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NATURAL THEOLOGY, METHODOLOGICAL NATURALISM, AND "TURTLES ALL THE WAY DOWN"

Del Ratzsch

Natural theology has not been held in particularly high regard during the past century and one half. However, recent developments both within science and within philosophy of science offer some new possibilities and resources. In what follows I explore some areas and structures within which natural theological potential might (in principle) emerge. I further argue that the current weapon of choice against substantive science/religion intertwining - methodological naturalism - not only fails as an inviolable norm, thus leaving the possibility of a genuine natural theology intact, but that it may even have unhappy theological consequences.

I. Introduction

Although *natural theology* is frequently defined as involving what humans can learn of God independent of special revelation, the widely held *de facto* picture focuses primarily upon what (if any) theological truths empirical (especially scientific) investigation of nature might secure for us. Prospects for such science-based natural theology will depend upon the nature and capabilities of science, and also upon the connections to theology which science might be capable of supporting. In what follows, I will argue that resources for natural theology are potentially richer than generally supposed, and that one major possible stumbling block to natural theology (methodological naturalism) not only fails to withstand close scrutiny, but could even have unfortunate theological consequences.

II. Scientific inference(s)

The phrase 'scientific inference' is often taken to suggest that there is some single style of reasoning which is definitively and uniquely scientific. Such is not, of course, the case. A number of types of reasoning are essential to various facets of science. Prediction, for instance, may involve straightforward implication, but currents often run in the opposite direction in confirmation - from confirming data back up to confirmed theory. There is here a backwash - an inferential ebb tide - with the empirical success of a theory anchoring its epistemic warrant. In some cases, even in the absence of strict inference in any direction a substantive intermeshing - the



smooth embedability of a theory into an accepted wider conceptual matrix - is taken as constituting support for the embedded theory.¹ Other currents are both more complicated and even less directional. For instance, the familiar claims that data are theory-laden, or that observation is partly constituted by paradigms, have led some to see epistemic feedback loops within science.² And depending upon where the boundaries for scientifically acceptable explanations are set, 'inference to best explanation' presents an extremely wide scope for scientific validation.

Epistemic legitimation can thus move in a variety of directions within science. Given that cognitive procedures within science are basically honed versions of common sense procedures, it is possible that processes generating epistemic legitimation within science may do so beyond science as well. For instance, just as empirical success provides backwash confirmation to relevant theory, the broader success of science itself might provide some level of genuine confirmation to the larger philosophical matrix within which that science is embedded.

III. *Scientific inference and natural theology: broad possibilities*

It is widely acknowledged that the birth and early development of science owe a considerable conceptual and practical debt to the Western European Christian intellectual context. Science works only in a very particular sort of reality and only with a very particular sort of conception of reality. The requisite picture - of a comprehensible, intelligible, uniform, predictable, even beautiful, cosmos which can in principle make sense to finite minds like ours when observed via perceptual faculties like ours - is a picture of a cosmos structured in fundamental ways like a mind would do it. It is a picture of a cosmos structured like a *creation*. Although details are disputed, that Christian doctrines of creation and of divine voluntarism provided a hospitable matrix for science is not in dispute.

As noted above, smooth interlockings of that sort *within* science are typically taken to have confirmatory force. But surely natural theology could perfectly properly avail itself of the variant types of legitimate scientific inference, and should reap some degree of the same epistemic legitimacy produced by those processes wholly within science. So an epistemic backwash to the philosophical presuppositions of science *and* on back to the theological principles which historically provided their foundations and within which they smoothly embed, would seem both in principle unproblematic and productive of epistemic significance.

Even deeper potential arises in other ways. First, the possibility of theory-ladenness of data suggests that currents may sometimes even carry substance as well.³ If so, then *content* may migrate among fundamental presupposition, theory, and observational data. Historically, varying conceptions of reality, of the proper aims of science, of the proper conceptual resources available (or not) to science, of the relative importance of competing epistemic values within science, and so forth have both affected and been affected by developments within science, within philosophy, and within theology (not to mention the broader social context in general). Just as observational data may be theory-laden, theories in this circumstance

may be metaphysics- or even theology-laden.

Second, it is sometimes argued that conceptual structure and content are not cleanly separable - that at least in (subtle) part structure is content. That, if true, has significant implications. As briefly noted above, the early modern Western European Christian intellectual context provided conceptual resources essential to the very existence and rise of science. That the (at least implicit) relevance of theological conceptual *shapes* is not mere historical curiosity is suggested by physicist Paul Davies:

Science began as an outgrowth of theology, and all scientists, whether atheists or theists ... accept an essentially theological worldview.⁴

If Davies is correct (and I think that he is) then science seems to (still) require a deep theological shape - a theological Cheshire cat's skeleton. And if structure contributes to content, then here again is subtle natural theological potential. As one example, I have elsewhere argued that the *logical* character typically attributed to natural law - nomological necessity, lying between logical necessity and accidental generalization yet supporting counterfactuals - is best, or perhaps only, accounted for in terms of counterfactuals of God's freedom.⁵

Third, it is widely held that metaphor plays an indispensable role in theoretical understandings. That would carry the potential - indeed the inevitability - of structure and content flowing into even the most arcane and abstruse scientific levels. As Dirac once remarked:

Nature's fundamental laws . . . control a substratum of which we cannot form a mental picture without introducing irrelevancies⁶

Fourth, if out of conceptual embedding and interactions any theistic *substance* flows, at least some whiff of that will nearly inevitably make its way into science 'proper.' That some theories have particular worldview atmospheres is evident. For instance, least action theories are virtually invisible to anyone outside the inner precincts of physics - almost as if not quite fit for polite society. Why the obscurity? The reason may have to do in part with least action's dark past. As one physicist notes, Maupertuis's

original statement of the principle [of least action] . . . was vaguely theological and could hardly pass muster today."⁷

And that theological air lingers. Max Planck noted that

[W]hat we must regard as the greatest wonder of all, is the fact that the most adequate formulation of this law creates the impression in every unbiased mind that nature is ruled by a rational, purposive will.⁸

Yet, contrary to the standard wisdom on such matters, that deep theological air does not interfere with genuine scientific scope, power, effectiveness, elegance, applicability, predictiveness or substance. Planck

elsewhere observed:

Amid the more or less general laws which mark the achievements of physical science during the course of the last centuries, the principle of least action is perhaps that which ... may claim to come nearest to [the] ideal final aim of theoretical research [i.e., to "condense all natural phenomena which have been observed and are still to be observed into one simple principle"]⁹

IV. *Rising stakes*

(a) *Backwash and pricetags.*

That conveyed ethos does not sit comfortably with certain world-views. We intuitively sense something like what C.S. Lewis once referred to as a "repugnance of atmospheres" between regnant naturalistic, secular predispositions and this conveyed impression of a governing "rational, purposive will." Quite a lot of people (not all of them necessarily anti-religious) are alarmed at the prospect of science lending weight to theism, and especially at the picture of theological currents running through science itself. Indeed, according to Harvard biologist Richard Lewontin, that latter is exactly what the whole structure of 'scientific method' is specifically designed to protect us all from:

Our willingness to accept claims which are against common sense is the key to an understanding of the real struggle between science and the supernatural. We take the side of science ... because we have a prior commitment, a commitment to materialism. It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our *a priori* adherence of material causes to *create* an apparatus of investigation and a set of concepts that produce material explanations, no matter how counterintuitive, no matter how mystifying to the uninitiated. Moreover that materialism is absolute, for we cannot allow a Divine Foot in the door.¹⁰ [emphasis mine]

Thus according to Lewontin and many others, any wisp of a theistic atmosphere is to be rigidly excluded from science 'proper.'

But such exclusion carries a higher potential *scientific* pricetag than generally realized. Given interconnections, multi-directional content currents, and so forth, the only way to shield particular parts of science from a backwash from specific results carrying theistic overtones might be to excise from science itself the factors generating those initial theology-suggestive specific results. That would of course undercut some prospects for legitimate science-based natural theology. But depending upon what had to be excised from within science, it might do so by partially impoverishing science itself.

On the opposite end, if the deep theistic foundations underlying science 'leak' into science, then if the only way to stop the leaks is to remove from science any connection to the offending foundation, then either science

must take essential presuppositions as 'brute', or else science must be deprived of the relevant foundational resources. In any case, if nature is a creation, and if that is in fact *why* science with its essential presuppositions works, and if the success of science generates a confirmatory backwash then the demand that science not speak of such matters entails (awkwardly enough) that science is forbidden to acknowledge some truths which it itself confirms.

(b) *Backwash, demarcation and gatekeepers*

Justifying exclusionary prohibitions may be not only more costly, but also more difficult than usually realized. Any attempt to construct a conceptual gatekeeper for science would seem to require at least a partial solution to the old (perhaps intractable) demarcation problem. Beyond that, the category blurring generated by content migration would dim prospects for clear demarcation even further. And as my colleague Stephen Wykstra has argued, (conceptions of) the character, behavior and status of genuine *nature* in a theistic, created, and designed universe might be very different from (conceptions of) the undesigned chance Nature of a non-theistic, non-created universe.¹¹ If science is supposed to focus solely upon the natural, then different conceptions of the natural will affect conceptions of and within science. Conceptions of achievable aims, epistemic values, plausibility structures, expectations, theoretical resources, evaluative tilts, and normative methodologies as well as anticipated structures, components, and governance of 'nature' itself might be very different in theistic and non-theistic universes. So even waiving the usual problems with demarcation, one might still be unable to formulate defensible demarcation criteria without *some* sort of *de facto* assumptions concerning whether we are in a theistic or non-theistic universe.

V. *Exclusion: methodological naturalism*

Whatever the potential costs and difficulties, exclusion is contemporary orthodoxy and although there are claims that science presupposes philosophical naturalism¹², the exclusionary principle of choice for most is *methodological* naturalism, often characterized as follows:

Philosophical naturalism may or may not be correct (science itself simply takes no position), but since science cannot deal with the supernatural, it is an essential methodological principle of science that science must proceed *as if* philosophical naturalism is correct.¹³

Standard justifications for methodological naturalism can be categorized as conceptual, pragmatic, or empirical. *Conceptual* attempts involve either bare stipulations that science just *is* methodologically naturalistic (e.g., Michael Ruse, Robert Pennock) or appeals to preferred definitions of science (e.g., Eugenie Scott, Nancey Murphy).¹⁴ The most compelling *pragmatic* justification involves the overwhelming attractions of scientific laziness.¹⁵ For instance, Pennock:

Once such supernatural explanations are permitted they could be

used in chemistry and physics as easily as Creationists have used them in biology and geology. Indeed, all empirical investigation beyond the purely descriptive could cease, for scientists would have a ready-made answer for everything.¹⁶

The precise risk is that if it were permissible to countenance design, supernatural agency, and the like in science, then scientists might abandon searches too soon, settling for easy - non-natural - alternatives.¹⁷ And such easy solutions are scientific dead ends given the standard contention that references beyond nature are *empirically empty*. That empirical emptiness plus the conviction that there is nothing explanatory of *any* sort left to be explored or said once investigation reaches the supernatural arena, underlies the common assertion that anything non-natural constitutes a "science-stopper." And beyond that, it is claimed, scientific progress historically has flowed exclusively in the wake of recognition of the empirical vacuity of non-natural theories, and methodological naturalistic prohibitions now stand solidly justified by their past empirical payoff.

(a) *Some cautions.*

None of those justifications is bulletproof. First, it is worth keeping in mind that definitional attempts are *prima facie* problematic for the simple reasons that no one actually *has* a completely workable definition of *science* (nor even necessary and sufficient conditions), and that proposed definitions have been historically unstable. In any case, definitions are *human* constructions, and why human definitions should be normative for truth concerning the objective cosmos is unclear.¹⁸

Second, the laziness worry is indeed legitimate, and methodological naturalism as a first approximation *pragmatic* (but defeasible) *strategy* may well be defensible - even crucial. But such pragmatic considerations would not support inviolable prohibitions. And in any case, there is a corresponding opposing hazard - the risk of refusing to recognize when it *is* time to quit. Refusing to abandon the search for a perpetual motion machine in the belief that scientists had adopted e.g., the second law out of a lazy reluctance to slog onward with the demanding search for perpetual motion could have been as prejudicial to science as quitting too soon in some other areas.

