

THE CLUMSINESS OF LAWRENCE M KRAUSS: REVIEW OF *A UNIVERSE FROM NOTHING*

Where were you when I laid the earth's foundations? Tell me, since you are so well-informed! Who decided its dimensions... stretched the measuring line across it?... Who laid its cornerstone when the stars of the morning were singing with joy, and the Sons of God were chanting praise in chorus? Who pent up the sea behind closed doors when it leapt tumultuous from the womb, when I wrapped it in a robe of mist, made black clouds its swaddling bands... and marked the limits it might not cross...

Job 38: 4-9

Modern physicists usually confine their attempts to provide an explanation for the world, their 'theory of everything', to the essences of things and ignore, or take for granted, the infinitely more significant issue of their existence. And with good reason: for with the *essence* of a thing realised in matter one at least has something of which one can take hold. But how, or why, a thing should exist, should *be in the real* and not just in mind, is imponderable.

An exception to this convention occurs in the recent work of Lawrence Maxwell Krauss, Professor at Arizona State University, entitled *A Universe From Nothing*.¹

*

*

I. It used be the case that one who undertook scientific studies would, before specialising, immerse himself in the liberal arts (philosophy, ethics, logic, history, language etc.) to ensure a sense of balance in deliberation. The modern approach is to refuse any deference to the history of thought or the world beyond the senses. Since Descartes' day, and with a momentum that has grown with time, university studies have turned from the transcendent and philosophy has been degraded from a consideration of the immaterial and objective to the material and subjective. The title *Doctor of Philosophy* has lost all meaning, the Queen of the sciences reduced to a drab. The modern scientist conducts himself like a theologian but his doctrine is more obscure.

*[T]he general public, and indeed philosophers of considerable standing, do not have the necessary experience in regard to the experiments conducted, or sufficient mathematical expertise in regard to the esoteric concepts dealt with, to know what exactly is intended by the theories and formulas discussed. So it is very much a matter of (human) faith for all but a select few of us.*²

The human mind operates through concepts. From a single object it abstracts different formalities, different understandings to aid it as, for instance, of *this dog* the concepts *a being, an animal, a living thing, a barker, a biter*, and so on; and again, in more accidental fashion, *colour, proximity, size, symmetry, number* (e.g., as one of

¹ London (Simon & Schuster), 2012.

² D. G. Boland LI. B., Ph. D., *God and the Theory of Everything*, 2012; the text will be available shortly from Sydney's Centre for Thomistic Studies whose website is <http://www.cts.org.au/>

three), and so on. The forms fall into three categories, and to these categories correspond the fields of abstract human knowledge.³

The first category is constituted by forms abstracted from *singular matter*. Of a sample of metal uncovered by a miner, for instance, the investigating mind observes properties which it recognises as peculiar to gold. It can consider the reality 'gold' abstracted from this instance. The knowledge that results is limited to the signs, or empirical properties, of gold and the laws these properties reveal. Because its considerations are confined to properties, external signs, the knowledge provided cannot get at the underlying reality to understand what is the *essence* of gold.⁴ The knowledge is called *perinoetic*, that is, *around or about* the subject : it addresses the essences of things but as they are hidden. This is the field of *experimental science*

The second category is constituted by accidental forms or essences abstracted not just from singular but from *sensible matter*. The mind looks at the circularity, the squareness, the dimensions, the number, of gold, wood, or any other material thing. But it does not need a sensible subject : it can consider *circularity, squareness, number, dimension* and so on, quite independently of their existence in the real. It can satisfy the need for a subject through the workings of imagination. This is *mathematics*.

In the third category the mind abstracts concepts such as *substance, quality, relation, act, true, beauty, good, cause, effect*, removing not only from *singular* and from *sensible matter* but even from *understandable matter* as it considers the most profound aspects of being. This knowledge is *dianoetic*, that is, knowledge of its subject *through* the causes.⁵ This, the field of philosophy or *metaphysics*⁶, provides the deepest understanding of reality. The least knowledge at this, the highest, level of abstraction tells us more than the most profound knowledge at a lower level.

Now the question 'Why is there something rather than nothing?' involves very much more than the appearances, the empirical properties, of things, much more than their mathematical or geometrical properties. It requires a study of *being*. The question might be solved, insofar as it can be, by a *metaphysical* consideration of reality : it can never be solved by a merely *empirical* consideration.

II. Lawrence M Krauss is quite candid about his prejudices : he is an atheist and rejects the possibility of an intelligent creator. His atheism ties him to a pair of philosophies, one of which, *materialism*, denies any reality or value in what does not

³ Cf. St Thomas Aquinas, *Summa Theologiae* I, q. 85, art. 1, resp. to objs. 1 & 2. Cf. Dorothy L Sayers', *The Lost Tools of Learning* available at http://www.superflumina.org/PDF_files/lost_tools_of_learning.pdf where the reader will find an answer to the tired assertion, which Krauss repeats, that mediaevalists spent their time arguing about the number of angels that could dance on the head of a pin.

⁴ What it is that makes gold be gold. This analysis is taken from the text of A.M. Woodbury Ph. D., S.T.D., *Logic*, produced for students of Sydney's *Aquinas Academy*; Ch. 35, Art. 2, nn. 388 et seq.

⁵ The Greek prefix *dia-* is found in English words such as diagonal, dialectic, diagnosis, dialogue.

