The two resolutions passed easily[52] and John Collins got up to close the meeting. But before he could close, Howard Guinness, a colleague of Stella Aldwinckle at St. Aldate's and an evangelical chaplain to students, leaped to his feet and demanded the sort of action that must have warmed the heart of Bishop Bell.[53] "Let's stand up and show we really are in earnest. I'll be the first." And over 1,000 people answered this "altar call" by standing and pledging to send a parcel of rationed food to Germany.[54]

Lewis was not at the meeting that started Christian Action. As he wrote at the end of his letter, "I am sure it is not my vocation to participate." Lewis had to pick and choose, especially since his unexpected public career had taken off with a vengeance. He had to turn down Archbishop Temple in 1942 and Canon Collins in 1946. *Miracles, The Great Divorce* and the Narnia tales might not have existed if he had chosen the path of collective action. Many readers will feel that Lewis had a correct idea of his vocation, and be grateful that he followed it.

[52] At the meeting in Oxford, two amendments were made to the final draft. The first was "the addition of the word 'economic' after the word 'social' in clause (d) of the first resolution." The second was "the addition of the words 'and other needy countries' after the word 'Germany'" in two clauses of the second resolution. John Collins, "A Call to Christian Action in Public Affairs," 93.

[53] Collins managed to get many conservative and evangelical students to the event. James Houston, who met with Lewis monthly during this time period, shared with the present writer that the religious conservatives at Oxford during this period did not trust C. S. Lewis.

[54] Diana Collins, *A Call to Christian Action*, 154.

Saving the Appearances? C. S. Lewis' Critique of Scientific Knowledge

Thomas Storck

C. S. Lewis' witty and insightful criticisms of *scientism*, of the notion that the scientific enterprise alone can discover truth, that it can take the place of religious authority, of philosophical insight, and in fact of the whole tradition of humane wisdom, is well known.[1] What has been less noted is the critique that he made in several places, not of scientism but of science itself, or rather of aspects of the scientific enterprise as carried on in the tradition of the scientific revolution brought about by such men as Galileo and Bacon.[2] It is a critique of science and of scientific knowledge that is much deeper and more interesting than a mere exposé of simplistic scientistic fundamentalism, necessary as that is. Lewis not only exhibited a less than favorable attitude toward the technological bias that seems inherent in modern science, but looked with some skepticism upon the knowledge claims of modern science, and, as we will see in his most developed evaluation of it, put forward ideas similar to those of the

[1] See, for example, Michael D. Aeschliman, *The Restitution of Man: C. S. Lewis and the Case Against Scientism* (Grand Rapids, 1983); also John G. West, ed., *The Magician's Twin: C. S. Lewis on Science, Scientism and Society* (Seattle, 2012).

[2] Aeschliman, for example, in *The Restitution of Man*, does not recognize or does not address Lewis' critique of science itself, simply conflating it with his strictures on scientism. Better are some of the essays in West, *The Magician's Twin*, about which more is discussed below.

American philosopher and historian of science, Thomas Kuhn.[3] C. S. Lewis dealt with questions concerning the origins, methodology, and cultural significance of modern science as early as *The Abolition of Man* (1947), and developed this thesis further in *English Literature in the Sixteenth Century* (1954), but it was not until one of his last works, *The Discarded Image* (1964), that his critique takes the form that contains significant affinities with the work of Kuhn, and that will be the chief object of our consideration here.

In *The Abolition of Man* one can see that Lewis already did not see modern science as simply the unbiased discovery of truth about nature. He writes:

> The serious magical endeavour and the serious scientific endeavour are twins: one was sickly and died, the other strong and throve. But they were twins. They were born of the same impulse. . . . There is something which unites magic and applied science while separating both from the 'wisdom' of earlier ages. For the wise men of old the cardinal problem had been how to conform the soul to reality, and the solution had been knowledge, self-discipline, and virtue. For magic and applied science alike the problem is how to subdue reality to the wishes of men. . . . Bacon condemns those who value knowledge as an end it [sic] itself: this, for him, is to use as a mistress for pleasure what ought to be a spouse for fruit. The true object is to extend Man's power to the performance of all things possible.