(b) *History: pro and con*

Furthermore, the history presupposed above is seriously suspect, on several counts. First, neither science or scientists may be so vulnerable to the temptations of intellectual sloth as presumed. Indeed, the history of science would suggest that the risks are not that great *on precisely this point*. Historically, no disaster such as that darkly suggested by Pennock occurred. In fact, if the history of science told by *critics* of teleology, creationism, intelligent design, and the like is accurate, during the 19th century previously entrenched supernatural design explanations *lost* the scientific battle to mere fledgling naturalistic explanations - hardly what one would expect if merely allowing currently *disenfranchised* supernatural design explanations into the conversation were likely to destroy current mature and robust natural science. Thomas Huxley once remarked that:

Extinguished theologians lie about the cradle of every new science as the strangled snakes beside [the cradle] of Hercules.¹⁹

If the infant Hercules could strangle the serpents that surrounded his cradle, it is not terribly likely that the adult Hercules would be done in by rogue nightcrawlers.

Beyond that, non-natural and teleological approaches within science have sometimes historical been quite fruitful.²⁰ Furthermore, pursuit of successful strategies in science may not have been the only thing that drove exclusion of the non-natural. On the contrary, it is evident that e.g. Huxley and others operated from a prior commitment to naturalism, materialism and/or mechanism in their primary work.²¹ (And recall Lewontin's statement above.) If key scientific passages were driven by such prior philosophical demands and agendas, the fact (if it is such) that the path of science has led away from the non-natural would have reduced significance.

But still, might not history tell us at least something in this region? For instance, it might be argued that naturalism has come to characterize science (whatever the reason), and science so characterized has experienced unrivaled success. Surely, then, this naturalism - whatever its roots - enjoys substantial backwash confirmation, removing any lingering need to appeal to theism. Perhaps. But theism at least holds its own here. Indeed, key presuppositions required by science and consonant with theism - e.g. of an orderly and intelligible cosmos - seem to be even more scientifically indispensable than are any presuppositions of naturalism. Given an orderly, intelligible universe, science could still operate *whether or not* naturalism of any sort were assumed. There are a number of very simple existence proofs of that fact: e.g., Newton. Historically, a number of major scientists took 'natural' laws to be simply manifestations of direct, moment-to-moment divine activity, and their science did not particularly suffer from it.²² But in the absence of this mind-redolent uniformity, intelligibility, and the like, attempts to construct a science even given the assumption of virtually *any* type of naturalism will fail.

So if empirical success constitutes empirical confirmation of operative presuppositions, the fact that a reality which is *de facto* creation-friendly is presupposed by science in an even more essential way than is any form of naturalism, suggests that the success of science tells *at least* as much in favor of the deeper, more crucial mind-suggestive presuppositions as it does any of the structurally more superficial mind-denying naturalistic presuppositions.²³

Of course, most scientists don't seem to *take* the success of science as either payoff or confirmation of theistic presuppositions. But believers and unbelievers both do feel a theistic tug here. For instance, nature does sometimes just clobber us with the conviction of designedness - as even Darwin testified.²⁴ And Crick's perception of the strength of that impulse is such to induce him to issue a warning:

Biologists must constantly keep in mind that what they see was not designed, but rather evolved.²⁵

And again, it is not necessarily irrelevant that it was not until nature was looked at as a product of design - i.e., as a creation - that science itself really got off the ground. Blanket stipulative prohibitions (definitional or otherwise) against *exactly* that initiating intuition would seem to demand extraordinary justification.

The related claim - that non-natural theories have no empirical import, content, or consequences - is not obviously true in any case. On a very general level, John Leslie says:

Strong evidence for something ... is whatever causes a puzzlement which the existence of that something would reduce or remove ...²⁶

In that sense, the existence of other universes, for instance, might 'explain' fine-tuning in this one.²⁷ But by precisely that same principle the empirically determinable fine-tuning of our world would constitute empirical *evidence* for supernatural design as well. One could, of course, adopt a philosophy which enshrines ultimate puzzlement,²⁸ but its status *as* philosophy should not be overlooked.

VI. Prohibitions - consequences in principle

The basic problem with pre-stipulated boundaries is that *if* reality chooses to ignore our restrictions (and why on earth shouldn't it?), then theorizing forbidden to cross those boundaries will inevitably be either incomplete or skewed.²⁹ That could be particularly problematic were reality an integrated unity - a true cosmos - with theistically-suffused principles of structure and governance shaping the character of the empirical realm. In that case, insistence that theorizing about one category of aspects systematically refuse to acknowledge other categories of aspects appears risky. And that is especially true given the apparent pervasiveness of backwash effects at all levels, and given the interplay between substantive matters within science and its embedding conceptual matrix.

Of course, it might be claimed that incompleteness of science is unsurprising - that science does not *claim* to be complete, that science cheerfully admits to realms of reality which it does not address. Perhaps - although that depends upon exactly who is doing the talking.³⁰ But if science is not competent to all reality, then the freedom to recognize when to quit pursuing specific programmes becomes imperative.

But even just *methodological* naturalism conjoined with aspirations for completeness has substantive implications. First, if one restricts science to the natural, then assumes that science can in principle get to *all* truth, then one has implicitly presupposed philosophical naturalism.³¹ But even if one merely stipulates methodological naturalism as essential to science, then assumes only that science is competent for all physical matters, or that what science (properly conducted in the long run) does generate concerning the physical realm will in principle be truth, then if the truth of the specific matter in question is non-natural, even the most excruciatingly proper naturalistic scientific deliverances on that matter may be wide of the mark, typically *in exactly the way a science built on philosophical naturalism would be*.³²

For *practical* purposes, that comes close to importing philosophical naturalism into the structure of science.

