Chapter 4

THE NEW METANARRATIVE: SOME ONTOLOGICAL CONSIDERATIONS

Lest they disappear down the rabbit hole of irrelevancy, graduate students are often encouraged to keep in mind the purpose of their work by asking, What difference will this make? Will this change anything? Does anybody care? These questions are brutally summed up by supervisory faculty in their assessment of student research with the demand: So what?

It's a question that can be applied to almost anything because it immediately cuts to the core of the meaning of a situation – it's philosophically provocative, in other words. And nowhere has this query been more poignant than in a flippant remark once tossed off by an economist in *Business and Society Review*: Suppose that, as a result of using up all the world's resources, human life did come to an end. So what?[1]

So what indeed. Unlikely though the prospect of self-termination might be, it does stimulate an interesting thought experiment which probes the meaning of such an unhappy eventuality. The null hypothesis (the position assumed to be true unless proven otherwise) no doubt implicitly endorsed by the economist just mentioned, is … so nothing. Extinction has no meaning. We did what we did because we could, and because we wanted to, and then it ended. We drove it until the wheels fell off. So what?

This is rude because it imputes to humanity an unflattering carelessness and a callow disregard for the future but, once again, so what? If human life did end, no one would be left to assign value to the loss of the human experience. Our absence simply wouldn't matter. We would just be gone (the detritus of our civilization notwithstanding), a forgotten footnote in Earth's history.

The philosophical nettle here of course is that the null hypothesis would only be true if all value metrics – in fact the very concept of value, worth or merit – were social constructs, products of our imagination. If that were in fact the case, all such ethereal manifestations of human being would evaporate along with the physical ending of our species. On the other hand, however, if these things somehow exist independently of the human experience, then maybe our extinction

[1] This anecdote was cited by Arran E. Gare, *Postmodernism and the Environmental Crisis*, New York: Routledge, 1995, p.12.

(especially if self-induced) really would damage an unseen fabric, diminishing the goodness of the wider Universe by foreclosing our participation in it. Our absence in that case would be genuinely misfortunate, perhaps wrong, even pathetic, according to some larger measure. This alternative hypothesis (the inverse of the null) posits that some important values, ideals or principles may exist independently of human thought. If so, social constructions would retain their importance as worldly frames of reference but could now be understood as representations of less transitory, possibly universal, templates. This hypothesis matters – that is, this is relevant and could make a difference – because, if true, we would no longer be working for planetary sustainability for our own sake alone. What we do and how we do it could leave a lasting mark on the evolutionary trajectory of the Universe itself.

Clearly, this allusion to values which may exist independently of humanity is controversial. The null hypothesis asserts that there are no absolute values on this planet, no inviolable truths or principles, and certainly no unconditional measure of morality. In a fruitless quest, deontologists, for example, call upon that which is intrinsically and timelessly right, that which finds expression in duty or obligation. It's exemplified by Kant's categorical imperative – Act as if the maxim of your action should become universal law – but it's not hard to find important exceptions to this requirement in a host of life's morally stressed situations. Consequentialism, on the other hand, seeks retroactive guidance for rectitude in the results of conduct instead of the behaviour itself. Jeremey Bentham and John Stuart Mill are the progenitors of its best-known variant, utilitarianism, which seeks the 'greatest good for the greatest number.' But here too, proponents run afoul of practical calculations such as how to measure 'good' and how to balance costs and benefits over an indeterminate number of people, and an indeterminate period of time. It seems clear that, apart from the laws of physics, nothing is necessarily true. This bald assessment implies that all morally vexed situations are contingent affairs that could have been otherwise under different circumstances, and this in turn raises the possibility that all ethics are relative, that morality is situation dependent; that postmodernists might be right after all.

It may very well be true that there is no perfection 'on this planet' and that morally vexed situations are contingent; however, this does not necessarily obviate the alternative hypothesis, the wider possibility that valuation templates – ideals, as it were, from which worldly notions of truth, morality, and aesthetics emerge – exist prior to our experience of them. To assert

otherwise, to insist that these principles exist at the whim of the imagination, is to arrogate to ourselves authorship of all determinants of valuation. I will explore the ontological status of ideals – whether conceived as templates, principles or 'absolute values' – and I'll suggest in this chapter that the tension between these ideals and our worldly experience of them could be the critical dialectical driver of moral evolution, and therefore of the new metanarrative. On this view, the Good, the True and the Beautiful are mirrored on Earth contingently as morality, reason and aesthetics.

