GOD AND STEPHEN HAWKING

A Lion Book
an imprint of
Lion Hudson plc
Wilkinson House, Jordan Hill Road,
Oxford OX2 8DR, England
www.lionhudson.com
ISBN 978 0 7459 5549 0 (print)
ISBN 978 0 7459 5937 5 (epub)
ISBN 978 0 7459 5936 8 (Kindle)
ISBN 978 0 7459 5945 0 (pdf)

First edition 2011
10 9 8 7 6 5 4 3
First electronic format 2011

Acknowledgments

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UK trademark number 1448790.

A catalogue record for this book is available
from the British Library

Typeset in 9.5/12 Palatino
Printed and bound in the UK by Clays Ltd, St Ives plc.

GOD AND STEPHEN HAWKING

WHOSE DESIGN IS IT ANYWAY?

JOHN C. LENNOX

For Rachel, Jonathan and Benjamin, gifts of the Creator, who have made of me a father.

Acknowledgments

My thanks are due to Professors Nigel Cutland and Alister McGrath for constructive advice.

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A matter of logic: a self-creating universe?

One of the main conclusions of *The Grand Design* is: "Because there is a law of gravity, the universe can and will create itself out of nothing."[20] First, a general comment on this key expression of Hawking's belief.

According to him, as we have seen, philosophy is dead. However, one of the main tasks of philosophy is to train people in the art of definition, logical analysis, and argument. Is Hawking really telling us that this also is dead? Surely not. However, it would seem that some of his arguments could have profited from a little more attention to the matter of clarity of definition and logical analysis. We shall start with the statement just quoted.

The first question to ask is: what does Hawking mean when he uses the word "nothing" in the statement "the universe can and will create itself out of nothing"? Note the assumption in the first part of that statement: "Because there is a law of gravity…" Hawking assumes, therefore, that a law of gravity exists. One presumes also that he believes that gravity itself exists, for the simple

[20] Op. cit. p. 180.

reason that an abstract mathematical law on its own would be vacuous with nothing to describe – a point to which we shall return. The main issue for now, however, is that gravity or a law of gravity is not "nothing", if he is using that word in its usual philosophically correct sense of "non-being". If he is not, he should have told us.

On the face of it, Hawking appears, therefore, to be simultaneously asserting that the universe is created from nothing and from something – not a very promising start. Indeed, one might add for good measure the fact that when physicists talk about "nothing", they often appear to mean a quantum vacuum, which is manifestly not nothing. In fact, Hawking is surely alluding to this when he writes: "We are a product of quantum fluctuations in the very early universe."[21]

Later on in the book he sets the total energy of empty space to zero by subtracting the actual value and then seems to proceed on the assumption that the energy actually is zero when he asks the question: "If the total energy of the universe must always remain zero, and it costs energy to create a body, how can a whole universe be created from nothing?"[22] This seems, at least to me, a rather dubious move.

Could all of this be just a little too "much ado about nothing"?

The situation does not improve when we move on to the logic of the second part of Hawking's statement: "the universe can and will create itself from nothing". This assertion is self-contradictory. If we say "X creates Y", we presuppose the existence of X in the first place in order to bring Y into existence. That is a simple matter

[21] Op. cit. p. 139.
[22] Op. cit. p. 180.

of understanding what the words "X creates Y" mean. If, therefore, we say "X creates X", we imply that we are presupposing the existence of X in order to account for the existence of X. This is obviously self-contradictory and thus logically incoherent – even if we put X equal to the universe! To presuppose the existence of the universe to account for its own existence sounds like something out of *Alice in Wonderland*, not science.

It is seldom that one finds in a single statement two distinct levels of contradiction, but Hawking appears to have constructed such a statement. He says the universe comes from a nothing that turns out to be a something (self-contradiction number one), and then he says the universe creates itself (self-contradiction number two). But that is not all. His notion that a law of nature (gravity) explains the existence of the universe is also self-contradictory, since a law of nature, by definition, surely depends for its own existence on the prior existence of the nature it purports to describe. More on what laws are later.