(a) *Further implications*

So whether methodological naturalism has substantive *philosophical* implications depends upon what it operates in tandem with. At the least, methodological naturalism makes the *de facto* assumption that there is an identifiable realm of reality which is *in scientifically relevant respects* functionally self-contained and operationally de-coupled from the supernatural. That assumption is neither obvious, trivial, nor - since it is an empirical universal negative - demonstrable.³³

In any case, if there are relevant but non-natural truths *within* the structure and governance of the cosmos, a science forbidden the requisite conceptual resources will be unable to accommodate (or acknowledge or maybe even recognize) those truths. And given that possibility, the widely accepted 'self-corrective' ability of science will be jeopardized.

(b) *Stoppers*

One further consideration involves the "science-stopper" concern. The claim that non-natural theories would point to (or admit of) no further explorations beyond themselves (e.g., "that's just how God did it" - end of story) may not be completely true³⁴, but even if it were, it remains to be shown that that is all bad. It is at least possible that in some areas that accurately represents the truth of the matter. And a natural science which is forbidden to stop its natural explaining where the natural explanation actually stops faces some epistemic difficulties.

A *strict* methodological naturalism is basically a stipulation that at every level of explanation the next, more fundamental level of explanation (if any) must also be sought within the explanatory resources of the natural. In any area where a genuine, satisfactory explanation can *only* be found beyond the natural realm, one's alternatives seem to be (a) abandoning science (at least by that definition) in that area, (b) choosing an arbitrary stopping point, or (c) pursuing a regress of 'natural' and *ex hypothesi* incorrect explanations through successive levels.

A non-naturalistic theory, on the other hand, might constitute a *regress-stopper*. Naturalism of any sort has no relevant regressing-spiking resources beyond chance, brute fact, or some sort of necessity - from none of which conceptual promise just beams.³⁵ That lack might explain why doctrinaire naturalists such as Peter Atkins find themselves driven to saying startling things like this:

When we have dealt with the values of the fundamental constants by seeing that they are unavoidably so, and have dismissed them as irrelevant, we shall have arrived at complete understanding. Fundamental science then can rest.³⁶

(c) *Turtles all the way down*

Since none of the easily-available naturalistic resources constitute satisfactory stopping points, naturalism is destined to have no principal justification for quitting, no matter how appropriate quitting might be. But unending explanatory sequences (whether infinitely varying, repetitive, or

regressive) are not logically attractive. Consider the old story about a claim that the earth rested upon the back of an elephant. When asked what held up the elephant, the claimant responded that the elephant stood upon the back of a turtle. When questioned as to what held the turtle up, appeal was made to another turtle. That turtle, it emerged under further questioning, stood upon the back of yet another turtle. Then faced yet again with another round of the same question, the claimant exasperatedly shortcut further (potentially interminable) hounding by declaring that the underpinnings of the earth consisted of "turtles all the way down."

That is widely taken to be obviously - and laughably - explanatorily fraudulent. And the problem is not reference to turtles - nearly *anything* all the way down would constitute the same fraud. The problem is the clearly suspect assumption that infinite repetitions of the same explanatory resources whose evident incompleteness on even the first level was what triggered the sequence of questions could make ultimate explanatory headway.³⁷

But if "turtles all the way down" is problematic, then "naturalism all the way down" may be as well. Yet that is precisely the assumption to which an unending allegiance to methodological naturalism in science apparently commits one. It is possible to simply bite various bullets and claim that there really is no ultimate explanation, that brute givens are the final answer, that reality just is a wildly lucky chance, that basic scientific principles are logically necessary, or that there really *are* turtles all the way down. But it is hard to see why anyone should be rationally *obliged* to do any of that.

VII. Prohibitions - consequences in practice?

Interesting as the foregoing 'in principle' risks might be, are there any traces of *actual* effects of even the most unbending methodological naturalism? There are certainly hints. For instance, with respect to the origin and diversity of biological life on earth, there are no *serious* naturalistic candidates beyond evolution. Since methodological naturalism says that naturalistic candidates constitute the entire catalogue of acceptable theories, evolutionary theory becomes the scientific default position. That is emphatically *not* to say that the empirical evidence does not in fact strongly support evolutionary theory, but it decidedly does mean that the relation between theory (facing no admissible challengers) and empirical data risks becoming anomalous. And in fact one does see from a number of prominent evolutionists (e.g., Ruse, Eldridge, and Futuyma) surprisingly explicit admission of a potential disconnect between actual truth and permissible biological science (e.g., creationism "is not necessarily wrong ... but it is not science")³⁸, and closely related assertions from some others (e.g., Pennock, Dawkins, and Brauer and Brumbaugh)³⁹. However, I shall focus here on a more current case.

Prohibitions and cosmology

Cosmology offers intriguing examples of methodological (and philosophical) naturalism generating both resistance to some design-friendly ideas and overly tenacious allegiance to other design-averse ideas - i.e., both confor-

mity to prohibitions and resistance to timely quitting. Some of the well-known initial resistance to Big Bang cosmology (due to its resemblance to creation-*ex-nihilo* theologies) might be classified as the former, while the associated refusal of Hoyle and others to abandon steady-state cosmologies (pursuing them even to the point where they implied that the majority of the known universe was anomalous) might fit under the latter heading.

Cosmology is a not-unlikely place for influences not wholly empirical to emerge. The field is historically relatively new, it strains at the edge of science's observational capabilities, the scope of its theories is huge (cosmic, even), and given the trickiness and relative scarcity of data and given that tying sometimes-equivocal data to often-difficult theory is a delicate matter, enormous theoretical edifices often have comparatively tiny empirical footprints and fairly ethereal scaffolding. Of course, any full-bodied theoretical structure must get its full complement of content *somewhere*, and where data are tenuous substance may - sometimes must - be borrowed from other components of the larger conceptual matrix.

Of present interest is the continuing debate involving fine tuning, cosmological anthropic principles, and many-universe cosmologies. It was for many centuries believed that life and species resulted from deliberate, direct design. Darwin proposed an evolutionary mechanism which could (it was argued) generate (or mimic) apparent exquisite biological design by blind, natural means - random variation sieved by natural selection (plus some auxiliary processes). It was noted, however (even by Darwin)⁴⁰ that evolution itself depended upon conditions and processes specific enough to themselves suggest design. Subsequent scientific developments revealed just how specific the conditions had to be - and how special and improbable a place the Earth was. Of course, the primary traditional means of overcoming unfavorable odds is to multiply tries. The apparent vastness of the cosmos, with its presumed numerous and varied planets (perhaps 10^7 in our galaxy alone) seemed to offer ample opportunities for the cosmos to produce suitable planets purely by chance. However, it began looking as if the laws, constants, and boundary conditions necessary just to produce planets within a Big Bang cosmology were themselves subject to wildly tight constraints. By one estimate, the odds of all relevant factors being 'tuned' for the bare production of planets (let alone life) were one in 10^{29} .⁴¹ Such apparent 'fine tuning' got the attention even of those unsympathetic to non-natural explanations.

