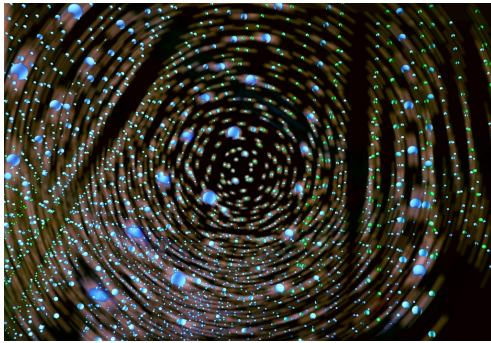




The Rick and Morty Every-Universe Fallacy

If anything can happen, would that imply that everything does happen?

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Rick and Morty's cartoon metaphysics

Rick and Morty is a witty science fiction cartoon series that finds much of its humor by exploring the metaphysical implications of scientific theories. The episodes are fun and entertaining with plenty of dark humor, and although the stories sometimes get a bit absurd, they are at least vaguely plausible and consistent with the show's sort-of-scientific premises. The show's effort at consistency keeps it interesting and also invites analysis and critique of that consistency. In this case, we examine the show's Every-Universe theory.

(To be clear, I don't see pointing out something that I disagree with as an attack on the show or its creators. I'm a huge fan and I wrote this because the show got me thinking about something that I'd like to share.)

If you've never watched the series then the relevant context is that Rick Sanchez is an eccentric, brilliant scientist that has built a device allowing him and his grandson, Morty, to move between parallel universes. The idea is that there are an infinite number of parallel universes out there, therefore anything you can think of must exist somewhere in the infinite number of parallel universes.

Early on in the series this idea is used as the ultimate way of fixing things that go horribly wrong. When one of Rick's inventions inadvertently turns everyone on Earth into blob-like monsters from a horror film, the solution is to find another universe where a) Rick did not screwup and turn everyone into monsters, and b) where Rick and Morty have just been killed in an accident. The Rick and Morty that turned everyone into monsters just pick up and move to this very convenient alternate universe that has a place for them. They bury their alternate selves' bodies in the back yard, and carry on in their place as if nothing happened.

A multitude of parallel universes

This infinite multiverse idea ends up getting used a lot in the series. At one point Rick ends up in a universe exactly like ours, except that everyone is a Nazi fascist, implying that in that universe Hitler was not defeated in WWII or something along those lines. Nazis are evil, things go badly, and Rick ends up in another universe where people are still Nazis fascists, but instead of being humans like us, they are giant talking shrimp people. It sounds silly, but remember the premise is that there are an infinite number of parallel universes, so for any crazy thing you come up with, no matter how bizarre, then according to that theory there must be an alternate universe where that crazy thing is true and normal.

This idea that every imaginable universe exists is a fun trope for the show, but I don't think the show's interpretation is consistent with its own multiverse premise. My understanding of the core tenet is that any time a random event occurs, instead of one outcome being randomly selected, duplicate universes are created with there being one duplicate for every possible outcome no matter how improbable. This principle implies that anything that *could* happen *does* happen in some universe, but that does not imply that anything anyone could imagine must exist. For a particular something to exist in some parallel universe, there needs to be some possible path through time where that other universe starts with its big bang and then, following whatever the laws of physics are in that universe, the things that could happen do happen, and that universe ends up in a configuration which includes that particular something. In other words, there must be some series of events that could take place that would lead to a universe being as imagined.¹

Consider the example from the show of having a parallel Earth that is just like ours, but everyone is a Nazi. In that universe, I don't think I'd have been born, so how would there be a parallel me? My mother is Iraqi and she moved to the US in the 60's to escape the Arab Socialist Ba'ath Party that was taking over Iraq. It is hard to imagine that Nazis would allow a non-Aryan Iraqi to immigrate and then go to law school. Furthermore, the reason my mother came to the US instead of some other country is because her sister, my aunt, got married and was living in the US. However, my uncle, in addition to being a warm and jovial person who I miss, was Jewish. A universe *exactly* like this one, except for the one single difference being that our parallel selves are all Nazis, is internally inconsistent.

Preserving universal consistency

If just one single difference would lead to inconsistency, then maybe we can start making some additional changes to restore consistency. Perhaps my uncle in that parallel universe was not Jewish, or maybe the alternate universe Nazis were more humane than the monsters in our universe and didn't murder millions of people. For any objection to the consistency of an imagined universe, it seems we can always change something else and make the problem go away.

However, notice that each time we change something to fix one inconsistency, we typically end up introducing more inconsistencies which then need to be fixed. We cannot just change one thing, we would have to change a lot of things to make our imagined alternate universe internally consistent. In fact, by the time we would be finished fixing all the inconsistencies it would be hard to recognize any parallels. You might have a universe where the evil Nazis won WWII, but it would be very different from ours in many, many ways.

As an example that is perhaps more clear because it does not involve the fun, but confusing, concept alternate-selves, imagine a world very much like ours except that people walk on their hands, not their feet. Sure, it's possible that in some other parallel universes primates mammals would evolve to walk upright on their front rather than their rear legs, but evolution in that universe would continue to go in a different direction than ours. Those "humans" would not evolve to look like us. Their "arms" would be developed for walking and their "legs" would be developed for holding and manipulating things. There would also need to be some reason why literally having their head between their legs was a better evolutionary strategy than having it up top where it could see things. I'd also imagine that their digestive and circulatory systems would need to have evolved very differently from ours. All of those differences would in turn create more differences in their biology, society, and pretty much everything. We can imagine whatever crazy things we like, but a universe with those crazy things can only exist if

it is self-consistent.