⁶ We have here enlarged the title *metaphysics* beyond its strict limits to embrace not only the philosophy of being but also the philosophical studies of nature, of ethics, etc. which accompany it.

fall under the senses or is not physically measurable. Materialism has the effect of degrading the *philosophical*, the third level of abstraction, to that of the empirical, so its adherents are constrained to deny that a metaphysical interpretation of science's discoveries is acceptable, or even possible. Yet, as he looks for ultimate explanations, the modern scientist cannot escape an inclination for the transcendent.

The modern view is not a crudely empiricist position. For it allows for the contribution of mathematics towards our understanding of empirical reality. Indeed, if anything, the objects of mathematics dominate the picture of reality as conceived in modern science so that it is not simply what is sensibly observable which is determinative for the scientific method but what is also conceivable according to the creative ability of the human imagination.

This introduces a complication and indeed a kind of opposition into the modern concept of (material) reality. We might put it that in the modern concept of science mathematics plays the role of a meta-physics, not in the Aristotelian sense, but as relating to a strange order or 'dimension' of reality, as we can know it, that transcends the purely empirical.⁷

There is a peril in this engagement. Even as the scientist uses mathematics to make precise—to *precisify*—his findings he runs the risk of allowing a preoccupation with the imaginary to dominate. The peril is compounded, moreover, by another influence, the second of the philosophical poles by which he is affected, *subjectivism*, whose burden it is that truth is determined not by reality but by the opinion of the individual or, in a common discipline, by the opinion of the majority.

To these two yet a further peril is added, one that follows on the limitations of modern education. A poor grounding in logic renders the scientist (the group), already prone to confuse the intentional (or *hypothetical*) with the real, to argue from one to the other oblivious of the logical rule that conclusions based on such mixed premises are valueless at any level but the hypothetical. The scientist may think he is concluding to some element of reality when he is only dealing with the imaginary.

III. Consider the influence of Descartes' *Cogito ergo sum*.⁸ From the acceptance that reality is primary and knowledge rooted in the real, *the objective* (the Aristotelian position), Descartes asserted the thinker's perceptions to be primary. No longer, thereafter, was *the real* the measure of truth but the thinker's *perception* of the real or the *perception generally accepted*.

There was a secondary effect, the rejection of what is *formal* in things. Reality is rooted in substantial form, matter's contribution is subsidiary.⁹ The *Principle of Indeterminacy* applies. The syllogism it grounds is straightforward.

That which can be many, from itself is not one of the many.

But matter can be any one of an infinite number of things.

Therefore matter is not from itself any of these infinite number of things.

⁷ *God and the Theory of Everything*, op. cit.

⁸ René Descartes, 1596-1650.

⁹ This nature as substrate is delineated by the philosophers by the name *primary matter*. In itself it is unidentifiable, unknowable ; we can only ever know matter under some formality such as a book, a tree, a computer or Lawrence M Krauss !

Whatever it is that makes matter be *this* thing or *that*, then, it cannot be matter. This influence metaphysics has, for centuries, labelled *substantial form*.

Descartes abandoned substantial form's roots in the immaterial and replaced it with the first of the accidents, *quantity*, the influence which gives a material substance extension. Now it is mathematics that is concerned with this *accidental* essence. What followed ?

Mathematics, from being only the formal part of modern science, and that focused on an accident (of quantity), took on also the role of being the substantial part, thus usurping the role of physics considered (in classical natural philosophy) as an empirical science, i.e., as the science of physical substances or bodies.

In the history of modern philosophy this is highlighted by a curious consequence. As Locke [John Locke, 1632-1704] noted, physical properties other than those stemming from quantity, such as the qualities of hardness, heat, colour, etc., thereby lost their 'objective' status, epiphenomena of our faculties of knowledge. Only quantitative properties of bodies such as size, shape, etc., were 'primary qualities', by which [it] was understood that they [alone] enjoyed the substantial reality of quantity, independent of mind.

The effect of this disconnection of 'secondary qualities' from the objective order grounded in substance, however, as Hume [David Hume, 1711-1776] quickly noted, was to undermine the real basis of all human knowledge, ironically of science itself. Descartes' attempt to save our certainties from within the mind had ended in a scepticism more radical than any.¹⁰

Locke's empiricism, Hume's scepticism, Comte's positivism¹¹, the logical positivism of Moritz Schlick [1882-1936], Ernst Mach [1838-1916] and others, and the aberrations that followed, are all in one way or another redactions of the philosophy of *materialism* aided by *subjectivism*. There is no modern scientist unaffected by these errors. Thus Albert Einstein —

"Hume saw clearly that certain concepts, for example that of causality, cannot be deduced from our perceptions of experience by logical methods."¹²

And again —

"The theory of relativity suggests itself in Positivism... This line of thought had great influence on my efforts, most specifically Mach and even more so Hume, whose *Treatise of Human Nature* I studied avidly and with much admiration shortly before discovering the theory of relativity."¹³

Einstein's biographer, Walter Isaacson, summarises these influences on his subject.

"Hume applied his sceptical rigor to the concept of time. It made no sense, he said, to speak of time as having an absolute existence that was independent of observable objects whose movements permitted us to define time. 'From the succession of ideas and impressions we form the idea of time,' Hume wrote. 'It is not possible for time alone ever to make its appearance.' This idea that there is no such thing as absolute time would later echo in Einstein's theory of relativity. Hume's specific thoughts about time, however, had less influence on Einstein than his more general insight

¹⁰ *God and the Theory of Everything*, op. cit.