There was, of course, a readily available non-natural explanation: that the basic nomic structures and boundary conditions of the cosmos looked deliberately designed because they *were* designed - the laws, conditions, and parameters even of the Big Bang itself having been delicately adjusted for subsequent life. Both within and outside science, rational explanation typically trumps brute fact non-explanations, so the ready availability of a non-natural explanation for the empirically determinable character of the cosmos created conceptual pressure for philosophical naturalists.⁴²

The subsequent response is well known. Since, again, the standard mechanical procedure for overcoming unfavorable odds is to multiply tries, the available naturalistic recourse was to multiply randomly-varying universes - indeed, to proliferate them to the degree required to swamp

odds on the order of one in $10^{10^{123}}$.⁴³ (Some simply postulated infinitely many worlds, or even all possible worlds.⁴⁴)

Of course, on most tellings, the alternative universes are mutually inaccessible, meaning that from our world their empirical status is tenuous at best.⁴⁵ Confirming their actual existence seems problematic. Falsifying their actual existence seems problematic. There must also presumably be some natural mechanism for generating those worlds. There have been a number of proposed mechanisms - all of which are, of course, seriously speculative. Postulation of this thicket of universes more nearly resembles philosophical hope than empirical science.⁴⁶

Furthermore it appears that stepping back one level does not solve any of the really fundamental problems. The production of multiple worlds intuitively would seem to require a structure of mechanisms, conditions and capabilities *at least* as demanding - or fine tuned - as the worlds being produced. John Leslie, for instance, remarks that:

Even when a Grand Unified Theory is selected cunningly to achieve the desired results - which ... can look suspiciously like the 'fine tuning' which the inflationary hypothesis is so often praised for rendering unnecessary - you may still be forced to postulate a gigantic space containing rare regions in which inflation of the right type occurs.⁴⁷

Others have made similar points (in this and related contexts).⁴⁸

Richard Dawkins has (ill-temperedly) remarked that design theories attempting to explain complexity in terms of a designer of even greater complexity are "cowardly and dishonest".⁴⁹ Why the same moral opprobrium should not attach to those trying to explain the fine tuning of our cosmos in terms of a comparably fine-tuned world-ensemble and world-ensemble generator is not clear.⁵⁰

VIII. Regresses and recursions

In adding infinitely many universes, one may not be getting any *ultimate* explanatory traction, and may be importing more - and worse - puzzles than those with which one began. Of course, similar things could be alleged concerning theistic theories as well. They add not only an additional level of complexity (a creator/designer), but one which perhaps imports even more puzzles than does an ensemble of other universes.

But there are intriguing differences. The rough history, recall, is almost cyclic. Something appears to be a likely product of deliberate design. But (often for philosophical reasons) a natural, mechanistic, non-design explanation is nonetheless sought. Once accepted, that explanation itself requires factors and conditions which in their turn seem to be likely candidates for a design explanation. But some deeper-level natural, mechanistic, non-design explanation is again sought, and when one is accepted it too exhibits characteristics that invite a design explanation.

It is tempting to suggest that since we never get rid of the initial appearance of the need for design explanations at each level, that that need constitutes an explanatory requirement (turtles) all the way down, indicating

that the only sort of explanation which can stop the regress is a design explanation. The response, of course, is that whatever the explanatory temptation at each level, that natural and mechanical explanations have ultimately proven adequate at each of those successive levels, and that if iterations cut any ontological ice, any turtle-dependent case for design is paralleled by an equally powerful case for naturalism.

That counter cannot be casually dismissed. But there is a difference. Although the same type of *demand* arises at each new level, the naturalistic explanatory resources demanded at each level escalate. The problem facing the naturalist at each level is to overcome unfavorable (typically prohibitive) odds - the odds against earth conditions being just right by chance, the odds against the boundary conditions of the Big Bang being just right by chance, the odds against the laws and constants of the cosmos (or the megaverse) being just right by chance, and so forth. The strategy again is to multiply tries. But tries must be multiplied *at each level*. And getting the right factor *f* at level *L* by multiplying tries at that level requires a *broader* mechanism than *f* operating at L^{-1} - a mechanism whose *output* is both *f* and variants upon *f*. Thus, to get the right sort of planet requires a mechanism operating at a level more fundamental than the planetary level - at the planet-producing level - and with the capacity for producing hugely many and varying planets. To get the right sort of universe requires a mechanism operating at a level more fundamental than the mere universe level - at the universe-producing level - and with the capacity for producing hugely many and varying universes. Thus, every explanatory retreat to a production mechanism at a deeper level involves not only escalation of demands, but a profound broadening of the scope, capacity and powers of the mechanisms demanded.

But where in the (or any) world does one go for a broader mechanism than that which produces not only multiple universes, but perhaps infinitely many universes?⁵¹ The situation resembles not only a regress, but a rapidly degenerating regress at that - a classic Kuhnian case of the growth of explanatory demands and complexities outstripping increases in explanatory payoffs.

If that is the case, then unless arbitrarily halted at some level, doctrinaire conformity to methodological naturalism will guarantee that cosmology is driven into sterility. *Without* some sort of stopper - a cosmological telomere - science simply frays away. (The earlier Atkins quote represents an attempt to finesse the problem, but I know of no empirical support for that hopeful proposal.) By contrast at each successive level *L*, precisely the *same design resources* - e.g., a supernatural being - which would have been adequate at the lower level will be adequate at *L* as well.⁵²

VIII. Natural theology again

Methodological naturalism may, again, be strategically important. But it not only fails to be a universal trump card but depending upon how inflexibly it is wielded has the potential for scientific disfunction. Prospects for the varieties of natural theology suggested earlier are thus so far forth still live. Indeed, a few suggestive points can now emerge.

