Building Human Worlds – DMT and the Simulated Universe

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When at last they awoke, it was already dark night. Gretel began to cry and said, "How are we to get out of the forest now?" But Hansel comforted her and said, "Just wait a little, until the moon has risen, and then we will soon find the way." And when the full moon had risen, Hansel took his little sister by the hand, and followed the pebbles, which shone like newly-coined silver pieces, and showed them the way.
Hansel and Gretel, the Brothers Grimm

In the early 19th century, when the Brothers Grimm were busy by candlelight, with quill and ink, crafting worlds populated by industrious elves and imposturous wolves, it would perhaps have exceeded their imagination to envisage the creation of worlds into which the creator himself could stride, wander and, as if in a dense and dusky forest, become quite lost. Of course, now in the early 21st century, such a scenario is ever closer to being realised in the form of computer-generated virtual realities. As computational power continues to grow, and VR technologies are honed and polished, we can now immerse ourselves in fully synthetic worlds less and less distinguishable from the real one. But which is the real one?

The question of whether we are living in an objective physical reality (whatever that means) or a Matrix-like computer simulation is no longer restricted to science fiction; a number of serious scientists and philosophers now take this idea quite seriously (Beane *et al.* 2014). Whilst the Wachowski brothers' Matrix trilogy was undoubtedly responsible for much of the renewed interest in the so-called *simulation argument* (SIM) (Bostrom 2003, Papakonstantinou 2015), the idea has its roots decades earlier. In 1969, computer pioneer and inventor of the world's first programmable computer, Konrad Zuse, penned a rather unusual little book titled Calculating Space (Rechnender Raum) (Zuse 1969), in which he

argued the universe was a *cellular automaton*, a type of computer programme evolving through a series of discrete steps, according to pre-defined rules dictating how the system updates with each 'click' of time. The most famous example of a cellular automaton is mathematician John Conway's 'Game of Life' (Gardner 1970), which is a simple grid-based zero-player game that, with only four simple update rules, produces a startling array of complex evolving patterns and behaviours, from simple static formations ('still lifes') to pulsating and gyrating 'spaceships' traversing the screen emitting projectiles. Zuse proposed that, despite the astounding complexity of the natural world, at its foundation could be a set of rather simple rules updating the universe with each passing moment. However, Zuse certainly wasn't suggesting the universe is a computer simulation. But what he *was* suggesting is that the universe is *computable*: the most fundamental requisite of a simulated universe. A computable universe must be wholly defined by a finite amount of information that could be represented, processed, and stored on a computational device (Zenil 2012). Of course, all modern computational devices we are familiar with represent information digitally. Eminent theoretical physicist, John Wheeler, maintained that digital information lay at the ground of reality. His epigrammatic coinage – "It from bit" – submitted that "every particle, every field of force, even the space-time continuum itself derives its function, its meaning, its very existence entirely from the apparatus-elicited answers to yes-or-no questions, binary choices, bits." (Wheeler 1990) This was certainly the pithiest articulation of the idea of a computable universe constructed from a colossal but, crucially, finite amount of digital information (if you're wondering how much: best guess is around 10^{120} bits) (Davies 2004). Although Wheeler himself never actually endorsed a simulated universe (in fact, he made it clear that the information he was talking about was very much physical), several of his contemporaries came closer to doing so. One of the most important is computer scientist, Ed Fredkin, founder of digital physics (often later referred to as *digital philosophy*), which seeks to explain the physical world in terms of digital information processing (Fredkin 2003). According to Fredkin, "physics is a consequence of the fundamental bits being engaged in the fundamental information process." (Fredkin 1992). Further:

> *In DP [digital philosophy], the computation that is physics runs on an engine that exists in some place that we call "Other". There is no reason to suppose that Other suffers the same kinds of restrictive laws present in this universe. Computation is such a general idea that it can exist in worlds drastically different than this one; any number of regular spatial dimensions or almost any kind of spacetime structure with almost any kind of connectivity." (Fredkin 2003)*

Whilst Fredkin stops short of enthroning a super-intelligent alien programmer as the architect of the cosmos, his view of the universe certainly doesn't rule out the possibility, and it's hard to resist inserting such a creature into his so-called Other.