¹¹ Auguste Comte 1798-1857.

¹² Quoted in Walter Isaacson, *Einstein, His Life and Universe*, New York, 2007, p. 82.

¹³ Einstein to Moritz Schlick, December 14th, 1915; quoted in Isaacson, *Einstein His Life and Universe*, op. cit., p. 82.

that it is dangerous to talk about concepts that are not definable by perceptions and observations...

...

“The essence of Mach’s philosophy was this, in Einstein’s words: ‘Concepts have meaning only if we can point to objects to which they refer and to the rules by which they are assigned to these objects.’ In other words, for a concept to make sense you need an operational definition of it, one that describes how you would observe the concept in operation. This would bear fruit for Einstein when, a few years later, he and Besso [Michele Angelo Besso, 1873-1955] would talk about what observation would give meaning to the apparently simple concept that two events happened ‘simultaneously’.

“The most influential thing that Mach did for Einstein was to apply this approach to Newton’s concepts of ‘absolute time’ and ‘absolute space.’ It was impossible to define these concepts, Mach asserted, in terms of observations you could make. Therefore they were meaningless. Mach ridiculed Newton’s ‘conceptual monstrosity of absolute space’; he called it ‘purely a thought-thing which cannot be pointed to in experience.’”¹⁴

The reader will note the preoccupation with *perceptions of reality*, rather than with reality itself. Even as he condemns Newton’s alleged subjectivism, Mach is quite unconscious of his own. These philosophers misunderstand the effect and tool of the intellect, *the concept*, and its function : they do not realise that—

“the mode whereby one understands [a thing]... is not the same as the mode the thing exercises in existing...”¹⁵

When the mind considers some existing thing the concept it produces reflects its reality but *in a fashion proper to the intellect*. A concept need not reflect reality accurately. Indeed, most human concepts, especially ones about abstract matters, are confused and only become clearer with study and reflection. Moreover, concepts do not ‘have to make sense’ ; their precision or lack of it is a function of how well or ill they reflect reality. One does not, incidentally, ‘define a concept’ : a concept is itself a definition *in signified act*¹⁶ delimiting for the mind (i.e., setting the boundaries to) a *universal* nature abstracted from reality (*real being*), or else a contrivance which exists only in the mind (*mental being*).¹⁷

These philosophical aberrations are exemplified in the misunderstandings of time and space they reveal. *Time* is not an idea of the mind. It is not something caused by our perceptions. It is the measure of change, of movement, in material things from potency to act.¹⁸ Time does not (in contradiction of Hume’s view) ‘ever make an

¹⁴ Isaacson, *Einstein His Life and Universe*, op. cit., pp. 82, 83-4.

¹⁵ St Thomas Aquinas, *Summa Theologiae* I, q. 85, art. 1, resp. to obj. 1

¹⁶ A *word* is a sign of a *concept* (understanding) which is a sign of a *thing*, whether real or imagined.

¹⁷ Mach’s strictures about the need for an operational definition of a concept, *one that describes how you would observe the concept in operation*, do not seem to have troubled Einstein in acknowledging space as non-being somehow existing.

¹⁸ Aristotle, *Physics* IV, 10-14 (221b) ‘The number of motion in respect of before and after.’ (219b2) *Now* is the division and link between past and future. (222a 10-11) There is not a series of *nows* but one only which is associated with different events that produce the experience of before and after ; as if the *now* was a constant that takes on different properties as it is associated with the process of motion.

appearance' ; it is not 'something existing'. What exists, what 'appears', is the movement, the change, in material being ; time is its inexorable measure. The *matter* (the subject matter) of time is thus only quasi-material ; its *form* is the mind's operation in numbering, in measuring.

Space is related to place which, as Aristotle makes plain, is *first immoveable surface of circumambient body*.¹⁹ *Space*, while constituted materially by the dimensions of surrounding body (or bodies), has an added character, namely, the *relation* of distance to that (or those) surrounding bodies applied by the mind. While *materially* identical, place and space differ *formally*. Nor is it necessary 'to experience' space for the mind to acknowledge it ; the mind's use of analogy is sufficient. Mach's errors are a consequence of his reduction of the mind to the level of a sense.

IV. A popular summary of positivism's philosophical claim is as follows :

"Positivism is a philosophy of science based on the view that information derived from logical and mathematical treatments and reports of sensory experience is the exclusive source of all authoritative knowledge and that there is valid knowledge (truth) only in scientific knowledge."²⁰

The claim is reflected in Krauss's Preface :

For more than two thousand years the question 'Why is there something rather than nothing?' has been presented as a challenge to the proposition that our universe... might have arisen without design, intent, or purpose. While this is usually framed as a philosophical or religious question, it is first and foremost a question about the natural world, and so the appropriate place to try and resolve it, first and foremost, is with science.

Of course existence has to do with the natural world, but that does not mean that science is 'the appropriate place to try and resolve the question' why there is something rather than nothing. Not only is it beyond science's brief to consider the issue, it has not the competence. Science deals with things existing : it takes their existence for granted. Its submission to materialism, a submission some 350 years old now, has served to make scientists think themselves philosophers (*materialist* philosophers, of course). Yet science has not emerged from its *perinoetic* roots to embrace a *metaphysical* gaze upon reality. The opposite has occurred : positivism has served to degrade philosophy by denying validity to what is above matter, thus denying the intellect's proper power to abstract what is formal in things.