First, it is at the least intriguing that fine-tuning - with its suggestion of intentionality - has arisen out of a scientific context specifically constructed (on Lewontin's telling) to preclude exactly such suggestions. Maybe the cosmos is positively insisting on telling us something whether we propose to hear it or not. Not only did the suggestion emerge unbidden, but bringing it to heel has proven particularly problematic and costly. Throughout most scientific history, simplicity, elegance and other allied considerations played substantive roles in theory construction and evaluation. One standard element in such legitimately *scientific* considerations was 'Ockham's Razor'. Yet, the impulse to avoid design conceptions (and associated natural theology possibilities) at the cost of huge rafts of universes looks like abandonment of that principle.⁵³ Paul Davies, for instance, remarks that

Invoking an infinite number of other universes just to explain the apparent contrivances of the one we see is pretty drastic, and in stark conflict with Occam's razor.⁵⁴

In the case of infinitely many universes, Ockham would be well advised to bring along more than a mere razor - perhaps something more like a chainsaw.

Furthermore, the dynamic and structure of the escape attempts are suggestive as well. That the successive layers of proposed naturalistic cosmological explanations *differ* at each explanatory level but never discharge the mystery of the recurring fine-tuning may constitute an explanatory *regress*, while the *same* possible design explanation being conceptually adequate at each level might suggest that the parallel design track exhibits an explanatory *recursion*, whose stable character really does indicate an ultimate, foundational fact of reality. There is potentially a difference here which might indicate a foundational priority of design over ultimate brute mechanical naturalism. Just as repetition of pattern at each successive scale in a Mandelbrot picture reveals a fundamental and stable scale-invariant structure in the equations producing it, it may be that a repetition of design-suggestive and design-explainable pattern at successive levels in cosmological explanations reveals a fundamental structure at the core of the cosmos. In short, if design-suggestive structures reappear at each new level of analysis, and if (as argued earlier) design-related matters are conceptually more fundamental than naturalism it may be that the turtles not only do not go all the way down, but that even whatever turtles there are are in fact designed.

And finally, there is one broader matter. As noted earlier, doctrinaire stipulation of naturalism (methodological or otherwise) risks skewing even purely empirical results in some areas of scientific investigation. That seems to be especially plausible in worlds that are created. But there is a further risk. It has recently been argued that the only plausible justification for various science-essential presuppositions is that our perceptual, conceptual, and other cognitive systems were deliberately designed for catching onto specific types of truth. But if an omnipotent supernatural being deliberately constructed both our cognitive structures and the natural world we investigate

via those structures, it is clearly possible that we and the world were coordinately fashioned in such a way that features of nature as comprehended by our epistemic faculties would reveal to us specified features of the maker of both. Suppose that not only was the creation intended to speak to us concerning its creator, but that creation's voice was multileveled - some things being audible only through particular results discoverable only scientifically. Processes which either skew or truncate the picture of nature science generates could obscure the very features of nature in question, obscuring in turn what nature was meant at that point to say. Unbending application of even methodological naturalism might thus preferentially position science precisely to miss natural-theology-relevant deep features of nature, and might consequently force us to miss their theological import.

IX. Conclusion

Both scientific progress and deeper philosophical understanding of science reveal richer prospects for a science-rooted natural theology than standard cultural myth would have it. And the obstacle of choice - methodological naturalism - although perhaps indispensable as a provisional pragmatic scientific strategy is dubious as a norm. To wield it as a theistic (or design, or natural theology) conversation-stopper around science leaps well beyond any justification it can muster, any track record it can cite, and any future promise it can seriously make. Indeed, a doctrinaire prohibition on what one is permitted *qua* scientist to think, may ultimately not only work to the detriment of empirical science, but may obscure or contort deeper theological messages nature may carry. Although he undoubtedly did not mean it as I shall use it, Nobel physiologist Christian DeDuve recently remarked:

We need a pathway, a succession of chemical steps leading from the first building blocks of life to the RNA world. Chemistry, however, has so far failed to elucidate this pathway. At first sight, the kind of chemistry needed seems so unlikely to take place spontaneously that one might be tempted to invoke, as many have done and some still do, the intervention of some supernatural agency. Scientists, however, are *condemned by their calling* to look for natural explanations of even the most unnatural-looking events.⁵⁵ [my emphasis]

Perhaps in these politically correct and postmodern times we should free the scientists.⁵⁶

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NOTES

1. As Owen Gingrich says,

Science is primarily looking for a self-consistent description of nature that hangs together in a convincing way ... Science works by coherence,

not by proof.

"How Galileo Changed the Rules of Science." p. 32-36, *Sky and Telescope* Vol. 85#3, 1993, p. 36.

2. Data are the repository of choice for all sorts of things. Not only are they alleged to be theory-laden, and/or partially constituted by paradigms, but they (or their 'fabrication') are sometimes described as "decision-laden" (Karin Knorr-Cetina, *The Manufacture of Knowledge*, p. 5-6 (NY: Pergamon, 1981)) or as "inference-laden" (Naomi Oreskes, Kristin Shrader-Frechette, and Kenneth Belitz, "Verification, Validation and Confirmation of Numerical Models in the Earth Sciences" p. 642, *Science* Feb. 4, 1994, vol 263 #5147, p. 641-646).

3. Of course, coherentism or any other sort of view entailing that forward inferences and backwash are not cleanly separable would have this same consequence. And if the observation/theory line is as blurred as often claimed, similar consequences ensue.

4. Davies, *Are We Alone?* (NY: Basic, 1995), p. 138. Kant, of course, argued that science could not operate *except* under design as a regulative principle - meaning that the structure Davies refers to is not mere historical accident.

5. "Nomo(theo)logical Necessity" *Faith and Philosophy*, 1987. 4:383-402.

6. Quoted in Polanyi, *Science, Faith and Society* (Chicago: Chicago, 1964) p. 88.

7. Herbert Goldstein, *Classical Mechanics* (Addison-Wesley, 1950) p. 231, footnote.

8. Planck, "Religion and Natural Science" p. 151-187 in *Scientific Autobiography and Other Papers*, (London: Williams and Norgate, 1950, p. 177. The original essay was published in 1947. This passage was pointed out to me by David Van Baak.