And he goes on to state, "It might be going too far to say that the modern scientific movement was tainted from its birth: but I think that it was born

[3] The similarities between Lewis' theories and those of Kuhn were noted by Steven Lovell in his Ph.D. dissertation, *Philosophical Themes from C.S. Lewis* (University of Sheffield, 2003), 7-8. Lovell writes, "Few seem to have commented on Lewis' reflections on the philosophy of science as they appear in the epilogue to his *The Discarded Image* (1964a). Those reflections bear notable similarities to Thomas Kuhn's *The Structure of Scientific Revolutions* (1962)." Lovell, however, notes that he is not "addressing *all* the philosophical themes to be found in Lewis' work—there are far too many for that to be possible" (2), and this point is among those that he mentions but does not address further. Accessed online at myweb.tiscali.co.uk/annotations/content/phd_thesis.pdf on 19 February 2016.

This similarity with Kuhn was also noted by C. John Collins, "A Peculiar Clarity," in West, *The Magician's Twin*, 73. Two other authors in that volume, without mentioning Kuhn by name, discuss those aspects of Lewis' approach to science that are akin to Kuhn's. See Jake Atkins, "C. S. Lewis, Science, and the Medieval Mind," 66-7, and John G. West, "Darwin in the Dock," 141-4.

in an unhealthy neighbourhood and at an inauspicious hour."[4]

His critique here is based on the undoubted *technological* bias of modern science, that is, its orientation toward the manipulation of the natural world for the convenience of mankind.[5] This characteristic of modern science has, of course, been noted over and over again, and as one philosopher of science asserted, "modern science is not so much the understanding of nature as the art of mastering nature."[6]

It might be objected that I am wrong to instance Lewis' discussion of science in *The Abolition of Man* as an example of a critique of science, at least in any negative sense, since just before the passage that I quoted Lewis stated, "Nothing I can say will prevent some people from describing this lecture as an attack on science. I deny the charge, of course. . . ."[7] But in denying this charge, what did he mean? Surely one might assume from his remarks about magic and science that he had some serious reservations about the whole modern scientific enterprise. And in fact it is not "the modern scientific movement" that he refrains from attacking, but rather, as he goes on to say, "a new Natural Philosophy," one based perhaps on the scientific ideas of Goethe or even Rudolph Steiner, and that "would not do even to minerals and vegetables what modern science threatens to do to man himself."[8] But this is hardly science as understood or practiced today. Of course, in Lewis' understanding such an activity would be genuine science, but it would not be what we know as "modern science." Lewis makes clear his differentiation of the "new Natural Philosophy" from "the modern scientific movement." Perhaps one could better understand his denial that he was attacking science as meaning that he was not attacking *real* science, science according to his own conception. But such real science

[4] C. S. Lewis, *The Abolition of Man* (New York, 1947), 87-9. About the same time as this work, Lewis refers in another book to "[t]he evil reality of lawless applied science (which is Magic's son and heir)." C. S. Lewis, *Miracles, a Preliminary Study*, (New York, 1947), 155.

[5] Or as Lewis pointed out more than once, for the convenience of those who hold power. Compare, for example, in *That Hideous Strength*, Professor Filostrato's avowal to Mark Studdock, "All that talk about the power of Man over Nature—Man in the abstract—is only for the *canaglia*. You know as well as I do that Man's power over Nature means the power of some men over other men with Nature as the instrument." C. S. Lewis *That Hideous Strength*, (New York, 1965), 178.

[6] Jacob Klein, "Modern Rationalism," in *Lectures and Essays* (Annapolis, 1985), 60.

[7] Lewis, *Abolition of Man*, 86.

[8] Lewis, *Abolition of Man*, 89-90.

is hardly the same thing as the science that "was tainted from its birth [and] was born in an unhealthy neighbourhood and at an inauspicious hour."

If in *The Abolition of Man* Lewis concentrated his critique on the technological orientation of modern science, on its desire "to subdue reality to the wishes of man," in his later two works he introduces a further and extremely important point: the pervasive use of mathematics in modern science as its chief technique for manipulating nature. In the brilliant first chapter of his 1954 work, *English Literature in the Sixteenth Century*,[9] he discusses some of the causes for the success of the new science which had "delivered Nature into our hands." This is chiefly its use of mathematics.