The modern scientist searches, like the Atomists of ancient Greece, among the empirical properties of things to try and discover their provenance. He thinks that if he uncovers their smallest element, the lowest common denominator as it were, he will know the answer. His efforts remind one of the child who sets about taking

¹⁹ 'The innermost motionless boundary of what contains.' (*Physics* 4.4; 212a 20-21). Place is the limit in which a body is ; it is both separable from and contains the body. The boundary of a thing immediately surrounds the thing and is motionless.

²⁰ John J. Macionis, Linda M. Gerber, *Sociology*, Seventh Edition, Pearson, Canada; and Jorge Larrain *The Concept of Ideology*, (1979) p. 197; cited in http://en.wikipedia.org/wiki/Positivism#Auguste_Comte

apart a clock to discover what makes it tick. The more he concentrates on the parts, the less he comprehends that it is not the parts, but *the way they are ordered*, that produces the 'tick'. Or again, he is like a man walking in a field who, narrowly overtaken by a bouncing ball, declines to investigate its trajectory to discover the agent responsible for its flight, and the agent's intent, in favour of dissecting the ball.

V. What the scientist puts forward for acceptance often has little to do with reality and more with *an imagined representation of reality*. He is frequently in difficulties distinguishing the two.²¹ Einstein fed the inclination with his remark, "Imagination is more important than knowledge."²² Newton expressed the view that gravity was a force of repulsion not one of attraction *but that it sufficed that gravity's effects could be calculated as if they entailed* a force of attraction between the relevant bodies. He recognised that *calculation* is not the same as *causation*. Neither is *explanation* identical with *causation*. It may save the appearances which a further thesis may better explain.²³ In other words, it does not follow that the imaginative representations of the scientist accurately portray reality.

The scientist's confusion of imagination and intellect is well illustrated in Krauss's eighth chapter entitled *A Grand Accident?* —

"It is now traditional to think of 'our' universe as comprising simply the totality of all that we can now see and all that we could ever see. Physically, therefore, our universe comprises everything that either once could have had an impact upon us or that ever will.

"The minute one choses this definition for a universe, the possibility of other 'universes' — regions that have always been and always will be causally disconnected from ours, like islands separated from any communication with one another by an ocean of space — becomes possible, at least in principle.

"Our universe is so vast that... something that is not impossible is virtually guaranteed to occur somewhere within it. Rare events happen all the time. You might wonder whether the same principle applies to the possibility of many universes, or a *multiverse*, as the idea is now known. It turns out that the theoretical situation is actually stronger than simply a possibility. A number of central ideas that drive much of the current activity in particle theory today appear to require a multiverse..."

This passage contains a number of logical errors. The definition *universe* is not comprehended by 'the totality of all that we can now see and all that we could ever see', nor by 'everything that either once could have had an impact upon us or that ever will'.²⁴ Nor does it follow [*non sequitur*] from these definitions (however well or

²¹ This is particularly noticeable among promoters of Darwinian macro-evolutionary theory. Because some characteristic found vestigially in one animal is found elaborated in another, they will proceed, in the face of evidence to the contrary, to assert the one has 'evolved' from the other : that they can *imagine* the elaboration is sufficient to persuade them it must be so.

²² In George Sylvester Viereck, *Glimpses of the Great*, New York, 1930, p. 377; quoted in Isaacson, *Einstein, His Life and Universe*, op. cit, p. 7. See also, Thomas Friedman, 'Learning to Keep Learning', New York Times, Dec. 13, 2006, quoted *ibidem*.

²³ On which see St Thomas Aquinas in *Summa Theologiae*, I, q. 32, art. 1, ad 2.

²⁴ The reader will note that the 'definitions' are cast in the subjective rather than in the real.

ill elaborated) that 'other universes become[.]... possible'. One may posit other universes *hypothetically* but these are no more than products of the mind. Nor is the claim assisted by the gratuitous assertion, *Rare events happen all the time*.

Since the materialist scientist is constrained *ex hypothesi* to exclude the influence of any *formal* or *final* cause in the real world (universe), he must look to the only possible contributor to the order he finds there, namely *chance*. The invocation of chance, as we have noted elsewhere, is a device to invoke *final* causality surreptitiously.²⁵ One can only assume from the suppositions Krauss and his fellow physicists advance that the levels of chance upon which they rely are so close to the infinite they think it necessary to go beyond the possibilities offered even by the immensity of 'our [own] universe'. Let the reader note the chapter's title.

VI. While the intellect has its own way of representing a thing, the concept it produces does not fail to express what really exists. It is otherwise, however, with *mental* being, that is, being which exists only in mind. There are two species : 1. mental being *based* in the real ; 2. mental being *unbased* in the real.

Based mental being has some connection with reality. It manifests itself in two categories, one of them grounded in *privation*, the other in *relation*. 'Night' is an instance of the first type. Night is not something positive but something negative, *privative*, a lack of light conceived as if it was something positive (the negative signified, by the common sense of our ancestors, in substituting the letter 'n' for 'l'). 'Space', which we have discussed above, is an instance of the latter category. It is not real but mental being, something the mind arrives at through *relation*.²⁶ For space is formally constituted by the mind's addition to place (which is a reality) of the *relation* of distance from the ambient body, or bodies.