Thus, the main conclusion of the book turns out not simply to be a self-contradiction, which would be disaster enough, but to be a triple self-contradiction. Philosophers just might be tempted to comment: so that is what comes of saying philosophy is dead!

In the above, Hawking is echoing the language of Oxford chemist Peter Atkins (also a well-known atheist), who believes that "space-time generates its own dust in the process of its own self-assembly".[23] Atkins dubs this the "Cosmic Bootstrap" principle, referring to the self-contradictory idea of a person lifting himself by pulling on his own bootlaces. His Oxford colleague, philosopher

[23] *Creation Revisited*, Harmondsworth, Penguin, 1994, p. 143.

of religion Keith Ward, is surely right to say that Atkins' view of the universe is as blatantly self-contradictory as the name he gives to it, pointing out that it is "logically impossible for a cause to bring about some effect without already being in existence". Ward concludes: "Between the hypothesis of God and the hypothesis of a cosmic bootstrap, there is no competition. We were always right to think that persons, or universes, who seek to pull themselves up by their own bootstraps are forever doomed to failure."[24]

What this all goes to show is that nonsense remains nonsense, even when talked by world-famous scientists. What serves to obscure the illogicality of such statements is the fact that they are made by scientists; and the general public, not surprisingly, assumes that they are statements of science and takes them on authority. That is why it is important to point out that they are not statements of science, and any statement, whether made by a scientist or not, should be open to logical analysis. Immense prestige and authority does not compensate for faulty logic.

The worrying thing is that this illogical notion of the universe creating itself is not some peripheral point in *The Grand Design*. It appears to be a key argument. And if the key argument is invalid, in one sense there is little left to say.

However, since the laws of nature (gravity in particular) play a major role in Hawking's argument, it will be important to comment on what look very much like serious misunderstandings regarding the nature and capacity of such laws.

[24] *God, Chance and Necessity*, Oxford, One World Publications, 1996, p. 49.

The nature of the laws of nature

Hawking points out that there was originally no clear distinction in Greek thought between human laws and the laws of nature; and he gives the classic example of Heraclitus (c.535–c.475 BC), who thought that the sun's movement in the sky was occasioned by its fear of being hunted down by a vengeful goddess of justice. The idea that inanimate objects possessed minds and intentionality was espoused by Aristotle, and dominated Western thinking for around 2,000 years.

Hawking reminds us that it was Descartes (1596–1650) who first formulated the concept of the laws of nature in our contemporary sense. Here is Hawking's definition of a law of nature: "Today most scientists would say that a law of nature is a rule that is based upon an observed regularity and provides predictions that go beyond the immediate situations upon which it is based."[25] A familiar example of such a law is "the sun rises in the east". It is based on an observed regularity, and predicts that the sun will rise in the east tomorrow. On the other hand, "swans are white" is not a law of nature. Not all swans are white; the next one we see may well be black.

Of course, saying that "the sun rises in the east" is a law rests on a number of unspoken assumptions. As David Hume, the Scottish Enlightenment philosopher, pointed out, the fact that we have observed the sun to rise a thousand times in the past does not prove that it will rise again tomorrow. We have to add something like, "all things being equal", "provided the sun does not explode", etc.

[25] Op. cit. p. 27.

In fact, the apparently simple concept of a law of nature turns out to be anything but simple. Must laws be universally exact and exceptionless to qualify as laws? Think of Newton's famous laws of motion. They are accurate enough to facilitate the calculations needed to effect a moon landing; but they cannot cope with velocities near that of light, where Einstein's more accurate relativity theory is needed.

In other words, it is not enough to state Newton's laws on their own. We need additionally to specify at least the range of conditions under which they are valid.

