This virtual world

Is our world a huge virtual reality simulation? One local information scientist suggests the idea has legs. By **Rob O'Neill**

ABOUT FIVE YEARS AGO A CURIOUS question popped into Brian Whitworth's head: "Why is there a maximum speed of light?"

Whitworth can't remember exactly when or why the question occurred to him, but, years of pondering and a year of writing later, his paper, titled "The Physical World as a Virtual Reality" proposes one possible answer.

"Why is there a maximum speed of light? Why does there have to be a maximum speed? Einstein doesn't answer that," Whitworth says.

But Whitworth's proposed answer — that we explore the idea that our universe is a virtual reality created by information processing — has both its fans, and its critics.

"The feedback has been generally favourable," he says. The paper — which attracted international attention earlier this month — has been referenced on both Boing Boing and Slashdot (where it generated over 1,100 comments), and was cited as recommended reading on other blogs. However, a lot of subsequent online discussion has focused on the existence, or otherwise, of God.

"As far as I can see, a virtual world doesn't change that question. The question becomes who created the system and booted it up, and the answer remains 'we don't know'."

Whitworth, an information scientist at Massey University's Albany campus, sug-

Brian Whitworth

gests the world could, logically at least, be a virtual reality. If that was the case, the creation of the Big Bang would no longer be paradoxical "as every virtual system must be booted-up".

"Modern information science can suggest how core physical properties like space, time, light, matter and movement could derive from information-processing," he writes.

"Such an approach could reconcile relativity and quantum theories, with the former being [about] how information-processing creates space-time, and the latter [being about] how it creates energy and matter."

Whitworth acknowledges the idea may seem strange, but asks whether it

Answering the bloggers

Brian Whitworth responds to some of the New Scientist blog commentators

1. A universe so big must be real.
Answer: It may only be "big" for those within it.

2. The universe has been going for so many billions of years it must be real.
Answer: This again is only relative to us. Given enough processing power, one could "run" the entire history of the universe in a few seconds.

3. It would take a computer bigger than the universe to simulate it.
Answer: So?

4. So, who is the programmer?
Answer: How should I know?

5. This guy is smoking too much crack.
Answer: That's not an argument.

6. If this world is a VR, there must be an objective reality (OR) above it.
Answer: Why so? That our world is a VR and that there is an OR above it are two entirely different issues. The paper is about the first, not the second. Whatever you think about the second issue, the first issue exists as a separate issue.

7. This is a crazy idea.
Answer: I agree, but that does not make it untrue. Our reality is what it is. It may not be what we expect it to be. However, entities in a reality can't demand that it must be this or that. We have to accept our reality, however it is.

8. This means there is a God.
Answer: No, sorry, it doesn't change the arguments about God one way or another. If you thought the world was a mystery before, it still is now. If you thought it was all mathematics that is no less true [now]. The question of whether there is a God or not is still a question, whether the world is a virtual reality or not.

9. Occam's Razor denies this theory.
Answer: Not any more. The paper argues that, in modern physics, Occam's Razor now supports VR theory. What is simpler: that an entire physical universe was created out of nothing at a single event-point (that also began time and space), or that it was the start-up of a virtual reality? In many ways the latter is simpler.

10. This hypothesis is not testable.
Answer: To state this is to not read the paper, which for several pages argues that

since this is a theory about this world, it is a theory that can be assessed by reference to data from this world. The claim is not just that VR theory is possible, but that it may turn out to be probable.

Confusion arises if one assumes objective reality is a proven theory. It is not. It is just as unproven as virtual reality theory.

In a virtual world, all science would still work. From a science perspective, neither objective reality nor virtual reality are "proven". Indeed, modern physics, with effects like time-dilation, space-contraction, object-teleportation and so on, does not support the view that the world is an objective reality.

For example, if mass is an objective property why does an object's mass increase to infinity as its speed approaches the speed of light? To decide whether the world is a virtual or objective reality I am saying we should look at the facts of how the world behaves and decide which is more probable, as we did with Big Bang theory.