Of course, just because the universe is computable and, in theory, *could* be simulated doesn't mean it *is* being simulated, and only a handful of scientists actually take the idea seriously. But for this spirited few, conceiving the world as a digital simulation is more than just a cute mathematical exercise - the universe is a strange place, and the advent of quantum theory and relativity in the last century has only made it stranger. Many of the curiosities of the post-Newtonian world: quantum entanglement of subatomic particles; light speed as the absolute maximum; the quantisation of energy, space, and time at the Planck scale; even the origin of the universe itself, remain somewhat mysterious. But, in a simulated universe, such quirks would be a natural consequence of the running of a digital computer program: the properties of two electrons being run by the same subprogram would appear correlated, distance being an illusion; an absolute maximum velocity would be determined by the maximum clock speed of the processor; the resolution of the spatial grid and the fundamental time step of the simulation would reveal a pixellation, or graininess, of the world at high magnification. And the origin of the universe? That's when the Simulator(s) hit the run key (Whitworth 2007).

Leaving the physics aside, Oxford philosopher, Nick Bostrom, proposes a method of calculating the likelihood of us being part of a grand computer simulation. In his version of SIM, the Simulators are not advanced alien beings

from a parallel universe, but 'post-human' versions of ourselves. Bostrom argues that, if the human species ever reaches a 'post-human' stage of advancement, these post-humans might decide to run simulations of their ancestors using super-powerful computers. Bostrom uses a fairly simple calculation (which I will spare the reader here – please see the original paper for the details) to show that, unless no other human-level species reach a post-human stage (at which point such simulations become feasible) or, having reached such a stage, all post-human civilisations converge on the decision not to perform such simulations (e.g. for ethical reasons), then we are almost certainly living in a simulation (Bostrom 2003). Pause for thought.

Whilst Bostrom's argument is, for some, quite persuasive, it is actually somewhat conservative. Bostrom concerns himself only with human-level species that evolved in this universe – this is a necessary restriction, as we cannot be certain other universes containing intelligent life exist. However, there is no reason to assume this universe is the only one. In fact, such an exceptionalist position is difficult to defend and most scientists are understandably agnostic on the issue. After all, if this universe burst into being from a single, dimensionless point, there is no reason why this couldn't have happened countless times. It is perhaps just as anthropocentric to assume this is the only universe containing intelligent life, as it is to assume Earth is the only life-bearing planet in this universe. As such, we certainly can't assume those running the simulation were ever 'human' at all and the term 'post-human' should perhaps then be replaced with 'super-intelligence', with no presumption as from what this intelligence evolved. Of course, by this point, we are straying into highly speculative territory. However, all of this speculation would be unnecessary should we ever discover a means of observing our programmers directly and, with this discussion in mind, we shouldn't be too surprised if they turn out not to be human or even 'post-human'.

Bostrom is careful to point out that we shouldn't rely on his philosophical argument alone to decide whether or not SIM is true and, should further evidence arise either supporting or contesting the SIM argument, then this evidence ought to be conditioned into our credence in SIM. To illustrate, using Bostrom's own examples, if we had sound justification to believe all simulated

humans would be wearing black trenchcoats, the fact that only a very small minority of the population are so adorned would be strong evidence for SIM being untrue. Conversely, if the Simulators were to place a 'window' in the visual field of all humans, stating, 'YOU ARE LIVING IN A COMPUTER SIMULATION', then this would dramatically elevate our credence in SIM (Bostrom 2005). Of course, such an obvious clue doesn't appear to be forthcoming. However, this particular example leads us to question whether the Simulators would be careful to avoid leaving any such clues to our simulated nature, or whether they might have an interest in us eventually finding out.

If we are to progress beyond mere conjecture, it would be helpful to answer a couple of questions: If SIM is true, would it ever be possible for conscious beings living within the simulation to learn they are living in a simulation? If we assume the answer is yes, would the Simulators allow the simulated beings (us!) to learn they are living in a simulation, would they want to hide it, or would have no control over this (i.e. if our emergent intelligence transcended their ability to hide it)? To answer this second question, we would need to know something of the motives of the Simulators and this could only be speculation. However, assuming SIM is true, should our Simulators wish to hide from us the fact that we are living in a simulation, it is likely they would be capable of preventing us from acquiring such an understanding. This is likely to remain the case even when we acquire high levels of intelligence, but perhaps not if our level of intelligence closely approaches theirs, which may or may not be possible from within the simulation. In other words, at this stage of human cognitive evolution and technological development, at least, our ability to learn of our simulated nature almost certainly requires either the active enablement of this ability by our Simulators or, minimally, their passivity in this regard. So, if we are to pursue the SIM argument with a view to truly understanding whether or not it is true, rather than simply as an interesting philosophical exercise, then we must assume our Simulators would allow this pursuit to bear fruit. And this raises the question of whether our Simulators might actually *want* us to learn we are in a simulation. This is a particularly interesting perspective, as it would render the entire human enterprise as something akin to a cosmic game or, perhaps, a cosmic joke.