The origin of the laws of nature

Hawking has three questions to ask about the laws of nature:[26]

- What is the origin of these laws?
- Are there any exceptions to the laws, i.e. miracles?
- Is there only one set of possible laws?

Hawking suggests that the traditional answer to the first question, given by the great pioneers of science like Galileo, Kepler, Descartes and Newton, is that the laws are the work of God. Hawking adds: "However, this is no more than a definition of God as the embodiment of the laws of nature. Unless one endows God with some other attributes, such as being the God of the Old Testament, employing God as a response to the first question merely substitutes one mystery for another."[27]

[26] Op. cit. p. 29.
[27] Op. cit. p. 29.

However, the God in whom Galileo, Kepler, Descartes and Newton believed was not merely the embodiment of the laws of nature. He was (and is) the intelligent Creator and upholder of the universe, who is a person and not a set of abstract laws. He was, in fact, the God of the Bible. Hawking's statement, therefore, seems somewhat confused.

I spoke earlier of Newton's laws, and not God's laws. The reason for doing that is simple. It was Newton who formulated the laws that encapsulated the behaviour of bodies in motion under certain conditions. Newton's laws describe the regularities, the pattern, to which motion in the universe conforms under certain initial conditions. It was God, however, and not Newton who created the universe with those regularities and patterns. It was also God who ultimately was responsible for the intellectual power and insight of the mind of Newton that recognized the patterns and gave them elegant mathematical formulation. The laws were therefore, in that sense, the work of Newton.

It would surely sound rather foolish to say that, in ascribing the laws to Newton, it is no more than a definition of Newton as the embodiment of the laws of nature. It does not sound any less foolish when applied to God. Some people may wish to define God as the laws of nature. Indeed it seems to me that Hawking is effectively doing just that when he assigns creatorial powers to those laws. That inadequate view of God is surely not what Galileo, Kepler, Newton and Descartes believed.

God or the laws of physics?

Hawking's faulty concept of God as a "God of the Gaps" now has serious consequences. This "more science, therefore less God" kind of thinking inevitably leads Hawking to make the mistake (frequently made by Richard Dawkins and others) of asking us to choose between God and science; or, in Hawking's specific case, between God and the laws of physics. Talking about M-theory (his chosen candidate for a final unifying theory of physics), Hawking writes: "M-theory predicts that a great many universes were created out of nothing. Their creation does not require the intervention of some supernatural being or god. Rather, these multiple universes arise naturally from physical law."[28]

A supernatural being or god is an agent who does something. In the case of the God of the Bible, he is a personal agent. Dismissing such an agent, Hawking ascribes creative power to physical law; but physical law is not an agent. Hawking is making a classic category mistake by confusing two entirely different kinds of entity: physical law and personal agency. The choice he sets before us is between false alternatives. He has confused two levels of explanation: agency and law. God is an explanation of the universe, but not the same type of explanation as that which is given by physics.

Suppose, to make matters clearer, we replace the universe by a jet engine and then are asked to explain it. Shall we account for it by mentioning the personal agency of its inventor, Sir Frank Whittle? Or shall we follow Hawking: dismiss personal agency, and explain

[28] Op. cit. pp. 8–9.

the jet engine by saying that it arose naturally from physical law?

It is clearly nonsensical to ask people to choose *between* Frank Whittle and science as an explanation for the jet engine. For it is not a question of either/or. It is self-evident that we need *both* levels of explanation in order to give a complete description. It is also obvious that the scientific explanation neither conflicts nor competes with the agent explanation: they complement one another. It is the same with explanations of the universe: God does not conflict or compete with the laws of physics as an explanation. God is actually the ground of all explanation, in the sense that he is the cause in the first place of there being a world for the laws of physics to describe.

Offering people the choice between God and science is therefore illogical. In addition, it is very unwise, because some people might just choose God and then Hawking could be accused of putting people off science!