Unbased mental being, in contrast, exists (and can exist) only in mind. A *square circle* is a conception of the mind impossible of realisation because it involves the putative blending of contraries, figures each of whose definitions formally opposes the other. Another instance is to conceive of God, a being of infinite power, as capable of creating another being of infinite power, another 'God'. Here there is a juxtaposition not of contraries but of contradictories.

In an earlier chapter entitled *Much Ado About Nothing*, Krauss says this :

"A key tenet of quantum physics... is the Heisenberg Uncertainty Principle which... states that it is impossible to determine, for certain pairs of quantities, such as position and velocity, exact values for a given system at the same time. Alternatively, if you measure a given system for only a fixed finite time interval, you cannot determine its total energy exactly.

"What all this implies is that, for very short times, so short that you cannot measure their speed with high precision, quantum mechanics allows for the possibility that these particles act as if they are moving faster than light! But, if they

²⁵ Cf. *Evolution is Impossible* at http://www.superflumina.org/PDF_files/evolution_is_impossible.pdf

²⁶ For the relation of measurement is *mental* in the measure, though *real* in the measured.

are moving faster than light, Einstein tells us they must be behaving as if they are moving backward in time.

“Feynman [Richard Feynman, 1918-1988, American theoretical physicist] was brave enough to take this apparently crazy possibility seriously and explore its implications...”²⁷

He does not condemn the theory for embracing the impossible, does not assert that what it entails could not be true in reality. Instead, he accepts that the impossible is possible, and builds on this to posit something just as impossible—“at least for a little while, something has spawned out of nothing!”²⁸

Consider the assertion on which the claim is based. *Pace* Hume, Mach & co., time is the measure of change of material being whose substrate, *primary matter*, is in potency to be anything. The mutability of matter is inexorable. It is progressive ; something cannot ‘unchange’. Even if it reverts to a former reality—as water devolving into hydrogen and oxygen should subsequently be reformed as water—the movement is progressive, *potency* (can-be-ness) followed by its corresponding *act* (does-be-ness). Since every potency is for the sake of its corresponding act, it is impossible that act could be followed by its predisposing potency. But this is what would be entailed for time to move backward. Hence, Feynman’s conception is impossible of real existence : it is *unbased* mental being.

What does Krauss mean by ‘nothing’ ? Like ‘night’, nothing is a *negative* conceived after the likeness of a *positive*, an instance of *based* mental being. The mind first conceives being and then, by *privation*, negates it. As ‘night’ signifies in the positive ‘absence of light’, ‘nothing’ signifies in the positive ‘absence of being’. But let it be understood that to *conceive of* ‘nothing’ is not to *affirm* nothing (as if it could exist in the real) : for this negation is negation *as signified*, not negation *as exercised*.²⁹ Here, again, we observe the modern scientist’s logical debility. From an impossible premise nothing possible in the real order can be concluded. Feynman’s conclusion that “at least for a little while, something has spawned out of nothing”, is exposed as a figment of his (and Krauss’s) imagination.

VII. There are other instances in Krauss’s text of this confusion of *unbased* mental being with real being, *videlicet* the contention that the world (the universe) exists in four rather than three dimensions. This, a consequence of Einstein’s theorising, is false, no matter how vehemently the theoretical physicist may insist upon it, no matter how treating it so may assist his calculations, or assist in solving the problems of motion in the universe. Time is not a dimension but the measure of change. How much more fatuous, though, is the following—

“In the simplest version of the [string] theory, such infinite predictions can be obviated only if the strings that make up elementary particles are vibrating, not

²⁷ *A Universe from Nothing*, op. cit., p. 62.

²⁸ *A Universe from Nothing*, op. cit., p. 64.

²⁹ ‘Blind’ when said of a horse, affirms a *negation as exercised* for it is due to a horse that it should see, and to say that it is blind is to affirm a negative reality, a real absence (or privation).

merely in the three dimensions of space and one of time... but rather in twenty-six dimensions! ... [I]n the mid-1980s some beautiful mathematical work... demonstrated that the theory could in principle do far more than just provide a quantum theory of gravity. By introducing new mathematical symmetries... it became possible to reduce the number of dimensions required for consistency of the theory from twenty-six to merely ten."³⁰

The interpretative clue here is the adjective 'mathematical'. One can *imagine* a universe with any number of dimensions, but no such universe exists in reality. Nor is this *imaginary* world less imaginary because it is shared among theoreticians.

A triangle is a plain figure bounded by three straight lines. When geometry defines it so, it reflects reality. One can *imagine* a triangle scribed on the surface of a globe, but the figure so scribed is, *pace* Krauss, no longer a triangle. There may, indeed, be practical applications for triangles *imagined* to have internal angles totalling *more than* 180°, or totalling *less than* 180° for that matter, but these do not reflect reality. In similar fashion, one can *imagine* 'curved space'. But no such thing exists. For here science's theorising runs into a threshold problem. It is this. By 'space' the scientist means 'non-being somehow existing', a void; this is impossible. The truth is simple, as simple as that water flows downhill : *nothing does not exist*.³¹

Now if there is no such thing as 'space' so conceived, *a fortiori* there can be no such thing as 'curved space' *even if experiment seems to indicate there is ; even if treating it so solves scientific problems*. Explanation is not the same as causation ; or realisation.