> What was fruitful in the thought of the new scientists was the bold use of mathematics in the construction of hypotheses, tested not by observation simply but by controlled observation of phenomena that could be precisely measured. On the practical side it was this that delivered Nature into our hands. And on our thoughts and emotions . . . it was destined to have profound effects. By reducing Nature to her mathematical elements it substituted a mechanical for a genial or animistic conception of the universe. The world was emptied, first of her indwelling spirits, then of her occult sympathies and antipathies, finally of her colours, smells, and tastes. . . . The result was dualism rather than materialism. The mind, on whose ideal constructions the whole method depended, stood over against its object in ever sharper dissimilarity. Man, with his new powers, became rich like Midas but all that he touched had gone dead and cold. This process, slowly working, ensured during the next century the loss of the old mythical imagination: the conceit, and later the personified abstraction, takes its place. Later still, as a desperate attempt to bridge a gulf which begins to be found intolerable, we have the Nature poetry of the Romantics.[10]

It is a commonplace, of course, that for modern physics qualities such as "colours, smells, and tastes" do not exist in nature, in things themselves. The real world is not the vivid world of animals, trees, and inanimate objects we see around us, but consists only of what can be studied or manipulated by techniques grounded in mathematics. This physico-mathematical world

[9] C. S. Lewis, *English Literature in the Sixteenth Century* (Oxford, 1954). See 2-8 for his discussion of science.

[10] Lewis, *English Literature*, 3-4.

exists as a kind of duplicate of the familiar, but ultimately illusory, world of "colours, smells, and tastes." Sir Arthur Eddington's famous description of his "two tables" illustrates this memorably.

> I have settled down to the task of writing these lectures and have drawn up my chairs to my two tables. . . .
>
> One of them has been familiar to me from earliest years. It is a commonplace object of that environment which I call the world. . . . It has extension; it is comparatively permanent; it is coloured; above all it is *substantial*. . . . It is a *thing*. . . .
>
> Table No. 2 is my scientific table. . . . It does not belong to the world previously mentioned – that world which spontaneously appears around me when I open my eyes. . . . My scientific table is mostly emptiness. Sparsely scattered in that emptiness are numerous electric charges rushing about with great speed; but their combined bulk amounts to less than a billionth of the bulk of the table itself. . . . I need not tell you that modern physics has by delicate test and remorseless logic assured me that my second scientific table is the only one which is really there. . . .[11]

This merely quantitative world became the real world for science because it was the world which was susceptible to manipulation by mathematical techniques. If mathematical physics is interested in the natural world only insofar as it can measure and manipulate that world, it follows that for such researches the world effectively is reduced to what can be measured and manipulated accordingly. Whatever of nature cannot be controlled by these techniques is ignored and hence banished from the only world that science considers real. Another scientist and philosopher of science, Thomas Fowler, put it in this way,

> First, observing that they were dealing with natural phenomena, and hence nature, and that nature could be described and predicted with these formulae, the scientists made an implicit identification of nature with the law. That is, the law, expressed in the formula, became *more* real, so to speak, than the phenomena which were instances of it.[12]

[11] Arthur Eddington, *The Nature of the Physical World* (New York, 1929), ix-x, xii.

[12] Emphasis in original. Thomas Fowler, "Three Dogmas of Western Science," *Faith & Reason*, vol. 7, no. 3, 1981, 190-1.

Lewis continued his reflections on the use of mathematics in the sciences in the last book of his that we will consider, *The Discarded Image*,[13] but in addition he raised the question of the value of scientific models in general and the related question of the epistemological status of scientific knowledge. Let us first look at his discussion of mathematics.

In the Epilogue of this work, after admitting that the medieval model of the universe "delights me as I believe that it delighted our ancestors," Lewis acknowledges that "some readers [may] have long been itching to remind me that it had a serious defect; it was not true." This he agrees, of course, is correct. He goes on to say, however, "that this charge can no longer have exactly the same sort of weight for us that it would have had in the nineteenth century."

