

Glitch in the Matrix: Urban Legend or Evidence of the Simulation?

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Abstract: In the last decade, an urban legend about “glitches in the matrix” has become popular. As it is typical for urban legends, there is no evidence for most such stories, and the phenomenon could be explained as resulting from hoaxes, creepypasta, coincidence, and different forms of cognitive bias. In addition, the folk understanding of probability does not bear much resemblance to actual probability distributions, resulting in the illusion of improbable events, like the “birthday paradox”. Moreover, many such stories, even if they *were* true, could not be considered evidence of glitches in a linear-time computer simulation, as the reported “glitches” often assume non-linearity of time and space—like premonitions or changes to the past. Different types of simulations assume different types of glitches; for example, dreams are often very glitchy. Here, we explore the theoretical conditions necessary for such glitches to occur and then create a typology of so-called “GITM” reports. One interesting hypothetical subtype is “viruses in the matrix”, that is, self-replicating units which consume computational resources in a manner similar to transposons in the genome, biological and computer viruses, and memes.

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1. Introduction

The Matrix movie (1999) popularized the idea that we may live in a computer simulation, created by an advanced artificial intelligence, and also that in this simulation could be glitches, that is observable but unintended artifacts, which defy known laws of physics. Also, Whitworth suggested that many physical laws of our world may be best explained as laws of information processing (Whitworth, 2008).

The idea of living in a simulation is explored in philosophical literature, starting from Putnam (Putnam, 1981) “brain in a vat”, but most famous is its analysis in the Bostrom’s Simulation argument (Bostrom, 2003), which appeared shortly after the *Matrix* movie and presents the idea in the form of an alternative: either we are in a simulation, or we will go extinct soon, or no future AI will be interested in creating the simulation. As we analyzed in our article “Simulation typology and termination risks” (Alexey Turchin, Batin, Denkenberger, & Yampolskiy, 2019) this argument should include not only future of humanity, but all other possible civilizations, including extraterrestrial ones, and this makes the case of being in simulation much stronger.

The idea of glitches got a lot of attention recently, but not in the scientific literature, but as a form of current mythology or urban legend, centered around “Glitch in the matrix” Reddit community.

In this article, we will explore if such glitches in the matrix could be evidence of Bostrom’s simulation.

In section 2 we will discuss theoretical reasons why simulations may have glitches. In section 3 the typology or reports of possible glitches will be created. In section 4 will be shown that most reported glitches could be explained as hoaxes or cognitive biases and even if they were true they don’t look like the glitches expected in a linear computer simulation, but may be explained if we are in a hostless simulation. However, hoaxes and creepypasta memes are a better explanation. In section 5 a new hypothesis will be suggested: glitches as viruses in a hostless (abandoned) simulation.

2. Simulation and glitches

2.1. History of the idea of glitches in the matrix

In the *Matrix* movie ([see clip](#)), Neo experiences “deja vu”, seeing a black cat apparently repeating the same action twice. Another character explains that the phenomenon is, in fact, “[a] glitch in the matrix, which typically happens when they [the owners of the simulation] change something”.

The [Glitch in the Matrix community](#) of Reddit (GITM) started from a [question](#) on another subreddit (*Askreddit*) about possible experiences which could be described as a matrix glitch. Thousands of stories emerged.

The validity of such stories is questionable: everything could be explained as a combination of coincidences, hoaxes, lies and error in observations. Some stories turned out to have mundane explanations, like carbon monoxide poisoning, or seizures. Other stories were too good: they were built as high-quality horror stories; these attracted many readers but turned out to be fiction (based on previous posts or similar stories in the *Nosleep* subreddit of fictional horror stories.)

As a result, some mundane stories likely have mundane explanations, and the most bizarre ones are probably fictional.

2.2. Possible types of evidence for glitches

This may press us to conclude that there are not any scientifically validated glitches of the matrix. However, there are two circumstantial pieces of evidence:

- 1) The reported structure of the so-called glitches consists of some repeated elements. It could be explained by creepypasta (copying and pasting scary stories) or by Internet memes, but also may imply some real causal similarity between events (which could again have a mundane explanation). An example of such repeated glitch a situation when a night passes in the blink of eye (sometimes for two people, so it is not absent seizure – a type of epilepsy) or (false?) memories of breathing under water in childhood.
- 2) GITM-like stories were reported in folklore and from other sources, long before reddit.