Regarding our worldly experience of them, it is abundantly and immediately clear that we haven't done very well in the practice of these reflected ideals. Morality is strained by war, by the ill-treatment of our children, and by the expropriation of the living space of Earth's other creatures. Reason is compromised by the destruction of resources vital to our survival despite clear lessons from science and history. And aesthetic sensibilities are dulled by rampant industrialism and the defacement of natural landscapes. This inappropriate behaviour is exaggerated by a collective sense of exceptionalism which we've taken to mean that we are independent of nature, of any kind of loftier reality, and that we are unaccountable for our actions Alternatively, the hypothetical positing of 'absolute values' suggests that accessing and applying supra-human precepts may provide a useful context, helping us move from the fractured values inherent in postmodern (and post-truth) secularism to truer values drawn from a deeper well, and to a better understanding of our moral predicament as a species in self-induced peril.

To admit the possibility of absolute values independent of human construction is to introduce a tension between the perfect and the imperfect, between the timeless and the merely temporal. More generally, it opens a broader question which has perturbed philosophers for millennia about the exact nature of the relationship between necessity and contingency, and how one may emerge from the other. These various tensions reveal the prevalence and importance of dyads, pairs of entities sometimes in opposition, sometimes mutually reinforcing. Of thematic importance to this book is the relationship between the ideational and the material, but significant (and often baffling) dyads range from (at the very foundation of reality) the wave/particle duality familiar to physicists, up the compositional ladder to the inanimate/animate distinction which ostensibly separates life from all else, to the subjective/objective division which purportedly isolates life from its environment, and all the way up to the hard problem of

conscious, self-reflexive awareness and our parlous relationship with the natural Earth, the tension which stands at the core of the global environmental crisis.

Dualism and Relationalism

Dualism typically divides the universe into two fundamentally different types of entity, namely, mind and matter. Though these entities are clearly ontologically unique they are not mutually exclusive; they do not constitute or inhabit separate and incommensurable worlds.[2] I adopt instead the holistic point of view which asserts that the Universe (all that exists) is of a single piece comprising within it a range of types of being. On this view, mind and matter co-exist within a naturally whole continuum. They are, however, under no obligation to co-exist in harmony or to their mutual benefit and, as discussed previously, they don't. Their current concordance is in fact, with respect to sustainability, counterproductive. The physical foundations of life on which we depend completely have been negatively impacted by today's dominant metanarrative, a story that encourages materialism and legitimizes impulsive behaviour. That metanarrative is evidently at an early, immature stage in its evolution and as such is incapable of restraining or otherwise guiding the unreflective behaviour prompted by easy access to the benefits and conveniences of the material world. Reconstituting the relationship between mind and matter lies at the heart of the sustainability challenge.

Dualism (albeit embedded in a holistic universe) is a pervasive feature of the world as we know it. Multiple instances of it will be alluded to or confronted directly in what follows. For example, dualism is evident in the two points of view – the social and the natural – briefly presented in chapter 3 with regard to the origin of the Anthropocene epoch. Both perspectives emanate from a dyadic sample of reality for which a minimum of two actor/objects is required. Specifically, the ecological (objective) perspective is based on relationships among lifeforms (flowers and bees, for example) or among biotic and abiotic systems (such as plants and water). By the same token, the constructivist (subjective) point of view derives from relationships among two or more people, especially their shared ideas. Epistemologically, of course, these two knowledge systems are completely different. Ecology draws on positivist empiricism, that is, on what can be seen and tabulated. In contrast, constructivism trades in unobservable phenomena; it relies, therefore,

[2] For a novel exegesis of this position, see Alexander Wendt, *Quantum Mind and Social Science: Unifying Physical and Social Ontology*, Cambridge: Cambridge University Press, 2015.

on a narrative explanatory protocol to reveal the nature of the relationship at hand. Interestingly, both dyadic systems point to a modern singularity. Ecology reveals the evident fact of one hegemonic species on Earth, and constructivism exposes one collective intention embodied in today's dominant metanarrative and, as indicated in chapter 3, these two systems in tandem have forcibly ushered in the historically unique, self-proclaimed Anthropocene epoch.

Obviously, one's choice of discipline has no bearing on the nature of reality. Other branches of the life sciences such as botany and zoology focus on individual flora or fauna and as such employ an atomistic (or single actor/object) point of view; and likewise, a social scientist might prefer to study psychology where the unit of analysis is the single person, not the group. Disciplines don't determine reality; they carve out a piece of it to suit their exploratory objectives. That said, the dyadic epistemology of ecology and social constructivism serves as a useful jumping off point for a closer look at what we can know about reality as such, insofar as we have any meaningful access to the ontology of the world.

