

# Why This Universe?

## Toward a Taxonomy of Possible Explanations

ROBERT LAWRENCE KUHN

WHEN I WAS 12, IN THE SUMMER BETWEEN seventh and eighth grades, a sudden realization struck such fright that I strove desperately to blot it out, to eradicate the disruptive idea as if it were a lethal mind virus. My body shuddered with dread; an abyss had yawned open. Five decades later I feel its frigid blast still.

*Why not Nothing? <sup>1</sup> What if everything had always been Nothing? Not just emptiness, not just blankness, and not just emptiness and blankness forever, but not even the existence of emptiness, not even the meaning of blankness, and no forever. Wouldn't it have been easier, simpler, more logical, to have Nothing rather than something? <sup>2</sup>*

The question would become my life partner, and even as I learned the rich philosophical legacy of Nothing,<sup>3</sup> I do not pass a day without its disquieting presence. I am haunted. Here we are, human beings, conscious and abruptly self aware, with lives fleetingly short, engulfed by a vast, seemingly oblivious cosmos of unimaginable enormity.<sup>4</sup> While “Why Not Nothing?” may seem impenetrable, “Why This Universe?”, revived by remarkable advances in cosmology, may be accessible. While they are not at all the same question, perhaps if we can begin to decipher the latter, we can begin to decrypt the former. “Why This Universe” assumes there is “Something” and seeks the root reason of why it works for us. I am the creator and host of the PBS television series *Closer To Truth*, and for the past several years I have been bringing together scientists and scholars to examine the meaning and implications of state-of-the-art science. The next *Closer*

*To Truth* series, now in production, focuses on cosmology and fundamental physics, philosophy of cosmology, philosophy of religion, and philosophical theology, and thus I have been inter

viewing cosmologists, physicists, philosophers, and theologians, asking them, among other questions, “Why This Universe?” From their many answers, and from my own night musings, I have constructed a taxonomy<sup>5</sup> that I present here as a heuristic to help get our minds around this ultimate and perennial question.

### The Problem to be Solved

In recent years, the search for scientific explanations of reality has been energized by increasing recognition that the laws of physics and the constants that are embedded in these laws all seem

exquisitely “fine tuned” to allow, or to enable, the existence of stars and planets and the emergence of life and mind. If the laws of physics had much differed, if the values of their constants had much changed, or if the initial conditions of the uni

verse had much varied, what we know to exist would not exist since all things of size and substance would not have formed. Stephen Hawking presented the problem this way:

Why is the universe so close to the dividing line between collapsing again and expanding indefinitely? In order to be as close as we are now, the rate of expansion early on had to be chosen fantastically accurately. If the rate of expansion one second after the big bang had been less by one part in  $10^{10}$ , the universe would have collapsed after a few million years. If it had been greater by one part in  $10^{10}$ , the universe would have been essentially empty after a few million years. In neither case would it have lasted long enough for life to develop. Thus one either has to appeal to the anthropic principle or find some physical explanation of why the universe is the way it is.<sup>6</sup>

To Roger Penrose, the “extraordinary degree of precision (or ‘fine tuning’) that seems to be required for the Big Bang of the nature that we appear to observe...in phase-space-volume

terms, is one part in  $10^{123}$  at least.” Penrose sees “two possible routes to addressing this question...We might take the position that the initial condition was an ‘act of God....’ or we might seek some scientific/mathematical theory.” His strong inclination, he says, “is certainly to try to see how far we can get with the second possibility.”<sup>7</sup>

To Steven Weinberg, it is “peculiar” that the calculated value of the vacuum energy of empty space (due to quantum fluctuations in known fields at well-understood energies) is “larger than

observationally allowed by  $10^{56}$ ,” and if this were to be cancelled “by simply including a suitable cosmological constant in the Einstein field equations [General Relativity], the cancellation would have to be exact to 56 decimal places.” Weinberg states “No symmetry argument or adjustment mechanism could be found that would explain such a cancellation.”<sup>8</sup>

To Leonard Susskind, “the best efforts of the best physicists, using our best theories, predict Einstein’s cosmological constant incorrectly by 120 orders of magnitude!” “That’s so bad,” he says, “it’s funny.” He adds that “for a bunch of numbers, none of them particularly small, to cancel one another to such precision would be a numerical coincidence so incredibly absurd that there must be some other answer.”<sup>9</sup>

The problem to be solved is even broader than this. Sir Martin Rees, Britain’s Astronomer Royal, presents “just six numbers” that he argues are necessary for our emergence from the Big Bang. A minuscule change in any one of these numbers would have made the universe and life, as we know them, impossible.<sup>10</sup> Deeper still, what requires explanation is not only this apparent fine-tuning but also the more fundamental fact that there are laws of physics at all, that we find regularity in nature.

What of our astonishingly good fortune? In 1938 Paul Dirac saw coincidences in cosmic and atomic physics;<sup>11</sup> in 1961 Robert Dicke noted that the age of the universe “now” is conditioned by biological factors;<sup>12</sup> and in 1973 Brandon Carter used the phrase “Anthropic Principle,” which in his original formulation simply draws attention to such uncontroversial truths as that the universe must be such as to admit, at some stage, the appearance of observers within it.<sup>13</sup> Others then took up this oddly evocative idea, calling what seems to be a tautological statement the “Weak Anthropic Principle,” as distinguished from what they defined as the “Strong Anthropic Principle,” which makes the teleological claim that the universe *must* have those properties that allow or require intelligent life to develop.<sup>14</sup> Steven Weinberg used anthropic reasoning more rigorously to provide an upper limit on the vacuum energy (cosmological constant) and to give some idea of its expected value. He argued that “it is natural for scientists to find themselves in a subuniverse in which the vacuum energy takes a value suitable for the appearance of scientists.”<sup>15</sup>

Although the (Weak) Anthropic Principle appears perfectly obvious—some say that a logical tautology cannot be an informative statement about the universe—inverting its orientation may elicit an explanatory surprise: What we can expect to observe must be restricted by the conditions necessary for our presence as observers. Such expectations then suggest, perhaps inevitably, the startling insight that there could be infinite numbers of separate regions or domains or “universes,” each immense in its own right, each with different laws and values—and because the overwhelming majority of these regions, domains, or universes would be non-life-permitting, it would be hardly remarkable that we do not find ourselves in them nor do we observe them. One could conclude, therefore, that while our universe seems to be incredibly fine-tuned for the purpose of producing human beings, and therefore so specially designed for us, it is in fact neither.

Since the 1970s, theists have invoked this fine-tuning argument as empirical

evidence for a creator by asserting that there are only two explanations: God or chance. However to pose such a stark and simplistic choice is to construct a false and misleading dichotomy. Since the Anthropic Principle leads to multiple universes, a “multiverse,” other possible

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explanations are made manifest. I have documented 27 such explanations—a constellation of what I’ll call “ultimate reality generators” in a kind of typology of cosmological conjecture. I’m sure there are more, or some could be subdivided, but generally the taxonomy can be structured with four overarching categories: One Universe Models, Multiple Universe Models, Nonphysical Causes, and Illusions. My claim is that the set of these four categories is universally exhaustive, meaning that whatever the true explanation of “Why This Universe?” it would have to be classified into one (or more) of these categories (irrespective of whether we ever discover or discern that true explanation).<sup>16</sup>

Yet the set of the 27 possible explanations which compose the categories is not universally exhaustive nor is there practical hope of making it so. Therefore unless we can ever answer the “Why This Universe?” question with certainty and finality (a dubious prospect), there will be other explanations out there that cannot be logically excluded. Further, while it might seem tidy for

these explanations to be mutually exclusive—meaning that no two can both be right—such simplicity cannot be achieved. The explanations, and their categories, can be combined in any number of ways—in series, in parallel, and/or nested.

The 27 possible explanations, or ultimate reality generators that follow, are based on criteria that are logically permissible, a logic that for some may seem lenient. I do not, however, confuse speculation with science. Logical possibilities should not be mistaken for scientific theories or even scientific possibilities.<sup>17</sup> A physicist’s speculations do not morph, as if by cosmological alchemy or professional courtesy, from metaphysics into established physics. That said, some of the more intriguing metaphysical possibilities are being proffered by physicists.<sup>18</sup>

I provide scant analysis of the explanations; all are subject to withering attack from experts, as well they should be. And to the critique that the lines of the taxonomy are drawn too sharply, or that my explanations overlap, I can only empathize and encourage the critic to offer a more refined version.

## 1. One Universe Models

We begin with traditional nontheistic explanations (traditionally, one recalls, there was only one universe), which also include a radically nontraditional explanation and the philosophical positions that the question makes no sense and that even if it did make sense it would still be unanswerable.