Based on Bostrom's simulation argument (SA), it is very likely we are now within a simulation, as SA has two other branches: inevitable extinction of all civilization before strong AI or universal anti-simulation morals among all possible civilizations are much less probable, as we previously discussed in the article "Simulation typology and termination risks."

Thus, our *a priori* Bayesian estimate of being in a simulation should be very high, and we should not dismiss the possibility of glitches. There were two scientific experiments in which the possibility of glitches was tested: scattering of cosmic rays on possible space-time lattice of the simulation (Beane, Davoudi, & Savage, 2014) and calculating of the soft-rate errors in calculations, which turn out to be our universe origin as they disappeared after the computer was put in an underground bunker (Alexander, 2018).

2.3. Why might a simulation be glitchy?

We could ask, what is the probability of glitches, if we are in the simulation? On a first glance, even if we are in a simulation, the probability of glitches is very low, as simulation owners after running numerous simulations—and this condition is assumed within the SA—should learn to make simulations without glitches. In other words, $P(\text{simulation}) = 1$, but $P(\text{glitch/simulation}) = 0$.

However, there are some reasons why glitches might occur more often. Barrow (Barrow, 2007) suggested that as a typical simulation only approximates physical laws, it needs to be patched from time to time to make it consistent. Such patches would look like glitches to internal observers—who might see, for example, slow changes to physical constants. The same slow changes in constants might be, according to S. Lem, evidence of the existence of very remote supercivilizations (Lem, 1999), as they could wage wars against each other by changing physical laws.

In our article about the typology of simulations (Alexey Turchin et al., 2019) we concluded that the most probable types of simulations are the cheapest ones, as well as those that are observer-centered. The reason for why it is that cheap (in computational sense) is that such simulations could be created in larger numbers and also there is typical power law distribution between number of simulation and their price, as we could see in human made simulations. These cheap simulations may have less protection from glitches, as there is less investments in

glitch-protection mechanisms, or some cheap computational shortcuts are used, like simulating only observable surfaces of things.

Another important subtype that could be prone to glitches is “natural simulation”, that is, simulations which exist in the same way as a Boltzmann brain, inside possible computers, as suggested by Egan (Egan, 2009) and discussed by Armstrong (Armstrong, 2018).

It’s also possible the creators of any type of simulation could add glitches for their own amusement.

Some factors contribute to simulations that are inherently more likely to be glitchy:

1. *Hostless or abandoned simulation.* More about them below in section 2.6.
2. *Cheap hardware.* This seems unlikely, as error-correcting algorithms are relatively easy to implement, like checking control sums. If the simulation runs on inexpensive hardware, errors are more likely.
3. *Multirole game mismatch.* If the simulation is a multirole game where many different parts of it run on many different hosts or many players are interacting with one simulation, some coordination problems may result in glitches. Anything which could be called a “collective hallucination” would be prone to glitches.
4. *Low-resolution simulation.* If the simulation is simple and low-resolution, e.g. a technical weather simulation, where the quality of human experiences does not matter to the goal of the simulation (this scenario is close to that of an *abandoned simulation*, as the creator of the simulation doesn’t care about what happens to the humans inside it). Also, if the simulation is only simulating human experiences, but not the “lower levels of the simulation, e.g. atoms, it would be much more prone to glitches: computing coherent experience without reality is difficult. For example, memories of different people about past events should match each other; however, real human memory is so prone to errors that such glitches will vanish in normal inaccurate memories – which could also be real explanation of many reported glitches, which could be just false memories (Lacy & Stark, 2013).
5. *Programmers’ mistakes.* If the hosts are bad programmers who run buggy code. This is generally unlikely if we assume that the simulation was created by future superintelligent AI.
6. *Editing.* If the simulation is actively edited by its owners (as in the movie *The Matrix*).
7. *Debugging.* If the simulation is just a ~~test drive~~ beta version for debugging.
8. If glitches are in fact *features*, for instance, intended to allow preservation of some memory during respawning.
9. If the simulation is generated by a generative neural net or other algorithm that tends to produce bugs (e.g. dreams).

The existence of many glitches in the simulation might indicate that the simulation owner does not care about them. If the glitches were very important, the code would be cleaned of them, or the simulation was halted each time a glitch happened, and the memories about glitches erased.

Their presence means that owners don't really care about the simulation, meaning the situation is closest to that of a hostless or abandoned simulation, or even a natural one. The fact the observer (if we are in a simulation and if glitches actually happen) could discuss glitches, means that any control over the simulation by its hosts is relatively weak as it could be much more Draconian.