Sir Isaac Newton, a previous holder of the Lucasian Chair at Cambridge, did not make Hawking's category mistake when he discovered his law of gravitation. Newton did not say: "Now that I have the law of gravity, I don't need God." What he did was to write *Principia Mathematica*, the most famous book in the history of science, expressing the hope that it would "persuade the thinking man" to believe in God.

The laws of physics can explain how the jet engine works, but not how it came to exist in the first place. It is self-evident that the laws of physics could not have created a jet engine on their own. That task also needed the intelligence, imagination, and scientific creativity of Whittle. Indeed, even the laws of physics plus Frank

Whittle were not sufficient to produce a jet engine. There also needed to be some material that Whittle could use. Matter may be humble stuff, but laws cannot create it.

Millennia ago Aristotle thought a great deal about these issues. He spoke about four different "causes" that we can, perhaps, reasonably translate informally as "levels of explanation". Thinking of the jet engine, first there is the material cause – the raw material out of which the engine is crafted; then there is the formal cause – the concept, plan, theory, and blueprint that Sir Frank Whittle conceived and to which he worked. Next there is the efficient cause – Sir Frank Whittle himself, who did the work. Fourthly, and last in the list, there is the final cause – the ultimate purpose for which the jet engine was conceived and built: to power a particular aircraft to fly faster than ever before.

The example of the jet engine can help us to clear up another confusion. Science, according to many scientists, concentrates essentially on material causation. It asks the "how" questions: how does the jet engine work? It also asks the "why" question regarding function: why is this pipe here? But it does not ask the "why" question of purpose: why was the jet engine built? What is important here is that Sir Frank Whittle does not appear in the scientific account. To quote Laplace, the scientific account has "no need of that hypothesis".[29] Clearly, however, it would be ridiculous to deduce from this that Whittle did not exist. He is the answer to the question: why does the jet engine exist in the first place?

[29] However, the answer to some of these questions *may constitute scientific evidence for* the input of an external intelligence – a matter that I pursue in some detail in *God's Undertaker*, see e.g. p. 11.

Yet this is essentially what many scientists (and others) do with God. They define the range of questions that science is permitted to ask in such a way that God is excluded from the start; and then they claim that God is unnecessary, or doesn't exist. They fail to see that their science does not answer the question as to why something exists rather than nothing, for the simple reason that their science cannot answer that question. They also fail to see that by assumption it is their atheist world-view, not science as such, that excludes God.

The scientists did not put the universe there. But neither did their theories, nor the laws of mathematical physics. Yet Hawking seems to think they did. In *A Brief History of Time* he hinted at this kind of explanation, suggesting that a theory might bring the universe into existence:

> The usual approach of science of constructing a mathematical model cannot answer the questions of why there should be a universe for the model to describe. Why does the universe go to all the bother of existing? Is the unified theory so compelling that it brings about its own existence? Or does it need a creator, and, if so, does he have any other effect on the universe?[30]

Much as I find it hard to believe, Hawking seems to wish to reduce all explanation to formal causes only. He claims that all that is necessary to create the universe is the law of gravity. When asked[31] where gravity came from, he answered: "M-theory." However, to say that a theory or physical laws could bring the universe (or anything at

[30] Op. cit. p. 174.

[31] *Larry King Live*, 10 September 2010.

all, for that matter) into existence is to misunderstand what theory and laws are. Scientists expect to develop theories involving mathematical laws to describe natural phenomena, which enable them to make predictions; and they have done so with spectacular success. However, on their own, the theories and laws cannot even *cause* anything, let alone *create* it.