Whilst undoubtedly fascinating, arguments from physics or philosophy are limited in that they provide nothing in the way of direct experiential insight into whether SIM is *really* true or not – to accept SIM would require the uprooting of the most fundamental of our ontological assumptions (i.e. that we live in an objective reality) and evidence implicit in the laws of physics and even the soundest of philosophical arguments are alone unlikely to be sufficient to ever cause such a shift. So, if we allow for the possibility that our Simulators might have an interest in or desire for us to gain true experiential insight into SIM, then it would make sense for them to leave more explicit clues, although perhaps not as explicit as Bostrom's 'window'.

The late great psychedelic bard and grand speculator, Terence McKenna, felt the experience elicited by the powerful natural psychedelic, N,N-dimethyltryptamine (DMT), was the most intense a human could have "this side of the yawning grave," firing the user into ineffably bizarre alien realms replete with a dazzling array of peculiar creatures, many of which actively communicate with the tripper. The online trip report literature is filled with tales of DMT users' voyages in these unimaginably extraordinary territories and of their meetings with the locals. In other articles, I have discussed at length the problems in attempting to explain the worlds visited during the DMT experience (Gallimore 2013, Gallimore 2014). When trying to understand any world appearing to consciousness, whether it be the regular waking world we're all familiar with (the consensus world), or an alien world visited at the peak of a DMT trip, it's useful to think of the brain as the 'world builder' – the informational structure of the world must have a representation in the brain. It doesn't matter whether the world is real or hallucinatory – the world must be built from information encoded in the patterns of activity of the billions of interconnected neurons over large areas of the cerebral cortex. The difference between a 'real' world and a hallucinatory world is the former is built with the aid of sensory data from that world, whereas the latter is built entirely without the guidance of such externally sourced data (Llinas *et al.* 1998, Behrendt 2003). In the case of the waking consensus world, this external data would include light and sound, for example. But, of course, the world is not built from light and sound. These merely guide

the construction of the world, which happens entirely in the brain. Even without sensory input, the human brain is perfectly content building the consensus world, and will continue to do so even during sleep, during dreaming. But, even when awake, only small amounts of sensory data are required to help shape the world (Edelman 1993, Tononi *et al.* 1998). This is because patterns of sensory data have sculpted and moulded the connectivity of the cortical neurons such that the brain now builds the consensus world as a default. In fact, the consensus world is the only world your brain knows how to build. Or, at least, it's the only world your brain *ought* to know how to build. But, of course, within seconds of DMT levels surpassing an undefined threshold, the brain begins building bizarre alien worlds of crystalline clarity and inexpressible complexity. This is perhaps as hard to explain as a child, brought up in a monolingual English family, suddenly shifting into fluent Siberian Yupik. It's comfortably glib to dismiss the DMT experience as "an exotic aberration of the brain's perceptual mechanics" (Kent 2004), but the reports of thousands of users across the world suggest otherwise. When the content of large numbers of trip reports is analysed (see (Gallimore 2013)), in many cases, the worlds visited under the influence of DMT seem strikingly similar across users and yet to bear no relationship whatsoever to the consensus world, and the assertion that this results from the "brain's own pattern-matching systems trying to impose order on chaotic patterns" (Kent 2004) becomes less than persuasive. Whilst it is tempting to appeal to the brain's unbounded and yet normally untapped creativity to explain the DMT visions, those dismissing the DMT worlds as purely hallucinatory offer no convincing explanation as to why the brain would impose 'order' on chaotic brain activity by generating visions of elves singing impossible objects into existence, or super-intelligent entities weaving the fabric of reality. This difficulty in explaining how the brain could render these worlds without access to extrinsic sensory data from them, together with the large proportion of DMT users arriving in the same type of world – highly artificial, constructed, inorganic, and in essence technological (Hancock 2006) – and meeting the same types of entities, leads many to conclude that the DMT worlds have an objective existence independent of the user and that the brain *does* receive data from them. This interpretation of the DMT experience has been popularised as a sort of *tuning model* – the brain

can be tuned, in a manner analogous to a radio, to different realities dependent on specific neurochemically-defined states (Hancock 2006). I develop a more neurologically-informed version of this model in *Building Alien Worlds* (Gallimore 2013). But here's the problem: even if the DMT reality is real – and there's nothing in the laws of physics to rule out alternate universes as such – the most astonishing revelation would not be the existence of such a world, but the fact we had the ability to access it. There seems to be no mechanism for the brain to receive, parse, and render sensory data from an alternate reality – this is what I call the *data input problem*. However, the simulation argument might provide a solution.