**1.1 Meaningless Question.** Big “Why” questions such as “Why This Universe?” are words without meaning and sounds without sense; this emptiness of content is epitomized by the ultimate “Why” question—“Why Not Nothing?”<sup>19</sup> As a matter of language, to ask for the ultimate explanation of existence is to ask a question that has no meaning. Human semantics and syntax, and perhaps the human mind itself, are utterly incapable of attaching intelligibility to this concept. Words transcend boundaries of ordinary usage so as to lose their grounding.<sup>20</sup> The deep incoherence here is confirmed by the fact that only two kinds of possible answers are permissible—an infinite regress of causation or something that is inherently self-existing—neither of which can be

confirmable or even cogent. (Logical positivism verifies propositions as cognitively meaningful only by sensory facts or logical grammar.)

**1.2 Brute Fact.** The question makes sense but no answer is possible, even in principle. There has been and is only one universe and its laws seem fine-tuned to human existence simply because this is the way it is; the universe and all its workings stand as a “brute fact”<sup>21</sup> of existence, a terminus of a series of explanations that can brook no further explanation.<sup>22</sup> All things just happen to be and “there is no hint of necessity to reduce this arbitrariness” (Robert Nozick).<sup>23</sup>

**1.3 Necessary/Only Way.** There has been and is only one universe and its laws seem fine-tuned to human existence because, due to the

deep essence of these laws, they must take the form that they do and the values of their constants must be the only quantities they could have. It could never be the case that these laws or values could have any other form or quantity. Finding this “deep

essence” is the hope of Grand Unification Theory or Theory of Everything (TOE); in technical terms, there would be no free parameters in the mathematical equations; all would be determined, derived or deduced from fundamental

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principles.<sup>24</sup> As for the existence of life and mind in this only-way explanation, the laws of biology must be embedded within the laws of physics either inextricably or by happenstance. (And we are fortunate, wildly fortunate, I guess).

#### 1.4 Almost Necessary / Limited Ways.

Physical laws have only a small range in which they can vary, such that the number of possible universes is highly constrained. This means that what would appear on the surface to be most improbable, i.e., a universe that just happens to be hospitable for life and mind, is in its deep structure most probable. (As with 1.3, of which this is a variant, the presence of life and mind still cries out for explanation.)

**1.5 Temporal Selection.** Even though physical laws or the values of their constants may change, regularly or arbitrarily, we have been living during (or at the end of) an extended period of time during which these laws and values happen to have been, for some reason or for no reason, within a range consistent with the existence of stars and planets and the emergence of life and mind. This temporal selection can operate during periods of time following one big bang in a single universe or during vastly greater periods of time following sequential big bangs in an oscillating single universe of endless expansions and contractions.

**1.6 Self Explaining.** The universe is self-creating and self-directing, and therefore self-explaining. In

Paul Davies’ formulation, the emergence of consciousness (human and perhaps other) some

how animates a kind of backward causation to select from among the untold laws and countless values that seem possible at the beginning of the universe to actualize those that would prove consistent with the later evolution of life and mind. In this teleological schema the universe and mind eventually meld and become one, so that it could be the case that the purpose of the universe is to allow it to engineer its own self-awareness.<sup>25</sup>

Note: Quentin Smith theorizes that the “universe caused itself to begin to exist.” By this he means that the universe is a succession of states, each state caused by earlier states, and the Big Bang singularity prevents there from being a first instant. Thus in the earliest hour, there are infinitely many zero-duration instantaneous states of the universe, each caused by earlier states, but with no earliest state.<sup>26</sup> This model, like other atheistic mechanisms that obviate the need for a First Cause or preclude the possibility that God exists, could empower any of these One Universe Models. Similarly, if information is somehow fundamental to reality (as opposed to it being constructed by the human mind to allow us to represent reality), an idea defended by Seth Lloyd (“It from Bit”), information *per se* would undergird or endow these One Universe models (and, for that matter, Multiverse Models as well).<sup>27</sup> Independently, should limitless domains of our possibly infinite universe exist beyond our visible horizon,<sup>28</sup> these domains would still be included in One Universe Models. We would have an inestimably larger universe to be sure but we would still have only one universe to explain.

## 2. Multiple Universe (Multiverse) Models

There are innumerable universes (and/or, depending on one’s definition of “universe,” causally disconnected domains within one spatiotemporal setting), each bringing forth new universes ceaselessly, boundlessly, in a multiverse.<sup>29</sup> What’s more, there are perhaps immeasurable extra dimensions, with all universes and dimensions possessing different sets of laws and values in capricious combinations, yet all somehow coexisting in the never ending, unfurling fabric of the totality of reality. Our reality is the only reality, but there is a whole lot more of it than ever imagined. This means that in the context of this multi-universe, multi-dimensional amalgam, the *meaningful* fine tuning of our universe is a mirage. The fine tuning itself is real, but it is not the product of purpose. Rather it is a statistical surety that is predicted by force, since only in a universe in which observers exist could observers observe (the Weak Anthropic Principle).<sup>30</sup>

Thus, the laws and values engendering sentient life in our universe are not a “fortuitous coincidence” but rather a guaranteed certainty entirely explained by physical principles and natural law.

**2.1 Multiverse by Disconnected Regions (Spatial).** Generated by fundamental properties of spacetime that induce mechanisms to spawn

multiple universes—for example, eternal chaotic inflation (i.e., unceasing phase transitions and bubble nucleations of spacetime) which causes

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spatial domains to erupt, squeeze off in some way, expand (perhaps), and separate themselves forever without possibility of causal contact (Alan Guth,<sup>31</sup> Andre Linde,<sup>32</sup> Alex Vilenkin<sup>33</sup>). **2.2 Multiverse by Cycles (Temporal).**

Generated by an endless sequence of cosmic epochs, each of which begins with a “bang” and ends with a “crunch.” In the Steinhardt-Turok model, it involves cycles of slow accelerated expansions followed by contractions that produce the homogeneity, flatness, and energy needed to begin the next cycle (with each cycle lasting perhaps a trillion years).<sup>34</sup> Roger Penrose postulates a “conformal cyclic cosmology,” where an initial space-time singularity can be represented as a smooth past boundary to the conformal geometry of space-time. With conformal invariance both in the remote future and at the Big Bang origin, he argues, the two situations are physically identical, so that the remote future of one phase of the universe becomes the Big Bang of the next. Though the suggestion is his own he calls it “outrageous.”<sup>35</sup>

**2.3 Multiverse by Sequential Selection (Temporal).** Generated by fertile black holes out of which new universes are created continuously by “bouncing” into new big bangs (instead of collapsing into stagnant singularities). Applying principles of biological evolution to universal development, and assuming that the constants of physics could change in each new universe, Lee Smolin hypothesizes a cosmic natural selection that would favor black holes in sequential (“offspring”) universes, thus increasing over time the number of black holes in sequential universes, because the more black holes there are, the more universes they generate.<sup>36</sup> A multiverse generating system that favors black holes might also favor galaxies and stars (rather than amorphous hydrogen gas), but jumping all the way to favor life and mind, however, is a leap of larger magnitude.

**2.4 Multiverse by String Theory (with Minuscule Extra Dimensions).** String theory postulates a vast “landscape” of different “false

vacua,” with each such “ground state” harboring different values of the constants of physics (such that on occasion some are consistent with the emergence of life). Structured with six, seven or more extra dimensions of subatomic size, string theory thus generates its own kind of multiple universes (Leonard Susskind).<sup>37</sup>

**2.5 Multiverse by Large Extra Dimensions.**

Generated by large, macroscopic extra dimensions which exist in reality (not just in mathematics), perhaps in infinite numbers, forms and structures, yet which cannot be seen or apprehended (except perhaps by the “leakage” of gravity).<sup>38</sup> Multiple universes generated by extra dimensions may also be cyclical.<sup>39</sup>

**2.6 Multiverse by Quantum Branching or Selection.**

Generated by the many-worlds interpretation of quantum theory as formulated by Hugh Everett and John Wheeler in which the world forks at every instant so that different and parallel “histories” are forming continuously and exponentially, with all of them existing in some meta-reality.<sup>40</sup> This means that whenever any quantum object is in any quantum state a new universe will form so that in this perpetual process an incalculable number of parallel universes come into existence, with each universe representing each unique possible state of every possible object. Stephen Hawking has conceptualized this staggering cascade of “branching universes” as a kind of retro-selection, in which current decisions or observations in some sense select from among immense numbers of possible universal histories, that exist simultaneously and represent every state of every object and which the universe has somehow already lived.<sup>41</sup>

**2.7 Multiverse by Mathematics.** Generated by Max Tegmark’s hypothesis that every conceivable mathematical form or structure corresponds to a physical parallel universe which actually exists.<sup>42</sup>

**2.8 Multiverse by All Possibilities.**

Generated by the hypothesis that each and every logically possible mode of existence is a real thing and really exists, that possible worlds are as real as the actual world, and that being merely possible rather than actual just means existing somewhere

else (David Lewis's "modal realism";<sup>43</sup> Robert Nozick's "principle of fecundity"<sup>44</sup>).

