

Reviews

Universes. By JOHN LESLIE. London and New York: Routledge, 1989. 228 pages. \$25.00.

Physical Cosmology and Philosophy. Edited by JOHN LESLIE. New York: Macmillan, 1990. 277 pages. \$9.00 (paper).

John Leslie is the philosopher who has most devoted himself to the analysis of recent claims that our universe is fine-tuned for producing life. We already have a massive, difficult, and controversial book on this issue by two physicists (*The Anthropic Principle* [Oxford, 1986], by John D. Barrow and Frank J. Tipler), but Leslie's *Universes* is the first such book by a philosopher. Although Leslie's position is already widely known, since nearly all this material, integrated here into systematic, book-length analysis, has appeared in print earlier, his previous articles were widely scattered or sometimes only exploratory. It is important, therefore, to have the fruit of Leslie's work, across two decades, summarized in one accessible book of manageable length, seriously argued but neither overly technical nor esoteric. In a companion book, *Physical Cosmology and Philosophy*, Leslie has coupled his systematic treatment with an anthology of the principal articles in the field. Thus readers have a double opportunity: systematic treatment and/or anthology. Together, the two books are excellent texts for a stimulating class on cosmology.

In *Universes*, Leslie assembles and appraises an impressive array of physical facts, suggesting that the universe "is spectacularly 'fine tuned' for life" (p. 2). If there is to be life, our universe, born 20 billion years ago in the Big Bang, has to be about the size and age that it is and has to be expanding at the rate that it is. Also, it has to have about the homogeneity and heterogeneity that it has. If the early expansion speed of the universe had been smaller by one part in a million, the universe would have recollapsed rapidly. If the speed had been slightly slower, no galaxies would have formed, and hence no stars. In the stars all the heavier elements, requisite for life, are constructed. Either way, there would have been no life.

Four forces hold everything in the world together and permit all its energetic processes: the weak and the strong nuclear forces, electromagnetism, and gravity. Had the weak nuclear force been even a little stronger, all hydrogen would have turned to helium, and

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the result would have been the absence of water and stable stars to provide the energy for life. For carbon to be created in quantity inside stars, the strong nuclear force could not have deviated from its actual strength by as much as 1 percent. If electromagnetism had been even slightly stronger, the stars would have been too cold to encourage life's evolution and would not have exploded as supernovas—would not have distributed the heavier elements forged within stars, elements that are recollected on the planets and that form life on Earth. Gravity had to be "fine-tuned" because the ratio between gravity and electromagnetism is critical for stellar and galactic evolution. These delicately adjusted binding forces range over forty orders of magnitude. The principal particle masses and charges (neutrons, protons, electrons) have to be what they are, or nothing much could be constructed.

Approximately half of Leslie's book is devoted to evidence of this kind (largely quantitative), most of which has come to light in astrophysics and nuclear physics over the last quarter century. These facts are associated with what is called the *anthropic principle*, the idea that the universe is somehow marvelously right for life. Although the term is unfortunate, since it seems to refer exclusively to humans, the principle involves intelligent life anywhere in the universe and all kinds of life on Earth. Indeed, it involves complex structures of all kinds, not just *anthropos*, or human observers. Brandon Carter, who introduced the term, now regrets the unfortunately anthropocentric implications (*Cosmology*, p. 14; *Universes*, p. 136).

John Polkinghorne's definition of the anthropic principle is helpful: "The collection of scientific insights which indicates that a universe capable of evolving systems as complicated as men must have a delicate balance in the structure of its fundamental forces and (perhaps) special initial conditions" (cited in *Universes*, p. 135).

Two features that make *Universes* so readable are Leslie's fertile imagination and revealing analogies—the fly on the wall (a dart hits the only fly on a large wall, and there are no other flies in the vicinity); the fussy fishing apparatus, which catches only fish exactly 23.2576 inches long (which happens to be the only length of fish in the lake); the firing squad made up of fifty sharpshooters, all of whom miss the person to be executed. Leslie rings all the changes on variations of his parables, an interesting illustration of how argument by analogy can illuminate conclusions reached from mathematical equations.

