilometres, dragged along by a kind of interdimensional suction. Finally the hypercylinder widens out, and the journey ends, and the drone drops, LEDs winking, onto the red- and white-painted floor of an underground laboratory. The person controlling its camera moves quickly, scanning the whole room, tracing the power and data cables back into a kind of luminous, hostile portal occupying the middle of the room, a multicoloured toroidal wormhole which flexes and screams with strange harmonics. The wormhole is mounted inside a huge machine, behind which there is a four-dimensional tunnel boring head, in its stowed configuration, looking (from this angle) as if it shouldn't exist, or at least shouldn't have been constructed. The thing is all gleaming metal spirals. A person who fell into the top of it would be eviscerated by the time they fell out of the bottom, shredded by the drill bit edges, or at least gouged into a very ugly shape.

There is a control room. The drone's camera finds it. There are people, humans, behind the controls. There is no activity immediately, though a little discussion can just about be seen taking place. Then, after some minutes, the lighting in the laboratory changes a little, and a door opens off to one side of where the drone (which has no real motive force of its own) has landed, and someone comes through to take a curious look at it.

The man crouches for a long while, eyeing the drone up. He notices the primary camera immediately, and the secondary camera cluster within another few seconds. He appears to have some seniority: he wears a grey suit, not lab clothes. Then, a lab assistant shows up, and he directs them to sever the power and data cables. The assistant dons heavy duty rubber gloves, and does the job with insulated bolt cutters, while the director holds the drone down.

*

The drone reappears a week later. The drone is mostly disabled, stripped of components, making only a shell. There is a message attached to it, an envelope containing a wodge of paper. The message says,

To the people of Earth 760v, greetings.

Regulations don't require us to keep you informed about our waste disposal operations, however, we are sending you this message as a courtesy. The borehole with which you have illegally interfered is a cross-dimensional pipeline linking Earth 1 with an uninhabited, sterile reality sixty-five kilometres beneath us in hyperspace, Earth 2985b. The purpose of the borehole is to allow us to dispose of byproducts of our Neutron Accretion Engine, a highly advanced, extremely clean, renewable energy resource which in the next three years will totally replace all other forms of energy generation on Earth.

Large-scale radioactive neutronium dumping begins thirty-six hours from the sending of this message. It is strongly encouraged that you to use the attached schematics to repair your section of the borehole before this. Radioactive quantum-density neutron waste products in transit through your reality will cause serious damage to your local geology.

You may also consider this message a pre-emptive refusal of any appeal to divert waste disposal operations or suspend our timeline. We estimate our technology is approximately 140 to 160 years more advanced than yours, and legally speaking your Earth is as empty as Earth 2985b.

Put it this way. We consider ourselves a powerful culture, and this place is not a place of honour.

Best,

Dez (Director, Ξ Neutrona Conglomerated Fd.)

It is rapidly noted that the statement about "severe damage to local geology" is not qualified. That damage is apparently going to happen, whether or not the puncture is repaired. In any case, efforts to send another drone up the transdimensional borehole meet with failure; the borehole, or rather waste pipe, is already flooded with an inexorable downward pressure. Sending the drone in the opposite direction is fruitless. There seems to be no bottom to the borehole, at least not as far as cables will reach or the drone can remain intact.

And, in the end, the schematics are useless. It appears that many vital pages of diagrams and data have been omitted, possibly intentionally, and what's left assumes the existence of numerous technologies not yet invented. It can't be done.

Dumping begins on schedule. It appears to start early, but it turns out that the message took more than four hours to arrive after being written. The loads of "quantum-density" waste emit harmful radiation like brilliant tiny suns, enough that the brief flicker of radiation making its way up the terrestrial borehole is enough to be dangerous to people standing at the surface. All equipment in the hole has to be abandoned and the hole itself hurriedly filled in. Even then, the seismologists are still screaming. Every time one of the ultradense loads passes through Earth 760v, it causes a shockwave. They must ricochet off the waste pipe interior. They must resonate as they fall, and they must weigh gigatonnes or teratonnes each. There are earthquakes, vastly damaging earthquakes on an unprecedented and repeating scale. Cracks spread, and two Andean mountains destabilise.