Note: For Paul Davies, "The multiverse does not provide a complete account of existence, because it still requires a lot of unexplained and very 'convenient' physics to make it work." There has to be, he says, a "universe-generating mecha-

nism" and "some sort of ingenious selection still has to be made," and that unless all possible worlds really exist (2.7 and 2.8), "a multiverse which contains less than everything implies a rule that separates what exists from what is possible but does not exist,"—a rule that "remains unexplained." And regarding all possible worlds really

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existing, Davies states, "A theory which can explain anything at all really explains nothing."<sup>45</sup> According to Richard Swinburne, arguing for theism, the problem is not solved by invoking multiple universes: the issue that would remain, he says, is why our multiple universe would have the particular characteristic it does, that is, of producing at least one universe fine-tuned for life. And to

postulate a mechanism that produces every kind of universe, he adds, would be to postulate a mechanism of enormous complexity in order to explain the existence of our universe, which would go far beyond the simplest explanation of the data of our universe as well as raise the question of why things are like that.<sup>46</sup> According to Quentin Smith, arguing for atheism, it cannot yet be determined if a multiverse, which he calls speculation not science, is even logically possible.<sup>47</sup>

### 3. Nonphysical Causes

This universe, however unfathomable, is fine-tuned to human existence because a nonphysical Cause made it this way. The Cause may be a Person, Being, Mind, Force, Power, Entity, Unity, Presence, Principle, Law, Proto-Law, Stuff or Feature. It is likely transcendent and surely irreducible; it exists beyond the boundaries and constraints of physical law, matter, energy, space and time; and while it is the Cause it does not itself have or need a Cause. There is blur and overlap among these explanations, yet each is sufficiently different in how it claims to generate ultimate reality, and sufficiently opposed to the claims of its competitors, as to warrant distinction.

**3.1 Theistic Person.** A Supreme Being who in Christian philosophy is portrayed as incorporeal, omnipotent, omniscient, perfectly free, perfectly good, necessarily existent and the creator of all things, and who is also a "person" with person-like characteristics such as beliefs, intents and purposes; a "divine being" (as defined by Richard Swinburne<sup>48</sup>), a theistic God (as defended by Alvin Plantinga<sup>49</sup>) with a "nature."<sup>50</sup> In Judaic-Christian tradition, the existence-as-essence Name offered to Moses—"I am that I am."<sup>51</sup> In Islamic philosophy, the concepts of Unity, the Absolute, Beyond Being.<sup>52</sup> In modern thought, God as underlying fundamental reality, entailing the meaning of universe and life (George Ellis);<sup>53</sup> God as working through special divine action, interventionist or noninterventionist (Robert John Russell).<sup>54</sup> The affirmative creative act of this theistic God may bring the universe into being by a creation from nothing (*creatio ex nihilo*),<sup>55</sup> or may be a continuing creative sustenance of the universe (*creatio continua*), or both.<sup>56</sup> A theistic explanation of ultimate reality

is logically compatible with both One Universe and Multiverse Models.<sup>57</sup>

**3.2 Ultimate Mind.** A Supreme Consciousness that hovers between a personal theistic God and an impersonal deistic first cause; a nonpareil artist who contemplates limitless possibilities; a quasi-Being with real thoughts who determines to actualize certain worlds (Keith Ward).<sup>58</sup> Understanding this kind of God does not begin with an all-powerful "person" but rather with an unfathomable reservoir of potentialities as expressed in all possible universes, for which Ultimate Mind is the only and necessary basis.

**3.3. Deistic First Cause.** An impersonal Primal Force, Power or Law that set the universe in motion but is neither aware of its existence nor involved with its activity. The idea requires initializing powers but rejects beliefs, intents and purposes, active consciousness, self-awareness or even passive awareness. There is no interaction with creatures (humans).<sup>59</sup>

**3.4 Pantheistic Substance.** Pantheism equates God with nature in that God is all and all is

God.<sup>60</sup> The universe (all matter, energy, forces and laws) is identical with a ubiquitous metaphysical entity or stuff, which to Baruch Spinoza possessed unlimited attributes and was the uncaused “substance” of all that exists. The pantheistic “God,” nontheistic and impersonal, is the paragon of immanence in that it is neither external to the world nor transcendent of it. In diverse forms, pantheism appears in Western philosophy (Plotinus’s “One,” Hegel’s “Absolute”), process the

ology, and some Eastern religions (Taoism; later Buddhism; Hinduism where Brahman is all of existence).<sup>61</sup> Pantheism finds a unity in everything that exists and in this unity a sense of the divine.<sup>62</sup>

**3.5 Spirit Realms.** Planes, orbs, levels, domains and dimensions of spirit existence as the true, most basic form of reality. Described by mystics, mediums, and occult practitioners, and exemplified by mystic, polytheistic and animistic

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religions, these spirit realms are populated by the presence of sundry spirit beings and laced with complex spiritual rituals and schemas (some good, some evil).<sup>63</sup>

**3.6 Consciousness as Cause.** Pure Consciousness as the fundamental stuff of reality out of which the physical world is generated or expressed.<sup>64</sup> It is the explanation claimed or typified by certain philosophical and quasi-theological systems, Eastern religions, mystic religions, and cosmic consciousness devotees, and by some who accept the actuality of paranormal phenomena.<sup>65</sup> For example, Buddhism and Rigpa in Tibetan Buddhism<sup>66</sup> (omniscience or enlightenment without limit).<sup>67</sup> Even some physicists ponder the pre-existence of mind.<sup>68</sup>

**3.7 Being and Non-Being as Cause.** Being and Non-Being as ineffable dyadic states that have such maximal inherent potency that either one can somehow bring all things into existence. In Taoism, the invisible Tao (Way) gives rise to the universe; all is the product of Being, and Being is the product of Not-being.<sup>69</sup> In Hinduism, it is the Brahman (unchanging, infinite, immanent, transcendent).<sup>70</sup> The Ground of All Being; Great Chain of Being; Great Nest of Spirit (Ken Wilbur).<sup>71</sup>

**3.8 Abstract Objects / Platonic Forms as Cause.** Although philosophers deny that abstract objects can have causal effects on concrete objects (abstract objects are often defined as causally inert), their potential, say as a collective, to be an explanatory source of ultimate reality cannot be logically excluded. (This assumes that abstract

objects, like mathematics, universals and logic, manifest real existence on some plane of existence not in spacetime.) Platonic Forms, abstract entities that are perfect and immutable and exist independently of the world of perceptions, are occasionally suspected of possessing some kind of causal or quasi-casual powers.<sup>72</sup>

**3.9 Principle or Feature of Sufficient Power.** An all-embracing cosmic principle beyond being and existence, such as Plato’s “the Good” or John Leslie’s “ethical requiredness”<sup>73</sup> or Nicholas Rescher’s “cosmic values,”<sup>74</sup> or some defining characteristic so central to ultimate reality and so supremely profound that it has both creative imperative and causative potency to bring about being and existence. Derek Parfit says it might be no coincidence if, of the countless cosmic possibilities or ways reality might be, one has a very special feature, *and* is the possibility that obtains (actually exists). “Reality might be this way,” he says, “because this way had this feature.” He calls this special feature the “Selector,” and two candidates he considers are “being law-governed and having simple laws.”<sup>75</sup>

Note: Cyclical universes of Eastern religious traditions can be consistent with all of these non physical ultimate reality generators,<sup>76</sup> although the Western Theistic Person (3.1) would normally be excluded. To Derek Parfit, if we take the apparent fine-tuning of the universe to support, not some multiverse or many-worlds hypothesis, but some theistic hypothesis, this should invoke a creator who may be omnipotent, and omniscient, but who isn’t wholly good, or indeed significantly good. What we can see of reality, he says, counts very strongly against this hypothesis.<sup>77</sup>

## 4. Illusions

This universe, everything we think we know, is not real. Facts are fiction; nothing is fundamental; all is veneer, through and through.

**4.1 Idealism.** As argued by generations of idealistic philosophers, all material things are manifestations of consciousness or assemblies of mind, so that while the physical world appears to be composed of non-mental stuff, it is not.<sup>78</sup>

**4.2 Simulation in Actual Reality.** We exist merely or marginally in someone's or some thing's simulation, in an artificial world that actually exists in terms of having physical particles and forces and galaxies and stars, but that entirety is not what it seems because that entirety is

derivative not original. Andre Linde analyzes "baby universe formation" and then asks, "Does this mean that our universe was created not by a divine design but by a physicist hacker?"<sup>79</sup> Paul Davies speaks of "fake universes," and of those beings who created them as "false gods;" and he ponders that if multiple universes really exist, the great majority of them may be fakes because some of them (there are so many) would have spawned, at some time or another, unthinkable superior beings who would have

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had the capacity to create these fake universes—and once they could have done so they would have done so, creating immensely many fake universes and thereby swamping the real ones.<sup>80</sup>

**4.3 Simulation in Virtual Reality.** We exist merely or marginally in someone's or something's simulation, in an artificial sensory construction that is an imitation of what reality might be but is

### A Work in Process

If it seems improbable that human thought can make distinguishing progress among these categories and explanations, consider the formulating progress already made. Two centuries ago the available options were largely Nonphysical Causes (Category 3) structured simplistically. A century ago scientists assumed that our own galaxy, the Milky Way, was the entire universe. Today we grasp the monumental immensity of the cosmos.