2.4. Types of possible miracles in simulations

The general rule of thumb is that the more miracles there are in a simulation, the less realistic it is, and thus the lower the value of such miracles is. For example, if in a novel the main character is an absolute wizard, there is no conflict, and the novel would be not very interesting. The stories of a magician's apprentice are much more interesting.

Simulation, by definition, creates an illusion of some outside world, and this world seems to be governed by some set of laws. The hosts of the simulation could override almost any such law, but if they do it too often, the simulation will lose its quality of an illusion of real world.

There are several types of possible miracles:

- *Acts of God*. Invasion by the simulation's owner.
- *Magic*. Miracles are controlled by some secondary set of laws, like magic.
- *Errors*. Errors or glitches—miracles are rather random events.
- *Exploits*. "Cheat codes", which could be used to hack simulation from inside (as in Scott Meyer's "Off to be the Wizard").
- *Viruses*. "Demons" in mythological systems.
- *Glitch correction systems*, like *The Matrix's* "Agent Smith" or the MIB (Men in Black – an urban legend about men in black suited who intimidated UFO witnesses, but acting in absurd and ineffective ways (Redfern, 2011)).

Hypothetically speaking, we could try to establish direct communication with the simulation's owners (or owners of owners, in the case of a nested simulation) and ask for some miracles. Some forms of religious prayer are like this. Some people claim that they received "miracles" (glitches?), via such an appeal to God. However, if this occurred often enough to be scientifically testable, it would break the realism of our simulation; thus, hosts' miracles should be rare, below the noise level, or unreportable for other reasons.

2.5. Human dreaming as an example of a simulation with glitches

The human brain is capable of generating advanced simulations, which we call night dreams. The reasons why evolution created such adaptation is not obvious. One explanation is that dreams are needed to properly train internal neural networks to act in dangerous situations, in which real-life training would be too expensive or risky (Revonsuo, 2000). That would explain why the general structure of many dreams is to want something, but get only partly and with unexpected obstacles (e.g. a bullet in a dream may slow fall from a barrel or sex is interrupted by an intruder). It also explains nightmares. However, the evolution never has an articulated plan, and dreaming may have many functions.

Dreaming is in some sense a hostless simulation. Evolution created the general mechanisms for generating dreams, and such mechanisms include some form of protecting dreams' integrity: sleep paralysis, sensory input termination, quick forgetting of dreams after awakening, and the inability to recognize a dream *as* a dream from within. But evolution does not direct any particular dream one may have, as evolutionary forces exist over generations (this evolution, then, is similar to a Boltzmann simulation which creates possibility for many dreams).

Perhaps there is some director of dreams inside the human unconscious? Some dreams seem to have an obvious scenario, but most evolve rather chaotically, based on some rules of the dream world. Human dreams are observer-centered simulations which create only the dreamer's experiences. Moreover, dreams often generate the next scene based on the content of the current scene; in that sense, they are similar to a chain of observer-moments (though some dreams may have a hidden plot which is not obvious to the observing mind until the end). Regardless, human dreams are full of "glitches": objects shift forms, people appear and disappear, different places overlap and physical laws constantly break. However, the dreaming mind has a system which suppresses the impact of glitches that mostly works through our inability to recognize such glitches or to doubt the observed reality.

It appears the dreaming brain uses something like an adversarial generative network to generate images of a world which looks plausible and simultaneously suppresses critical reasoning. Some people train themselves to have "lucid dreams", where they use glitches to become aware that they are in the dream. These people can make the dream "controlled"—hacking the simulation from inside. In a lab, some lucid dreamers were able to send signals outside the dream to an observer via eye movement (La Berge, Nagel, Dement, & Zarcone Jr, 1981).

LaBerge and other researchers investigating lucid dreaming have mentioned that a dream can generate plausible explanations for observed inconsistencies, which makes difficult to recognize such dream *as* a dream and reach lucidity (LaBerge & Rheingold, 1991). If we were able to keep the critical mind at the same level as during wakefulness while dreaming, we would be able to see inconsistencies in almost all dreams. Because the critical mind is not in action, the dream looks very real from the inside, despite many absurdities of the story and images. This also means that relatively small computational resources are used to generate the dream—just *part* of the human brain.

Some unconscious processes could affect the content of the dreams. The most well-known example is the Freudian idea that sexual desires affect content of the dreams, where symbols of sex acts and body parts appear, edited by internal censorship (Freud & Cronin, 1913).