In *Cosmology*, his anthology, Leslie gathers twenty-one readings (eighteen earlier in print) to assemble both a historical and a contemporary collection. These readings too are surprisingly accessible for

so esoteric a topic and literature. They are often short, but Leslie includes both a general and a specific introduction to each article. Thus, the reader is well oriented.

In an opening article, Ernan McMullin cautiously asks, "Is philosophy relevant to cosmology?" Following his tentative yes, there are readings from George Gamow, W. B. Bonnor, and H. Bondi, articles over a generation old. These materials are now dated (as are others by R. H. Dickie and John A. Wheeler); but the dated materials are important because they caution us that, thirty years hence as thirty years ago, things could look different. They also convey a sense of development; and when, from a later vantage point, we see pioneers in the field mixing seminal insights with mistakes, this can help us find the parallel mixture within ourselves. Perhaps we also learn not to take all the present discussion overseriously.

Martin Rees defends a consensus that the universe emerged, many billions of years ago, from a primordial state of high density, the Big Bang, though Jayant Narlikar registers a minority opinion to the contrary. In one way or another, most of the authors address the remarkable way in which the universe which emerges from that explosion is fine-tuned for life, asking about the philosophical issues this raises.

Adolf Grunbaum demurs. There is nothing here that raises issues for a philosophy of religion. Grunbaum is especially allergic to the word *creation*, which he thinks lurks too near the Creator (possibly as *Lawgiver* lurks near the word *law*). He prefers to speak of *origins*, which has no Originator nearby. Grunbaum is determined to call whatever these origins are "natural" and maintains that when we discover that an event is natural (whether necessary or contingent), explanations are over. To use a word he likes, the problem of creation is a *pseudoproblem*.

Grunbaum is a difficult person to startle. If the universe comes into being in an instant, fine-tuned for life and pregnant with 20 billion years of cosmic history, that's natural. Pseudoproblem it may be, but everyone else sees a real problem here, causing them to posit multiple universes, infinite universes, selection effects, anthropic principles, staggering inflation out of chaos, God, and other explanations to solve the pseudoproblem. Possibly Grunbaum's response is as much a biographical report of his imperturbable, resolute naturalism (maybe even his hostility to theism) as it is an analysis of the logic of cosmology. Meanwhile, we discover a pretty super "natural."

Swinburne thinks oppositely to Grunbaum. Given the fine-tuned universe, there is no reason to think explanations are over, and theism is so obvious a possibility that it should be examined before

we invoke more complicated solutions. Anthropic principles that seek to substitute other explanations (a run of universes, some of which are at random right for life; multiple universes; backward causation, by which later-coming humans cause the earlier universe to have started up as it did) “serve only to obfuscate” (p. 166). The facts of the fine-tuned universe “render the existence of God significantly more probable than not” (p. 172). Nature is not all that self-explanatory, and if one is looking for the simplest set of assumptions about what there is that will give rise to the phenomena we are trying to explain, that assumption is God.

Heinz Pagels joins him, though somewhat cryptically. Pagels dislikes the anthropic principle as “a cozy cosmology” which has no place in strict science; but, religiously speaking, Pagels thinks that “the theistic principle is quite straightforward: the reason the universe seems tailor made for our existence is that it *was* tailor made for our existence; some supreme being created it as a home for intelligent life” (p. 180). Here we should notice that none of the world religions has ever discerned that the world was “cozy.” To the contrary, Buddhists found that the world was unsatisfactory; Christians find grace, but in the midst of a fallen world requiring redemptive suffering.

Another pair of contrasts sets paleontologist Stephen Jay Gould against physicist Freeman Dyson. From the evidence summarized in the anthropic principle, Dyson reaches the conclusion that “the universe in some sense must have known that we were coming”; but Gould pronounces this “raw hope gussied up as rationalized reality” (p. 182). Gould has somewhere learned that he must “always be suspicious of conclusions that reinforce uncritical hope and follow comforting traditions of Western thought” (p. 187). That seems to be how he knows that Dyson is rationalizing, but whether Gould’s own resolution is bias or logic is not examined here.