> The nineteenth century still held the belief that by inferences from our sense-experience . . . we could 'know' the ultimate physical reality. . . .
>
> Already, to be sure, mathematics were the idiom in which many of the sciences spoke. But I do not think it was doubted that there was a concrete reality *about* which the mathematics held good. . . . We should [thus] have through mathematics a knowledge not merely mathematical. We should be like the man coming to know about a foreign country without visiting it. He learns about the mountains from carefully studying the contour lines on a map. . . .
>
> It would be very different if someone were to say to him . . . 'But it is the contour lines themselves that are the fullest reality you can get. . . . All those ideas about "real" rocks and slopes and views are merely a metaphor or a parable; . . . permissible as a concession to the weakness of those who can't understand contour lines, but misleading if they are taken literally.'
>
> And this, if I understand the situation, is just what has now happened as regards the physical sciences. The mathematics are now the nearest to the reality we can get. Anything imaginable, even anything that can be manipulated by ordinary (that is, non-mathematical) conceptions, far from being a further truth to which mathematics were the avenue, is a mere analogy, a concession to our weakness. . . .[14]

Thus, in what seems to be a step beyond even Eddington's "scientific table"

[13] C. S. Lewis, *The Discarded Image: An Introduction to Medieval and Renaissance Literature* (Cambridge, 1964).

[14] Lewis, *Discarded Image*, 216-18.

with its "numerous electric charges rushing about with great speed," the mathematics itself has become the object of knowledge. This understanding of the nature of theories expressed in mathematical formulae is of course by no means unique to Lewis. As the mathematician Henri Poincaré wrote,

> The object of mathematical theories of physical phenomena is not to reveal to us the true nature of things; that would be an unreasonable claim. Their sole aim is to co-ordinate the physical laws that are made known to us by experiment, but which we could not even express without the aid of mathematics.[15]

And so,

> It is a common mistake to believe that we can translate the theorems of mathematical physics into ordinary language, as if the mathematical apparatus used by the physicists were only a tool employed in expressing their theorems more easily. The mathematical method of our physics is inseparable from the very nature of this science.[16]

Significant as has been the reductive understanding of the world imposed by the use of mathematics, Lewis sees implications of a deeper sort and immediately broadens the discussion to speak of scientific models in general.[17]

> It would therefore be subtly misleading to say 'The medievals thought the universe to be like that, but we know it to be like this'. Part of what we now know is that we cannot, in the old sense, 'know what the universe is like' and that no model we can build will be, in that old sense, 'like' it.[18]

But why is it the case that all models are unsatisfactory? Lewis compares

[15] Henri Poincaré, quoted in Jacques Maritain, *The Degrees of Knowledge* (New York, 1959), 61.

[16] Klein, "Modern Rationalism," 61.

[17] Earlier in the book (13-18), Lewis had introduced an important point of pre-modern scientific thought, the notion of "saving the appearances." Although the idea of "saving the appearances" is closely connected with Lewis' ideas about the insufficiency of all scientific models, he does not explicitly connect his discussion of models in the Epilogue with his earlier comments on appearance saving. I will discuss the concept of "saving the appearances" below.

[18] Lewis, *Discarded Image*, 218.

the investigation of nature to a forensic cross-examination in which a skilled attorney, without "elicit[ing] falsehoods from an honest witness," will nevertheless determine "how much of [the] total truth will appear and what pattern it will suggest." In other words, given the vast multiplicity of natural objects, events, and processes, it is impossible for a scientist to investigate each and every one of them in every possible way or to explore every lead theoretically open to him. The scientist works within the confines of a model that simultaneously guides and restricts his research choices. In short, we can say that "nature gives most of her evidence in answer to the questions we ask her."[19]

One important factor that guides the choice of scientific models is the general cultural attitude of the age.