It is possible that future genetic technology could create a "human brain on steroids", which would be much more capable of consistent dreaming. Such minds could generate advance dream-simulations. In that case, Bostrom's argument about simulations would also be applicable to dreaming: my life could be a dream within a much more advanced brain, which is capable of generating a much more coherent narrative than my own dreams.

2.6. Hostless simulations

There are several ideas about how a simulation could exist without a simulator. We will call *hostless simulation* a simulation which creates an illusion of objective reality by the means of some computational media, but doesn't have any director, who consciously created and controls the storyline of such simulation. Putnam and Chalmers discussed a possibility of such computations inside natural physical processes (Chalmers, 1996). By definition, such simulation without control will be more glitchy, as it doesn't have any central agency which protect the simulation's integrity. The canonical example of such simulation is night dreams discussed above.

In this subsection we will briefly overview possible types of hostless simulations.

1. Night dreams

Natural night dreams. Around half of all human experiences are happening in the night dreams, and some people claimed to see very long and stable dreams. It is not easy to prove that you are not in a dream (even of another person than you think you are). Some level of control is still present in night dreams: (a) libido generating symbols, (b) prevention of lucidity, (c) general structure of the dream narrative which seem to be something like a failed attempt to do some interesting and risky things, (d) incorporation of the occasional external stimulus like sounds into the dream narrative.

Human brain is built in the ways that it generates some types of dreams, but the level of control over exact content of each dream is relatively small and it evolves rather randomly based on its initial conditions, without screenplay or a “film director”. In other words, there is a computational medium capable to generate dreams, but there is no “simulation owners”, who are actually caring about what is going on in the simulation. That is why we call it “hostless simulation”.

Night dreams of a genetically-modified brain in a vat, which is adapted to create much more consistent and long dreams or hallucinations than a typical human brain.

Neural net generated dreams. Illusions similar to night dreams could be generated by current GAN networks and it is easy to imagine that soon GAN could create full length immersive movies as well as users’ experiences in them (virtual observers). Such generating seems to be very computationally cheap, and movie generating networks may have just a few billions or trillions parameters and run on a currently available computers. As we suggested in another article (Alexey Turchin et al., 2019), computationally simpler simulation should numerically dominate as the number of simulations in our world is governed by some form of power law. However, it is not clear why future civilization may need to run large number of neural net generated illusions of real human life: may be for games or train new AIs? GAN-generated images – as of 2018 – have some interesting glitches in the background, teeth structure etc. (more [here](#)), but these glitches are not similar to the self-reported GITMs.

2. Abandoned computer simulation

This could be a “normal” computer simulations which are actually abandoned by their owners. They have a designer who is not interfering with a simulation once it is started and it is rather typical. Simulation could be abandoned but run perfectly as it is based on verified design, or it could be abandoned and damaged. In that case, some errors will accumulate in it.

Partially abandoned computer simulations. Some simulations may just not care about what is going on human mind’s level, for example, a detailed weather simulation. Level of abandoness is in some sense just a level of policing for glitch prevention.

Non-human hosts of simulation with different types of intelligence. If we are living in alien simulation, it may be owned by completely non-human beings which has different ways of problem solving, like hive-minds. However, they still have to converge to some form of rationality which requires conservation of resources and thus not running abandoned simulations for too long. Or they have very cheap computational resources that they don’t care to turn off useless simulations (maybe the owners don’t turn off the simulations with conscious being because it is unethical). If they are actually interested to artificially implant “glitches” in the simulation, it is not glitches from their point of view, but miracles.

3. Natural simulations and illusions

It was suggested that some natural computational process may appear which could create an illusion of subjective experience, which was called freak observers (Crawford, 2013) or Boltzmann brains. (Biological cells also could be regarded as an example of natural computers, and they are affected by biological viruses and transposons, which causes mutations which could be called glitches in DNA. While cells don't have observers inside them, they are example of glitchy natural computers.) Turchin explores the possible types of Boltzmann brains in greater details in "Dust in the wind. Types of Boltzmann brains" (Turchin, 2019).

Boltzmann Brains (BBs). These are minds which spontaneously appears from vacuum due to some quantum fluctuations. In more details, this problem will be discussed in our "Dust in the wind. Typology of Boltzmann brains" article. The main problem of BBs is that they are "too glitchy": randomness in their experience should be overwhelming and this is not what our reality looks like.