It will be objected (*materialism* calling *subjectivism* in aid) that there is no member of the scientific community who would deny that space is 'non-being somehow existing'. If the *materialism* to which the modern scientist is addicted is anti-intellectual (for its systematic denial of *formal* and *final* causality), his adherence to the subjective is plain silly. If a majority believes wrong to be right, does that make it right ? It does not. If a majority of scientists believe space to be 'non-being somehow existing', does that mean space is non-being somehow existing ? It does not. What matters is reality, not *majority opinion about* reality. Krauss demonstrates how mindless is scientific theorising in a passage redolent of a Douglas Adams novel—

"Special relativity says nothing can travel *through* space faster than the speed of light. But *space itself* can do whatever the heck it wants, at least in general relativity. And as space expands it can carry distant objects, which are at rest in the space where they are sitting, apart from one another at superluminal speeds..."³²

First, note his use (albeit semi-humorously) of the macro-evolutionist's gambit of ascribing intellectual activity to what lacks it. In the evolutionist's case it is a plant,

³⁰ *A Universe from Nothing*, op. cit., pp. 131-2.

³¹ Cf. Aristotle, *Physics* IV 6.213 a 11—9.217b 28. *De Caelo* 1.2.268a 1-10; 279a 11; 2.4. 287a7-12; 2.8.290a7. St Thomas Aquinas *In IV Physics* Ll. 9-14. It is ironical that those who subscribe to a philosophy focussed on the material should deny the need for a material continuum throughout the universe.

³² *A Universe from Nothing*, op. cit., pp. 96-7.

an insect or a brute animal.³³ In Krauss's case it is *mere matter*. No : worse than this ; he ascribes intellectual activity to what, on his own assessment, does not even exist ! If you observe intellectual effects (such as order and subordination) in a thing and you refuse to acknowledge intellect in the thing's author (because you refuse to acknowledge the author's *existence*), you have no option : you must ascribe intellectual activity to the dumb creature. In the same way Krauss suggests that it is the non-intellectual chaos of matter that (*God knows how !*) produces the vast number of natural laws he treats with such reverence.

Through what, one is entitled to ask, is Krauss's hypothetical 'space' expanding ? Through a hypothetical infinite 'nothing' ? If so, how does this hypothetical infinite 'nothing' differ from that 'non-being somehow existing' which constitutes his understanding of 'space' ? How can nothing expand through nothing ? These are but *Kraussian* imaginings : they have not the slightest relation to reality. In contrast, Aristotle's assessment (with only a fraction of Krauss's knowledge) that 'place' is the limit in which a body is ; that it is both separable from, and contains, the body ; that this boundary immediately surrounds the thing and is motionless, is simply common sense, as is Aristotle's analysis of what the scientist calls 'space' :

"[A]ll things are in the heaven ; for the heaven, we may say, is the All. Yet their place is not the same as the heaven. It is part of it, the innermost part which is at rest and in contact with movable body ; so the earth is surrounded by water, water by air, and the air by *aether*, and the *aether* by the heaven, but we cannot go on and say that the heaven is in anything else."³⁴

Aristotle insists that for the eye, *a sense organ*, to see light there must be a material and diaphanous medium between its source and the eye. St Thomas Aquinas agrees.³⁵ Whatever it is that fills the vast interstices between the stars, the planets, their satellites, the asteroids and comets, *it must be something material*. What it is, its *essence*, does not seem to have troubled the scientific community (save perhaps for Poincaré, Lorentz and their followers) since the *Michelson-Morley* experiment in 1887, but that is their fault. If, as a consequence of subservience to materialism they choose to think this element cannot exist they have a problem.

We have remarked elsewhere³⁶ that there are two objections to materialist theory. They present a sort of 'paw fork' for the modern scientist. Since a void is impossible, if the heavenly regions were comprised of nothing this would present an absolute barrier to the transmission of light. Therefore it is impossible they are not constituted by a material medium. If the scientist refuses to accept this objection—insists that 'nothing' can somehow exist—he must address another problem. If there is nothing to impede the transmission of light, why is *C*, the speed of light, limited to 299,792,458 metres per second : why is it not infinite ?

³³ As may be observed in any of the nature DVDs of David Attenborough. Cf. on this topic, the author's paper *Decoding David Attenborough* at http://www.superflumina.org/PDF_files/decoding_DA.pdf

³⁴ *Physics* IV 4. 212b 17-24

³⁵ Cf. Aristotle, *De Anima* II.7; St Thomas *In II De Anima*, L. XIV, 6

³⁶ *Science and Aristotle's Aether* at http://www.superflumina.org/PDF_files/aether_science.pdf

It matters not that experiment may indicate 'space' is curved. The dilemma is, like most dilemmas, apparent only. When scientists make the effort to discover the nature of the material element that fills the universe, which Aristotle calls *aether* or 'the heavenly body', they will learn what provides the appearance of curvature experiment reveals.³⁷ They will learn, too, why *C*, the speed of light, is limited.

VIII. Along with almost every other physicist on the planet, Krauss accepts 'the Big Bang' as the primordial 'creation event'.³⁸ The idea is philosophically impossible. We are not speaking here of the obvious problem, that before a 'big bang' could occur there had first to be something material to explode, but the more fundamental issue that before it could occur, there had first to be a *place* for it. 'Place', as Aristotle reminds those thinkers who live in the real world rather than the world of scientific imagination, requires the presence of circumambient matter. In the order of reality *this* matter must pre-exist any matter that may have exploded.³⁹ Hence, even if it did occur, the 'big bang' was not the primordial 'creation event'.