The Material World

'Relationalism' is an ontological theory that draws on the notion of dualism. This theory suggests that reality can only be made known to us by way of the relationships which occur between two or more entities. Position, size, mass, velocity, forces exerted or felt, even time itself are all without meaning for a single bit of matter in an otherwise empty universe, simply because, according to relationalism, there is no context, no frame of reference against which to measure these quantities. Cosmologist/philosopher Lee Smolin puts it this way:

> [R]elationalism claims that the quantities physics can measure and describe all concern relationships and interactions. When we ask about the *essence* of matter, or of the world, we are asking what it is intrinsically … the relationist stance is that there's nothing real in the world apart from those properties defined by relationships and interactions.[3]

Primarily a mathematical physicist, Smolin maintains that 'real knowledge' must take the form of testable propositions, apart from which 'there's nothing real in the world.' The public verifiability of such propositions depends entirely upon empirical observation and the scientific

[3] Lee Smolin, *Time Reborn: From the Crisis in Physics to the Future of the Universe*, Toronto: Vintage Canada, 2013, pp.266-7. Original italics.

method; metaphysical interpretations of reality are, on this view, particular, idiosyncratic and decidedly unscientific, albeit not without personal value. This position, however, puts Smolin in his philosophical persona on the horns of a dilemma, which he readily acknowledges. "But does it make sense," he wonders, "for two things to have a relation – to interact – if they are nothing intrinsically?"[4] Smolin finds no solace in the hope that mathematics, in its elegant and incisive ability to cut logically into the deepest mysteries of reality, might offer an answer. "If there's more to matter than relationships and interactions, it is beyond mathematics [because] relationships are exactly what mathematics expresses. Numbers have no intrinsic essence … they are defined entirely by their place in a system of numbers."[5]

Smolin's tussle with reality, briefly reviewed above, is hardly new in the philosophy of science. Immanuel Kant opined in the eighteenth century that "What may be the case with objects in themselves … remains *entirely unknown to us. We are acquainted with nothing* except our way of perceiving them, which is peculiar to us."[6] And before Kant, in the seventeenth century, two heavyweights of the Enlightenment era, Isaac Newton and Gottfried Wilhelm Leibniz, fought to a draw about the nature of matter, space and time, while René Descartes notoriously popularized the division of reality into two incommensurable parts, *res extensa* (matter) and *res cogitans* (thought), ultimately granting precedence to the latter.

Deeper in history and prior to the ascendance of practical reason during the Enlightenment, Thomas Aquinas in the thirteenth century suggested that observable objects were a combination of form and matter. A bronze bowl, for example, is made from base materials manufactured at arms length, as it were, by God but 'form' (such as the shape which makes it a bowl) is a subjective attribute expressive of God directly. And this in turn echoed scholars from antiquity such as Plato and Aristotle who expended much intellectual effort trying to come to grips with what it means to be 'real.' Plato's influence on the debate has probably been the most long-lasting and influential, as will be seen. His dualistic notion of reality is nicely summarized by Philip Clayton:

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[4] Ibid., p.267.
[5] Ibid., *Epilogue*, fn 10, p.294.
[6] Quoted in Michael Rohlf, "Immanuel Kant," *The Stanford Encyclopedia of Philosophy* (Spring 2020 Edition), Edward N. Zalta (ed.), p.22. Italics added. URL=https://plato.stanford.edu/archives/Spr2020/entries/Kant/

> Plato found his solution in the doctrine of 'Forms.' What is ultimately real is the *eidos*: the idea of a thing. These ideas exist in a purely intellectual realm and serve as the pattern or exemplars after which all existing things are modeled. This object is a tree because it participates in the form of tree-ness, and this is a just state because it participates in the form of justice.[7]

To be brief, the simple but perplexing fact is that we have no consensus, no verifiable idea what matter 'really' is, nor do we know, at bottom, what energy is either, except to say that it's interchangeable with matter by way of Albert Einstein's famous equation linking them together in what may be the world's best-known, elegant, but ultimately mysterious relationship. Einstein himself averred that the only way to bring any true understanding of reality into concordance with observation is by way of an "extra-logical (intuitive) procedure."[8]

The relational point of view, especially with respect to observer dependency,[9] is gaining traction in the physics world, but in everyday life it's still just a sidebar to the materialist reductionism which has dominated practical thinking since the development of Newtonian mechanics in the seventeenth century. On this latter view, matter consists of small indivisible particles which, together with the four natural forces that act upon them, comprise the substance and behaviour of all objects in the world. 'Reductionism' simply means that analytically anything and everything can be reduced to these fundamental constituents and the laws that guide them; that all causal arrows point upward from below; and that all explanatory arrows point downward to this underlying aboriginal firmament.