Boltzmann Simulations. Armstrong discussed this idea in his post "[Are you in a Boltzmann simulation](#)": "Thus, most nucleated BB OMs will be inside a Boltzmann simulation: a spontaneous (and causal) computer simulation created in the deep darkness of space." (Armstrong, 2018) He later concluded that Boltzmann Simulations are not very probable type of BBs as they require more energy which makes them exponentially less likely. But some other types of Boltzmann Simulations are still possible, for example, the ones inside the *mathematical universe* of Tegmark (Tegmark, 2014), where all possible mathematical structures exist, including all possible computers – and simulations. The attractive explanatory feature of Boltzmann simulations is that they dilute frequency of glitches, the similar way as cosmological inflation dilutes number of magnetic monopoles and other exotic particles which may appear in the early Universe.

Chains of observer-moments. The idea was presented as *Dust theory* by Egan (Egan, 2009) in his *Permutation city* novel. Similar random OMs create something like "chains" which are not causally connected, but which are connected subjectively. Such chains of OMs will eventually start to look like an observation of real worlds as suggested by Mueller (Mueller, 2017), at least to a first approximation. Using the idea of Kolmogorov complexity, Mueller showed that "next" observer-moment will be the one which is the most simpler explanation of the previous OM. He shows that this assumption is enough to derive basic laws of quantum mechanics and some other observed physical laws. "Flux universe" is an interpretation of the dust theory where an observer has an illusion of internal stability, but, in fact, is losing causal connection with anything which leaves his/her mind. An important part of the formalization of such theory is that simpler observers are more probable.

3. Typology of reported glitches

3.1. Reddit posts about GITM

There are many repeating stories which are attributed to glitches in our "Matrix". However, GITM is such a powerful explanatory mechanism that almost everything could be attributed to it. The previous explanatory mechanism of such power was "aliens", and before that "demons". Such explanatory mechanisms tell us more about the epoch's mythology than about actual nature of events. If an explanatory mechanism (e.g. "God did it") can explain everything but can't predict anything it loses any value.

GITM events should be events that look more like an error in the simulation than anything else. The inspiration here comes from computer games, where different types of bugs are widespread. So, one may expect that a potential GITM should not be just any strange occurrence, but something which is similar to computer game errors, like freezing, wrong rendering of texture or the shape of a 3D object. However, there are things which are often regarded as GITM, but are not similar to the known computer bugs—e.g. the so-called Mandela effect, when memories about the past become inconsistent with actual reality. A typical computer game has its own linear time, and changes to the past as well as premonitions about random events in the future are both impossible.

Below is a list of typical GITM stories—this is a low-level empirical classification, a list of self-reported events, which repeat at least once, and which authors of the texts attributed to a GITM.

- 1) Repeating events. [People](#). Cars.
- 2) Breathing [underwater](#)
- 3) An entire night going by in a blink of eye. [For a couple after only a small drink](#).
- 4) Doppelgangers. [Post](#).
- 5) Unexplainable disappearance of small things. [Post](#).
- 6) Changes in street plans: appearance of a new building. [Post](#).
- 7) Empty world without people. [Post](#). (The same type of story was told to me by a witness near Balaklava, Crimea: a whole camp looked empty in the morning, while typically it is full of people at the time – but it could be explained that he got up too earlier.)
- 8) Living an alternative life in a dream or coma. [Classic story about a lamp](#).
- 9) Doubling of a small object.
- 10) Small object reappears a long time after it was lost.
- 11) An animal enters a closed room.
- 12) Night terrors. [Post](#).
- 13) World halts for a short moment.
- 14) People behaving if they are not real, “switched off”, or [robotic](#).
- 15) The same dream shared by two people.
- 16) New neighborhood in an old place + disappearance of a [shop](#)
- 17) Being locked in a timeloop.
- 18) Sky color changes. [Post](#).
- 19) Errors in rendering. [Post](#) about two people seeing a lamp differently.
- 20) Strange airplanes or strangely morphed objects, cars, animals, people.
- 21) [Black Eyed Kids](#) or any other “beings” (creepy creatures with completely black eyes trying to enter apartments; the idea existed in folklore and demonology for centuries)
- 22) Resurrection of presumably dead animals—or the appearance of animals [similar to those that have died](#).
- 23) Glitches in elevators. [Post](#).
- 24) Missing floors in buildings.
- 25) Small changes of body parts: disappearing scars, eye color change, weight loss overnight.
- 26) Sensory data from different channels do not add up: “I heard something fall, but didn’t see it”.
- 27) Oz factor; nonexistent towns either full of strange people or empty. [Post](#). [Post](#).
- 28) Strange houses which appear non-existent after next examination. [Post](#).
- 29) Sex with strange beings. [Post](#).
- 30) Repeating numbers. 3.33; 22.22.
- 31) Ability to induce glitches. [Post](#).