Long ago none other than the Christian philosopher William Paley said as much. Speaking of the person who had just stumbled on a watch on the heath and picked it up, he says that such a person would not be

> less surprised to be informed that the watch in his hand was nothing more than the result of the laws of *metallic* nature. It is a perversion of language to assign any law as the efficient, operative cause of any thing. A law presupposes an agent; for it is only the mode, according to which an agent proceeds: it implies a power; for it is the order, according to which that power acts. Without this agent, without this power, which are both distinct from itself, the *law* does nothing; is nothing.[32]

Quite so. Physical laws cannot create anything. They are a description of what normally happens under certain given conditions. This is surely obvious from the very first example that Hawking gives of physical law. The sun rises in the east every day, but this law does not create the sun; nor the planet earth, with east and west. The law is descriptive and predictive, but it is not creative. Similarly Newton's law of gravitation does not

[32] William Paley, *Natural Theology*, 1802, p. 7.

create gravity or the matter on which gravity acts. In fact, Newton's law does not even *explain* gravity, as Newton himself realized.

The laws of physics are not only incapable of creating anything; they cannot even *cause* anything to happen. For instance, Newton's celebrated laws of motion never caused a pool ball to race across the green baize table. That can only be done by people using a pool cue and the actions of their own muscles. The laws enable us to analyse the motion, and to map the trajectory of the ball's movement in the future (provided nothing external interferes); but they are powerless to move the ball, let alone bring it into existence.

One can understand what is meant by saying that the behaviour of the universe is governed by the laws of nature. But what can Hawking possibly mean by saying that the universe arises naturally from physical law, or that gravity arises from M-theory?

Another example of this basic misunderstanding of the nature of law is given by well-known physicist Paul Davies: "There's no need to invoke anything supernatural in the origins of the universe or of life. I have never liked the idea of divine tinkering: for me it is much more inspiring to believe that a set of mathematical laws can be so clever as to bring all these things into being."[33]

However, in the world in which most of us live, the simple law of arithmetic by itself, 1+1=2, never brought anything into being. It certainly has never put any money into my bank account. If I put £1,000 into the bank, and later another £1,000, the laws of arithmetic will rationally explain how it is that I now have £2,000 in the bank. But if

[33] Cited by Clive Cookson, "Scientists who glimpsed God", *Financial Times*, 29 April 1995, p. 20.

I never put any money into the bank myself, and simply leave it to the laws of arithmetic to bring money into being in my bank account, I shall remain permanently bankrupt.

C. S. Lewis grasped this issue, with characteristic clarity. Of the laws of nature he writes:

> They produce no events: they state the pattern to which every event – if only it can be induced to happen – must conform, just as the rules of arithmetic state the pattern to which all transactions with money must conform – if only you can get hold of any money. Thus in one sense the laws of Nature cover the whole field of space and time; in another, what they leave out is precisely the whole real universe – the incessant torrent of actual events which makes up true history. That must come from somewhere else. To think the laws can produce it is like thinking that you can create real money by simply doing sums. For every law, in the last resort, says: "If you have A, then you will get B." But first catch your A: the laws won't do it for you.
>
> Laws give us only a universe of "Ifs and Ands": not this universe which actually exists. What we know through laws and general principles is a series of connections. But, in order for there to be a real universe, the connections must be given something to connect; a torrent of opaque actualities must be fed into the pattern. If God created the world then He is precisely the source of this torrent, and it alone gives our truest principles anything to be true *about*. But if God is the ultimate source of all concrete, individual things and events, then God Himself must be concrete, and individual in the highest degree. Unless the origin of all other things were itself concrete and individual, nothing else could be so; for there is no conceivable means whereby what is abstract or general could itself produce concrete reality. Book-keeping, continued to all eternity, could never produce one farthing.[34]

The world of strict naturalism, in which clever mathematical laws all by themselves bring the universe and life into existence, is pure (science) fiction. Theories and laws do not bring matter/energy into existence. The view that nevertheless they somehow have that capacity seems a rather desperate refuge from the alternative possibility implied by Hawking's question cited above: "Or does it need a Creator?"