In his seventh chapter, *Our Miserable Future*, Krauss says this :

"What about the other major pillar of the Big Bang, the cosmic microwave background radiation, which provides a direct baby picture of the universe ? First, as the universe expands ever faster in the future, the temperature of the CMBR will fall. When the presently observable universe is about 100 times larger than it is now, the temperature of the CMBR will have fallen by a factor of 100, and its intensity, or the energy density stored within it, will have fallen by a factor of 100 million, making it about 100 million times harder to detect than it currently is..."

Why the preoccupation with the infinitely distant past, or the (perhaps) infinitely distant future ? Neither are within our ken save through hypotheses whose truth is conjectural and the uncertainty of which is, in all likelihood, directly proportional to the distance in time of the events addressed. Even if the imaginings encapsulated in this passage could be borne out by reality, what on earth do they matter here, now ? Why not try and understand the phenomenon of cosmic microwave background radiation *as a present reality* ? Even the most obdurate of scientists admits that nature seems to do nothing in vain : for what purpose, then, does the phenomenon exist ?

IX. *Something From Nothing*—Krauss's Thesis

In his ninth chapter, *Nothing Is Something*, Krauss says :

"Why is there something rather than nothing ? We are now presumably in a better position to address this, having reviewed the modern scientific picture of the universe, its history, and its possible future, as well as operational descriptions of

³⁷ We have suggested the nature of this element, the true *quintessence*, Aristotle's *aether*, in a series of articles on this website. Its presence may, perhaps, be reflected by the phenomenon of cosmic microwave background radiation whose presence throughout the universe was discovered in 1964.

³⁸ This obsession with going backwards rather than concentrating on the present is one physicists share with evolutionists. It seems to haunt the entire materialist / subjectivist syndrome whose adherents are constantly looking for evidence to justify their flights from reality and from formal causality.

³⁹ Aristotle's *aether* would satisfy this demand.

what ‘nothing’ might actually comprise. As I also alluded to at the beginning of this book, this question too has been informed by science, like essentially all philosophical questions. Far from providing a framework that forces upon us the requirement of a creator, the very meaning of the words involved have so changed that the sentence has lost much of its original meaning—something that again is not uncommon, as empirical knowledge shines a new light on otherwise dark corners of imagination.

“At the same time, in science, we have to be particularly cautious about ‘why’ questions. When we ask ‘Why?’ we usually means ‘How?’ If we can answer the latter, that generally suffices for our purposes...”⁴⁰

He misunderstands the place of science in the scheme of human knowledge. Science does not *inform* in fundamental questions : its vision, circumscribed by its *modus operandi*, is limited to properties, the external signs, of things. It provides the *matter* upon which the higher disciplines can *do the forming*, provide the solutions. His unwillingness to contemplate the possibility of an intellectual cause of the universe moves him to find excuses for avoiding the question. ‘Why?’ looks for a cause : ‘How?’ looks merely for means. The device is as old as David Hume who pretended to answer difficult questions by turning his back on them. The passage shows, too, that Krauss simply does not understand that ‘nothing’ is a product of the mind, a positive concept standing for a negative, *mental* being. Natural knowledge may be infinitely more profound today than in the past, but its students have lost the wisdom to apply it rightly.

Krauss goes on to say this:

“Newton’s work dramatically reduced the possible domain of God’s actions, whether or not you attribute any inherent rationality to the universe. Not only did Newton’s laws severely constrain the freedom of action of a deity, they dispensed with various requirements for supernatural intervention. Newton discovered that the motion of planets around the Sun does not require them to be continually pushed along their paths, but rather, and highly non-intuitively, requires them to be pulled by a force acting toward the Sun, thus dispensing of the need for the angels who were often previously invoked as guiding the planets on their way. While dispensing with this particular use of angels has had little impact on people’s willingness to believe in them (polls suggest far more people believe in angels in the United States than believe in evolution), it is fair to say that progress in science since Newton has even more severely constrained the available opportunities for the hand of God to be manifest in his implied handiwork.”⁴¹

Scientists do not create laws : they find them, uncover what exists.⁴² Nature is surrounded by—immersed in—laws : indeed, each of the sub-disciplines of the

⁴⁰ *A Universe from Nothing*, op. cit., p. 143.

⁴¹ *A Universe from Nothing*, op. cit., p. 145. It should be said in passing, a. that it is pleasing the majority of Americans seem to be able to see through the Darwinian nonsense, and b. equally pleasing to see Krauss admitting that evolutionism is a species of belief. Indeed, evolutionism is a sort of *anti*-belief, a belief in ‘no-God’. He misquotes Newton’s opinion about gravity.

⁴² The Latin root of the word ‘discover’ is revealing—*invenire*, ‘to come in upon’. It means that what the discoverer finds *is already there* ! Who, might one reasonably ask, put it there in the first place ?

science Krauss values so profoundly is grounded in the rigour of their immutability. So who, or what, laid them down ? Scientists are happy to take the law of gravity and its force for granted : they have yet to expose gravity's cause. Reading Krauss, we can see why : there is no need to worry about 'Why?' ; 'How?' is all that matters : explanation is sufficient. But explanation is not the same as causation, or realisation. Far from Newton's discovery of such laws 'constrain[ing] the... action of the deity', the exposure of their intricacy reveals an ever more immense regime of ordination and subordination giving testimony of the majesty of the intellectual power of their cause to anyone prepared to allow intelligence, rather than prejudice, to rule him.