The next list consists of descriptions of events which are often attributed to glitches, but cannot be explained by glitches in linear computer simulations; however, they could be explained by something like “breaking a chain of BBs” or a “flux universe”:

- 1) So-called “intentional dimensional jumping”. [Subreddit](#)
- 2) Mandela effects and “dimensional shifting”. [Shift after ECT](#).
- 3) Timeslips: lost time, or travelling too quickly or too slowly. Typically, either living one day twice, or losing a few hours during a nighttime car trip. Time glitches overview [part 1](#), [part 2](#).
- 4) Paranormal-style incidents: synchronicities, premonitions, telepathy.
- 5) Respawning with Mandela effects—after near-death experience the person finds him-herself just before it and live it differently and survive, but the world slightly changes. + unexpected escaping of risk. In GITM subculture such events often called “quantum immortality”, but it has nothing similar to the original idea of quantum immortality (A. Turchin, 2018). [Post](#), [Post](#), [Post](#), [List](#).
- 6) Memories about a person who never existed (according to documents) and memories that there was a family member nobody knows. [Post](#). [Post+comments](#).

3.2. High-level classification

A high-level typology was suggested in a reddit [post](#) by the user *doovecraig*:

Type 1a: One finds themselves in a strange location
 Type 1b: Something goes missing without explanation
 Type 1c: One remembers doing something nobody else can corroborate.

Type 2a: A true doppelgänger. Observed by person experiencing glitch.
 Type 2b: An extra cigarette or other extra item appears.
 Type 2c: An outside party sees you do something or somewhere you haven't been. (A doppelgänger one isn't aware of)

Type 3a: One views another's life or experiences an alternate reality
 Type 3b: Something changes. (Mandela effect items would fall here).
 Type 3c: One goes about their business, while others notice a change in person. (doovecraig believes this to be a Type 1c glitch from the opposite perspective).

We could combine types of objects and types of changes into a table:

	Addition	Disappearing	Morphing	Texture change	Probability
World changes	A road from nowhere appears	People disappear everywhere	Mandela affects; Dream-like world	Sky color changes	Improbable meetings
Object changes	Doppelgangers	Object disappears from home	Levitation	Object color or size changes	

Time changes		Missing time	Meeting someone who should be dead		
Knowledge changes	Remembering someone who doesn't exist				
People	A girl in the class who nobody remembers	A person at a company is missing			A very similar person with the same name, etc.
Events	Strange exam at a school		Repeating events, like the same car passing twice		Strange silence in an event
Death change	"Respawning" after death	Escaping inevitable death			

Note that the general structure of a GITM is different than that of a paranormal event, where strong emotion, energy sensations or other worldly beings are typically present. A GITM typically looks like an ordinary event, and the only emotion is surprise.

3.3. Forgetting about glitches: is it a glitch-protecting mechanism?

Some witnesses claim that their memories related to glitches they observed quickly fade. Some people who have seen the same glitch do not like to discuss the glitch later with other witnesses. Even during the strange events, they forget to take a photograph; they may later claim that the physical evidence disappeared.

This evidence disappearance is sometimes claimed to be with the help of so-called "Men in Black" (urban legends about them have existed since the 1950s, and inspired the famous movie of the same title (Redfern, 2011); the "Agent Smiths" in the *Matrix* movie exhibit a similar style to the MIBs: suits, black glasses). Even a hostless simulation (like a dream or Boltzmann brains chain) may have some control over glitches, as the same process that supports general stability of the simulation will suppress the illusions.

4. Most reported "glitches" can be explained as hoaxes, cognitive biases and creepypasta

4.1. Hoaxes

People are prone to complex hoaxes, and some people invest years of efforts to prank other people, including family members. The victim of a hoax actually believes in events, and this is the difference from creepypasta cases, where the writer knows that he is lying.

4.2. Creepypasta

Another type of hoaxes is writing text optimized to garner more “likes”. Reddit gives users the opportunity to quickly test such texts. In other words, this is a case of *winner’s curse*: the most likeable texts are false, but optimized to collect likes. If a text is good at attracting likes and shares, it (or its fabula) becomes a meme, in the form of so-called creepypasta.