How to explore "Why Not Nothing?" A taxonomy of possible explanations for "Why This Universe?" may suggest new seas to sail, if only by loosening our mental moorings from the one or two cultural conditioned explanations that are generally and uncritically accepted.<sup>83</sup> Nonetheless there remains a great gulf between the two ques-

tions: even if we eventually obtain the explanation of this universe we may still have made no progress on why there is something rather than nothing.<sup>84</sup>

**4.4 Solipsism.** The universe is wholly the creation of one's own mind and thereby exists entirely in and for that mind.<sup>82</sup>

tions: even if we eventually obtain the explanation of this universe we may still have made no progress on why there is something rather than nothing.<sup>84</sup>

Cosmological visions are overwhelming, but I am oddly preoccupied with something else. How is it that we humans have such farsighted understanding after only a few thousand years of historical consciousness, only a few hundred years of effective science, and only a few decades of cosmological observations? Maybe it's still too early in the game. Maybe answers have been with us all along. This is a work in process and diverse contributions are needed.<sup>85</sup> ▼

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### Endnotes and References

1. Quentin Smith would reformulate my awestruck "Why not Nothing?...." so as to satisfy an analytical philosopher. He points out (in a personal communication) that it is a logical fallacy to talk about "nothing," to treat "nothing" as if it were "something" (with properties). To say "there might have been nothing" implies "it is possible that there is nothing". "There is" means "something is." So "there is

nothing" means "something is nothing," which is a logical contradiction. His suggestion is to remove "nothing" and replace it by "not something" or "not anything", since one can talk about what we mean by "nothing" by referring to *something* or *anything* of which there are no instances (i.e., the concept of "something" has the property of not being instantiated). The common sense way to talk about Nothing is to talk about something and negate it, to deny that there is something. Smith

would rewrite my lines about like this: "*There is some thing. But why? There might not ever have been anything at all. Why are there existents rather than no existents?*" As for Nothing being "easier," Smith says that the word connotes that it would have been easier for "God," and God he does not like at all. So my passage becomes, "*Wouldn't it have been easier if there were not even one thing, in the sense that there is no causal activity, whereas things require causes to bring them into*



existence? Wouldn't it have been simpler in the sense that there are zero things if there are no things, and that as a number zero is simpler than one, two, three or any other number? Wouldn't it have been more logical in the sense that the laws of logic do not imply there are things and if there are things, that fact is inexplicable in terms of the laws of logic?" (For euphony, as well as simplicity, I will continue to use

"Nothing"—Quentin, my apologies.) 2.

No argument, only the fact of the matter, dissuades me from continuing to sense, following Leibniz, that Nothing, no uni verse, is simpler and easier, the least arbitrary and most logical descriptor of ultimate reality (Leibniz, Gottfried. 1714. *The Principles of Nature and Grace*). An empty world, Nothing, would then be followed by, in order of increasing

complexity, illogic and oddity: infinite numbers of universes (for parsimony, "all" is second only to "none"), one universe (it's all we know but inconceivable to explain), few but-not-many universes (maybe there's some simple generating principle at work), innumerable-but-finite numbers of universes, and many-but-not-innumerable universes. Peter van Inwagen argues that since there can be infinitely many non-empty worlds (populated by things, any things at all), but only one empty world ("Nothing"), the likelihood that any given world is non-empty (not Nothing) is maximally probable (i.e., the probability of Nothing is zero). van Inwagen, Peter. 1996. "Why Is There Anything at All?" *Proceedings of the Aristotelian Society*, pp. 95-110. The argument is fascinating and hinges on two

assumptions: (i) all possible populated worlds have the same probability and (ii) the probability of the empty world (Nothing) is no different than that of any of the infinite number of possible populated worlds. While recognizing that the empty world is vastly, even infinitely, easier to describe, van Inwagen reasons that this should not increase its relative probability unless "one is covertly thinking that there is something that is outside the 'Reality'...[like] a 'pre-cosmic selection machine', not a part of Reality" (for Leibniz this was God)...or "some thing that determines that *there being nothing* is the 'default setting' on the control-board of Reality." "But there could be no such thing," van Inwagen argues, "for nothing is outside Reality," and he concludes, tentatively, that "the simplicity

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of the empty world provides us with no reason to regard it as more probable than any other possible world." Yet I find it hard to get out of my head the sense that the *a priori* probability of an empty world (Nothing) is greater than that of any possible populated world (Something) in that to have Something seems to require a second step (and likely many more), a process or rule or capricious happening that generates whatever is populating whatever world. If so, any given possible world (Something) would be less parsimonious than the empty world (Nothing), which would mean that the probability of the empty world (Nothing) would be greater than zero.

3. Martin Heidegger famously called "Why is there something rather than nothing?" the fundamental question of metaphysics. Heidegger, Martin. 1959. *Introduction to Metaphysics*. New Haven: Yale University Press. Leibniz. 1714. Parfit, Derek. 1998. "Why Anything? Why This?" *London Review of Books*. January 22, pp. 24-27 and February 5, pp. 22-25. van Inwagen. 1996. (van Inwagen says "we can make some progress...if we do not panic.") Leslie, John. 1998. *Modern Cosmology and Philosophy*. Amherst, N.Y.: Prometheus Books. Rundle, Bede. 2004. *Why is there Something Rather than Nothing*. Oxford: Clarendon Press. (Rundle seeks "what might be possible in areas where it is so easy to think that we have come to a dead end.") Leslie, John. 2005. Review of *Why is there Something Rather than Nothing* by Bede Rundle. *MIND*. January 2005. Nagel, Thomas. 2004. Review of *Why is there Something Rather than Nothing* by Bede Rundle. *Times Literary Supplement*. May 7. "Nothing."

Stanford Encyclopedia of Philosophy.  
http://plato.stanford.edu

/entries/nothingness/. Carlson, Erik and Erik J. Olsson. 1998. "The Presumption of Nothingness." *Ratio*, XIV, 2001: 203-221. Nozick, Robert. 1981. "Why is there Something Rather than Nothing." *Philosophical Explanations*. Cambridge, MA: Harvard University Press, Ch. 2. Nozick's aim is "to loosen our feeling of being trapped by a question with no possible answer." He says that "the question cuts so deep, however, that any approach that stands a chance of yielding an answer will look extremely weird. Someone who proposes a non-strange answer shows he didn't understand the question." "Only one thing," he says, "could leave nothing at all unexplained: a fact that explains itself." He calls this "explanatory self-subsumption."

4. To Quentin Smith, grasping the universe as a world-whole and asking "Why?" engenders global awe, feeling-sensations that tower and swell over us in response to the stunning immensity of it all. The more we consider this ultimate question of existence, he believes, the more our socio-culture would improve. (Personal communication and Smith, Quentin. 1986. *The Felt Meanings of the World: A Metaphysics of Feeling*. West Lafayette, Indiana: Purdue University Press.) Arthur Witherall argues "that a feeling of awe [wonder, astonishment, and various other affective states] at the existence of something rather than nothing is appropriate and desirable," perhaps because "there is a fact-transcendent meaning to the existence of the world." (Witherall, Arthur. Forthcoming, *Journal of Philosophical Research* — <http://www.hedweb.com/witherall/existence.htm>, 2006). Santayana describes existence as "logically inane and morally comic" and "a truly

monstrous excrescence and superfluity." (Santayana, George. 1955. *Scepticism and Animal Faith*. New York: Dover Publications, p. 48).

5. This is new territory and the first step in methodical exploration is often to construct a taxonomy. How could we: (i) discern and describe all possible explanations of ultimate reality (devised by human intelligence or imagined by human speculation); and then (ii) classify and array these possible explanations into categories so that we might assess and compare their essence, efficacy, explanatory potency and interrelationships?
6. Hawking, Stephen. 1996. "Quantum Cosmology." In Hawking, Stephen and Roger Penrose. *The Nature of Space and Time*. Princeton, NJ: Princeton University Press, pp. 89-90.
7. Penrose, Roger. 2005. *The Road to Reality: A Complete Guide to the Laws of the Universe*. New York: Knopf, p. 726-732, 762-765. Penrose's analysis of the "extraordinary 'specialness' of the Big Bang" is based on the Second Law of Thermodynamics and the "absurdly low entropy" [i.e., highly organized] state of the very early universe.
8. Weinberg, Steven. 2007. "Living in the Multiverse." In Carr, Bernard, ed. *Universe or Multiverse*. Cambridge, UK: Cambridge University Press.
9. Susskind, Leonard. 2005. *The Cosmic Landscape: String Theory and the Illusion of Intelligent Design*. Boston MA: Little, Brown, p. 66, 78-82.
10. Rees, Martin. 2000. *Just Six Numbers: The Deep Forces That Shape the Universe*. New York: Basic Books. Following are Rees' six numbers:  
 $N = 10^{36}$ , the ratio of the strength of electric forces that hold atoms together to the force of gravity between them such that if  $N$  had just a few less zeros, only a short-lived and miniature universe could exist, which

would have been too young and too small for life to evolve.