9. This is from Planck's entry on the principle of least action in the encyclopedia *Kultur der Gegenwart*, 1915, p. 68. At least one translator (Michael Stoeltzner) employs "probably" instead of "perhaps."

10. "Billions and Billions of Demons", *New York Review of Books*, January 9, 1997, 44(1).

11. For discussions in this general area, see Stephen Wykstra "Religious Beliefs, Metaphysical Beliefs, and Historiography of Science", p. 29-46 *Osiris*, vol 16, 2001, and "Should Worldviews Shape Science? Toward an integrationist account of scientific theorizing", p. 123 - 171, *Facets of Faith and Science*, vol 2., ed. Jitse van der Meer (Ancaster. Ontario, Pascal Centre and Lanham, University Press of America, 1996)

12. For instance, Norman and Lucia Hall, p. 27, "Is The War Between Science and Religion Over?" *The Humanist*, May/June 1986, p. 26-28.

13. Eugenie Scott, Executive Director of the National Center for Science Education (NCSE) explicitly employs this sort of "as if" view. See "Darwin Prosecuted", p. 43, *Creation/Evolution* 13, 2 (Winter) 1993. One caveat concerning this common definition will emerge later. 'Methodological materialism', 'methodological atheism,' and 'methodological naturalism' are commonly used interchangeably. Although perhaps not the first use of the term, the use in recent discussion of 'methodological naturalism' probably originated with Paul DeVries.

14. For instance, except for the last, the following can be found in various essays in Robert Pennock's *Intelligent Design Creationism and Its Critics* (Cambridge: MIT, 2001)

qua science, that is *qua* an enterprise formed through the

practice of methodological naturalism ...

Michael Ruse p. 365-66, "Methodological Naturalism Under Attack", p. 363-385.

Methodological naturalism is not a dogmatic ideology that simply is tacked on to the principles of scientific method; it is essential for the basic standards of empirical science

Robert Pennock p. 90, "Naturalism, Evidence, and Creationism: The case of Phillip Johnson", p. 77-97.

What we might call *methodological atheism* [her term for methodological naturalism] ... is by definition common to all natural science

Nancey Murphy p. 464, "Phillip Johnson on Trial: A critique of his critique of Darwin", p. 451-469.

By definition, science cannot consider supernatural explanations ... So by definition, if an individual is attempting to explain some aspect of the natural world using science he or she must act as if there were no supernatural forces operating on it.

Eugenie Scott, "Creationism, Ideology, and Science", *Annals of the NY Academy of Science*, Vol 775, June 24, 1996.

15. There are others as well - e.g., Pierre Duhem *Aim and Structure of Physical Theory*, (Princeton: Princeton, 1954), p. 274-5

16. Pennock, *op. cit.*, p. 90

17. In 1623 Bacon wrote:

[T]he handling of final causes mixed with the rest in physical inquiries, hath intercepted the severe and diligent enquiry of all real and physical causes, and given men the occasion to stay upon these satisfactory and specious causes, to the great arrest and prejudice of further discovery.

Of the Proficiency and Advancement of Learning, Second Book, VII, 7. *Great Books of the Western World*, Vol. 30, p. 45. Mortimer Adler, Assoc. Ed., (Chicago: Encyclopedia Britannica, 1952).

And Boyle at least thought that warnings were in order:

[A] *naturalist* who would Deserve the Name, must not let the Search for Knowledge of *First Causes*, make him Neglect the Industrious Indagation of *Efficients*.

A disquisition about the Final Causes of Natural things; wherein it is inquir'd Whether, And (if at all) with what Cautions, a naturalist should admit them? [1688] p. 237.

18. As Kuhn remarks, "Can very much depend upon a *definition* of 'science'?", *Structure of Scientific Revolutions* (Chicago: Chicago, 1970) 2nd ed, p. 160.

19. Huxley, review of *Origin of Species*, in *Westminster Review*, 17, 1860, p. 541-570.

20. See, e.g., John Hedley Brooke, *Science and Religion*, (Cambridge: Cambridge, 1991).

21. Antipathy to religion has even motivated some scientific career choices. For the interesting case of Francis Crick, see "DNA pioneers lash out at religion" Roger Highfield, *London Daily Telegraph* March 24, 2003.

22. Samuel Clarke says:

[W]hat men commonly call "the course of nature" ... is nothing else but the will of God producing certain effects in a continued, regular, constant, and uniform manner.

A Demonstration of the Being and Attributes of God. Ezio Vialati, ed., (Cambridge: Cambridge, 1998), p. 149. Boyle, Charles Kingsley, and others made similar statements.

23. It may be that the success of science constitutes empirical import of theism - just as for some Quinean mathematical naturalists the success of science is an empirical confirmation of mathematics.

24. Darwin is quoted as saying that a conviction of the designedness of nature sometimes came over him with "overwhelming force." See e.g., Francis Darwin (ed) *Autobiography of Charles Darwin and Selected Letters*, (NY: Dover, 1958), p. 68 note.

25. *What Mad Pursuit*, (NY: Basic, 1988), p. 138.

26. *Universes*, (NY: Routledge, 1989), p. 194.

27. That is not, however, obvious to everyone. See, e.g., Roger White, "Fine-Tuning and Multiple Universes", p. 229-250, in Neil Manson (ed), *God and Design*, (NY: Routledge, 2003).

28. For instance, J.A. Wheeler's outlook has been summarized by John Horgan as: "at the heart of everything is a question, not an answer" p. 84, *The End of Science* (NY: Broadway, 1996).

29. Here is an analogy. Suppose that during the final pre-launch crew briefing for NASA's first manned mission to Mars, the head of NASA warns the crew of the dangers of starting public panics and instructs them to make no mention in any of their reports of aliens - *regardless* of what they happen to find on Mars. The restriction does make some sense. But suppose that the first thing the crew sees upon exiting their lander is an utterly undeniable Martian bulldozer. The question instantly arises: where did *that* come from? But the crew has a problem answering that question. Given the prohibition barring reference to aliens, the crew has only two options: (a) they can refrain from addressing the question, or (b) they can construct a theory of the chemical evolution of Martian bulldozers. But that means that their science of Mars will be either (a) woefully incomplete - leaving out perhaps the single most fascinating aspect of the mission - or (b) outrageously mistaken.