4.3. Cognitive biases and memory problems

There are many biases which could create an illusion of a “glitch”. First is a *confirmation bias*. If we start to search for some pattern in the random noise, we will eventually find it.

People are known to be capable to create false memories of events which didn’t happen.

4.4. Illusion of improbable events

There are 7 billion people on Earth, and most random (even the most improbable) events surely happen somewhere, to someone.

Human psychology also results in the underestimation of the frequency of coincidents and other random events. An example is the “birthday problem” (discussed in more detail in the following section) which illustrates that many seemingly improbable events happen much more often than one might otherwise expect

5. Law of series in medicine and so-called pair cases

Very improbable coincidences are often attributed to glitches. For instance, in medicine, there is an urban legend about paired cases: if one patient was brought to the hospital having swallowed a spoon, the legend holds that a such patient is more likely to arrive soon. There is a similar observation in ordinary life, the Baader-Meinhof phenomenon, which more generally is called the Law of Series.

These phenomena are usually explained by different cognitive biases: the law of selective attention and the tendency to confirm their point of view (confirmation bias). However, there is a mathematical (and not mystical) reason.

We first consider the following case: if there is a class of 30 people, then almost certainly there a few members of the class will share birthdays. Why? For the first person in the class, the probability that his birthday will coincide with the second is 1 out of 365. The probability that the first person will have at a birthday that coincides with one member out of the whole class is equal to

$$p(\text{one student}) = 1 - (1 - 1/365)^{29} \approx 7.6\%$$

and this is only for the first student. Now, apply the same operation to all 30 students, apply the rules of combinatorics and get approximately 70 percent (for the full derivation of the formula, see https://en.wikipedia.org/wiki/Birthday_problem).

$$P(n, d) = 1 - e^{(-n^2 / 2d)} \quad (1)$$

d – days, n – people

In other words, with a probability of 70 percent, there will be two birthdays on the same day in a class of 30 people. That is, paired birthdays are more likely than you might think at first glance.

We now turn to medicine. Suppose we have a hospital in which there are 100 people. At the same time, let's say we have 10,000 possible diagnoses, all equally probable. What are the chances that there will be people with the same diagnosis among the patients? Apply the same formulas and get 55 percent. That is, in a hospital there is a 55 percent probability there will be a couple of patients with coinciding rare diagnoses, and for any patient the chance to have a “pair” is 1 percent. (The same probability holds for cases of one in a million in a hospital with a thousand patients).

However, the empirical law on paired events, as described by the medical legend, sounds different: if a rare event has occurred, then the second such rare event will soon occur. In our case, if they brought a patient who swallowed a spoon, then the chance that a second person with the same complaint would arrive the same during the day was only 1 percent.

Here, most likely, there is confirmation bias. Since any pair of events occur almost every day, a person faced with a rare event converges in the opposite direction from rarity to pairing and remembers only those cases in which such an expectation was confirmed. Moreover, it turned out that if there is even the slightest correlation between the frequencies of random events, and they are not entirely random, then this sharply increases the probability of paired events (Downarowicz & Lacroix, 2011).

Another explanation of the law of paired cases is simple—if the events are completely independent (that is, they form a Poisson distribution, like the decay of radioactive nuclei) and occur with an average frequency f , then the distribution of time intervals between independent events is proportional to $\exp(-ft)$, so the most likely interval between them is zero (although the average interval is $1/f$).

There is also a scientific study of coincidents in Cambridge. One possible explanation of glitches is selective reporting: there is 7 billion people on Earth, and most of them are able to come to the same Reddit community if they have a story to share. Now the law of big numbers starts to play and even completely unbelievable (especially for naïve probability view) stories start to happen.

5. New hypothesis: GITM as viruses in the hostless simulation

The less control its hosts exert over the content of a simulation, the more probable it is that some units which use the computational power of the simulation for self-replication—viruses—will appear. In human dreams and minds, the self-replicators are memes and obsessive thoughts. Repeating nightmares could be an example of such viruses in human dreams: each new nightmare results in re-traumatization, which makes the new dream on the topic more probable.

If glitches are possible in our simulation, then the control over glitches is relatively weak. This means that viruses are also possible. Some repeating glitches or encounters with entities—assuming that such reports are true—are, in fact, such viruses.

To demonstrate this, we will look at the urban legend of “Black-Eyed Kids” (BEKs). According to multiple accounts on the Internet, these strange-looking kids appear from nowhere and try to get inside a house or car by asking stupid questions, like “let me call from your phone”. A person feels immediate intense dread and typically refuses them entry. This is the basic skeleton of the story—the details are always different.