Lacking in subtlety and obviously wrong, especially in light of Einstein's theories of special and general relativity and the emergence of quantum mechanics in the early 1900s, materialist reductionism nonetheless still dominates the public mindscape because, for all practical intents and purposes, it works. Newtonian mechanics inform the Machine Age. His equations linking force, mass and motion are mathematically tractable and universally applicable. We build

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[7] Philip Clayton, 'Unsolved Dilemmas: the concept of matter in the history of philosophy and in contemporary physics,' in Paul Davies and Niels Henrik Gregersen, (eds.), *Information and the Nature of Reality*, New York: Cambridge University Press, 2010, p.40.
[8] Quoted in Paul Davies, *The Mind of God: The Scientific Basis for a Rational World*, New York: Simon and Schuster, 1992, p.80.
[9] This refers to the fact that the outcome of quantum mechanical experiments will necessarily be influenced or determined by the characteristics of the observing apparatus.

bridges, run factories and put satellites into orbit according to those laws, and we can just as readily chart the movement of planets, stars and galaxies with them. It's true that modern electronics and some important services such as GPS direction-finding are dependent upon quantum phenomena, but by and large manipulating the 'real world' can be comfortably accomplished using Newton's straightforward but imperfect toolset.

Certainly, reality is clear enough to us – it's available to our senses without effort or any need for interpretation – and that has been sufficient for survival, adaptation (and, in modern terms, for prosperity) ever since our species began to walk upright. But we know now that it's radically incomplete. Our sense of vision, for example, upon which we rely for eighty percent of sensory input, only responds to some ten percent of the entire electromagnetic spectrum, the rest of which, ranging from very long radio waves to very short gamma waves, is invisible to us. This is analogous to our general perception of reality. We have a narrow sense of the physical (or so-called 'classical') world through the lens of Newtonian mechanics which, helpful and useful though that is, excludes any understanding of what stuff is really made of. Probing the substance of reality more deeply with sophisticated quantum mathematics and experimentation still leaves an inaccessible residue of mystery and speculation. And this difficulty is multiplied by the fact that the cognitive tools we use to perceive and analyze the world are themselves no more accessible than physical reality, which is to say, we don't have any verifiable explanation for what consciousness is either. A reductionist epistemology suggests that consciousness must inevitably be traceable to a 'brain state,' that is, to neurons firing in complex patterns, which in turn produces the phenomenon we recognize as a conscious 'mental state.' This conclusion is straightforward and understandable because much of what we perceive is simply the result of biological information processing and pattern recognition. These are things a computer can do and the human brain, on this view, is just an organic (albeit very complex) computer. This physicalist interpretation of consciousness still falls short, however, of explaining how neurons firing 'in here' can cause the perception of a world 'out there,' any more than it can explain why pain in one's knee is felt in that knee and not in the brain itself. This extension of consciousness beyond the brain and into the world presents a daunting problem for philosophers of mind.

But the mind-body problem encounters an even more intractable obstacle in trying to explain the process by which the objective reality of neuroscience is transmuted into the subjective

experience of living a life as ‘me.’ In other words, how can subjectivity emerge from objectivity? On this rock our understanding of the human mind founders: it is simply unknown how anything material could be conscious.[10]

Our sense of reality is bracketed on one side by the unknowability of matter and energy, and on the other by the ineffable quality of consciousness. The former somehow is presented to us as the classical world with which we are casually familiar; the latter gives rise to subjective experiences such as thoughts, emotions, memories and a wide variety of sensations, all of which elude explanation even as we channel them into the construction of cultural phenomena such as music, literature, mathematics, logic and spirituality. Only a very small percentage of the great mystery of the universe is available to us in knowable terms about which we may be categorically confident.

And yet, this relative ignorance notwithstanding, we have achieved a truly remarkable portfolio of accomplishments; in fact our intellectual prowess has produced much more than the material wonders of the modern age. Looking out and beyond, we’ve used our unique capacity for discovery on a grand scale to learn that we live on a small planet in the suburbs of an immense galaxy of stars, and that the Milky Way is just an average galaxy, one of some 200 billion others careering into the unfathomably distant reaches of the Universe. We have even theorized the origin of the Universe itself as having come into existence 13.7 billion years ago in what we now call the Big Bang. And from this marvellous ensemble of practical and esoteric knowledge we have even discovered our own origin in starbursts, in atomic elements and the chemistry of life, and in the evolution of our species from the deep history of Earth.

The Transcendental World

We are truly exceptional. Physical hegemony on Earth is one thing, but a masterful understanding of where we came from and in what stupendous surroundings we live take us far beyond any mere material dominance and into a transcendent realm unreachable and unoccupied by any other species. This unique attribute is of particular relevance to the current environmental

[10] *Panpsychism* supports the view that some form of ‘proto-consciousness’ is inherent to everything, right down to sub-atomic particles.

crisis because it allows us access to a non-material perspective, and thereby to the ontological domain in which narratives are born and evolve.