If we assume the simulation argument is true, then, as explained earlier, everything manifesting in this universe is the result of information processing, of computation. This includes sensory input into your brain, which is itself a complex data structure within the simulation. This means that, although sensory input appears to you as light hitting your retina, or sound waves resonating with your eardrum, for example, light and sound are themselves data within the simulation. So, what we see as sensory data is, in fact, simulation data interacting with, and being processed by, the data complex that is your brain. The programming of your brain will dictate the data that can be received and processed by it. This resolves the data input problem, as it is easy to imagine a recoding of the brain data structure such that it can receive data to which it normally has no access. So, DMT can be seen as a subprogram implanted in our main reality program. Consumption of DMT is essentially applying a 'patch' to the brain data complex that reprograms it to gate access to data normally disconnected from our reality program.

It is not clear whether the DMT reality is part of a much larger *simulated* reality of which our universe is also a part, or the actual *Simulator* reality. Both alternatives are conceivable, although certain characteristic features of the DMT reality might make us lean towards the latter. For example, surveying DMT trip reports reveals a striking number of users that, whilst deep in the DMT space, develop an inexplicable ability to directly perceive beyond 3-dimensional space.

Many are confronted with environments and objects that are not only extremely strange, but impossible:

> *"I was suddenly able to perceive 4D objects, like a tesseract, as if it was a 3D object. You could also say it was like looking at an Escher drawing or one of those 'impossible objects' as if they actually made sense."(Anon. 2013)*

> *"It is difficult to describe, but it seemed 'fourth-dimensional'. Meaning I was in a place at once both outside and inside the 3rd dimension, and I could see all sides of everything (and the inside) simultaneously."* (Meyer and Pup 2005)

The direct perception of higher-dimensional (i.e. above 3 spatial dimensions) objects is not possible within our 3-dimensional reality – in fact, such objects are difficult to envisage at all. A 3D reality is subsumed by any higher-dimensional system, in the same way our 3D world subsumes a lower dimensional one, such as a 2D 'flatland' world. Pertinently, physicist and SIM theorist, Brian Whitworth, points out that "every virtual world must have at least one dimension outside it, in its *containing reality* (Whitworth 2007)." If DMT users can indeed perceive 4- and higher-dimensional objects, then the reality in which these objects appear must be beyond consensus 3D reality. This is consistent with the requirement that the Simulator reality possesses more dimensions than the simulated reality (our reality), and suggests our brain is a 3D projection of a higher-dimensional processor and capable, with the appropriate programming, of rendering higher-dimensional data.

Commensurate with the requisite advancement of any Simulator civilisation, it is also common for DMT users to note many of the inhabitants of these hyperdimensional realms appearing to possess a level of intelligence beyond that of any human:

> *"There were these beings that seemed to inhabit this place, that seemed to come off as vastly more intelligent and vastly more capable." (Anon. 2006)*

> *"They are... the word is 'machine-like'. The whole thing bodes of high alien technology..."* (Anon. 2009)

Some entities even have the ability to create reality:

> *"She was a monstrous machine, somewhat insectoid in that she seemed to be spawning all the reality around her..." (Anon. 2009)*

And this user describes entities eerily reminiscent of Bostrom's post-humans:

> *"I did see intelligent insect alien god beings who explained that they had created us, and were us in the future, but that this was all taking place outside of linear time."* (Meyer and Pup 2005)

Of course, it's easy to cherry-pick trip reports to support the contention that DMT might be a technology provided by our Simulators to allow us to access their reality. But, if DMT is such a technology, then it's highly unlikely we're expected to settle for a stack of anecdotes. Although DMT is by far the most widespread of the naturally occurring psychedelics, and it is common to quip that it might be quicker to list those plants that don't contain DMT than those that do, simply consuming a DMT-bearing plant is insufficient to gain access to the Simulator domain and give the game away. The DMT must be extracted and purified to yield a smokeable or injectable form, such that the brain can be rapidly flooded with the drug. Although this feat of modern chemistry now seems pretty trivial, it actually requires a high level of intelligence and skill – firstly, to identify DMT as the active molecule of interest, and then to perform the chemistry to isolate or synthesise it. It feels rather apt that the clue to the nature of the universe should be planted almost everywhere we look and, yet, remain hidden until we acquire the requisite cognitive sophistication to understand the nature of the game and the technical skills to actually play it: by self-administering purified DMT.