> The revolution [in biology] was certainly not brought about by the discovery of new facts. When I was a boy I believed that 'Darwin discovered evolution' and that the far more general, radical, and even cosmic developmentalism which till lately dominated all popular thought was a superstructure raised on the biological theorem. . . . The truth would seem to be the reverse; that when changes in the human mind produce a sufficient disrelish of the old Model and a sufficient hankering for some new one, phenomena to support that new one will obediently turn up. I do not at all mean that these new phenomena are illusory. Nature has all sorts of phenomena in stock and can suit many different tastes. . . .
>
> We can no longer dismiss the change of Models as a simple progress from error to truth. No Model is a catalogue of ultimate realities, and none is a mere fantasy. . . . [E]ach reflects the prevalent psychology of an age almost as much as it reflects the state of that age's knowledge. Hardly any battery of new facts could have persuaded a Greek that the universe had an attribute so repugnant to him as infinity; hardly any such battery could persuade a modern that it is hierarchical.[20]

Lewis' remarks on models and the fact that a "change of Models [is not] a simple progress from error to truth" should remind us of Thomas Kuhn's *The Structure of Scientific Revolutions*,[21] an extremely influential work responsible for concepts such as "paradigm shift" and "scientific

[19] Lewis, *Discarded Image*, 223.
[20] Lewis, *Discarded Image*, 220-2.
[21] Thomas Kuhn. *The Structure of Scientific Revolutions*, 2nd ed. (Chicago 1970).

revolution," which are used or misused well beyond the confines of the philosophy of science, including by some who probably could not identify their source.[22] Kuhn is sometimes criticized as upholding an irrational and ultimately anti-intellectual position, in that he is said to have undermined the very notion of objective truth.[23] But this view in my opinion is mistaken, and in fact his (and Lewis') theories have a recognized place in the history of Western thought. But before proceeding to discuss this, let us briefly examine some of the similarities in the approaches of Lewis and Kuhn to scientific models.

Those who are familiar with Kuhn's thought will immediately see the similarities with Lewis. First, though, here is a very brief overview of Kuhn's theory as a whole. The following is reasonably accurate, and although labeled by its author as a "caricature," does give a succinct summary of his argument.

[22] For some examples of the use of Kuhn's approach in areas outside of the sciences, see Maxine Hairston, "The Winds of Change: Thomas Kuhn and the Revolution in the Teaching of Writing," *College Composition and Communication*, vol. 33, no. 1, Feb. 1982, 76-88; D. R. McNamara, "Paradigm Lost: Thomas Kuhn and Educational Research," *British Educational Research Journal*, vol. 5, no. 2, 1979, 167-73; Caroline A. Jones, "The Modernist Paradigm: The Artworld and Thomas Kuhn," *Critical Inquiry*, vol. 26, no. 3, Spring, 2000, 488-528.

Kuhn himself, however, "consistently denied that his model of scientific change applies to the humanities and social sciences." Steve Fuller, "Being There with Thomas Kuhn: A Parable for Postmodern Times," *History and Theory*, vol. 31, no. 3, 1992, 246. He himself says in a later book, "Monitoring conversations, particularly among [*Structure*'s] enthusiasts, I have sometimes found it hard to believe that all parties to the discussion had been engaged with the same volume. Part of the reason for its success is, I regretfully conclude, that it can be too nearly all things to all people." Thomas Kuhn, *The Essential Tension: Selected Studies in Scientific Tradition and Change* (Chicago, 1970), 293.

[23] "The basic content of Kuhn's book can be inferred simply by asking: what would the humanities crowd *want* said about science? . . . Kuhn's thesis is that scientific theories are no better than ones in the humanities. . . . Kuhn declared logic outmoded and replaced it with history." James Franklin, "Thomas Kuhn's Irrationalism," *The New Criterion*, June 2000, 29-34. Accessed on line at www.newcriterion.com/archive/18jun00/kuhn.htm on 3 February 2003.

At a higher intellectual level, in the symposium, *Debating the State of Philosophy*, Kuhn is identified not only (correctly) with the view that most science is "problem solving," but with a more sweeping charge of "historical relativism." Jürgen Habermas, Richard Rorty and Leszek Kolakowski, *Debating the State of Philosophy* (Westport, Connecticut, 1996), 36, 104.