To be clear, I'm using the term 'transcendentalism' here in its simplest possible meaning, to wit, not empiricism. It refers to knowledge gained beyond the senses, to the unobservable world of ideas and imagination (which, although completely open-ended, will be limited in the present context to that which comports with reason). It does not call upon the American transcendentalism of Emerson and Thoreau, the Kantian theory of transcendental idealism, or any other Western or Eastern school of mysticism, idealism, Romanticism or theology. The meaning employed here is contained within the bounds of what is presented in this book.

What, then, can be said about this non-material, transcendent realm? Here dualism is pertinent once again, as described by Paul Davies:

> We come to know the world in two quite distinct ways. The first is by direct perception, the second by rational reasoning and higher intellectual functions … Darwinian evolution has equipped us to know the world by direct perception … but there is no obvious connection at all between this sort of sensorial knowledge and intellectual knowledge … there is no selective advantage in our having brains able to incorporate quantum and relativistic systems in our mental model of the world … The mystery is, why do we have this dual capability for knowing the world? … After all, surviving 'in the jungle' doesn't require knowledge of the *laws* of nature, only of their manifestations … Survival depends on an appreciation of how the world is, not of any hidden underlying order.[11]

And yet an understanding of the 'hidden underlying order' is precisely what we do have, notably with respect to the laws of physics, discovered through scientific experimentation and the logical manipulation of theoretical mathematics. Two questions are raised here. Why do we have this access, and why does an underlying order exist in the first place?

The latter question has perplexed philosophers of science ever since physicists, stunned by their own remarkable success at understanding so much about the world (and far beyond) paused self-reflectively to ask 'Why is the Universe intelligible?' and 'Why does science work?' Simplistic though these questions appear to be, they aren't, as scientists began to realize that intelligibility

[11] Davies, *The Mind of God*, pp.152-155. Original italics.

was by no means a logical given; that the Universe might just as easily have been chaotic and formless, indeed lifeless, except for the structure of the known laws of nature which, as far as we can tell, are absolutely invariant and pervasive across the entire known Universe. The Universe is ordered, not chaotic. But why is this so?

Here empirical scientists and transcendentalists part company. The former either accept the world as it is without questioning the 'why' of it, or construct elaborate theories which purport the existence of a set of multiple, perhaps an infinite number of other, hidden universes in which all possible permutations of order and disorder occur.[12] Our Universe is the way it is not because of preternatural circumstances but because, in an infinite set, one will inevitably look like ours. This point of view has been criticized, however, as uneconomic, exaggerated and incompatible with Occam's razor, an informal but useful principle which suggests that 'entities should not be multiplied beyond necessity' or, more commonly, 'the simplest solution is probably the correct one.' The transcendental point of view, which postulates the existence of a noumenal (perhaps divine) domain from which the laws of nature emanate, is more parsimonious. Its central claim is that our Universe is unitary, unique and entire unto itself (which agrees with what we perceive to be the case). This presents a very different context for the question of why the Universe is ordered.

If the multiverse is dismissed as theoretically excessive then the only way to explain the singular uniqueness of our Universe is to illuminate some other reason *why* the laws of physics are what they are, and *why* so many constants of nature (from gravity to an electron's charge) are precisely tuned to build galaxies, stars and planets, and to support life as we know it. This is tantamount to asking where those laws come from. One answer appeals to the Platonic realm of perfect Forms.

If the laws of physics came into existence at the time of the Big Bang, then they cannot themselves explain that event because they were not prior to it.[13] If they did exist prior to it, then where did they reside and what form did they take? Paul Davies suggests that pre-existing

[12] See, for example, Brian Greene, *The Hidden Reality: Parallel Universes and the Deep Laws of the Cosmos*, New York: Alfred A. Knopf, 2011. Note the word 'hidden' which denotes the fact that no evidence supports the multiverse theory.

[13] Note that this assumes the time-bound notion that cause precedes effect. Under the highly unusual 'initial conditions' which obtained at the Big Bang, when time and space seem to behave differently, the cause-effect chronology may break down.