If DMT is the key to a cosmic game, it may be one that must be played over a sequence of advancing levels, each carrying us closer to the Big Reveal (or, perhaps, the punchline). Identifying DMT as the technology is only the first move, and we've barely progressed beyond our opening gambit: although the hallucinogenic properties of DMT were discovered almost 60 years ago (Sai-Halasz *et al.* 1958, Szara 2007, Gallimore and Luke 2015), and synthetic DMT made its appearance in the psychedelic subculture of the 1960s, we haven't

really moved past simply smoking it from a glass pipe, which remains the most popular method of administration. As a technology implanted by a super-intelligent advanced civilisation, this certainly isn't the optimal way to use it and we need to do better.

To improve our game plan, we need to consider the pharmacological peculiarities of DMT, which might be considered design features of the technology. With other natural psychedelics, such as mescaline or psilocybin, repeated use produces a tolerance effect with each subsequent dose, unless the doses are spaced apart several days. DMT is unique in not displaying such tolerance, so there is no diminishing of effects with repeated doses (Strassman *et al.* 1996). DMT is also metabolised very rapidly, far more so than other natural psychedelics (perhaps with the exception of salvinorin), so its effects, whilst mind-blowing, are mercifully brief. Unfortunately, this brevity also means most users are barely able to orient themselves in the maelstrom before being dragged back into the consensus world, gasping for air and grasping for words. But, it is precisely because of these characteristics that we needn't settle for a stack of verbose trip reports from the countless lay psychonauts who have sojourned all too briefly in the DMT space. If we really want to play the game, and potentially to reach the next level, we need to be much bolder.

Because of the lack of tolerance and brief duration of action, using the same technology developed to maintain a stable brain concentration of anaesthetic drugs during surgery (Leslie *et al.* 2008), it would be feasible to administer DMT by precisely regulated continuous intravenous infusion. Although a well-prepared ayahuasca brew might achieve a crudely comparable effect, standardisation of the dose is much more difficult and the concentration of DMT in the brain will fluctuate based on a range of pharmacokinetic and metabolic factors. A well-designed continuous IV protocol could avoid or at least account for these factors, allowing the brain DMT concentration to be kept stable or manipulated to gradually move the explorer deeper and deeper, permitting an extended, and theoretically indefinite, expedition to the DMT reality. This would effectively be a sort of *anti-Matrix machine*, reconnecting us to the Simulator domain, allowing extended and stable communications with the inhabitants to

be established. The next level of the game may well await the first volunteers, and we should probably await their field reports before speculating any further.

If we accept this view of the universe as a genuine possibility, it's natural to wonder about the Simulators. Whether you lean towards Bostrom's post-humans or hyperintelligent aliens from a parallel universe, it's easy to feel like the unwitting, and entirely unconsenting, subjects of a rather cruel experiment. But a far more positive outlook is also possible, and it makes sense to end on such a note. Drawing much of his worldview from Vedic thought, the philosopher Alan Watts likened the universe to a game of hide-and-seek played by the Godhead, the Self:

> *"God also likes to play hide-and-seek, but because there is nothing outside God, He has no one but himself to play with. But He gets over this difficulty by pretending that He is not Himself. This is His way of hiding from Himself. He pretends that He is you and I and all the people in the world, all the animals, all the plants, all the rocks, and all the stars. In this way He has strange and wonderful adventures, some of which are terrible and frightening. But these are just like bad dreams, for when He wakes up they will disappear." (Watts 1970)*

The game of hide-and-seek is the play of the Self in creating worlds into which He can stride, wander, and become lost. Simulated universes might be one way the Self hides from Himself, and our universe one of His strange and wonderful adventures. The DMT molecules scattered throughout the natural world are, perhaps then, Hansel's pebbles, glistening in the moonlight, winking, and leading us home.

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