30. In his 1998 essay "Awesome versus Adipose" *Free Inquiry* Vol 18 #2, Spring 1998, Peter Atkins says:

Science gives us the prospect of full understanding, for it continues to show that, given time, there is no aspect of the world that is closed to its scrutiny and explanation.

31. Francis Crick says:

... the knowledge we have already makes it highly unlikely that there is anything that cannot be explained by physics

and chemistry.

Of Molecules and Men (Seattle: Washington, 1966) p. 14

(see also 98).

32. Both Alvin Plantinga "Evolution, Neutrality, and Antecedent Probability: A reply to McMullin and Van Till", p. 197-236 in Pennock, *op. cit.* p. 235 n. 14, and Murphy, *op. cit.*, p. 464, recognize this point. The point might require some tinkering, however, in light of the Wykstra caveat discussed earlier.

33. Some, e.g., Howard Van Till, have tried to defend this assumption on theological grounds, but I do not find such positions particularly persuasive.

34. Cf. *Nature, Design, and Science*, (Albany: SUNY, 2001) p. 139-146 for additional discussion.

35. *Brute fact*, of course, is brute precisely because of its explanatory rootlessness. That *chance* is not explanatorily foundational is evidenced by the fact that whenever a scientific theory crucially employs it, there are invariably attempts to find deeper mechanisms that saturate the relevant state space precisely in the hope of explaining why the required events in the relevant state space region occurred. Philosophical *necessity* would halt an explanatory regress, but its relevance in empirical contexts has never been plausible.

36. *The Creation* (San Francisco: Freeman, 1981), p. 127. I have a suspicion (unsubstantiated) that Gödel could tell us something here.

37. The problem is a species of the well-known difficulty of paying credit card debt by putting it onto another credit card. No headway toward debt-reduction is made (except possibly with infinitely many credit cards - one could perhaps pay one's bill at Hilbert's Hotel with Hilbert's credit cards).

38. The quote is from Niles Eldredge, *The Monkey Business* (NY: Washington Square, 1982), p. 134, but virtually identical statements are found in writings of Ruse and Futuyma.

39. For example, Pennock implicitly endorses something like the Medieval "two truth" view in "Reply: Johnson's *Reason in the Balance*, p. 103-107 of his *Intelligent Design Creationism and its Critics*, (Cambridge: MIT, 2001), p. 104.

40. In an 1860 letter to Asa Gray, Darwin said:

... I cannot anyhow be contented to view this wonderful universe, and especially the nature of man, and to conclude that everything is the result of brute force. I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance.

Autobiography of Charles Darwin and Selected Letters, ed. Francis Darwin (NY: Dover, 1958), p. 249

41. Lee Smolin, *Life in the Cosmos*, (Oxford: Oxford, 1997), p. 45.

42. That may have been what Hoyle was feeling when despite initially arguing that that apparent fine-tuning really was just coincidence, he later said:

Such properties seem to run through the fabric of the natural world like a thread of happy coincidences. But there are so many odd coincidences essential to life that some explanation seems required to account for them.

Quoted in Walter Bradley, "The 'Just So' Universe" p. 75, *Touchstone* July / Aug 1990, p. 70-75. (p. 250)

43. Penrose, *The Emperor's New Mind* (Oxford: Oxford, 1990), p. 343-4.

44. E.g., John Barrow and Frank Tipler, *The Anthropic Cosmological Principle*

(Oxford: Oxford, 1986), p. 105. This sort of postulation is often justified by claiming that the principle that 'everything that can happen *must* happen' is a principle of quantum mechanics.

45. Some - e.g., Martin Rees, Lee Smolin, David Deutsch - have held that empirical evidence of other universes is possible.

46. David Van Baak has suggested that the standard Positivist arguments against God's existence would apply exactly as well against the existence of the (so-called) Mother Universe.

47. *Universes*, p. 30.

48. E.g. Richard Swinburne:

[T]he shape of the problem has in no way changed by postulating more universes.

"Prior Probabilities in the Argument from Fine Tuning", [Forthcoming],

and Ernan McMullin in a related context:

[I]t is curious how the same challenge arises over and over ...

"Indifference Principle and Anthropic Principle in Cosmology"

Studies in History and Philosophy of Science, vol 24 #3, 1993, p. 359-389

49. Lecture: "Unweaving the Rainbow."

50. The situation may be even worse - see my "Saturation, World-ensembles, and Design" [forthcoming]. Quite interesting here too is the work of Robin Collins, who was, I think, among the first to really pursue the 'generator' idea. See for instance his "Does the Many-Universe Hypothesis Really Explain the Fine-Tuning?" at <http://www.messiah.edu/hpages/facstaff/rcollins/MU.htm>.

51. For some twists at this point, see my forthcoming "Saturation" *op cit*.

52. There are multiple ironies lurking here. It is ironic that naturalists who themselves are retreating to deeper levels used to claim that a retreat of design to ever deeper levels was *prima facie* evidence of the substantive bankruptcy of design theories, and it is ironic that the *causal* adequacy - rather than bankruptcy - of design proposals is suggested by the very fact that such explanations are criticized as being 'science-stoppers'.

53. Interestingly enough, Boyle made a parallel point concerning one specific sort of atomism in his own day. See *The Excellency of Theology, Compared with Natural Philosophy*, in *Robert Boyle on Natural Philosophy*, Marie Boas Hall, ed., (Bloomington, Ind: 1965), pp. 149-50.

54. *Are We Alone?* (NY: Basic, 1995), p. 121. Others - e.g., Edward Harrison, *Masks of the Universe* (NY: Macmillan, 1985), p. 252 - have made similar points.

55. *Vital Dust : Life As a Cosmic Imperative*, (NY: Basic, 1995), p 24.

56. I wish to thank David Van Baak, and also the members of the fabled Calvin College Philosophy Department Tuesday Colloquia. Remaining errors are, of course, their fault.