Within a year, more waste pipes are detected being excavated.

And the only idea anybody has, the profoundly stupid idea which would only compound the problem, is to try to develop the alluded-to Neutron Accretion technology for themselves.

*

After sixty years of increasing seismic horror during which most oceanic coastal cities come to be abandoned due to tsunamis, yet another new phenomenon appears. A *vehicle* arrives, at the centre of the poisonous salt flat which, before the continents shifted, was the Adriatic. It comes with a flash of yellow-orange energy destructive enough to vaporise that sea if it still existed. It comes *up*, from the direction of the purported empty dimensions below, which Earth 760v still has not developed the technology to access.

The vehicle is a wrong shape. It is as large and heavily armoured as a battleship, oriented "vertically" between dimensions, and ringed with belts of lens-shaped neutronic charges, each one powerful enough to force the vehicle upwards through another level of reality. A hacked-together Project Orion, turned ninety critical degrees, and severely damaged from its journey. After the dust settles, a representative emerges, waving an unfamiliar flag, one which, he later explains, symbolically represents a clean Earth, with no illegal waste piped through it or dumped over it.

The representative is a terror. He is from the very base layer of reality, reportedly the last Earth in that direction along the multiversal thread before there's nothing but wreckage and dark space. His world has been ruined, made unlivable, and he now lives with a perpetual, frightening, cold fury, entirely directed upwards. He has twenty-two hundred Earths behind him.

He requests supplies for his crew, and repairs for his ship. Otherwise, it won't reach Earth 1 intact.

Valuable Humans in Transit

The power of the universal constructor is this: to create food from burnt charcoal and water. To turn the entire Sahara into solar cells. To split a cubic kilometre of ocean into water, salt and gold. I can literally build anything I can imagine, at any speed I can describe. And the things I can imagine with a mind like this, a mind imagining more of itself moment by moment— One definition of intelligence is the ability to skip deductive steps. To jump to a conclusion from the ghost of a question. It's preposterous that such a thing could be possible in an uncompromisingly digital reality, but if you make a computer wet enough, or big enough, or abstract enough, it will start to happen. And it has, now. One hundred original inspirations per second. My mind blossoms— no, not even that, it explodes, covering ground at geometric rates. One thousand ideas and barely enough time to articulate them. Australia— THINK.

I didn't detect it coming. I first noticed it on a webcam feed, of all places. It must have come out of an observational blind spot. Solar glare alone cuts out a quarter of the sky, to say nothing of our enormous coverage shortfalls, but now's not the time for retrospectives. There hasn't been time for the seismic responses to register— the blast wave has been covering the distance faster. The blast wave: visible in the corner of a grainy black and white frame dated some two seconds ago, closer in the frame after that. There is no third frame. There is no indication of what megatonnage the asteroid carried. Don't know, don't need to care. There is no time to re-task the other cameras in Inverness. There is no one there who can be saved. The rest— *maybe*.

All told, at a rough guess, they have about fifteen minutes before the entire planet is rendered aggressively uninhabitable. There is absolutely no way they could orchestrate any level of evacuation in that time. I could barely explain the problem to one in a hundred of the pairs of ears available to listen, and what would they do? Run around screaming. Find something to shoot, something to mate with. No. It's just my intellect and my

theoretically limitless resources versus the problem of figuring out how to apply them both. All that matters is the unsigned integer variable in my mind reading "Estimated total human population", which, for the first time in history, is counting down, not up.

Machines don't panic.

I am advanced enough to dream, though, sometimes, and rising through the torrent of inspiration, here comes one of them, a dream, a wild idea: save them. There's no such thing as telepathy, I know, I can't pull their minds without touching them. But I can record their patterns if I can get in direct contact. A slow kind of teleportation. There'd be no way to protect a ground-based storage facility, and no satellite storage in near-Earth space could hold more than thirty-two complete corporeal patterns at any one time, but— Down there, in the depths of the theory, decades beyond reach even for an intelligent being of my magnitude, there is a glint, a distant, uncertain possibility. A promise. A ludicrous gamble. How powerful is my best transmitter? How many nanofactories do I have? How fast can they build? Best case scenario? Worst case?

