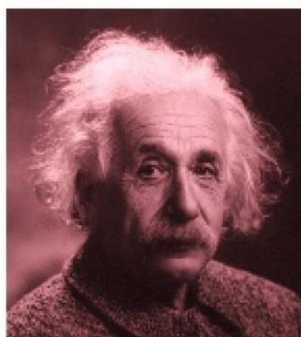


Revisiting Einstein's argument
that space is a physical substance

The Ether Dispute



“Space without ether
is unthinkable.”
Einstein

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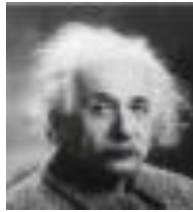
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“By far the greatest hindrance and aberration of the human understanding proceeds from the dullness, incompetency, and deceptions of the senses; in that things which strike the sense outweigh things which do not immediately strike it, though they are more important. Hence it is that speculation commonly ceases where sight ceases; insomuch that of things invisible there is little or no observation.”

Francis Bacon: *Novum Organum* 1620

Introduction



Einstein

“We may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists ether . . . space without ether is unthinkable; for in such empty space there would be no propagation of light . . .”

Einstein: *Leyden Address* 1920

The Dispute

There is a serious dispute by very intelligent people over the physical nature of space. The dispute arises because of what Francis Bacon calls in his *Novum Organum* the “dullness, incompetence, and deceptions of our human senses.” When we observe outer space, our human senses lead us to two different conclusions:

On the one hand, if we judge by appearance, space appears and feels to us like an empty void, leading some to conclude the earth and heavenly bodies are spinning in an empty vacuum. On the other hand, if we judge by behavior, space exhibits physical behaviors – for example, it carries light and heat from the sun and stars – leading some to conclude space is some sort of invisible substance called “the ether.”

Parties to the Dispute: Cosmology champions the conclusion that space is an empty vacuum. Although often confused with astrophysics, cosmology is not a modern science like astrophysics. It is a scholastic philosophy that uses Aristotle's ancient method of inquiry, and seeks the goal described in his ancient Greek *Organum*.

Following this ancient method, cosmologists divide the universe into categories according to appearance to arrive at the conclusion that it is composed of three base elements of *space, energy, and matter*, and it then applies human logic to speculate upon *where* the universe came from, *where* it will end up, and *how many* universes exist.

Early biblical cosmologists used this ancient method to develop the theory that in the beginning there was only God and totally empty space. Lonely God then created the heavenly bodies to float in the void, and created man to populate the earth and keep him company. They also speculated there are two other invisible universes called Heaven and Hell where man goes after life in this universe, and predicted, if man doesn't mend his ways, God will destroy our universe in a fiery apocalypse.

Modern cosmologists generally agree with the biblical cosmologists. Using the same method of inquiry, they theorize our universe began as an empty vacuum; and that there was a mysterious "big bang" that created the earth and heavenly bodies that are now speeding from the point of explosion out into space. They also speculate there are probably many alternative universes,

and that ours may someday collapse upon itself in a fiery apocalypse.

Modern cosmologists argue this “big bang” theory is the result of advances in modern science that just happens to agree with Genesis, but Francis Bacon observed in his *Novum Organum* that they were already promoting such a theory based on Genesis in 1620:

“Some moderns have with extreme levity indulged so far as to attempt to found a system of natural philosophy based on the first chapter of Genesis . . . and bring them into the view of the world so fashioned and masked, as if they were complete in all parts and finished.”

On the other hand, astrophysics champions the conclusion that space is some sort of invisible physical substance. Using the modern scientific method suggested in Francis Bacon’s *Novum Organum*, astrophysicists divide the universe into parts according to their observed behavior, and seek to determine *what* the universe is made of, *how* it produces its behaviors, and *the laws* that nature uses to govern the behavior.

Using this different method and seeking this different goal, astrophysicists theorize that, since space, energy, and matter all exhibit physical behaviors, they must all be physical substance forming a part of a *unified field* of interrelated and interchangeable substance. Einstein managed to discover the formula for converting

matter into energy, and was actively contemplating the possibility that space could be converted into energy and matter.

As we can see, this conclusion drastically differs from the biblical view regarding the physical nature of space. However, astrophysicists from Newton to Einstein, remembering the sad fate of Galileo, carefully played down this difference, and avoided entering into a debate with theology and cosmology over *where* the universe came from. They just went off on their own tangent seeking their own goal of determining what the universe is made of, and how it produces its behaviors.

And our establishment, also remembering the embarrassing Galileo incident, carefully published papers in its forums from both cosmologists and astrophysicist, tolerating both the biblical view of the universe and space, and that of astrophysics. Cosmologists discussed their Big Bang theory and called space an “empty vacuum;” while astrophysicists discussed their Unified Field” theory and often referred to space as “the ether.”

Dispute Led To Progress: We need to recognize at this point that the Big Bang theory of modern cosmology had been substantially complete since biblical days, but that it didn’t lead to any progress in understanding our universe. While it satisfied man’s longing to speculate upon the unknown – to talk about where we came from, where we’ll end up, and how many universes exist – it was sterile of

progress. We knew little more about the universe before Copernicus' time than did the biblical cosmologists.

Francis Bacon noted in his *Novum Organum* that the failure of scholastic philosophies like that of Genesis to lead to progress was that it wasn't looking for progress. Its goal was to discover *where* things came from, and not *whereby* or how they behave. And he argued, the lack of progress of scholastic theories, even if they grab our attention, should be taken for a sign that the theory is sterile and that a new approach is necessary:

“They make the quiescent principles wherefrom, and not the moving principles whereby things are produced, the object of the contemplation and inquiry. For the former tend to discourse, the latter to works. . .

“Fruits and works are sponsors and sureties for the truth of philosophies. For what is founded on nature grows and increases; while what is founded on opinion varies but increases not.”

Progress in understanding our universe only began when astrophysicists like Copernicus, Galileo, and Kepler decided to ignore Genesis, and study the actual behavior of the universe. Their new approach provided a more accurate picture, leading Isaac Newton in the 17th century to discover many of the physical laws that govern its behavior to set the stage for our modern Age of Space. And the subsequent development of the new Unified Field theory by astrophysicists like Faraday, Lorentz, and Poincare in the late 19th century, led Einstein to his revolutionary Theory of Relativity to set the stage for our modern Atomic Age.

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