George Gale posits cosmological fecundity: multiple universes besides our own, perhaps spatially multiple to ours (existing in distant realms), or temporally multiple (existing at other times), or in other dimensions beyond the four we experience, or contemporary universes multiplied as our universe at each moment splits into further universes. Cosmologists do not lack fecundity themselves. They can get not just a particle out of a vacuum fluctuation or a quantum event; they can get a whole universe (Edward P. Tryon’s article). Indeed, they can get not just one universe but an ensemble, an infinity of them, either by more fluctuations or by runaway expansion. The universe is the only free lunch, at which all possible dishes are available (*Cosmology*, p. 199; *Universes*, p. 8). John Wheeler

repeatedly reprocesses the universe (Big Bang, Big Squeeze, Big Bang, Big Squeeze), although he thinks that we cannot have any evidence of universes before or after our own. Mostly what is infinite here seems to be cosmological imagination. That there are other worlds in which Napoleon won Waterloo, and that these have a faint possibility of jostling our world (*Universes*, p. 91), is science fiction, not science. There is no evidence whatsoever for such a claim.

There should have been in the preface a note of caution and perhaps a plea for humility. Any scientist who thinks he or she knows what happened in the first microseconds of the universe, now 20 billion years old, is at least as presumptuous as any theologian who thinks he or she detects a God behind it all. "God" is a modest assumption beside an alternative "theory of everything." Alternatively, it is difficult to tell when we are getting scientific myths or latter-day versions of the creation stories of Genesis 1-3, and when we may be getting latter-day versions of the Tower of Babel story in Genesis 11, with humans storming the gates of Heaven. Cosmology is the logic of the cosmos; philosophy is the love of wisdom. Both are honorable pursuits, always with the Socratic reminder that those are wisest who know their ignorance.

A problem with these readings is that wary readers are left to themselves to form whatever sense they can of what is reasonably well settled (as is the expanding universe and many of the fine-tuned phenomena) and what is sheer speculation (as is our universe splitting into myriads of others at every moment or being reprocessed in 80-billion-year cycles). There is a danger that untested speculation will be too readily believed because of the seeming authority of these experts. When these experts write, it is difficult to tell the difference between well-accepted notions, on which considerable reliance can be placed, and the current and quite provisional research concerns of a particular astrophysicist or cosmologist. Much of this material reads as much like science fiction as like science, but the imaginative part is so commingled with science that one gets lost in the "twilight zones." It all "has an air of magic to it" (Paul Davies, *Cosmology*, p. 231). "Nature's miraculous jar of energy" (p. 231), otherwise called a "vacuum" or even a "false vacuum," is too much like Elijah's miraculous cruse of oil, except that Elijah only got oil from nowhere. Paul Davies gets a universe.

Logicians have long taught us that we need premises adequate for our conclusions; scientists now claim to get a universe out of nothing. Maybe what they really mean is that there is creation after all. The energy pit out of which all comes can look like no-thing from one perspective (as Buddhists have often said), like chaos from another,

and like a divine spirit brooding from still another (as Genesis said). Those who persist in calling everything *nature*, no matter what, might want to spell *nature* with a capital *N*.

The vast numbers of fine-tuned coincidences, the vast improbabilities with which they are said to occur (one chance in “one followed by a thousand billion billion zeroes, at least” [*Universes*, p. 28]), the brief compass in which they are presented, and then footnoted to some esoteric specialist—from all this one concludes that there is something important here, but often the detail inspires little confidence. Much of this is as speculative as it is fine-tuned. These speculations look like facts, but we (readers) can only take them on faith. Indeed no one, Leslie included, has worked through all these computations.

Leslie concludes *Universes* with a useful chapter on how the design argument looks now, followed by a chapter on God. “It is high time we philosophers took the Design Argument seriously. Whether the evidence of fine-tuning points to multiple universes or to God, it does do some exciting pointing” (p. 198).

Leslie holds that, before the evidence of contemporary physical cosmology, there are two really implausible responses, made by others, and only two plausible responses, which he appraises. The first, least plausible response is to say: Well, that’s just the way nature is. This in effect is Grunbaum’s route. If matter appears out of nothing, that’s natural. Leslie replies that if cherubim or the Koran were suddenly to appear *ex nihilo*, it would not do to accept them as being natural, nor *a fortiori* will it do to accept as just natural a well-designed universe (much more startling than cherubim or a Koran) suddenly appearing from nowhere.