$\epsilon$  (epsilon) = .007, a definition of how firmly atomic nuclei bind together such that if  $E$  were .006 or .008 matter could not exist as it does.

$\Omega$  (omega)  $\approx 1$ , the amount of matter in the universe, such that if  $\Omega$  were too high the universe would have collapsed long ago and if  $\Omega$  were too low no galaxies would have formed.

$\lambda$  (lambda) =  $\sim 0.7$ , the cosmological constant, the positive energy of empty space, an "antigravity" force that is causing the universe to expand at an accelerating rate, such that if  $\lambda$  were much larger the universe would have expanded too rapidly for stars and galaxies to have formed.

$Q = 1/100,000$ , a description of how the fabric of the universe depends on the ratio of two fundamental energies, such that if  $Q$  were smaller the universe would be inert and featureless and if  $Q$  were much larger the universe would be violent and dominated by giant black holes.

$D = 3$ , the number of dimensions in which we live such that if  $D$  were 2 or 4 life could not exist.

11. Dirac, P.A.M. 1938. *Proceedings of the Royal Society A* 165, 199-208. Dirac noted that for some unexplained reason the ratio of the electrostatic force to the gravitational force between an electron and a proton is roughly equal to the age of the universe divided by an elementary time constant, which suggested to him that the expansion rate of the macroscopic universe was somehow linked to the microscopic subatomic world (and that gravity varied with time). Although his inference was in error,

Dirac's observation enabled a novel way of thinking about the universe.

12. Dicke, Robert H. 1961. "Dirac's cosmology and Mach's principle." *Nature* 192: 440. In order for the universe to host biological observers, it has to be sufficiently old so that carbon would already have been synthesized in stars and sufficiently young so that main sequence stars and stable planetary systems would still continue to exist ("golden age"). Dicke, Robert H. 1970. *Gravitation and the Universe*. Philadelphia: American Philosophical Society.
13. Carter, Brandon. 1973. "Large Number Coincidences and the Anthropic Principle in Cosmology," reprinted in Leslie, John. 1999. *Modern Philosophy and Cosmology*. Amherst, NY: Prometheus Books.
14. Barrow, John D. and Frank Tipler. 1986. *The Anthropic Cosmological Principle*. New York: Oxford University Press.
15. Weinberg, 2007, op cit. Weinberg, Steven. 1987, "Anthropic Bound on the Cosmological Constant." *Physical Review Letters* 59, 22 2607-2610.
16. Methodologically, I first try to expand the possible explanations and their categories, striving to be universally exhaustive—my objective here—and only later try, in some way, to cull them by data, analysis or reasoning. (Falsification for most of these "ultimate reality generators" is unrealistic.) After Paul Davies presents the pros and cons of the various main positions he offers to answer the ultimate questions of existence, he asks a dull but deeply profound question, "Did I leave any out?" Davies, Paul. 2006. *The Goldilocks Enigma: Why is the Universe*

*Just Right for Life?* London: Allen Lane / Penguin Books, p. 302.

17. "Modal logic" allows an infinite number of logical possibilities that are (or seem) scientifically impossible. Smith, Quentin. Personal communication.
18. That the explanation for the universe may be hard to understand is no surprise to Derek Parfit. "If there is some explanation of the whole of reality, we should not expect this explanation to fit neatly into some familiar category. This extraordinary question may have an extraordinary answer." Parfit. January 22, 1998.
19. Those who contend that "Why Not Nothing?" is a Meaningless Question (1.1) often rely on what they believe to be logical contradictions in the concepts "Nothing" and "Something." For example, they argue that the statement "There is Nothing" has no referent and makes no legitimate claim; something more, such as a location of the Nothing, must be specified to complete it and make it meaningful, but any such addition contradicts itself in that by specifying Something it destroys Nothing (as it were). Rundle. 2004. Olsson, Erik, J. 2005. *Notre Dame Philosophical Reviews*. March 3. <http://ndpr.nd.edu/review.cfm?id=2081>. See Endnote 1. In like manner, the question "Why is there Something?" makes a simple logical mistake in that it presupposes an antecedent condition that can explain that Something, but there can be no such antecedent condition because it too must be subsumed in the Something which must be explained. Edwards, Paul. 1967. "Why" in Edwards, Paul, ed. *The Encyclopedia of Philosophy*. New York: Macmillan, vol. 8, pp. 300-301. Witherall, 2006.
20. Nagel, 1981. As John Leslie puts this view, "Metaphysical efforts to explain the cosmos offend against grammar in Wittgenstein's sense." Leslie, 2005.
21. To be a brute fact, a universe does not depend on any particular universe-generating mechanism—Big Bang, steady state, complex cyclical can all fit the brute fact framework. A multiverse or surely a God can be a brute fact. The point is that there must be a terminal explanation: a brute fact as far as you can ever get, even in principle.
22. Bertrand Russell said "The universe is just there, and that's all." Russell, Bertrand and F.C. Copleston. 1964. "The Existence of God." In Hick, John, ed. *Problems of Philosophy Series*. New York: Macmillan & Co., p. 175. Parfit states that "If it is random what reality is like, the Universe not only has no cause. It has no explanation of any kind." Of the explanatory possibilities, he later notes that
23. Brute Fact "seems to describe the simplest, since its claim is only that reality has no explanation." Parfit. February 5, 1998. Smith, Quentin. 1997. "Simplicity and Why the Universe Exists." *Philosophy* 71: 125-32.
24. Weinberg, Steven. 1983. *Dreams of a Final Theory: The Scientist's Search for the Ultimate Laws of Nature*. New York: Vintage Books. Witten, Edward. 2002. "Universe on a String." *Astronomy* magazine (June 2002). Gell-Mann, Murray. 1994. *The Quark and the Jaguar*. New York: W.H. Freeman. Greene, Brian. 2003. *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*. Reissue edition. New York: W.W. Norton. 25. Davies, 2006. Davies, Paul. 1993. *The Mind of God*. London: Penguin. Personal communication. Davies, Paul. 2005. In Harper, Charles L., Jr., ed. *Spiritual Information: 100 Perspectives on Science and Religion*. West Conshohocken, PA: Templeton Foundation Press.
26. Smith, Quentin. 2007. "Kalam Cosmological Arguments for Atheism." In Martin, Michael, ed., *The Cambridge Companion to Atheism*. Smith, Quentin. 1999. "The Reason the Universe Exists is that it Caused Itself to Exist", *Philosophy*, Vol. 74, pp. 136-146. Personal communication.
27. Lloyd, Seth. 2006. *Programming the Universe: A Quantum Computer Scientist Takes On the Cosmos*. New York: Knopf.
28. To any observers, the visible horizon of the universe that they see, the farthest they can ever see, is bounded by the speed of light multiplied by the age of the universe such that light could have traveled only so far in so long. (In special relativity, a "light cone" is the geometric pattern describing the temporal evolution of a flash of light in Minkowski spacetime. Wikipedia, [http://en.wikipedia.org/wiki/Light\\_cone](http://en.wikipedia.org/wiki/Light_cone).)
29. Rees, Martin J. 1998. *Before the Beginning: Our Universe and Others*. New York: Perseus Books. Rees, Martin J. 2004. *Our Cosmic Habitat*. Princeton, NJ: Princeton University Press. Rees, Martin J. 1999. "Exploring Our Universe and Others," *Scientific American*, December. Leslie, John. 1989. *Universes*. London: Routledge. Davies, 2006, p. 299. Personal communication.
30. Weinberg, 1987. Weinberg, 2007.

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20. Nagel, 1981. As John Leslie puts this view, "Metaphysical efforts to explain the cosmos offend against grammar in Wittgenstein's sense." Leslie, 2005.
21. To be a brute fact, a universe does not depend on any particular universe-generating mechanism—Big Bang, steady state, complex cyclical can all fit the brute fact framework. A multiverse or surely a God can be a brute fact. The point is that there must be a terminal explanation: a brute fact as far as you can ever get, even in principle.
22. Bertrand Russell said "The universe is just there, and that's all." Russell, Bertrand and F.C. Copleston. 1964. "The Existence of God." In Hick, John, ed. *Problems of Philosophy Series*. New York: Macmillan & Co., p. 175. Parfit states that "If it is random what reality is like, the Universe not only has no cause. It has no explanation of any kind." Of the explanatory possibilities, he later notes that

Brute Fact "seems to describe the simplest, since its claim is only that reality has no explanation." Parfit. February 5, 1998. Smith, Quentin. 1997. "Simplicity and Why the Universe Exists." *Philosophy* 71: 125-32. 23. Nozick, 1981.

24. Weinberg, Steven. 1983. *Dreams of a Final Theory: The Scientist's Search for the Ultimate Laws of Nature*. New York: Vintage Books. Witten, Edward. 2002. "Universe on a String." *Astronomy* magazine (June 2002). Gell-Mann, Murray. 1994. *The Quark and the Jaguar*. New York: W.H. Freeman. Greene, Brian. 2003. *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*. Reissue edition. New York: W.W. Norton. 25. Davies, 2006. Davies, Paul. 1993. *The Mind of God*. London: Penguin. Personal communication. Davies, Paul. 2005. In Harper, Charles L., Jr., ed. *Spiritual Information: 100 Perspectives on Science and Religion*. West Conshohocken, PA: Templeton Foundation Press.