The most obvious explanation is that BEKs are a virus, but of a purely mundane nature: people find pleasure in sharing creepypasta on the Internet, and the stories are optimized to produce fear

among those who read them at night. The creepiest stories gain the most likes and thus self-replicate.

However, the same stories structurally about demons with strange eyes who try to get permission to come inside a stranger's house existed in the folklore from old times—the idea seems to be introduced by Leo Allatius in 17 century (Allacci, 1645) and also mentioned in Goethe's *Faust* and Stoker's *Dracula* (1897)—long before the Internet. Perhaps someone just adapted or rediscovered the effective meme from old tales?

The BEK story, even as an Internet meme, illustrates how a virus in the matrix could work: it would need to generate strong emotions to gain access to the target mind's computational resources and make the person start to think about it and repost the story. So, obviously, BEKs are not actually interested in going inside, they want to create fear in its victim (Any folk explanations of stories of BEKs being about “aliens” seem implausible, because any civilization advanced enough for interstellar travel would be able to get inside without such deception, and would also be able to make its eye color conventionally human).

We could suggest that the viral behavior of BEK could explain the phenomenon even if BEKs were actual “viruses in the matrix”. Their absurd behavior is necessary to gain access to some kind of computational resources and provide them with a means of self-replication. Their strange appearance is necessary in order to allow them to replicate, and they need to be invited in to facilitate activation of some programs. For example, invitation turns on access to some computational resources in the simulation.

If a simulation has glitches and viruses, it also should have some internal self-stabilizing mechanisms to prevent it from breaking apart. Many events, which initially seems to be glitches, have many repeating properties, and this repeating pattern implies the existence of some “viral behavior”. This could be just due to the viral behavior of hoax-writers, who change details in some creepypasta stories before presenting them as new—but we could also suggest that a glitch is happening if a few specific mundane objects appear together and produce a rare error. This could be akin to the Intel processor bug FDIV, which occurs only if specific numbers are divided. One example of such a repeating glitch-story is a story about a couple who have a nice evening, start a TV program and have a glass of wine—then find out that many hours were skipped and they do not have memories about what happened: [Post 1](#), [Post 2](#) and [Post 3](#).

6. Discussion: could GITMs reports be evidence of simulation?

At least some so-called reported glitches are not easily explained by glitches in the simulation, if we assume the simulation is something like a linear simulation of space-time. In such a simulation, everything that happened in the past is fixed, and the future is unknown until it is simulated. However, many supposed glitches violate the linearity of time: for example, predictions of the future, large-scale changes in the past (like the so-called Mandela effect discussed above), unrealistically rapid travel, time slips, or *respawning* (a term from computer games, where it means entering the game again at an earlier point in time when the gamer is killed) in a slightly different world.

These phenomena could all be explained by specifying that the simulation is nonlinear or multidimensional, or even “quantum”, but these *ad hoc* patches of the original “glitch in the matrix” hypothesis dilute its explanatory value. In other words, glitches in the matrix, if real, would be evidence of some non-typical simulation: hostless, abandoned, in the process of termination.

A special case is simulations which has a second set of laws, after physical, that is magical laws. Many human-made entertainments, like TV-series *Game of Thrones*, or games, like *Heroes of Might and Magic*, are simulating magic, so this seems to be typical of entertaining simulations. In contrast, scientific simulations, like Fermi simulations (solving the Fermi paradox numerically) or Singularity simulations (modelling routes of AI development), are unlikely to simulate magical worlds. Same with access to the source code.

The idea of the world as a chain of observer-moments, as described by Egan's dust theory (Egan, 2009) and formalized by Mueller (Mueller, 2017), is illusion, but not a computer simulation. In these types of illusion, the observations of different observers could be slightly different from each other, which could take the form of glitches rather similar to those described by GITM stories.

Conclusion

The most probable type of computer simulation in which we could be located—if the simulation argument is true—would not produce glitches, with the exception of an entertainment simulation with magic, or programmed glitches. Most of the cases of “glitches” reported on the internet can be explained by coincidence, creepypasta, or hoaxes. Even if they were real, they do not appear to be evidence of glitches in a linear computer simulation. Hostless, natural, abandoned, dream-like or Boltzmann simulations should have more glitches, but their relative share of all possible simulations is currently unclear, as well as the possibility they exist at all. Finding a real glitch would be strong evidence that we live in a simulation with weak or no host control.

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