What is space? The 300-year-old philosophical battle that is still raging today

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Mountains. Whales. The distant stars. All these things exist in space, and so do we. Our bodies take up a certain amount of space. When we walk to work, we are moving through space. But what is space? Is it even an actual, physical entity? In 1717, a battle was waged over this question. Exactly 300 years later, it continues.

You might think physicists have "solved" the problem of space. The

likes of mathematician Hermann Minkowski and physicist Albert Einstein taught us to conceive space and time as a unified continuum, helping us to understand how very large and very little things such as individual atoms move. Nonetheless, we haven't solved the question of what space is. If you sucked all the matter out of the universe, would space be left behind?

Twenty-first century physics is arguably compatible with two very different accounts of space: "relationism" and "absolutism". Both these views owe their popularity to Caroline of Ansbach (1683-1737), a German-born Queen of Great Britain, who stuck her oar into the philosophical currents swirling around her.

Caroline was a keen philosopher, and in the early 18th century she schemed to pit the leading philosophies of her period against each other. On the continent, philosophers were stuck in "rationalism", spinning world theories from armchairs. Meanwhile, British philosophers were developing science-inspired "empiricism" – theories built on observations. They were worshipping scientists such as Robert Boyle and Isaac Newton.

Caroline asked two philosophers to exchange letters. One was the German philosopher Gottfried Leibniz, rationalist par excellence. The other was the English philosopher Samuel Clarke, a close friend of Newton. The two men agreed, and their exchange was published in 1717 as A Collection of Papers. The dull title doesn't sound like much, but these papers were revolutionary. And one of their central issues was the nature of space.

Everything or nothing?

Is there space between the stars? The relationist Leibniz argued that space is the spatial relations between things. Australia is "south of"

Singapore. The tree is "three meters left of" the bush. Sean Spicer is "behind" the bush. That means space would not exist independently of the things it connects. For Leibniz, if nothing existed, there couldn't be any spatial relations. If our universe were destroyed, space would not exist.

In contrast, the absolutist Clarke argued that space is a sort of substance that is everywhere. Space is a giant container, containing all the things in the universe: stars, planets, us. Space allows us to make sense of how things move from one place to another, of how our entire material universe could move through space. What's more, Clarke argued that space is divine: space is God's presence in the world. In a way, space is God. For Clarke, if our universe were destroyed, space would be left behind. Just as you can't delete God, you can't delete space.

The Leibniz-Clarke letters exploded early 18th century thought. Thinkers like Newton, who were already involved in the debate, were dragged deeper in. Newton argued that space was more than the relations between material objects. He argued it was an absolute entity, that everything moves in relation to it. This led to the distinction between "relative" and "absolute" motion. The Earth moves relative to other material things, such as the sun, but it also moves absolutely – with regard to space.

Others joined the party later, like Immanuel Kant. He believed space is just a concept humans use to make sense of the world, rather than a real entity. It wasn't just philosophers and physicists who had views on space either. All sorts of people had their say, from stocking makers to tenant farmers. One especially unlikely discussion of space turns up in Thomas Amory's 1755 Memoirs: Containing the Lives of Several Ladies of Great Britain.

The problem with God

People were especially edgy about Clarke's view that space is God. Does that mean we're moving through God all the time? God doesn't just see everything, he is everywhere? They also became worried about Big Things. As a whale takes up more space than a holy man, is a whale holier? As mountains are so large, are they like God?

The 20th century philosopher Bertrand Russell once argued we shouldn't worship mere size. "Sir Isaac Newton was very much smaller than a hippopotamus, but we do not on that account value him less than the larger beast," he wrote. Some 18th century thinkers would have disagreed – they were worried they should be worshipping a hippopotamus over Newton.

Today, the concept of God is disappearing from the debate. Yet some contemporary philosophers, such as Tim Maudlin and Graham Nerlich think that current theories in physics do support Clarke's view (minus the religious parts). Spacetime is one big container, and all of us move around in it.

Other philosophers, such as Kenneth Manders and Julian Barbour, think our best physics is compatible with both views, and there are other reasons to believe Leibniz's theory was right. If the physics really is compatible with absolutism or relationism, then perhaps we should prefer relationism as the simpler theory? After all, why posit a giant entity that acts like a container if we don't have to?

As a historian of space and time, I'm fascinated by how the debate has evolved, how something that started 300 years ago has unfurled and grown. Clearly, though the Leibniz-Clarke papers are not well known outside of philosophy, the debate they started continues. Caroline of Ansbach has a lot to answer for.

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