26. Smith, Quentin. 2007. "Kalam Cosmological Arguments for Atheism." In Martin, Michael, ed., *The Cambridge*

*Companion to Atheism*. Smith, Quentin. 1999. "The Reason the Universe Exists is that it Caused Itself to Exist", *Philosophy*, Vol. 74, pp. 136-146. Personal communication.

27. Lloyd, Seth. 2006. *Programming the Universe: A Quantum Computer Scientist Takes On the Cosmos*. New York: Knopf.

28. To any observers, the visible horizon of the universe that they see, the farthest they can ever see, is bounded by the speed of light multiplied by the age of the universe such that light could have traveled only so far in so long. (In special relativity, a "light cone" is the geometric pattern describing the temporal evolution of a flash of light in Minkowski spacetime. Wikipedia, [http://en.wikipedia.org/wiki/Light\\_cone](http://en.wikipedia.org/wiki/Light_cone).)

29. Rees, Martin J. 1998. *Before the Beginning: Our Universe and Others*. New York: Perseus Books. Rees, Martin J. 2004. *Our Cosmic Habitat*. Princeton, NJ: Princeton University Press. Rees, Martin J. 1999. "Exploring Our Universe and Others," *Scientific American*, December. Leslie, John. 1989. *Universes*. London: Routledge. Davies, 2006, p. 299. Personal communication.

30. Weinberg, 1987. Weinberg, 2007.

Personal communication. There is hardly unanimity about the Anthropic Principle among physicists, some of whom characterize it as betraying the quest to find fundamental first principles that can

- explain the universe and predict its constituents. David Gross “hates” it, comparing it to a virus—“Once you get the bug, you can’t get rid of it.” Overbye, Dennis. 2003. “Zillions of Universes? Or Did Ours Get Lucky?” *New York Times*. October 28. Personal communication.
31. Guth, Alan. 1981. “The Inflationary Universe: A Possible Solution to the Horizon and Flatness Problems.” *Phys. Rev. D* 23, 347. Guth, Alan. 1997. *The Inflationary Universe: The Quest for a New Theory of Cosmic Origins*. Boston: Addison-Wesley.
32. Linde, Andrei. 1982. “A New Inflationary Universe Scenario: A Possible Solution of the Horizon, Flatness, Homogeneity, Isotropy and Primordial Monopole Problems.” *Phys. Lett. B* 108, 389. Linde, Andrei. 1990. *Particle Physics and Inflationary Cosmology*. Chur, Switzerland: Harwood. Linde, Andrei. 2005. “Inflation and String Cosmology.” *J. Phys. Conf. Ser.* 24 151–60. Linde, Andrei. 1991. “The Self Reproducing Inflationary Universe.” *Scientific American*, November 1991, 48-55. Linde, Andrei. 2005. “Current understanding of inflation.” *New Astron. Rev.* 49:35-41. Linde, Andrei. 2005. “Choose Your Own Universe,” in Harper, 2005.
33. Vilenkin, Alex. 2006. *Many Worlds in One: The Search for Other Universes*. New York: Hill and Wang.
34. Steinhardt, Paul J. and Neil Turok. 2002. “A Cyclic Model of the Universe.” *Science*, May 2002: Vol. 296. no. 5572, pp. 1436–1439. The authors claim that a cyclical model may solve the cosmological constant problem—why it is so vanishingly small and yet not zero—by “relaxing” it naturally over vast numbers of cycles and periods of time exponentially older than the Big Bang estimate. Steinhardt, Paul J. and Neil Turok. 2006. “Why the Cosmological Constant is Small and Positive.” *Science* 26 May 2006: Vol. 312. no. 5777, pp. 1180–1183. The oscillating universe hypothesis was earlier suggested by John Wheeler, who in the 1960s posited this scenario in connection with standard recontracting Friedman cosmological models (I thank Paul Davies for the reference).

35. Penrose, Roger. “Before the Big Bang: An Outrageous New Perspective and Its Implications for Particle Physics.” *Proceedings of the EPAC 2006*, Edinburgh, Scotland. 36. Smolin, Lee. 1992. “Did the universe evolve?” *Classical and Quantum Gravity* 9, 173–191. Smolin, Lee. 1997. *The Life of the Cosmos*. New York: Oxford University Press. Since a black hole is said to have at its center a “singularity,” a point at which infinitely strong gravity causes matter to have infinite density and zero volume and the curvature of spacetime is infinite and ceases to exist as we know it, and since the Big Bang is said to begin under similar conditions, the idea that the latter is engendered by the former seems less far-fetched. In 1990 Quentin Smith proposed that our Big Bang is a black hole in another universe, but said that it could not be a genuine scientific theory unless a new solution to Einstein’s ten field equations of general relativity could be developed, Smith, Quentin. 1990. “A Natural Explanation of the Existence and Laws of Our Universe,” *Australasian Journal of Philosophy* 68, pp. 22-43. It is a theory that Smith has since given up. Personal communication. Smolin called his theory a “fantasy.”
37. Susskind, Leonard, “The anthropic landscape of string theory.” arXiv:hep-th/0302219. Susskind, 2005. The string theory landscape is said to have  $\sim 10^{500}$  expressions.
38. Randall, Lisa. 2006. *Warped Passage: Unraveling the Mysteries of the Universe’s Hidden Dimensions*. New York: Harper Perennial.
- Krauss, Lawrence. 2005. *Hidden in the Mirror: The Mysterious Allure of Extra Dimensions, from Plato to String Theory and Beyond*. New York: Viking.
39. An “ekpyrotic” mechanism for generating universes postulates immeasurable three-dimensional “branes” (within one of which our universe exists) moving through higher-dimensional space such that when one brane in some way collides with another, a contracting, empty universe is energized to expand and form matter in a hot Big Bang. Khoury, Justin, Burt A. Ovrut, Paul J. Steinhardt and Neil Turok. 2002. “Density Perturbations in the Ekpyrotic Scenario.” *Phys. Rev. D* 66 046005. Ostriker, Jeremiah P. and Paul Steinhardt, “The

- Quintessential Universe.” *Scientific American*, January 2001, pp. 46-53.
40. Everett, Hugh. 1957. “Relative State’ Formulation of Quantum Mechanics.” *Reviews of Modern Physics* 29, No.3, 1957, pp. 454- 462. Reprinted in DeWitt, B.S. and N. Graham, eds. 1973. *The Many-Worlds Interpretation of Quantum Mechanics*. Princeton NJ: Princeton University Press, pp. 141-149. Wheeler, John Archibald. 1998. *Geons, Black Holes & Quantum Foam*. New York: W.W. Norton, pp. 268-270. Deustch, David. 1997. *The Fabric of Reality*. London: Penguin Books.
41. Gettier, Amanda. 2006. “Exploring Stephen Hawking’s Flexiverse.” *New Scientist*, April 2006.
42. Tegmark, Max. 2003. “Parallel Universes.” *Scientific American*, May 2003, pp. 41-51.
43. Lewis, David. 1986. *On the Plurality of Worlds*. Oxford, UK: Blackwell Publishing, p.2. Lewis writes, “I advocate a thesis of plurality of worlds, or *modal realism*, which holds that our world is but one world among many. There are countless other worlds...so many other worlds, in fact, that absolutely every way that a world could possibly be is a way that some world *is*.”
44. Nozick. 1981. Nozick seeks to “dissolve the inegalitarian class distinction between nothing and something, treating them on a par...., not treating nonexistent or nonobtaining as more natural or privileged...” One way to do this, he proposes, “is to say that all possibilities are realized.” He thus defines the “principle of fecundity” as “All possible worlds obtain.” Nozick, 1981, p. 127-128, 131.
45. Davies, 2006, pp. 298-299.
46. Personal communication.
47. Personal communication.
48. Swinburne, Richard. 2004. *The Existence of God* (second edition). Oxford: Clarendon/Oxford University Press.
- Swinburne, Richard. 1993. *The Coherence of Theism* (revised edition). Oxford: Clarendon/Oxford University Press.
- Swinburne, Richard. 1994. *The Christian God*. Oxford: Clarendon/Oxford University Press.
- Swinburne, Richard. 1996. *Is There a God?* Oxford: Clarendon/Oxford University Press.
- In his influential book, *The Existence of God*, Swinburne builds a “cumulative case” of inductive arguments to assert (not prove) the claim that the proposition “God exists” is more probable than not. He begins with a description of what he means by God. (“In understanding God as a person, while

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being fair to the Judaic and Islamic view of God, I am oversimplifying the Christian view.”)