> [A] science, say astronomy, is dominated for a long period by a "paradigm," such as Ptolemy's theory that the sun and planets revolve around a stationary earth. Most work [by scientists] is on "normal science," the solving of standard problems in terms of the reigning paradigm. But anomalies - results the paradigm cannot explain - accumulate and eventually make the paradigm unsustainable. The science enters a revolutionary phase as a new paradigm such as Copernicus's heliocentrism comes to seem more plausible. Defenders of the old order . . . gradually die out and the new paradigm is left in control of the field. Then the process repeats.[24]

What Kuhn calls paradigms Lewis calls models, and although Lewis did not develop the concept of what Kuhn calls "normal science," i.e., the ordinary activity of scientists working within a paradigm or model, it is implied in what he says.

One key point in both Kuhn and Lewis is that since there is hardly any limit to the variety of experiments that one could undertake, a scientist will almost always work within some framework (model or paradigm) according to which the natural world is understood to function. Kuhn at one place calls this a map. "And since nature is too complex and varied to be explored at random, that map is as essential as observation and experiment to science's continuing development."[25] Confronted with the vast and diverse amount of material provided by the natural world, scientists must obviously choose among various possible experiments and observations, and they do not usually make such choices at random.

> Science does not deal in all possible laboratory manipulations. Instead, it selects those relevant to the juxtaposition of a paradigm with the immediate experience that that paradigm has partially determined. As a result, scientists with different paradigms engage in different concrete laboratory manipulations.[26]

Even the design and use of laboratory equipment presupposes that the experimenter already has some idea of what he wants to measure.[27]

[24] Franklin, "Thomas Kuhn's Irrationalism."

[25] Kuhn, *Structure of Scientific Revolutions*, 109.

[26] Kuhn, *Structure of Scientific Revolutions*, 126.

[27] Kuhn, *Structure of Scientific Revolutions*, 59-62. Elsewhere Kuhn notes, "To discover quantitative regularity one must normally know what regularity one is seeking and one's instruments must be designed accordingly; even then nature may not yield consistent or generalizable results without a struggle." Kuhn, *The Essential Tension*, 219.

Moreover, their interpretation of their results also fits into the paradigm within which they are working.

> Galileo interpreted observations on the pendulum, Aristotle observations on falling stones, Musschenbroek observations on a charged-filled bottle, Franklin observations on a condenser. But each of these interpretations presupposed a paradigm.[28]

If I have succeeded in making the case that Lewis' attitude toward scientific knowledge was very similar to that of Thomas Kuhn, where do we place their view within Western intellectual history? How does it fit within the fundamental orientation toward reason of European thought? As was suggested above, Lewis' and Kuhn's theories have considerable affinities with an idea known as "saving the appearances,"[29] the idea that a scientific theory might well adequately explain the phenomena (save the appearances), though it was not necessarily true, simply that it could plausibly account for observable realities.[30] As Lewis explains it,

> The business of the natural philosopher is to construct theories which will 'save appearances'. . . . A scientific theory must 'save' or 'preserve' the appearances, the phenomena, it deals with, in the sense of getting them all in, doing justice to them. Thus, for example, your phenomena are luminous points in the night sky which exhibit such and such movements in relation to one another and in relation to an observer at a particular point, or various chosen points, on the surface of the Earth. Your astronomical theory will be a supposal such that, if it were true, the apparent motions from the point or points of observation would be those you have actually observed. The theory will then have 'got in' or 'saved' the appearances.[31]

[28] Kuhn, *Structure of Scientific Revolutions*, 122.

[29] The *phrase* "saving the appearances" seems to have originated with Simplicius, a sixth-century commentator on Aristotle. See Lewis, *The Discarded Image*, 14.

[30] The phrase "saving the appearances" will undoubtedly suggest to many readers Owen Barfield's work of the same title. Barfield, however, though he does discuss this ancient and medieval approach to science, is mainly concerned with a different question, one which is outside the scope of this article. But see his *Saving the Appearances: A Study in Idolatry* (New York, 1965), 49-57, for a useful discussion of the classic meaning of this phrase.

[31] Lewis, *Discarded Image*, 14-15.