"transcendent laws of physics [may be] the modern counterpart of Plato's realm of perfect Forms which acted as blueprints for the construction of the fleeting shadow-world of our perceptions."[14] More succinctly, Werner Heisenberg, author of the well-known uncertainty principle in quantum mechanics, avers that "Modern physics has definitely decided for Plato."[15]

Surprisingly, this cryptic point of view is not uncommon, partly because the field of mathematics in general is also troubled by a similar question. The laws of physics and the constants of nature are expressed numerically, but where exactly does the underlying logical structure of mathematics come from? Like the problem of order in the Universe, this seemingly simplistic question also has no clear answer. One opinion called 'formalism' suggests that mathematics is a human invention, a numerical interpretation of order which otherwise has no substantive existence. It's a tool we manufactured to help us manipulate the material world. Another opinion argues that mathematics – number systems and the rules that govern them – is a whole unto itself;[16] it's discovered, not invented, because it pre-exists as an accessible but immaterial reality. Eminent mathematician and cosmologist Roger Penrose supports the latter perspective:

> Mathematical truth is something that goes beyond mere formalism ... It is as though human thought is … being guided towards some eternal external truth – a truth which has a reality of its own, and which is revealed only partially to any one of us … I imagine that whenever the mind perceives a mathematical idea it makes contact with Plato's world of mathematical concepts … When one 'sees' a mathematical truth, one's consciousness breaks through into this world of ideas, and makes direct contact with it … When mathematicians communicate, this is made possible by each one having *a direct route to truth* … Since each can make contact with Plato's world directly, they can more readily communicate with each other … communication is possible because each is directly in contact with the *same* eternally existing Platonic world.[17]

[14] Davies, *The Mind of God*, pp.91-92.
[15] Cited in William Ophuls, *Plato's Revenge: Politics in the Age of Ecology*, The MIT Press, Cambridge, Massachusetts, 2011, p.50.
[16] Theoretical physicist Max Tegmark argues that the Universe is 'nothing but' mathematics. See Max Tegmark, *The Mathematical Universe: My Quest for the Ultimate Nature of Reality*: Alfred A. Knopf, 2014.
[17] Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics*: Oxford, Oxford University Press, 1989, p.428. Original italics.

Mathematics, like science in general, 'works' in my view because it's a true numerical translation or interpretation of ordered structures (of matter and energy) which inherently lend themselves to such interpretation. The equation $E=mc^2$ surely uses invented symbols, but those symbols represent a pre-existing relationship in nature which, by exploration, we have discovered. Mathematics is an epiphenomenal instantiation of the original underlying order of the Universe; it is not a fully emergent entity with an existence of its own. If it were, it would have causal properties, specifically, downward causation properties which would lend it the power to influence the ordered reality which it interprets. It does not have such power. In fact, sometimes the linkage between mathematics and reality is broken altogether.

There's no question that mathematics is logically structured, but some of its constructed edifices exceed the limits of material reality. One sees these over-extended structures in mathematical ideas and equations which, though perfectly logical in their own right, have no apparent connection to any physical entity. Or, they may purport the hypothetical existence of an unseen ordered structure or process which may or may not exist, in which case, mathematics can serve a useful predictive function, and, indeed, this function has achieved some notable successes.[18] But, given the human capacity to manipulate epiphenomenal symbols with endless dexterity, constructed mathematical objects may simply be recreational, alluding to castles in the air which, though logically possible, are not really there. The multiverse theory may fall into this category.

Mathematics, then, provides a window into an ordered world, perhaps a Platonic world, but that doesn't help explain the source of that order. One obvious approach to the problem of explaining the unique features of our singular Universe is to acknowledge the similarity between the Platonic world of Forms and the ineffable domain of a perfect God. It was Saint Augustine, an early Christian theologian and neo-platonic philosopher, who made the relationship between the two explicit with the postulate that Forms were necessary components of the 'mind of God,' and that divine being was the actual foundation of the otherwise merely possible reality of those Forms. This understanding not only merges Plato's ontology with theology, it also opens a new

[18] For example, the planet Uranus and the positron, a sub-atomic particle, were both predicted mathematically prior to their discovery. Similarly, the Euler beta function, a mathematical novelty, was later found to be directly relevant to string theory.

window on the nature of consciousness as that which links our own sense of semantic awareness with the ultimate source of meaning in the world (and beyond), namely, God.

Of course, the issue raised here from an empirical point of view is that science is based on the concept of naturalism which allows no recourse to supernatural or transcendent forces or entities. Its objective is to explain *how* things happen by interrogating nature impersonally and experimentally. Theology, on the other hand, and transcendentalism in general, are concerned with *why* things happen, relying on intuition and revelation to uncover reasons, not causes. Any successful merging of the two requires the mutual recognition that, first, science is not as concrete as its reputation advertises. Its observations and conclusions are inextricably theory-dependent[19] and much of what is studied remains fundamentally elusive, as previously discussed. And second, that the foundations of theology and morality are not as insubstantial as often portrayed; they are, like science, susceptible to reasoned argument and considered judgement. To deny this point, to draw a pejorative comparison between fact and opinion, would be to lionize science and dismiss as irrelevant the work of philosophers from Rawls and Kant to Aquinas, from Augustine and Socrates to Lao Tzu. Neither misrepresentation is supportable. An appropriate merger of science with transcendentalism would take into account the strengths and shortcomings of each and, in doing so, broaden our understanding of reality to include both how and why questions.