Swinburne states: “I take the proposition ‘God exists’ (and the equivalent proposition ‘There is a God’) to be logically equivalent to ‘there exists necessarily a person

without a body (i.e., a spirit) who necessarily is eternal, perfectly free, omnipotent, omniscient, perfectly good, and the creator of all things’. I use ‘God’ as the name of the person picked out by this description.” Swinburne then defines each of his terms. By God being a person, Swinburne means “an individual with basic powers (to act intentionally), purposes, and beliefs.” By God’s being eternal, he understands that “he always has existed

and always will exist.” By God’s being perfectly free, he understands that “no object or event or state (including past states of Himself) in any way causally influences him to do the action that he does—his own choice at the moment of action alone determines what he does.” By God’s being omnipotent, he understands that “he is able to do whatever it is logically possible (i.e., coherent to suppose) that he can do.” By God’s being omniscient, he

- understands that "he knows whatever it is logically possible that he know." By God's being perfectly good, he understands that "he always does a morally best action (when there is one), and does no morally bad action." By his being the creator of all things, he understands that "everything that exists at each moment of time (apart from himself) exists because, at that moment of time, he makes it exist, or permits it to exist." The claim that there is a God, Swinburne states, is called theism.
49. Plantinga, Alvin. 1983. "Reason and Belief in God," in Plantinga, Alvin and Nicholas Wolterstorff, eds. *Faith and Rationality: Reason and Belief in God*. Notre Dame, IN: University of Notre Dame Press. Plantinga argues famously that theistic belief does not, in general, need argument or evidence to be rational and justified; belief in God, in Plantinga's well-known terminology, is "properly basic." This means that belief in God is such that one may properly accept it without evidence, that is, without the evidential support of other beliefs. "Perhaps the theist," Plantinga asserts, "is entirely within his epistemic rights in starting from belief in God [even if he has no argument or evidence at all], taking that proposition to be one of the ones probability with respect to which determines the rational propriety of other beliefs he holds." Notwithstanding this position, Plantinga presents his own arguments for God's existence: Plantinga, Alvin. "Two Dozen (or so) Theistic Arguments." Lecture notes. [http://www.calvin.edu/academic/philosophy/virtual\\_library/articles/plantinga\\_alvin/two\\_dozen\\_or\\_so\\_theistic\\_arguments.pdf](http://www.calvin.edu/academic/philosophy/virtual_library/articles/plantinga_alvin/two_dozen_or_so_theistic_arguments.pdf).
50. Philosophical discussions of God's Nature, which much occupied medieval theologians (Scholastics), seem arcane and irrelevant today but may probe the structure and meaning of a theistic God, and as such may help advise whether such a Being really exists. Take the traditional doctrine of "Divine Simplicity" (which is anything but simple): God is utterly devoid of complexity; no distinctions can be made in God; God has no "parts." Plantinga describes the doctrine: "We cannot distinguish him from his nature, or his nature from his existence, or his existence from his other properties; he is the very same thing as his nature, existence, good-ness, wisdom, power, and the like. And this is a dark saying indeed." Plantinga, Alvin. 1980. *Does God Have a Nature?* Milwaukee: Marquette University Press.
51. In the Bible, names are often declarations of the essence of things. "Adam" means earth, soil, reddish-brownish stuff, from which, as the story goes, God made Adam—"Adam" the stuff was what Adam the man literally was. The Hebrew underlying "I am that I am"—first person singular imperfect form of the verb "To Be"—is perhaps more accurately but less euphonically translated "I-continue-to-be that which I-continue-to-be." Hence, since name is essence, and here the Name means existence, God's existence is his essence. A God of this Name can claim to be without need of further explanation, not in the sense that a further explanation cannot be known but in the sense that it cannot exist.
52. Nasr, Seyyed Hossein. 2006. *Islamic Philosophy from Its Origin to the Present: Philosophy in the Land of Prophecy*. Suny Series in Islam. Albany, NY: State University of New York Press. Nasr, Seyyed Hossein, Randall E. Auxier and Luican W. Stone, eds. 2000. *The Philosophy of Seyyed Hossein Nasr*. Library of Living Philosophers Series. Chicago and La Salle, IL: Open Court Publishing Company.
53. Ellis, George F. R. 2002. "Natures of Existence (Temporal and Eternal)." In Ellis, George F. R., ed., *The Far-Future Universe: Eschatology from a Cosmic Perspective*. Philadelphia, PA: Templeton Foundation Press.
54. Russell, Robert John. 2002. "Eschatology and Physical Cosmology—A Preliminary Reflection." In Ellis. 2002. Russell, Robert John, Nancey Murphy and Arthur Peacocke, eds. 1997. *Chaos and Complexity: Scientific Perspectives on Divine Action*. Vatican City State: Vatican Observatory Publications.
55. Craig, William Lane. 1991. "The Existence of God and the Beginning of the Universe." *Truth: A Journal of Modern Thought* 3: 85-96. Copan, Paul and William Lane Craig. 2004. *Creation out of Nothing: A Biblical, Philosophical and Scientific Exploration*. Grand Rapids, MI: Baker Academic. Craig, William Lane and Quentin Smith. 1993. *Theism, Atheism, and Big Bang Cosmology*. Oxford: Clarendon Press.
56. To John Polkinghorne, a mathematical physicist turned Anglican priest, the Big Bang is "scientifically very interesting but theologically neutral." He asserts that Christian doctrine, which he says never had a stake in the Big Bang vs. Steady State debate, has often erroneously been supposed to be "principally concerned with initiation, with the primary instant." Rather, he says, its concern is "not just with what God did, but with what God is doing; its subject is ontological origin, not temporal beginning." Polkinghorne, John. 1995. *Serious Talk: Science and Religion in Dialogue*. Valley Forge, PA: Trinity Press International, p. 64.
57. Theists debate among themselves whether the Judeo-Christian God is theologically compatible with a multiverse. While many theists denounce multiple universes as a naturalistic substitute for God—they argue that accepting a God is far simpler than postulating a multiverse—some theists now break tradition by claiming that a multiverse reveals an even grander grandeur of the Creator. Collins, Robin. 2007. "A Theistic Perspective on the Multiverse Hypothesis." In Carr, 2007. Collins, Robin. 2005. "Design and the Designer: New Concepts, New Challenges." In Harper, 2005.
58. Ward, Keith. 2006. *Pascal's Fire: Scientific Faith and Religious Understanding*. Oxford: Oneworld Publications. Personal communication. Ward's blurring of personal / impersonal models of God, he says, is influenced by the Brahman / Isvara distinction in Indian philosophy, with resonances in Eastern Orthodox theology (the distinction between *ousia* and *economia*).
59. "Deism," *Dictionary of the History of Ideas*, <http://etext.lib.virginia.edu/cgi-local/DHI/dhi.cgi?id=dv1-77>. Deist website: <http://www.deism.com/>.
60. Levine, Michael, "Pantheism", *The Stanford Encyclopedia of Philosophy (Spring 2006 Edition)*, Edward N. Zalta (ed.), <http://plato.stanford.edu/archives/spr2006/entries/pantheism/>. H. P. Owen proposes a more formal definition: "Pantheism' ... signifies the belief that every existing entity is only one Being; and that all other forms of reality are either modes (or appearances) of it or identical with it." Owen, H. P. 1971. *Concepts of Deity*. London: Macmillan. Pantheism is distinguished from Deism in that, while both sport nontheistic, impersonal Gods, the former allows no separation between God and the world while the latter revels in it. Pantheism's many variations take contrasting positions on metaphysical issues: its fundamental substance can be real or unreal, changing or changeless, etc.
61. *Panentheism*, a word that is a manufactured cognate of pantheism, is the doctrine that the universe is in God but God is more than the universe—i.e., it combines the robust immanence of pantheism (God is truly "in" the world) with the ultimate transcendence of theism (God exceeds the world in His ontological "otherness"). More formally, panentheism is "The belief that the Being of God includes and penetrates the whole universe, so that every part of it exists in Him, but (against pantheism) that His Being is more than, and is not exhausted by, the universe." Cross, F. L. and E. A. Livingstone, eds. 1985. *Oxford Dictionary of the Christian Church*. 2nd ed. Oxford: Oxford University Press, p. 1027. Panentheism, a recent formulation, is the guiding philosophy of Charles Hartshorne, process theologians, and some who seek harmony between science and religion. Clayton, Philip and Arthur Peacocke, eds. 2004. *In Whom We Live and Move and Have Our Being: Panentheistic Reflections on God's Presence in a Scientific World*, Grand Rapids, MI: Eerdmans. *Acosmic pantheism* considers the world merely an appearance and fundamentally unreal (it is more characteristic of some Hindu and Buddhist traditions). *Panpsychism*, the belief that every entity in the universe is to some extent sentient, amalgamates Pantheism (3.4) with Consciousness as Cause (3.6).
62. MacIntyre, Alasdair. 1967. "Pantheism." In *Encyclopedia of Philosophy*. Edwards, Paul, ed. New York: Macmillan and Free Press. John Leslie derives pantheism from his thesis that "ethical requiredness" (see endnote 73) is the ultimate reality generator. Leslie, John. 2001. *Infinite Minds: A Philosophical Cosmology*. Oxford: Oxford University Press, pp. 39-41, 126-130, 215-216.
63. A wide range of conflating examples include Spiritualism, Spiritism, Animism, Occultism, New