The second response, though superficially plausible, is tricky, and looked at more closely is implausible. One replies that the anthropic result is unsurprising because we already know, before we look, that observers must be in an observer-producing universe. Initially, that seems as though a survivor, after the bomb blast, were to wonder why he or she alone survived and all others were killed, when non-survivors never wonder. But that analogy misleads; it is more like wondering after surviving a firing squad when all fifty executioners miss. “The truth, in itself tautological, that all living beings must be in life-permitting universes, *is interesting* because our universe’s life-permitting nature *does seem to depend on fine-tuning*” (*Universes*, p. 134). We do not know before we look that the life-permitting universe is as fine-tuned as it spectacularly is; so “unsurprising” is an implausible response.

Leslie maintains that there are only two plausible responses: God

or multiple universes (p. 190). "While the Multiple Worlds (or World Ensemble) hypothesis is impressively strong, the God hypothesis is a viable alternative" (p. 1). "My argument has been that the fine-tuning is evidence, genuine evidence, of the following fact: *that God is real, and/or there are many and varied universes*" (p. 198). In some moods he seems almost to adopt the multiple-worlds account. "So my tentative conclusion is that God has no clear advantage over World Ensemble plus Observational Selection" (p. 149). (Leslie delights in nineteenth-century capitals.) Nevertheless, in the end, he opts for the explanation of cosmology in God. "So I need to say why the God hypothesis strikes me as non-silly, and even as every bit as plausible as the many-universes theory" (p. 161).

Is the multiple-universes account plausible, as Leslie thinks? I certainly have no objection to there being other universes. This one is grander than we had thought, and I hope there are others; nothing in theism implies that God has created this one universe only. To the contrary, much in Judeo-Christian theism suggests that one universe would not be enough for such a gracious and creative God. In that sense, God and multiple universes are not mutually exclusive alternatives. One can have both. Just as I welcome the discovery of other forms of life on Earth, and would welcome the discovery of other planets with life, I would welcome the discovery of other universes.

What seems implausible to this reviewer, though plausible to Leslie, is this: Some, almost as though they were driven to seek a naturalistic, godless account, seem determined to disregard the one explanation that stares at us and to invent myriads of other universes, for which we have little or no evidence, to make this one explanation stop staring. They posit enough other universes until this one can be explained as a random universe from a large ensemble. They may plead that this is the simplest explanation, but it is difficult for me to think so. Surely that is to refuse a simple, tidy explanation in favor of a messy, complicated one. Short of considerable evidence for them, many universes cannot be the logically preferred explanation, unless there is something highly illogical about a God hypothesis. You really have to dislike the idea of a Creator behind the creation if you are willing to posit a myriad other creations to avoid such a Creator.

Leslie, when he posits God, means God "as described by the Neoplatonist theological tradition. God is then not an almighty person but an abstract Creative Force which is 'personal' through being concerned with creating persons and acting as a benevolent person would. To be more specific, Neoplatonism's God is *the world's creative*

ethical requiredness" (p. 2). Leslie wants to make it clear that this "ethical requiredness" is not "a replacement for God": "it itself is God" (*Universes*, p. 167). It helped me to think of this as a fundamental axiom of the generation and conservation of value: If you find values in the world, and a Universe-system of great value startlingly arranged to project these values, the simplest explanation is to detect a requirement for Value behind the creation.

I did not find it clear why, from among the many forms of theism, Neoplatonism is the best fit for the anthropic principle. Leslie seems uncomfortable with the personalism in most classical theism; and there is an understandable tendency for cosmologists, lost in the vast reaches of space, time, and energy, to opt for creative forces over a personal God. On the other hand, if one is looking for a primal cause adequate to the creative effect, it is, after all, conscious and intelligent beings, "observers," who have been so remarkably produced by this fine-tuned universe, and if one wants a premise adequate for this conclusion, the logic seems to need "observer" qualities as much as "Creative Force" in the character of this God. I agree with Leslie that we may not have to posit a Valuer everywhere that we find value; on the other hand, the Ground of all values need not be denied the highest kind of value (conscious experience) that we have reached.

Leslie's *Universes* is written with a good deal of philosophical courage and much originality, virtues rather rare in contemporary philosophy.

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