Science and Theology

Cosmologist/theologian John Polkinghorne has offered a useful template for a reconciliation of science with theology, at least with respect to the question of order. Much is known about the initial conditions of the Universe because at that time those conditions were actually very simple. In fact the innate characteristics of the nugget from which the Big Bang erupted were so tightly constrained (to a precision of one part in more than 10^{123} according to Roger Penrose[20]) that the 'fine-tuning' of other physical constants, previously mentioned, pales by many orders of magnitude. In other words, the beginning of the Universe was highly ordered with exceptionally

[19] James Bogen, "Theory and Observation in Science", *The Stanford Encyclopedia of Philosophy* (Summer 2017 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2017/entries/science-theory-observation/>.

[20] Penrose, *The Emperor's New Mind*, pp.339-345. Only a very special set of initial conditions, plus specific laws, can explain the Universe as we see it today

low entropy.[21] This would require either a remarkably propitious set of pre-conditions from which such an event might originate, or it was an expression of a supernatural reality. If it was the latter, then the Big Bang was a moment of divine creation perpetrated, presumably, by God.

The role and impact of powerful contemporary religious institutions notwithstanding, today's metanarrative of Progress and Prosperity is predominantly secular, leaving little room for theological musings. However, because bringing the humanities back into the conversation about our environmental crisis may be critical to our eventual success with respect to that challenge, I'll pursue this line of thinking a little further.

A recurring and deeply perplexing puzzle in all branches of theology has been the nature of the relationship between necessity and contingency – between, for example, the necessarily perfect Forms of the Platonic realm on one hand, and the contingent details of actual but imperfect worldly events on the other, and how one may proceed from the other. One wonders, if God is necessarily perfect, then why would the Big Bang, pregnant with the promise of carbon-based life but including the potential for harm as well as good, be allowed to occur? Polkinghorne answers this way:

> The act of creation is an act of divine self-limitation – an act of kenosis, as the theologians say – on the part of the Creator in allowing creatures truly to be themselves and to make themselves. This implies that, although allowed by God, not all that happens will be in accordance with positive divine will … the Universe is not a divine puppet theatre … evil and suffering are the inescapable shadow side of evolutionary fruitfulness.[22]

In other words, creation is costly to God in the sense that some amount of perfection is given up, some degree of necessity is abandoned for the sake of encountering the living challenge of a contingent world. David Ward expresses a similar opinion by suggesting that Plato's world of archetypes is opened by God to the phenomena of the physical cosmos which participate in it

[21] Entropy is a statistically precise measure of disorder.
[22] John Polkinghorne, *The Anthropic Principle and the Science and Religion Debate*, Faraday Paper #4, The Faraday Institute for Science and Religion, St. Edmund's College, Cambridge: UK, April 2007, p.3.

"partially and imperfectly."[23] This overlap of types of being – the timeless and the merely temporal – allows God to influence and be influenced by the unfolding reality of the Universe as we know it. At the same time, it allows humanity conscious access to the source of absolute value, which provides an appropriate referent for judgement.

To put this in more science-friendly terms, the unique characteristics and singular uniformity of pre-Big Bang conditions quickly evolved into an unpredictably dynamic relationship between necessity in the form of the inviolate laws of physics and the instantiation of those laws in what we would now call quantum mechanical events and processes. The latter embodies the role of chance defined in terms of statistical probabilities, and this intrinsic unpredictability can be understood as the source of openness to the future. The interplay of necessity and chance, the intertwining of degrees of order with an open sensitivity to change means that "The Universe is a world of true becoming in which the future is not an inevitable consequence of the past."[24] Even the putative teleology of an ever-complexifying Universe, or the apparently progressive path of evolutionary biology, might be explained with reference to the underlying ordering principles inherent to complex, chaotic, and quantum systems.

Atheistic or humanist science and those with a penchant for naturalism want no truck with a transcendental deity. They turn instead to the physical and biological sciences for materials needed to construct a new origin story, a new cosmology which can accommodate the (evolutionary) emergence of value and meaning, but which will also inspire wonder and restore a deep concern for all planetary biota, with whom we share a common ancestor. Because this alternative narrative is ostensibly evidence-based, it's believed to be true and universal, so proponents of it argue that 'epic science' can provide sound information and the motivation necessary to galvanize widespread action on environmental issues.[25]

Stuart A. Kauffman develops this perspective at length by embracing the concept of emergence in complex systems. Emergence posits the existence of whole, self-organized structures which

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[23] Keith Ward, 'God as the Ultimate Information Principle', in Paul Davies and Niels Henrik Gregersen (eds.) *Information and the Nature of Reality: From Physics to Metaphysics*, Cambridge: Cambridge University Press, 2010, p.286.