The New Scientist says: "Whether the VR hypothesis is actually testable is a question Whitworth avoids." This is quite simply not true. The paper specifically addresses

this question — anyone can look at the paper and see this for themselves. A way of testing the theory is proposed there. Perhaps the New Scientist writer did not get past the abstract before trotting out his view that this is all "pure philosophy". Hopefully, others will actually read the paper.

11. What then is the world that is creating our world?
Answer: I don't know. The first question is surely whether our world is a virtual reality or not. Shouldn't we consider this first? This can be determined, I argue, by looking at how our world behaves, given what we know about how information processing works. It is not something science cannot consider.

12. Does this mean the universe is a fake?
Answer: Paul Davies calls the VR approach the fake universe option in his wonderful book The Goldilocks Enigma.

However, I don't think this is the correct word. That our reality is local to us, and not objective, doesn't make it fake. To entities in a virtual reality the VR is as real as it gets.

is any stranger than the various physics theories that propose parallel universes, or string theory, which proposes nine spatial dimensions, with six of these being invisible to us. Many of the statements physics makes simply don't fit our reality, yet many of them have been proven experimentally, he says.

Whitworth's paper goes on to present what he calls a "prima facie case" that our world is a virtual reality. In addition to explaining the Big Bang, the idea helps explain why our universe is made-up of discrete particles (it's digital); why space-time curves (due to processor-load), and, yes, why there is a maximum speed of light (there is a maximum processing speed), among other conundrums.

Conversely, the Big Bang "contradicts any theory that assumes the universe is objectively real and complete in itself", he says.

"How can an objective reality, existing in and of itself, be created out of nothing? The failure of the steady-state theory of the universe removes a cornerstone of support for the objective reality hypothesis," he writes.

"If nothing in our universe is created from nothing, how can an entire universe come from nothing? That our universe arose from nothing is not just incredible, it is inconceivable."

It fails to answer questions such as:
• What caused the Big Bang?
• What caused space to start?
• What caused time to start?
• How can a Big Bang arise when there is no time or space?
• How can space be caused if there is no "there" for a cause to exist within?

And, how can time be started if there is no time-flow for the starting to occur within?

One response to Whitworth's paper came from Justin Mullins, writing on the UK *New Scientist* technology blog. He says Whitworth avoids the question of whether his thesis is testable.

"But without testable predictions about the universe that would distinguish this idea from other theories, the VR hypothesis is pure philosophy," he writes.

"That's why it is almost certain to be ignored by mainstream physicists. It's not the first idea to suffer this fate — the physicist David Bohm proposed a small modification to quantum mechanics that made no difference to its predictions but ensured that the theory was deterministic.

"Most physicists rejected it on the basis of Occam's Razor: that science should strive for the simplest theory that fits all the facts.

"My guess is that Whitworth's work will go the same way."

However, Whitworth does address this concern, at least in part — after pointing out that there is little difference in testability between "unknowable dimensions" in this world and a dimension

that is external to our world, and that the idea of an objective universe is also untestable.

"To postulate the world is virtual does not contradict science, but rather engages its spirit of questioning," he writes.

"Science is a method of asking questions, not a set of reality assumptions. Scientists are entitled to ask if what could be actually is so.

"The only constraint is that the question be decided by feedback gathered from the world by an accepted research method.

"Science does not require an objective world, only information to test theories against, which a VR can easily provide. Not only can science accommodate the virtual world concept, a virtual world could also sustain science."

Whitworth also argues that Occam's Razor supports VR theory, in that VR is a simpler solution to many of the problems of physics than those currently proposed.

"My main point is that computer and information sciences can have some relevance to physics," he says. "At the moment, research is driven by physicists and mathematicians, but information science has a lot more relevance than previously thought. Even if the theory is not correct it could open new lines of thought."

Whitworth says he is now working on a another paper, which will, in brief, suggest matter is a programming error in our virtual reality universe caused by light getting stuck in an infinite loop.

Brian Whitworth's paper can be downloaded at http://arxiv.org/abs/0801.0337

"Third life?"