A river metaphor of time

So how can there be an infinite number of parallel universes that despite being infinite still excludes the inconsistent ones? The answer is that you can have an infinite number of things without having all the things. For example, “all the positive counting numbers” is an infinite set of numbers, and “all the positive counting numbers, except those less than 5” is also an infinite set of numbers, but it leaves out 1, 2, 3, and 4. Another example is “all the positive counting numbers that are divisible by 10”, that is also an infinite set. Not only is it an infinite set, but the set of things it leaves out is infinite as well.² So being infinite does not necessarily mean including everything.

To see how this idea of exclusive infinities could apply to these hypothetical universes, imagine a shallow river that is infinitely wide. If you dropped a leaf into the water then it would follow some path with the water flow. Drop it in a different place and it would follow a different path, a different streamline. Because the river is infinitely wide there are infinitely many different streamlines.³

Now, imagine dumping a giant rock into the river. The rock is much bigger than the river is deep, so it sits there and the water needs to go around it. All the obstructed streamlines now bend around the rock and then come back together behind it. The river is still infinitely wide. There are still an infinite number of streamlines, but now none of them go where the rock is. Next, imagine that the rock is so big that it actually splits the river. Instead of coming back together behind the rock, the two flows split apart and go off in different directions.

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Let's also free this river from gravity. In addition to being infinitely wide, it is also infinitely deep and it flows through space like an infinite floating tube of water. If we thought of the original river as a two-dimensional flow on a surface, now we have a three-dimensional flow in space. Infinitely wide and infinitely deep, each streamline path flowing with the water is a metaphorical timeline for one out of an infinite number of possible universes. The river starts at the big bangs and flows on until the end of time.

We can still have rocks, or whatever we want to call them, that block off areas where no water can go. In fact, we can still split our stream into pieces and those pieces might go off in different directions or weave around each other like an infinite bunch of metaphorical hoses. They always flow forward, in the direction of time, but they can split, twist around each other, maybe even merge. Even with an infinite number of hoses there may be gaps and or large volumes where no hose goes. Those regions are outside the flows.

If you imagine that every point in this metaphorical space represents some possible configuration of all the atoms that make up the universe, then we can see that some configurations can be reached by following a path through the flow, while other configurations are unreachable because they are outside the flow. The volume of the flow is infinite, the extent of the flow is infinite, but it still does not necessarily include everything. If there is no path of possibilities that leads to a particular configuration then it is outside the flow.

This is what the multiverse could be like, except instead of tubular flows in three-dimensions, it would be hyper-tubular flows in a number of dimensions proportional to the maximum number of particles in the universe, which might also be infinite. Mathematically, we can say that the reachable states of the universe form a non-compact manifold in the configuration space of all possible universes.

Closing time

So here we are: we can have an infinite set of possible universes, but impossible things are still impossible. Actually, I should say that if this multiverse theory is based on the idea that anything that could happen does happen in some universe, then according to this totally hypothetical theory of how a multiverse works, impossible things are still impossible.

Of course, Rick and Morty is a cartoon and this every-possibility-exists idea is not the only scientific aspect of the show that one might disagree with. Regardless, that's not a flaw in the show as it does not present itself as an educational resource. The show is meant to be entertaining and if every possibility exists in the Rick and Morty multiverse, then it allows the writers artistic license to explore the impossible. If the writers stuck with only the stuff that is actually possible then I think the show might lose some part of what makes it so much fun. Imagining the idea that absolutely anything is possible is sort of appealing somehow.

Footnotes:

[1] One interpretation of quantum mechanics might imply that there is an incredibly tiny, but non-zero, chance that all the particles in our universe would just spontaneously rearrange themselves into any envisioned configuration. However, this spontaneous arrangement must include some evident history. If it is a consistent history then nothing is changed as we still have a consistent path to the envisioned configuration. On the other hand, if the history is not consistent with the envisioned configuration, then those inconsistencies would cause the system to diverge away from the envisioned state as time moves forward and chaos would quickly ensue. We could start making changing to reconcile any inconsistencies with history, but by the time we would be finished fixing them all, it would be hard to recognize any parallels. I don't think that quantum mechanics fixes the problem, it just makes it a bit more complicated.

[2] Infinities are not all the same, which can be confusing. The number of positive integers is obviously infinite and the number of positive integers divisible by 10 (*e.g.* 10, 20, 30, ...) is likewise infinite. One might think that there are 1/10th as many positive-divisible-by-10 numbers as there are positive numbers, but it turns out that they are the same. That infinity is called Aleph Null ($\aleph_0$). Aleph null is sometimes referred to as "countably infinite".

[3] In fact, because the river is continuous, the number of possible streamlines is not just countably infinite, it is uncountably infinite. There are at least Aleph Null ($\aleph_1$) different possible streamlines. Note also that the concept of "an infinite number of things" is a distinct concept from "an infinitely wide river". Georg Cantor came up with this idea of different infinities. Initially, he was attacked by other mathematicians who found his ideas upsetting, but eventually his work was recognized as a profound and important contribution. David Hilbert famously said: "No one shall expel us from the paradise that Cantor has created."

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