If Hawking were not as dismissive of philosophy he might have come across the Wittgenstein statement that the "deception of modernism" is the idea that the laws of nature *explain* the world to us, when all they do is *describe* structural regularities. Richard Feynman, a Nobel Laureate in physics, takes the matter further:

> The fact that there are rules at all to be checked is a kind of miracle; that it is possible to find a rule, like the inverse square law of gravitation, is some sort of miracle. It is not understood at all, but it leads to the possibility of prediction – that means it tells you what you would expect to happen in an experiment you have not yet done.[35]

[34] *Miracles*, London, Fontana, 1974, pp. 63, 90–91.
[35] *The Meaning of It All*, London, Penguin, 2007, p. 23.

The very fact that those laws can be mathematically formulated was for Einstein a constant source of amazement that pointed beyond the physical universe. He wrote: "Every one who is seriously engaged in the pursuit of science becomes convinced that the laws of nature manifest the existence of a spirit vastly superior to that of men, and one in the face of which we with our modest powers must feel humble."[36]

Hawking has signally failed to answer the central question: why is there something rather than nothing? He says that the existence of gravity means the creation of the universe was inevitable. But how did gravity come to exist in the first place? What was the creative force behind its birth? Who put it there, with all its properties and potential for mathematical description in terms of law? Similarly, when Hawking argues in support of his theory of spontaneous creation, that it was only necessary for "the blue touch paper" to be lit to "set the universe going", I am tempted to ask: where did this blue touch paper come from? It is clearly not part of the universe, if it set the universe going. So who lit it, in the sense of ultimate causation, if not God?

Allan Sandage, widely regarded as the father of modern astronomy, discoverer of quasars, and winner of the Crafoord Prize (astronomy's equivalent of the Nobel Prize), is in no doubt about his answer: "I find it quite improbable that such order came out of chaos. There has to be some organizing principle. God to me is a mystery but is the explanation for the miracle of existence – why there is something rather than nothing."[37]

[36] Letter of 24 January 1936 to a schoolgirl, Phyllis Wright.
[37] *New York Times*, 12 March 1991, p. B9.

It is fascinating that Hawking, in attacking religion, feels compelled to put so much emphasis on the Big Bang theory, because, even if the non-believers don't like it, the Big Bang resonates powerfully with the biblical narrative of creation. That is why, before the Big Bang gained currency, so many leading scientists were keen to dismiss it, since it seemed to support the Bible story. Some clung to Aristotle's view of the "eternal universe" without beginning or end; but this theory, and later variants of it, are now discredited.

Hawking, however, contents himself with saying:

> According to the Old Testament, God created Adam and Eve only six days into creation. Bishop Ussher, primate of all Ireland from 1625 to 1656, placed the origin of the world even more precisely, at nine in the morning on October 27, 4004 BC. We take a different view: that humans are a recent creation but that the universe itself began much earlier, about 13.7 billion years ago.[38]

It is clear that Hawking, though he has thought in depth about the interpretation of the data of science, has not thought very seriously about the interpretation of the biblical data. Some might think that resting content with Ussher's interpretation of the Bible is like resting content with Ptolemy's interpretation of the universe with its fixed earth and all the heavenly bodies rotating around it – something which Hawking would not dream of doing.

[38] Op. cit. p. 124.

If Hawking had engaged a little more with biblical scholarship, rather than simply putting the biblical creation account into the same pigeonhole as Norse, Mayan, Africana and Chinese myths, he might have discovered that the Bible itself leaves the time of creation open. In the structure of the text of Genesis, the statement "in the beginning God created the heavens and the earth" does not form part of the creation "week" but clearly precedes it; and so, however one interprets the days of creation, neither the age of the earth nor that of the universe is specified; and so there is no necessary conflict between what Genesis says and the 13.7 billion years yielded by scientific calculation.

As Hawking points out, the first actual scientific evidence that the universe had a beginning did not appear until the early 1900s. The Bible, however, has been quietly asserting that fact for millennia. It would be good if credit were given where it is due.