[24] John Polkinghorne, *The Science and Religion Debate: An Introduction*, Faraday Paper #1, The Faraday Institute for Science and Religion, St. Edmund's College, Cambridge: UK, April 2007, p.4.

[25] For more on this, see the discussion "Cosmology and the Environment" at *The Immanent Frame: Secularism, religion and the public sphere*. URL = https://tif.ssrc.org/2015/09/14/cosmology-and-the-environment/

possess causal power[26] above and beyond the lawful constraints imposed on the constituents of elementary matter. These structures occur at all levels of reality, both physical and social, from the molecular to the institutional, and they interact with each other in ways that involve a certain degree of uncertainty because of their autonomous interaction with the determinative laws of physics. It's this emergent uncertainty in combination with quantum fuzziness that produces the "endless creativity of nature" which Kauffman tells us is the scientific stand-in for God. Moreover, not only is nature endlessly creative (that is, open to novelty), but evolution can also account for the appearance of agency, interpretation, values, meaning and purpose. Kauffman argues that these concepts appear prototypically even in early lifeforms such as bacteria which can act (agency), read environmental signals pertaining to the availability of food (interpretation), appreciate the importance of those signals (valuation, and therefore meaning) and move to accomplish the objective of consumption (purpose). On this view, there is no need to call upon theology to explain these transcendent features of life which appear in their fully evolved form with human consciousness and will.

This point of view satisfies the secular predisposition to explain rather than understand. Pursuing this debate in detail would take us too far afield, but it's worth noting that Kauffman's argument in some ways misplays both science and theology. His bacteria example above strikes me as just another form of reductionism, and his atheism prompts him to misleadingly portray God, if such an entity were to exist, as imposing clear strictures of moral behaviour on humanity, thus delimiting the freedom to choose and simultaneously arming fundamentalists with sets of beliefs which could only lead to conflict. The 'epic science' argument, in other words, is as dependent on subjective interpretations and leaps of speculation as any kind of transcendental intuition. In short, neither science nor theology is capable of presenting a logically coercive argument, so it may be that choosing between the two is a matter of personal taste. In this light and given the seriousness of the environmental crisis and the existential threat it presents, it might be prudent to open the door to the humanities a little wider.

The theological discussion presented here is probably closest to the position known as 'panentheism' which postulates that the phenomena of the physical universe – in other words,

[26] To be clear, 'causal power' here refers to the imposition of patterns and determinative or guiding influences which emanate from the whole organization of emergent structures, sometimes called 'downward causation'. These patterns and influences do not constitute new forces beyond the four known forces of nature.

reality as we perceive it – is an immanent manifestation of God and an open-ended encounter with life in which we all participate. It suggests that the Universe is a co-evolutionary partnership between God and lifeforms such as ourselves who can lead lives of our own choosing yet still have access to that part of creation still unblemished by contingencies, that is, to the perfection of God still at play as a necessary precondition for reality to exist at all. But that perfection is vulnerable, vulnerability being the cost of admission to the adventure of real life. And here we find an answer to the other question posed much earlier in this chapter – why do we have the capacity to perceive and understand that which constitutes the Universe itself, its underlying laws and processes, when this capacity serves no survival or reproductive purpose? The answer appears to be that we are co-evolutionists endowed with the responsibility to participate in an interaction between the imperfect and the perfect, the contingent and the necessary, the timeless and the merely temporal. To what purpose I leave the reader to speculate, but clearly meeting this teleological impulse in whatever form would not be possible without the cognitive and transcendental abilities we have and, of course, it remains to be seen how adeptly we use those tools. If we act as best as our natures permit, presumably we will survive and, with good fortune, flourish. If not, the worldline of all that is may be permanently ended.

Science is not helpful with respect to the moral evolution of modern society. It's prosaic and, without access to the poetry of life or to the transcendent dimension of reality, it falls prey to the foibles which afflict any kind of materialist worldview and, ultimately, it founders on the hard rocks of humanity's hubris. We're told by evolutionary science that our concepts of truth, morality, even beauty emerged from some kind of evolutionary imperative, that they serve useful social and reproductive purposes. From an intuitive or revelatory point of view, this is disturbingly prideful and, seemingly, a wilful exaggeration of human exceptionalism. Instead, our capacity to understand as well as explain the world around makes us full participants in a self-aware, co-evolving Universe, and our unique ability to perceive and partake of the intrinsic reality of the Good, the True and the Beautiful provides the opportunity and the relational context from which we may find our bearings in the pursuit of a morally felicitous future.