- Age religions of all kinds, Edgar Cayce and those like him, Theosophy and its sort, forms of Gnosticism—the list is as tedious as it is end less.
64. According to Amit Goswami, a quantum physicist inspired by Hindu philosophy, “everything starts with consciousness. That is, consciousness is the ground of all being” which imposes “downward causation” on everything else. Goswami, Amit. 1995. *The Self-Aware Universe: How Consciousness Creates the Material World*. New York: Tarcher.
  65. There are copious, fanciful schemes that attempt to make consciousness fundamental; many disparate philosophies and world systems take “cosmic mind” as the source of all reality (e.g., <http://primordality.com/>).
  66. To the Dalai Lama, consciousness (in its subtle form), which has no beginning, explains the world. Although he rejects any commencement of creation (“Creation is therefore not possible”), he asserts that the “creator of the world” in Buddhism is “the mind” and “collective karmic impressions, accumulated individually, are at the origin of the creation of a world.” Dalai Lama XIV, Marianne Dresser and Alison Anderson. 1996. *Beyond Dogma: Dialogues & Discourses*. Berkeley, CA: North Atlantic Books.
  67. Rigpa is considered to be a truth so universal, so primordial, that it goes beyond all limits, and beyond even religion itself (<http://www.rigpa.org/>).
  68. Vilenkin, 2006, p. 205.
  69. Taoism, an indigenous religion of China, is centered on “The Way,” the path to understanding of the foundations and true nature of heaven and earth. Its scriptures are the relatively short (81 chapters, 5000 Chinese characters) *Dao De Jing (Tao Te Ching)*, its essence signaled by its famous first verse: “The Tao that can be told is not the eternal Tao” (chapter 1; translation, Gia-Fu Feng & Jane English, 1972). “For though all creatures under heaven are the products of Being, Being itself is the product of Not-being” (chapter 40; translation, Arthur Waley).
  70. Wikipedia, <http://en.wikipedia.org/wiki/Brahman>. Robert Nozick, in his exploration of “Why is there Something Rather Than Nothing,” quotes the beginning of the Hindu Vedas’ Hymn of Creation, “Nonbeing then existed not nor being,” and then shows how Being and Nonbeing do not exhaust all possibilities—outside a certain domain, he says, a thing may be neither. Nozick thus suggests that “It is plausible that whatever every existent thing comes from, their source, falls outside the categories of existence and nonexistence.” Nozick. 1981, p. 150, 152.
  71. Wilber, Ken. 1995. *Sex, Ecology, Spirituality: The Spirit of Evolution*. Boston: Shambhala Publications.
  - Thompson, William Irwin. 1996. *Coming into Being: Artifacts and Texts in the Evolution of Consciousness*. New York: St. Martin’s Press.
  72. Penrose, Roger. 2006. “The Big Questions: What is Reality?” *New Scientist*, November 18.
  73. Leslie, John. 2001. Leslie, John. 1979. *Value and Existence*. Oxford: Blackwell. Personal communication. Leslie states, “A force of creative ethical requirement or...a principle that consists of groups of ethical requirements, ethical demands for the actual presence of this or that situation, can sometimes bring about their own fulfillment. The cosmos might exist because its existence was ethically necessary, without the aid of an omnipotent being who chose to do something about this.” Although Leslie surmises, “a divine person might well head the list of the things that the creative force would have created,” his preferred position is “a cosmos of infinitely many unified realms of consciousness, each of them infinitely rich... a picture of infinitely many minds each one worth calling ‘divine’ and each one ‘expected to include knowledge of absolutely everything worth knowing.” Leslie, 2002, p. v-vi.
  74. Rescher, Nicholas. 1984. *The Riddle of Existence: An Essay in Idealistic Metaphysics*. Lanham, MD: University Press of America. Rescher’s “cosmic values” are simplicity, economy, elegance, harmony, and the like, which are maximized by what he calls “proto laws” as they bring about the existence of the spatiotemporal laws and concrete objects of the actual universe. Witherall. 2006.
  75. Parfit. January 22, 1998 and February 5, 1998. Parfit suggests that if reality were as full as it could be (“All Worlds Hypothesis”), that would not be a coincidence. “We can reasonably assume that, if this possibility obtains, that is because it is maximal, or at this extreme. On this Maximalist View, it is a fundamental truth that being possible, and part of the fullest way that reality could be, is sufficient for being actual. That is the highest law governing reality.” It does not stop there. Parfit conceptualizes the “Selector” as some special feature that actualizes a real world from among countless cosmic possibilities. “It would determine, not that reality be a certain way, but that it be determined in a certain way how reality is to be.” Then, to the extent that there are competing credible Selectors, rules would be needed to select among them, which may be followed by higher level Selectors and rules. Can it ever stop? Parfit concludes by stating that “just as the simplest cosmic possibility is that nothing ever exists, the simplest explanatory possibility is that there is no Selector. So we should not expect simplicity at both the factual and explanatory levels. If there is no Selector, we should not expect that there would also be no Universe.” It seems that we arrive back at Brute Fact, which radiates a bit more color now, and we are enlightened by the journey.
  76. In Tao, the only motion is returning.
  - Dao De Jing*, chapter 6; translation, Arthur Waley
  77. Personal communication. To give the other side equal time, theists have a plethora of explanations or justifications of evil – some of them innovative and sophisticated, the “Free Will Defense” being only the most common among a legion of others (a summary of which would exhaust an article about like this one).
  78. “Idealism” Wikipedia, <http://en.wikipedia.org/wiki/Idealism>. Goswami, 1995.
  79. Linde, Andrei. 1992. “Hard Art of the Universe Creation.” *Nucl. Phys. B* 372 421-442. Using a stochastic approach to quantum tunneling, Linde develops a method to create “the universe in a laboratory.” He concludes by observing that this would be “a very difficult job,” but if it is true, “Hopefully, he [the other-worldly physicist hacker] did not make too many mistakes...”
  80. Davies, 2006.
  81. Bostrom, Nick. 2003. “Are You Living in a Computer Simulation?” *Philosophical Quarterly*, Vol. 53, No. 211, pp. 243-255.
  - Bostrom, Nick. 2005. “Why Make a Matrix? And Why You Might Be In One.” In Irwin, William, ed. *More Matrix and Philosophy: Revolutions and Reloaded Decoded*. Chicago: IL: Open Court Publishing Company. “Life’s a Sim and Then You’re Deleted” *New Scientist*, 27 July 2002. Another kind of Simulation in Virtual Reality (4.3) is Frank Tipler’s notion of a general resurrection just before a Big Crunch at what he calls the “Omega Point,” which would be brought about by an almost infinite amount of computational power generated by a universe whose inward gravitational rush is accelerating exponentially. Tipler, Frank. 1997. *The Physics of Immortality: Modern Cosmology, God and the Resurrection of the Dead*. New York: Anchor Books.
  82. “Solipsism” Wikipedia, <http://en.wikipedia.org/wiki/Solipsism>.
  83. If the problem is turned from explaining the fine-tuning of this universe to the more profound problem of explaining the fundamental essence or existence of ultimate reality (defined physically)—Why Not Nothing?—the categories and explanations shift. The new taxonomy would ask two overarching questions: (i)

“Of What does Ultimate Reality Consist?” and (ii) “By What (If Anything) is Ultimate Reality Caused?” or “For What Reason (If Any) Does Ultimate Reality Exist?” Under the “Consist” question, we have categories of One Universe and Multiple Universes (cataloguing exhaustively every kind of possible multiple universe). Under the “Cause” or “Reason” question, we take all the explanations listed under “One Universe Models” in the text, but here label the category “Natural Explanations,” to distinguish it from the “Nonphysical Causes” and “Illusions” categories (the sub category explanations of these remaining largely the same).

84 van Inwagen, Peter. 2002. *Metaphysics*

(Second Edition). Boulder, CO: Westview Press, p. 132. See also Endnotes 2 and 75 above. Derek Parfit states: “Reality might be some way because that way is the best, or the simplest, or the least arbitrary, or because its obtaining makes reality as full and varied as it could be, or because its fundamental laws are, in some way, as elegant as they could be.” Parfit, February 5, 1998.

85. That the universe may have popped into existence through some sort of cosmic spontaneous combustion, emerging from the “nothing” of empty space (i.e., vacuum energy generated by quantum fluctuations, unstable high energy “false vacua”) or from “quantum tunneling” (Vilenkin,

2006), may be the proximal cause of why we have a universe in the first place, but of itself it cannot be the reason why the universe we have works so well for us. Universe-generating mechanisms of themselves, such as unprompted eternal chaotic inflation or uncaused nucleations in spacetime, do not address, much less solve, the fine-tuning problem. Nor can vacuum energy or quantum tunneling or anything of the like be the ultimate cause of the universe, because, however hackneyed, the still-standing, still-unanswered question remains “from where did those laws come?”