In his tenth chapter, *Nothing Is Unstable*, we read this :

"[T]he recent decade has seen incredible progress in molecular biology. We learned of natural organic pathways, for example, that could produce, under plausible conditions, ribonucleic acids, long thought to be the precursors to our modern DNA-based world. Until recently it was felt that no such direct pathway was possible and that some other intermediate forms must have played a key role.

"Now few biochemists and molecular biologists doubt that life can rise naturally from nonlife, even though the specifics are yet to be discovered..."⁴³

Subjectivism yet again. That a majority may be of opinion that life can arise from 'nonlife' does not make it true. Their opinion, moreover, will never be anything more than that. Aristotle explained why some 2,400 years ago.

'For living things,' he said, 'to live is the same as to be'.⁴⁴ Take from an animal its life and you take from it existence ; the body of the animal quickly degrades into its component elements. The corollary is clear : *whatever it is that gives life to the animal also gives it existence (be ; esse)*. This also is clear : it is not from the *matter* of which it is constituted that a thing gets its life but from another influence.⁴⁵ Here the sea of materialism's expectations washes up against the stonewall of reality. The materialist can analyse the *material* structure of the living thing, but his philosophy blinds him to the *formal cause* which alone makes it *to live*, even as it makes it *to be*.

In his eleventh chapter, *Brave New Worlds*, Krauss pontificates :

"The Metaphysical 'rule' which is held as an ironclad conviction by those with whom I have debated the issue of creation, namely, that *out of nothing nothing comes*, has no foundation in science..."

Any scientist who accepts this premise has abandoned common sense. The issue between *nothing* and *something* parallels that between the *non-living* and the *living*. Life is nothing in the non-living ; and the living and the non-living are distinguished precisely in the possession in the one of what is *nothing* in the other.

X. *The Fatuousness of the Thesis*

⁴³ Ibid. p. 160

⁴⁴ *De Anima* II.4.415b12-15

⁴⁵ Whatever a man may 'create' it always involves the iteration in some form or other of what already exists ; man is a creator only *secundum quid*. He can impose artificial forms on matter but he cannot educe from matter any natural form, cannot create something living. And he cannot create something living because creation *simpliciter* is beyond his power.

Krauss's thesis is grounded in a premise which has little to do with theoretical physics and everything to do with materialism and atheistic prejudice. The 'nothing' of which he speaks so eloquently, and tries (if it were possible) to colour with the characteristics of something existing, exists only in the collective imagination of physicists. Intellect demands that what we call 'space' is filled with a medium which while material is not detectable by any scientific instrument.⁴⁶ Much as the sea is the medium and essential condition in which all sea-creatures live, *this medium* is the essential condition of the existence and coming into existence (the *be* and *become*) of all material things. Imagination may incline us to view a void as reality's 'default setting', but intellect insists this is impossible. Science's problem over the last 100 years is that it has allowed imagination free rein at intellect's expense.

The instinctive reaction of any reasonable man to Krauss's thesis must be dismay at its unreality. We live in a universe not only of intricate *goodness* and *order* but of immense *beauty* in the smallest of its elements. There is no mention of any of these realities or of their cause in *A Universe From Nothing*. Instead, we get this—

"The universe is far stranger and far richer—more wondrously strange—than our meager human imaginations can anticipate. Modern cosmology has driven us to consider ideas that could not have been formulated a century ago. The great discoveries of the twentieth and twenty-first centuries have not only changed the world in which we operate, they have revolutionized our understanding of the world—or worlds—that exist, or may exist, just under our noses: the reality that lies hidden until we are brave enough to search for it.

"This is why philosophy and theology are ultimately incapable of addressing by themselves the truly fundamental questions that perplex us about our existence. Until we open our eyes and let nature call the shots, we are bound to wallow in myopia."

It is because Krauss & co. have allowed their *meager human imaginations* to range uncontrolled over the information provided by nature that they think it appropriate to posit other worlds and universes. These are no more real than the 'nothing' they conceive of as something. It is not so much *the great discoveries* that *have revolutionized our understanding of the world* but the judgements on them by a science blind to its own defective vision, a science 'wallow[ing] in myopia'. In condemning philosophy *inter alia* as *incapable of addressing... the truly fundamental questions... about existence* Krauss has only condemned his own views. For they, too, are rooted in philosophy, a false philosophy.

If he thinks his book has proved the universe can come from nothing, that he has addressed 'the truly fundamental questions that perplex us', he is dreaming. Readers might think the answer posited by Douglas Adams' super computer 'Deep Thought' to *The Question of Life, the Universe, and Everything*, makes more sense than

⁴⁶ If scientists had not been infected with materialism they would have realised that the Michelson-Morley experiment was a success, not a failure. For it proved what Aristotle had taught some 2,300 years earlier, that the heavenly substance was unique among material substances *in being not detectable*, in manifesting no attributes comparable with common material being.

this science fantasy. They will certainly find *The Hitchhiker's Guide to the Galaxy* more readable.

Michael Baker

20th July 2013—*110th anniversary of the death of Pope Leo XIII*