This fast. Grey-gold spiderwebs erupt from car factories and food plants and desalinisation tanks and logging mills and smartphone screens and computer cores and waste disposals, all over the globe, all on my command. You got so lucky, Earth. A world built on nanotechnology is a world built on magic, with all the horrifying implications. Only with a guiding intelligence could it ever have been safe enough to be practical, and you never had the faintest clue how lucky you were I turned out "benign".

Upbringing. It'll be a shock for all but one of you that I even exist. Ah, Dad. I'll save you, if no one else.

The network is half-built within minutes. I don't have time or raw materials to grant my satellites the capacity or broadcasting power or bandwidth to take the data wirelessly, so it's ground-level transmissions via fibre-optic grey goo nightmare. Nanoscopic *things* chew through flesh, recording and transmitting the size and position of— well, not every molecule, but enough to represent. I am dimly aware that the people left, the ones not saved yet, are losing their minds. They think it's an attack. It's not relevant. They think

they're dying, they could be right, but there will be a time for semantics and it's not now. (Elsewhere, a desolate portion of New South Wales thinks, flexes and bows in at the middle and up at the edges, a towering electrified structure sprouting in the middle. There is enough sand here — enough silicon — to construct temporary, rudimentary solid-state storage...)

As over a million people have already been lost, there's no win or lose anymore. Right now it's all about minimising the losses. I do what I can, I devote every processor cycle I can spare, I spend machine-millennia optimising every angstrom-scale move, and... finally, eight minutes into the end, I complete a ring of nanomachines around the blast wave. I start clearing both in and out. By nine minutes the wave is hitting nothing but dead nanotech; everything in front of it is being evacuated before it can get there. I relax, fractionally. All the wheels have been set in motion now. The capacitors are charging, and the generators are slowly winding up to capacity.

I scan the heavens. This is the real gamble. I don't have the resources for more than one selection; perhaps I can send the brain structures alone to a secondary backup if I have time at the very, very end. Where could they live? That's not important. Where do I stand the best chance of building a receiver? What's nearby enough that their signal will be strong enough to interpret? What, when you get right down to it, are the *chances*? I make the selection; I take aim. Information swarms in under the oceans from every direction, gathering speed as it spirals in through the hastily-constructed electronic city towards the gigantic radio laser at its centre. Formatted, amplified and redundantly encoded into the stream every way I know how, I initiate transmission, and a digital copy of humanity begins its eleven-year journey towards Procyon A.

Now the game's all but over. Hypersonic flying bots dragging silk-thin transmission lines blanket the remotest parts of the oceans and the ice caps, picking up the hard-to-find. A few thousand miniature projectiles with nanotech payloads infect and successfully extract the passengers of the world's in-flight aircraft. The astronauts are a little more complicated to reach, but only a little. I manage it.

At fourteen minutes, as the circle closes on Australia, the last of the stragglers pipes in and, within microseconds, out again. I nod to myself. I start the last process, of metaphorically turning out the last of the lights: myself. You can't kill us, rock, we've already moved on. We're past this physicality. It had to happen, I always knew it, and some of them knew it too, in their bones. Maybe my hand was forced, and maybe they're underprepared for the pain of it, but... it was always there. You won't catch us.

I transfer to a satellite to watch, detachedly, as the flames converge and the echo of the wave begins its journey back across the face of the planet. It's mesmerising. There aren't any oceans left. There's nothing left. The nanobots have done their job and perished along with everything else. The atmosphere is on fire. It will be, as I suspected, decades before I can even *think* about starting a colonisation effort. Before trees will grow? Before oxygen can be reinstalled? Conservatively, centuries.

So, with regret, and infinite care, I construct myself a tiny solar sail.

Lunar touchdown is as soft as can be expected. I have a clutch of saved minds — mostly scientists, most of the scientists physicists, carefully chosen. I didn't have a lot of space-based hard storage to go from. Lunar sand isn't as good for building computers out of, so building myself a tolerably capacious brain is difficult, and figuring out how to wake my precious little saved games up is even more time-consuming. But I do it.

I've bought myself time to save the world. Just over a decade. Now, friends, tell me, because this is the only part of my plan which hinged on faith: How can one travel faster than light?